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Physicians & Scientists for Global Responsibility

When powerful agencies hijack democratic systems.

PART II: THE CASE OF SCIENCE SYSTEM REFORM

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Image: The New Coalition, Punch, 1855.

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SUMMARY

This 2-part 2025 review by the Physicians and Scientists for Global Responsibility New Zealand Charitable Trust (PSGR), documents policy process and official conduct regarding gene technology reform (part I)[1] and science system reform (part II). The papers consider information provided in official documents that suggest that officials may be setting aside or undermining important issues and conventions that are essential to sustaining a robust, healthy, accountable democratic nation-state. These reforms were undertaken by Ministry of Business, Innovation and Employment (MBIE) officials, working in tandem with the Minister in charge, the Hon Judith Collins, King's Counsel and Attorney-General, from November 2023 to February 2025.

PSGR calls for two separate public enquiries to evaluate the actions of that Minister and officials in driving outcomes which appear to severely restrict the capacity of the new gene technology regulator, and the New Zealand science system, to conduct activities that would serve the public purpose and support constitutional and democratic government.

The papers arrive at two recommendations:

Part I: Gene Technology Reform Recommendation: That the Gene Technology Bill be placed on hold. That the Ombudsman convene an Inquiry into the conduct of the Ministry of Business, Innovation, and Employment (MBIE) and the Hon. Judith Collins, Kings Counsel and Attorney-General, in regard to their work on gene technology regulatory reform over the period 2023-2025. That the Ombudsman considers evidence that this body of persons acted improperly in their duties, directly undermining public law conventions, in order to expedite policies and laws in favour of the deregulation of gene editing technology. That the terms of reference pay particular attention to the benefits of observing the principle of open justice, and require that the inquiry follows independent, impartial and fair processes.[1]

Part II: Science System Reform Recommendations: That a transparent and public inquiry is undertaken to evaluate the past, present and future role of New Zealand's RSI&T system. This inquiry must be independent, impartial and fair. It may be in the form of a public inquiry or a Royal Commission (Inquiries Act 2013, s.6). The terms of reference/ list of recommendations can be found on pages 53-56.

This inquiry is necessary because there is evidence that the current science system is inadequately resourced to meet the objectives of society at large; and that the science system reforms that are currently underway (2023-2024) have excluded any evaluation or discussion on this issue. These current reforms will further direct the RSI&T system away from optimising science and research designed to identify and address domestic problems and challenges. PSGR recommend that the RSI&T system Inquiry problem definition address:

> *'the capacity of the publicly funded RSI&T system to demonstrably contribute to public-good knowledge, and in doing so serve the public purpose and support the wellbeing of New Zealand, her people, resources and environment'.*

[1] PSGR (2025) When powerful agencies hijack democratic systems. Part I: The case of gene technology regulatory reform. See recommendations pages 50-51. Bruning, J.R., Dommisse, E.. Physicians & Scientists for Global Responsibility New Zealand. ISBN 978-1-0670678-0-9

This Part II paper, *The Case of Science System Reform,* draws attention to policy documents and decision-making processes in the 2023-2024 science system reform. The aims and outcomes of the current science system reform further tighten policy, and therefore science funding, to innovation-specific outcomes, leaving the RSI&T system inadequately resourced to meet the objectives of society at large. The public-good role remains inferred, but essentially drafted out of policy.

The paper highlights the historic context and that the current shifts follow three decades of systematically reducing the capacity of New Zealand's publicly funded RSI&T system to produce knowledge which might update information, inform policy and underpin the stewardship of resources

This paper considers the conflicts of interest when the agency for economic growth reforms policy and law to further demand and incentivise commercialisation of the science and technology it funds, for economic growth purposes. It reveals how policy problematisation centred around reform to incentivise innovation (a proxy for patent production) and commercialisation across the science and research system for economic growth purposes. In the process the role of public good research in fulfilling the objectives of society at large remains unaddressed, and, arguably, undermined.

MBIE and Judith Collins appear to believe that the science reforms will drive economic growth and that by more tightly binding funding for science, research and technology to commercial outcomes, national benefits and public good outcomes will arise or 'trickle down'.

When economic growth drives policy, the capacity of science and research systems to both inform and steward New Zealand is diverted away from public interest research. Innovation systems focus on commercial outcomes and intellectual property rights (IP). 'Innovation' requirements in science policy ensures that funding committees must favour research, science and technology proposals that reflect economic and commercial prospects. In competitive funding environments, the funding committee will downgrade science proposals that cannot promise an innovation and commercialisation pathway. Scientists structure funding proposals accordingly.

Innovation and commercialisation policies and incentives in highly competitive funding environments, drastically curtail the capacity of researchers and scientists to undertaken long-term work to evaluate system-level vulnerabilities and failings across human health, infrastructure and resources.

No study of the past 20 years of innovation-related policies, and the financial return on investment, was cited. There is no evidence from domestic sources, that the innovation-based research priorities have promoted economic growth. The new science reforms aim to advance innovation-related foreign investment, directing the RSI&T system to focus on the goals of foreign investors.

Government papers reveal an unwillingness to acknowledge that researchers and scientists in the prevailing research, science and technology system have struggled to deal with current science policies and innovation incentives. They have found that these policies have promoted cultures of secrecy, and undermined collaboration and the development of skills. As this paper discusses, the recent science system reforms ignored a 2022 consultation that outlined many of the problems science system insiders have faced over the past 20 years.

Four case studies reveal the contradictions and problems that arise when innovation is the priority. The first case study shows that when innovation-related emerging technologies have been funded, MBIE does not require a return on income analysis to justify the economic growth benefit of research outcomes.

Two case studies explore the importance of an RSI&T system in being able to critically analyse the risks of technologies. Technologies frequently come with their own set of risks. When there is an absence of long-term funding for technologies, policymakers and society can fail to understand risk, with the consequence that problems and harms from those technologies can be ignored and sidelined. A final

case study shows how long-term research to shed light on, and update basic information about biology and health falls outside of funding scopes, and how this can lead to missed technological opportunities.

Complex and multidisciplinary research that can monitor and evaluate explore technologies and technological outcomes, monitor human and environmental biology, or challenging existing scientific understandings, and that may contradict the status quo, is political. However, it is just as political to exclude and underfund research pathways that enable scientists to question the status quo and query taken for granted maxims.

Research, science innovation and technology (RSI&T) systems struggle when policy and funding is controlled by narrow groups of experts. The paper reveals how a select group of scientists whose expertise predominantly revolved around innovation technologies, were quickly brought in to make recommendations for science system reform that would prioritise enhancing innovation. Most are closely tied to industries that develop and commercialise technologies.

Part I, *The Case of Gene Technology Reform,* explored gene technology reform and the conflicts of interest when the government agency that controls all science funding, that is responsible for economic growth, then becomes the agency with the power to deregulate the biotechnologies it is funding (through that science system) for the purpose of economic growth. Part I shows how the problem definition centred around deregulating gene technology for economic growth purposes, rather than safely stewarding these technologies. MBIE, which controls science funding, would now control the capacity of the regulator to identify risks.

If the Gene Technology Bill was passed into law, MBIE would administer the Act and control the production of all secondary legislation. This is where the rules and guidelines would be formalised.

Part II reveals that national benefit and public-good is implied yet the current policy will render it almost impossible to identify threats, challenges and opportunities. This is because curiousity-driven, or basic research will be out of scope for research that explores, for example, productivity from better management of agricultural systems, pollution, environmental drivers of chronic and infectious disease. It's unlikely that this research would get the long-term multimillion dollar budgets, because there is no identified innovation or patent that can be pre-identified at the start of the research.

These two papers *When powerful agencies hijack democratic systems* reveal how MBIE controls the roll of the dice, firstly by directing funding to prioritise research to commercialise technologies that can present risks to human and environmental health, secondly, by designing funding policies that inhibit research that would explore the risks of the technology that MBIE funds, and thirdly, by controlling the design of the regulation that would lower barriers to the very technologies that it has allocated funding to develop, which increase likelihood of commercial release, we might say that the game is rigged.

PSGR ask the reader to consider whether the science system reforms may make it even more difficult for scientists and researchers to access meaningful funding for national benefit and public good research, than in the existing system it is replacing. That readers' question whether scientists and researchers will be even less able to evaluate risks from current and emerging technologies, including biotechnologies.

PSGR ask, will our systems which produce knowledge, be even less able to provide information and intelligence to guide decision-making and support policy-makers, and enhance democratic life?

When powerful agencies hijack democratic systems, published as these two papers, arrives at the conclusion that current governance processes and conventions have been corrupted and eroded to such a substantial degree that the national interest may not be protected, and well-being of New Zealand, including the productive capacity of human and environmental health, cannot be assured. This is why PSGR are recommending that two separate public inquiries are undertaken.

CONTENTS

[1] THE GOAL OF PUBLICLY FUNDED SCIENCE

What is the purpose of publicly funded research in the scientific and technological fields? To advance knowledge – to discover what is true. There are three goals of science. The first and most basic goal is to describe: to make careful observations, to understand the nature of reality. The second goal is to predict: in understanding relationships between behaviours and events, we may use that information to predict future events. The third goal is to explain: How did a behaviour or outcome arise?

Basic, 'pure' or 'fundamental scientific research is undertaken to understand cause-and-effect relationships, such as the behaviour of a system. Applied research generally addresses a specific issue, or practical problem, such as testing a theory to see if that can be practically applied to a real-world problem.

Healthy, functioning democracies require resilient, trustworthy informational systems – the intelligence - to support public knowledge, to guide Parliament, government administration and the judiciary. To sustain public trust, evidence-based policy formulation should be based on transparent, accountable, and unbiased information. This is why the scientific process and procedural fairness is important. Public trust can only be sustained if the reasoning and information that underpins policy is fair, i.e. transparent, accountable and trustworthy, and open to challenge.

Parliament, the legislative, and the government agencies are in place to achieve several, overlapping purposes. These purposes revolve around protecting natural rights and civil liberties, thereby safeguarding and stewarding the health of humans and the environment into the future. Human life is a distinctly political endeavour. Throughout the ages, humanity has struggled to prevent abuses of power and maintain control over local resources. Alliances and power shifts can erode sovereignty and health. Knowledge, skills, education can be undermined. This is why democratic checks and balances are in place, to guard against tyranny and abuse of power, limit the power of the head of state, and protect against interference and exploitation by foreign interests and agendas.

Up-to-date, evidence-based regulation maximises the functioning of human and environmental systems. Agencies are tasked with the provision of common resources (such as infrastructure, defence, education and welfare) and the regulation of natural resources (such as fresh water, soil and mineral deposits) and technologies (digital and informational, as well as industrial, agricultural and urban emissions). Healthy commerce and trade underpin societal wellbeing. However, the capacity for wellbeing to be sustained can be derailed when alliances and power shifts result in the abuse of power and misallocation of resources in ways that do not fulfill the public purpose, when new information is dismissed, when monitoring fails, and when regulators and scientists lack the autonomy to benchmark current practices and guidelines against the evidence in the peer reviewed literature.

The democratic paradox is that we must allocate scientific and research resources to not only solve our problems but to *understand* them over time. Knowledge, understanding, and the intelligence to identify harm and risk, accrues when resources are allocated for that purpose. This can lead to beneficial and negative feedback loops. Negative feedback loops can include a failure to know (ignorance), prioritising the wrong research (away from solving public problems), and failing to collaborate and cooperate (because of incentives, secrecy provisions and lack of funding).

Information and knowledge are key to safeguarding the health of humans and the environment now, and in the future. If a democratic nation-state is to function effectively, timely, relevant information must be able to be produced, even if it contradicts the status quo. Policy-relevant scientific information can often become 'locked-in' because it may accord with government objectives, yet be contradicted by information in the scientific literature. Harms can occur at scale, but reports of harm can and will be

rejected by officials if there is no published scientific evidence (because the government did not provide funding pathways for scientists).

While many people associate the suppression of academic freedom and censorship of academic research and findings with authoritarian states, democracies limit and prohibit research through tightly structured policy guidelines and funding contracts. The public, the judiciary and members of Parliament (MPs) may continue to view the scientist and researcher as critic and conscience of society.

Information that contradicts the status quo must be able to be freely produced, because scientific information is often used to design and justify new policies and laws (including regulations and guidelines). But the judiciary and MPs are likely to be unaware that MBIE's policy guidelines broadly constrain the capacity of scientists and researchers to engage in publicly-valued work because funding proposals will fail when they fall outside the 'innovative' or 'excellent' parameters.

However, public-good research will frequently fall outside of the 'innovation' scope and involve multidisciplinary research that is novel and creative. This work can be unpopular or controversial, draw attention to outdated policy, abuses of power, and highlight antiquated and/or harmful practices and activities, that public and private actors may prefer were not publicly disclosed.

Sometimes agencies will be reluctant to disclose their activities, and their activities may be politically influenced, or lack an evidence base, resulting in problems arising that are identified above. Institutional lock-ins which create barriers to new information can erode the function and the efficiency of agencies. Infrastructure and knowledge systems can become path dependent, calcify or become incentivised by commercial or foreign influences that also steer the agency away from serving the public purpose.

Large organisations act as consultants, contractors, and advisers to government agencies. Industries network to influence policy. These groups can, and do, shift policy to purposes that fulfill their own goals. Governments and media can control information and use policy to nudge public behaviour to achieve policy objectives, and some methods can undermine free will.[2] [3] [4]This is why constant vigilance and freedom of enquiry is key. One of the ways the claims and actions of powerful institutions and industries can be verified or challenged is through scientific enquiry. This is particularly important when the resources are out of sight of the public eye, or a high degree of scientific expertise is needed to understand a problem.

Contracts with research partners can directly limit the freedom and autonomy of scientists. Funding contracts can contain suppression clauses which can prevent publication of research findings when these run counter to the funders' objectives.[5] [6] [7]

Scientists must be freely able to research health risks from technologies and their emissions, to ensure that regulations are not lax or out-dated. Yet ss the above discussion illustrates, institutions funded for a public purpose cannot be apolitical or 'neutral', and indeed, present laws and regulations demand this.

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[2] Cabinet Office (2010). Mindspace: Influencing behaviour through public policy. Discussion document – not a statement of government policy. https://www.bi.team/wp-content/uploads/2015/07/MINDSPACE.pdf
[3] Cohen, S. (2013). Nudging and Informed Consent. *The American Journal of Bioethics*, *13*(6), 3–11. https://doi.org/10.1080/15265161.2013.781704
[4] Sunstein, Cass R., Nudging and Choice Architecture: Ethical Considerations (January 17, 2015). Yale Journal on Regulation. http://www.law.harvard.edu/programs/olin_center/papers/pdf/Sunstein_809.pdf
[5] Smyth, J. (2017). The Toxic University. *Palgrave MacMillan*.
[6] Buckley RC (2022) Stakeholder controls and conflicts in research funding and publication. PLoS ONE 17(3): e0264865. https://doi.org/10.1371/journal.pone.0264865
[7] Edgington U (August 5, 2023). The Corporate Playbook: Strategies and Impact on Academia. *Propaganda In Focus*. https://propagandainfocus.com/how-universities-control-the-narrative/

Furthermore, financing scientists and researchers to explicitly develop technologies, while failing to fund research with the capacity to critique new technologies, is of itself, a political decision.

Resilient, healthy democracies require governance systems with the capabilities and intelligence to produce, analyse and communicate challenging, contradictory and politically inconvenient information. If information and intelligence used for policy and law is to benefit society, it must be impartial and unbiased. Where there are financial or political conflicts of interest, there must be areas of resourced expertise that can act as a counter to those interests, so as to make decisions in the interest of society.[8]

From Public Good to Economic Growth

In the past three decades, government policies have systematically diverted the science and research system away from principles that prioritise the public purpose.

From the 1990's to present day, the focus of government science policy in New Zealand shifted from prioritising public-good knowledge and education to require outcomes that prioritised innovation, excellence and impact. Innovation was identified as a driver of economic growth, with numbers of registered patents viewed as a proxy for economic growth. After the year 2000, innovation, and academia pivoted as a service-provider and partner of industry, producing a "triple helix" of university-industry-government relations.[9] [10]

Prior to the year 2000, the New Zealand science and research system had focused on knowledge and education. A single autonomous institution, the Department of Scientific and Industrial Research (DSIR) directed science research in New Zealand until 1992, when the DSIR was dissolved.

DSIR staff shifted into ten Crown Research Institutes (CRIs), which had been created the year prior.

The CRIs were established on a profit and loss model, yet CRIs were still expected to undertake stewardship and policy-related work despite operating under a predominantly corporate funding model. This bifurcation resulted in harried institutes that would constantly struggle for money, then follow the money, while also attempting to do public-good work. As the Science System Advisory Group (SSAG) noted *'the commercial incentive drives a lot of undesirable consequences'*.

The Foundation for Research, Science and Technology (FRST) was established in 1990, with the stated mission of 'investing for results from research, science and technology to deliver greater prosperity, security and opportunities to all New Zealanders'.[11] The FRST was absorbed into the Ministry of Research, Science and Technology (MoRST).

In 2010 the Research, Science, and Technology Act was passed, repealing the FRST, and granting permission to establish boards to make independent funding decisions in respect of the allocation of specified expenses appropriated for the purposes of research, science, or technology. The Act was administered by the Ministry of Science and Innovation.

Today, MBIE administers this Act. When MBIE secured control, the government pivoted to enforce the economic growth agenda, where funding for science and research was an 'investment' which was directed to produce innovations that would be commercialised, and turned into assets.

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[8] PSGR (2023) When does science become propaganda? What does this suggest for democracy? Bruning, J.R., Physicians & Scientists for Global Responsibility New Zealand. ISBN 978-0-473-68632-1

[9] Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: from National Systems and 'Mode 2'' to a Triple Helix of university–industry–government relations. Research Policy, 109-123.

[10] Leitch, S., & Davenport, S. (2005). The politics of discourse: Marketization of the New Zealand science and innovation system. Human Relations, 891-912.

[11] Wikipedia ref: "About Us". Foundation for Research & Technology. Archived from the original on 11 March 2008.

As the title 'Our Investment System' of the diagram below suggests, officials overwhelmingly view the science system is an investment system. A system for maximising commercial returns, rather than a system for expanding knowledge for public-good outcomes.

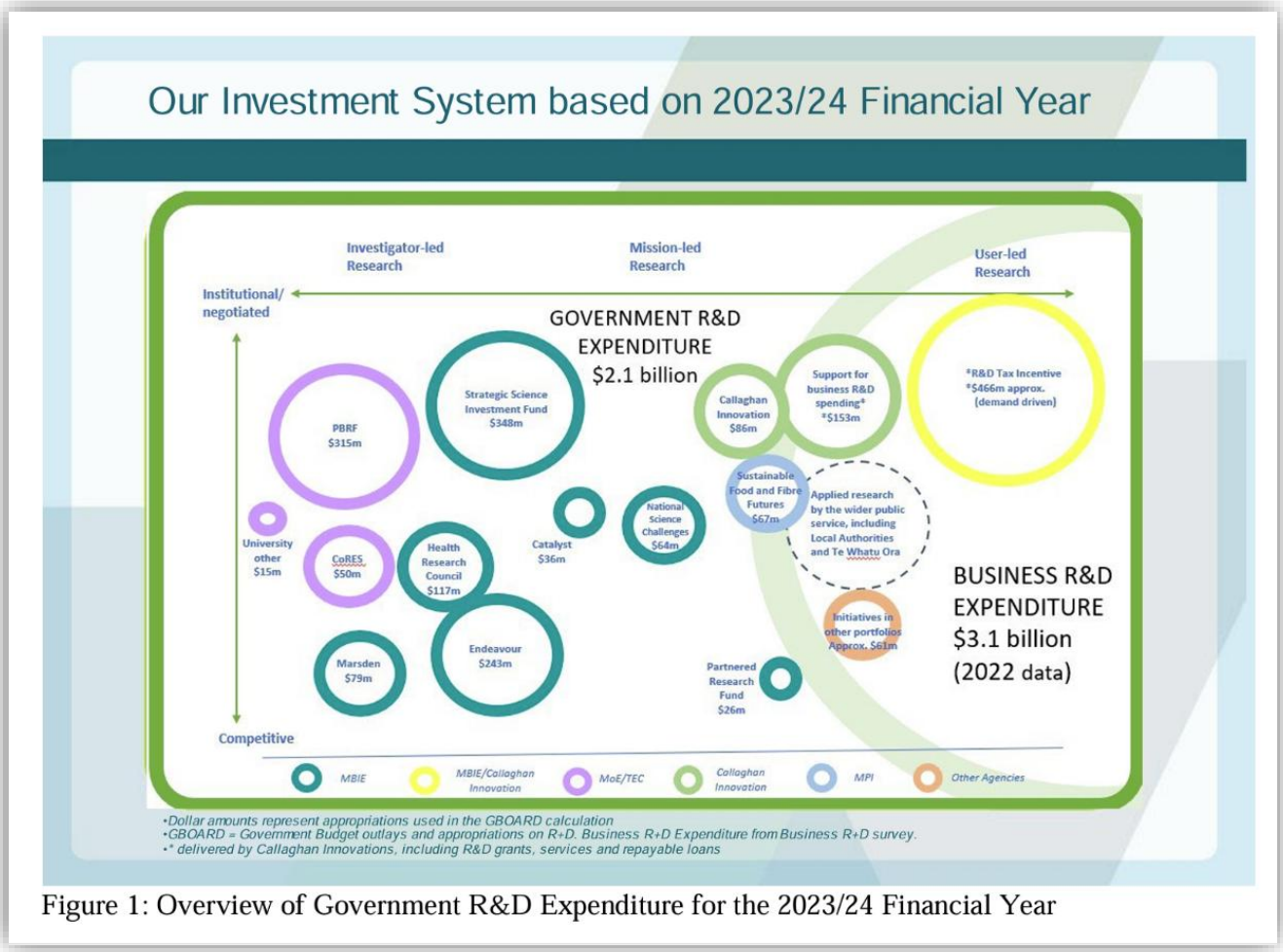


Figure 1: Overview of Government R&D Expenditure for the 2023/24 Financial Year

***Fig.2: Our Investment System. In Confidence* paper. March 23, 2024. Judith Collins and Penny Simmonds. Page 3.** [11zx5u179y 2024-04-23 09:17:35]

Within a couple of years, MBIE's 2015-2025 National Statement of Science Investment would direct funding panels to prioritise proposals that would promise 'innovation', and 'excellence', the system that continues to the present day.[12]

Innovation can be misconstrued as purely novelty or invention. In 2005 the Organisation for Economic Cooperation and Development (OECD) defined innovation as:

> *'the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations'.*[13]

[12] (2015) National Statement of Science Investment 2015-2025. Ministry of Business, Innovation and Employment. https://www.mbie.govt.nz/science-and-technology/science-and-innovation/funding-information-and-opportunities/national-statement-of-science-investment

[13] OECD. (2005). The Measurement of Scientific and Technological Activities, Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd edition,. A joint publication of OECD and Eurostat.

With this perspective, assessments of science and research system performance focuses on research and development (R&D), and gross domestic expenditure on research and development (GERD) expenditure.

MBIE's 2015-2025 policy included the requirement that science could be prioritised for funding if it was 'excellent'. The 'vision for 2025' involved the development of:

> *'A highly dynamic science system that enriches New Zealand, making a more visible, measurable contribution to our productivity and wellbeing through excellent science.'*

Excellence is broadly understood by the scientific community as a concept that confines work of high quality to a single disciplinary area. Excellent science tends to be non-controversial science that is commonly agreed upon by scientists in a given field of expertise. Together innovation and excellence tend to favour applied research. Innovation-centric shifts have produced far more elite scientists who work in narrow disciplinary fields, while shrinking the pool of broader-based scientists with multi-disciplinary expertise.

In 2018 MBIE further clarified that science and research must involve an innovation that could not simply lead to new knowledge:

> *'for a new idea, model, method or prototype to be considered an innovation, it needs to be implemented'.*[14]

After 2018, funding grants would be primarily directed to proposals where an outcome would be an innovation predominantly involving the development of intellectual property, such as patents; and the 'implementation' obligations showed scientists would be even more likely to be granted research money if their work not only resulted in some sort of IP, but in the release of a product.

The law does not specify that economic growth is the exclusive driver of science research. The 2010 Act had required that research, science and technology funding be allocated for the benefit of New Zealand. Economic growth was not specified as the key driver of funding allocation. The legislation simply specified economic growth as one of many likely outcomes. Other legislation which gives MBIE powers includes the Public Sector Act which requires that the Government pursue the long-term public interest.[15]

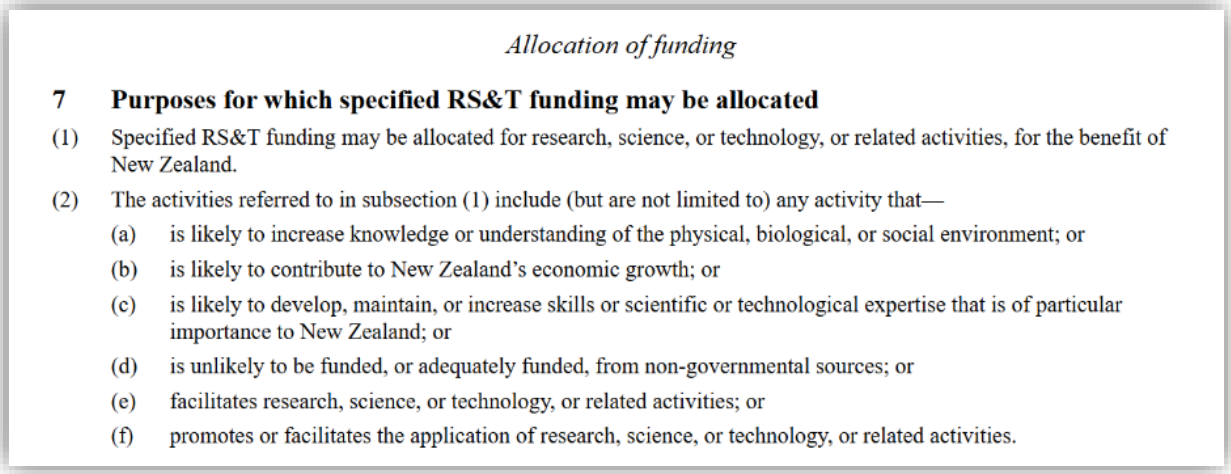
A new Ministry of Science and Innovation (MSI) was established in February 2011 via the State Sector (Ministry of Science and Innovation) Order 2010 under the State Sector Act 1988.[16] The Order in Council was proposed by Hon Dr Wayne Mapp, who was the Minister of Research, Science and Technology at that time. took over the policy and investment functions of both agencies. The Order simply inserted a Ministry of Science and Innovation into Schedule 1 of State Sector Act 1988.

MBIE was formed by merging four government agencies, the Ministry of Economic Development, the Department of Labour, the Ministry of Science and Innovation, and the Department of Building and Housing.

Cabinet Ministers quietly established MBIE , and gave MBIE power over the science and research system, not through a public Act of Parliament, but through secondary legislation. The 2012 Order in Council establishing MBIE, and dissolving this new Ministry, the MSI, was passed in July 2012. MBIE was by

[14] MBIE. (2018). Research, Science and Innovation System Performance Report. Ministry of Business Innovation and Employment. Page 97.
[15] Public Service Act 2020. [11] Purpose.
[16] Order in Council. State Sector (Ministry of Science and Innovation) Order 2010 https://legislation.govt.nz/regulation/public/2010/0247/6.0/whole.html

Cabinet through an Order in Council: the State Sector (Ministry of Business, Innovation, and Employment) Order 2012, under the State Sector Act 1988.[17]



Allocation of funding

7 Purposes for which specified RS&T funding may be allocated

(1) Specified RS&T funding may be allocated for research, science, or technology, or related activities, for the benefit of New Zealand.

(2) The activities referred to in subsection (1) include (but are not limited to) any activity that—

(a) is likely to increase knowledge or understanding of the physical, biological, or social environment; or

(b) is likely to contribute to New Zealand's economic growth; or

(c) is likely to develop, maintain, or increase skills or scientific or technological expertise that is of particular importance to New Zealand; or

(d) is unlikely to be funded, or adequately funded, from non-governmental sources; or

(e) facilitates research, science, or technology, or related activities; or

(f) promotes or facilitates the application of research, science, or technology, or related activities.

Fig.1: Research, Science, and Technology Act 2010[18]

The order was drafted by officials, and proposed by the Hon Steven Joyce, who was the Minister for Economic Development. The entire process of approving the establishment of MBIE was undertaken outside of the public eye, and away from the scientists and researchers who would be directly affected.

Globally, science systems tend to be institutionally independent or allied with the tertiary education system. Somewhat uniquely in New Zealand, the science system is controlled by the economic growth agency, MBIE.

Conventionally, the legislation that has established these agencies and government Ministries, requires that they fulfill certain purposes. Purposes help guide officials and prevent agency over-reach. There is no such purpose described in the secondary legislation that established MBIE. [19]

The Minister of Science, Innovation and Technology has a somewhat nebulous role. The Minister appears to be responsible for appointing board members, however these boards make independent funding decisions for government budgets, and do not report to that Minister. [20] Science and research agendas are not as independent as they may seem. The Science Board is an independent statutory board, and the Board selects funding based on criteria set by the Minister.[21] [22] However, it is MBIE that administers the budgetary appropriation (the Vote), while the science minister may exert relatively little power.

Government investment in the science and research system was approximately $2.15 billion in 2022. The seven Crown Research Institutes (CRIs) are expected to undertake scientific research for the benefit of New Zealand. CRIs are expected to *'operate independently and commercially under expectations that*

[17] State Sector (Ministry of Business, Innovation, and Employment) Order 2012. https://www.legislation.govt.nz/regulation/public/2012/0091/9.0/whole.html
[18] Research, Science, and Technology Act 2010. https://www.legislation.govt.nz/act/public/2010/0131/latest/whole.html#DLM3431000
[19] State Sector (Ministry of Business, Innovation, and Employment) Order 2012. https://www.legislation.govt.nz/regulation/public/2012/0091/9.0/whole.html
[20] Research, Science, and Technology Act 2010. https://www.legislation.govt.nz/act/public/2010/0131/latest/whole.html#DLM3431000
[21] MBIE. Our Science Board. https://www.mbie.govt.nz/about/who-we-are/our-external-boards/our-science-board
[22] New Zealand Gazette, notices made under the Research, Science, and Technology Act https://gazette.govt.nz/home/search?keyword=&year=&pageNumber=&noticeNumber=&dateStart=&dateEnd=&type=&act=&tags=Research,%20Science,%20and%20Technology%20Act

expenditure will match revenue'. As such, it is not surprising that CRIs focus on growing asset portfolios through the production of IP and product commercialisation. Eight universities do 95% of the research undertaken by the higher education sector, and are the primary providers of basic research in New Zealand.[23] [24]

The 2023-2025 science policy reform echoes the three decades of economic growth-centric policy. It revolves around the high-level aspiration, or public purpose: to 'deliver growth'. Officials believe that this will be done by improving the effectiveness and impact of the RSI&T system. The primary obligations for funding centre on economic growth and innovation, the secondary obligations emphasise excellence and impact, and a path to commercialisation. Economic impact is measured by

> *'the proportion of inventions which are patented or licensed'.*[25]

The aspiration

The Government is committed to building a thriving science, innovation and technology system (the system) that delivers growth for New Zealand's economy, environment and society by:

- Driving innovation and accelerate the shift towards a knowledge-based, diversified economy.
- Developing innovative solutions to emerging challenges such as climate change, biodiversity loss, and sociological change.
- Adapting to, and making good of opportunities provided by, a rapidly evolving global research landscape.
- Enhancing Government's effectiveness through the use scientific data, knowledge, and new technologies.

Fig.8: Science System Advisory Group Aspiration. Page 1.

The SSAGs terms of reference *aspiration* had been drafted by cabinet[26].

Innovation is the key factor which would *'accelerate the shift towards a knowledge-based diversified economy.'* This claim is contradicted the lived experience of many submitters to the Te Ara Paerangi consultation. Many submitters experienced years of an innovation-associated funding paradigm across science and health research, as a driver of secrecy and compartmentalisation and a detriment to collaboration and creativity.

The *aspiration* states that emerging challenges like climate change and biodiversity loss require solutions to be developed. [27] Solutions presume risks that are known that are technically solvable. Innovation-funding paths do not fund monitoring and evaluation to identify the drivers of risks. Biodiversity research

[23] SSAG (April 5, 2024). Background to New Zealand's Science, Innovation and Technology system SSAG-MBIE-001. https://www.mbie.govt.nz/dmsdocument/30353-background-to-new-zealands-science-innovation-and-technology-system-pdf
[24] Crown Research Institute Financial Performance. https://www.mbie.govt.nz/dmsdocument/30356-crown-research-institute-metrics-and-key-facts-pdf
[25] MBIE. (2018). Research, Science and Innovation System Performance Report. Ministry of Business Innovation and Employment. Page 97.
[26] MBIE (May 20, 2024) Proactive Release Science System and university Advisory Groups. March 23, 2024. Judith Collins and Penny Simmonds. 11zx5u179y 2024-04-23 09:17:35
[27] MBIE (February,7 2024) Terms of Reference. Science System Advisory Group https://www.mbie.govt.nz/dmsdocument/28134-terms-of-reference-science-skills-advisory-group

is for 'innovative solutions'. Significant long-term funding to monitor industrial and wastewater pollution and identify how these contaminants disrupt biological pathways would be outside of the scope of this 'aspiration'. Biodiversity research and scientific study to understand harm, is not an 'innovative solution'.

An *aspiration* includes 'Sociological change'. This perhaps infers an impact on citizens from emerging technologies but is not otherwise defined. Funding to assess harm from these emerging technologies has been out-of-scope in current RSI&T budgets and will likely continue to be out-of-scope following the science system reforms.

The SSAG's paper provides no clues as to how these gaps will be addressed. The SSAGs white paper refers to public-good research that happens via the Marsden Fund, Endeavour Fund, Health Research Council and the Centres of Research Excellence. Yet these routes predominantly require an innovation pathway to be built into the application, and funding is short term. The SSAG paper points to the role of stewardship, policy-related and knowledge-generating research, but does not point out that research into pollution and harm from manmade technologies is frequently political and must be safeguarded. Such research requires a separate institution, with long-term funding as this work is incompatible with research and development bent on developing and releasing potentially harmful technologies.

Invest NZ and New Zealand Trade and Enterprise would revolve around financial investment opportunities that would, among other things, privilege foreign interests and divert research resources away from the New Zealand public.

Foreign direct investment in science, research and technology in the form of private-public partnerships is by convention cloaked in secrecy relating to funding arrangements and financial outcomes for the foreign investor. The outcome or national benefit for the New Zealand people does not tend to be assessed.

These deliberate policy shifts over the past three decades have severely impacted the autonomy of scientists and researchers, restricting their capacity to identify public-good projects.

An MBIE authored document on public-good research in CRIs demonstrated that MBIE views public good research within a market-facing framework based on the functioning of markets and societies. [28] It's not surprising that health-based research, or research to monitor freshwater or soil quality for industrial pollutants would be excluded from the examples cited.

Public-good research is increasingly structured within pre-approved 'missions'. The mission-led frameworks do not include research that contradicts government policy. As incentives dictate outcomes, in tightly contested funding environments, scientists found that funding committees would shift worthy funding grant applications down the 'funding ladder' if they were out of scope and did not promise an innovation outcome.[29]

The latest 'refocusing' reforms further reinforce commercialisation trajectories, and a shift to permit publicly funded scientists to own the patents, the intellectual property (IP), rather than the IP being publicly owned. There was no evaluation of published data to evaluate a policy granting developers

[28] MBIE (May 22, 2024). Public good activities in Crown Research Institutes. 2324-2733 https://www.mbie.govt.nz/dmsdocument/30601-public-good-activities-in-crown-research-institutes
[29] Bruning, J. 2022. University of Auckland Master of Arts (sociology). Thesis. Innovation and Ignorance: How Innovation Funding Cultures Disincentivise Endocrine Disruption Research. https://researchspace.auckland.ac.nz/handle/2292/57929

ownership over IP would be of national benefit. Officials simply compared the approach of different jurisdictions.[30]

> *'When one has been threatened with a great injustice, one accepts a smaller as a favour.' JW Carlyle [1855]*

Ministry policy papers are silent on any methods that would enable funding systems to be directed towards the national interest and serve the public purpose. There is no language or policy pathway that enables the research system to troubleshoot and identify risks, threats and problems, including outdated understandings, that contribute to a less resilient New Zealand.

> *'Integrity without knowledge is weak and useless, and knowledge without integrity is dangerous and dreadful'. Samuel Johnson [1759]*

A policy prioritising innovation related science may sound innocuous but has real effects on what we know. For example, innovation and commercialisation policies will prioritise biomedical research. As funding is limited, nutrition and diet-based research will not be prioritised. Therapeutic medicines to treat disease may be invented. However, funding to identify the nutritional and environmental drivers of New Zealand's pandemic of metabolic syndrome, a cluster of conditions which include excess abdominal weight, high triglyceride levels, high blood pressure and high blood sugar, that increase risk for cancer, heart disease, stroke and type 2 diabetes will be deprioritised.[31] It is not obvious what IP, what patents and commercial outcomes will arise from this work.

The extent of scientific publications in research fields is a function of the extent of financial resourcing for research. In New Zealand biomedical publications outstrip health sciences publications, revealing the funding commitment to this field.[32] This reflects MBIEs funding priorities.

[2] REFORMS BASED ON COPYING WHAT OTHER COUNTRIES ARE DOING

The 2023-2025 reforms led by the Hon Judith Collins, replicate the process of gene technology reforms and reveal Collins' technical mastery over the policy process. Policy instructions were quickly put in place, a select group of experts were identified, the restructure occurs and public interest groups that might criticise or contradict the policies, fail to be consulted.

In January 2025 of Minister of Science, Innovation and Technology Judith Collins, announced the largest reset of the New Zealand research, science, innovation and technology (RSI&T) system. The 2023-2025 reform signifies another contraction, binding the RSI&T system even more tightly to '*commercialisation and delivering economic outcomes'.* The changes are envisaged to:

> *'clarify priorities, lift economic outcomes and harness advanced technology for a more prosperous future.'*[33]

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[30] SSAG (June 16, 2024). Management of Intellectual Property generated in Public Research Organisations. https://www.mbie.govt.nz/dmsdocument/30365-management-of-intellectual-property-generated-in-public-research-organisations-pdf

[31] Karlsson, O., Rocklov, J., Lehoux, A., Bergquist, J., Rutgersson, A., Blunt, M., & Birnbaum, L. (2020). The human exposome and health in the Anthropocene. International Journal of Epidemiology, 1-12.

[32] SSAG (June 7, 2024). Overview of areas of New Zealand's research activity. SSAG-MBIE-019. https://www.mbie.govt.nz/dmsdocument/30367-overview-of-areas-of-new-zealands-research-activity-pdf

[33] MBIE (2025) Refocusing the science, innovation and technology system. January 2025 https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/refocusing-the-science-innovation-and-technology-system

Ultimately, 2023-2025 policy frameworks favour funding proposals which reinforce economic outcomes, innovation and commercialisation, and technology transfer offices further direct government funding to support this.[34] [35] [36]

2024-11-13 Minute of Decision [ECO-24-MIN-0242] Agreed:

- Agreed to establish the future science system advisory group as a Prime Minister's Science, Innovation and Technology Advisory Council, and confirmed its terms of reference.
- Agreed to progress work on Crown Research Institution (CRI) restructure into three public research organisations (PROs).
- Agreed to establish an advanced technologies public research organisation.

2024-12-11 Minute of Decision [ECO-24-MIN-0302] Agreed:

- To confirm Invest New Zealand as a one-stop-shop for foreign direct investment.
- To disestablish Callaghan Innovation
- To progress national intellectual property (IP) policy for research in Universities and PROs.

2024-12-16 Minute of Decision [CAB-24-MIN-0504-02] Agreed:

- Minister Collins will inform CRIs of the PRO decision.
- That transfer and cessation of Callaghan Innovation functions will be considered through Budget processes, with Gracefield Innovation Quarter (GIQ) becoming the centre for science, innovation and technology.
- That PROs would be constituted as Crown agents so that they can be directed to give effect to government policy, including to deliver to the priorities identified by the Prime Minister's Science, Innovation and Technology Advisory Council.
- That the Minister will develop a national IP policy based on the model used at Waterloo University in Canada which vests ownership with the researchers who create it.
- Noted the core principle is that inventors must directly benefit from their invention; and that the Minister intends to report back to ECO in the second quarter of 2025 on a proposed policy and wider incentives for commercialisation in the science and innovation sector, including the operation of technology transfer offices in universities and PROs.

Fig. 3. Released Cabinet Papers

[34] MBIE (October 17, 2024) Briefing Government Support for Innovation. REQ-0004411. https://www.mbie.govt.nz/dmsdocument/30594-government-support-for-innovation
[35] MBIE List of Documents Proactively Released. 13 pages. https://www.mbie.govt.nz/dmsdocument/30016-driving-economic-growth-through-science-innovation-and-technology-proactiverelease-pdf
[36] SSAG (April 4, 2024). Commercialisation of research from Public Research Organisations. SSAG-MBIE-010 https://www.mbie.govt.nz/dmsdocument/30355-commercialisation-of-research-from-public-research-organisations-pdf

Released cabinet papers from late 2024 show that on the November 13th [37] and on December 11th [38] and 16th [39] of December, the Cabinet Economic Policy Committee were finely tuned to prioritise commercialisation topics and institutional structures, including innovation-related funding projects, commercial outputs and intellectual property settings and copyright law.

The section above briefly described how policy shifts in the 1990's through to the mid-2000s had sequentially shifted the science funding policies to prioritise research innovation and commercialisation outcomes. As PSGR discuss in chapter 11, wide-ranging concerns that were expressed New Zealand's science system in 2022, that suggest that the past 20 years of 'innovation' policy has not been as successful as imagined, but which would be further entrenched in the 2023-2025 reforms, have been ignored.

No assessment of the role of science and technology systems in achieving value for knowledge-based public good outcomes in democratic nations was carried out. Appendix (i) details the response to an Official Information Act request for information analysing and assessing the science and research systems of top performing nations, including smaller, high-income nations. No review was undertaken.

The request revealed that country scans of international science, innovation and technology systems tended to focus on R&D funding, the link to economic strategy, innovation and infrastructure. [40] [41] [42] [43] [44]

Scoping documents looked at different models, but did not consider outcomes including health, wellbeing and environmental protection.[45]

Neither the SSAG nor MBIE were interested in analysing and articulating broader public benefit.

In the SSAG's assessment of New Zealand universities, SSAG noted that New Zealand's performance was typical for a small, advanced economy. The SSAGs assessment of universities however focussed on industry collaboration and the economic benefits. The SSAG focussed on where New Zealand stands in

[37] MBIE (November 13, 2024). Minute of Decision. ECO-24-MIN-0242 Cabinet Economic Policy Committee. https://www.mbie.govt.nz/dmsdocument/30017-driving-economic-growth-through-science-innovation-and-technology-minute-of-decision-proactiverelease-pdf
[38] MBIE (December 12, 2024) Minute of Decision. ECO-24-MIN-0302 https://www.mbie.govt.nz/dmsdocument/30022-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-minute-of-decision-proactiverelease-pdf
[39] MBIE (December 17, 2024) Minute of Decision. CAB-24-MIN-0504.02 Cabinet. Rachel Hayward, Secretary of the Cabinet. https://www.mbie.govt.nz/dmsdocument/30023-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-minute-of-decision-part-two-proactiverelease-pdf
[40] SSAG (April 11, 2024). Models for Government owned research organisations: cross-country scan. SSAG-MBIE-006 https://www.mbie.govt.nz/dmsdocument/30366-models-for-government-owned-research-organisations-cross-country-scan-pdf
[41] SSAG (May 24, 2024) International Scan of Government Initiatives to Encourage the Commercial Application of Research from Public Research Organisations. SSAG-MBIE-016. https://www.mbie.govt.nz/dmsdocument/30364-international-scan-of-government-initiatives-to-encourage-the-commercial-application-of-research-from-public-research-organisations-pdf
[42] SSAG (May 24, 2025) Government functions that support innovation in New Zealand and peer countries. SSAG-MBIE-017. https://www.mbie.govt.nz/dmsdocument/30358-government-functions-that-support-innovation-in-new-zealand-and-peer-countries-pdf
[43] SSAG (May 24, 2024) International examples of science, innovation and technology councils. SSAG-MBIE-018. https://www.mbie.govt.nz/dmsdocument/30362-international-examples-of-science-innovation-and-technology-councils-pdf
[44] MBIE (June 6, 2024) Structures enabling funding decisions– An international scan. SSAG-MBIE-020. https://www.mbie.govt.nz/dmsdocument/30373-structures-enabling-funding-decisions-an-international-scan-pdf
[45] SSAG (April 24, 2024) International models for technology research ecosystems. SSAG-MBIE-012. https://www.mbie.govt.nz/dmsdocument/30363-international-models-of-technology-research-ecosystems-pdf

relation to global metrics. There was no discussion of the role of New Zealand universities in undertaken public good research for domestic benefit.[46]

The science system reforms to restructure the Crown Research Institutes (CRIs) into Crown controlled Public Research Organisations (PROs), aim to retain their focus on economic growth and entrepreneurial activities. Only the briefest of documents considered the CRI focus, and no attempt was made to reconcile the public good focus with the financial obligations of the CRIs.

Under the portfolio of science, innovation and technology, on November 13 the Cabinet Economic Policy Committee formalised the Gluckman-led suggestion, and confirmed that the Prime Minister's Science, Innovation and Technology Advisory Council (PMSTIAC) would be established. In January 2025 Judith Collins publicly announced that the Crown Research Institutes would consolidate into 3 public research organisations (PROs). A fourth PRO would focus on advanced technology. The Crown Research Institutes would collapse into a single bioeconomy PRO; with an earth science, a health and forensic sciences services and an advanced technology PRO being established.[47]

Judith Collins' instructions ensured that the new PROs would *'be directed to give effect to government policy, including to deliver to the priorities identified by the PMSTIAC'*, the newly established Prime Minister's Science, Technology and Innovation Advisory Council.[48]

Without a broader remit, this ensured that science would continue to be politically directed by a small group of predetermined advisors.

The new policy intends for settings and incentives to be tightened to maximise intellectual property outcomes. While institutions historically secured income from patents and royalties from publicly funded research, these science system reforms include an intention to provide publicly funded scientists with financial income from their discoveries, further incentivising them to undertake research that would have a clear commercial impact.

There is an absence of discussion of outcomes from, for example, that arise from 'block' funding or 'slack' in budgets, where scientists can freely identify and research societal, environmental and scientific problems, opportunities and challenges. This form of research can also result in positive economic impacts, including downstream patents and inventions.

Without this discussion the CRIs, or PROs, must only consider science and research that accords with the innovation and commercialisation agenda, if their scientists are to be paid and their labs to be equipped.

The Cabinet agreed to progress work to merge the existing Crown Research Institutes into three public research organisations (PROs), grouped under three themes: bio-economy, earth science and health and forensic science services. A fourth PRO would focus on advanced technologies. The funding platform for the advanced tech PRO would come from the Strategic Science Investment Fund.[49]

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[46] SSAG (May 24, 2024). The role of universities in the science, innovation, and technology system. SSAG-MBIE-015. https://www.mbie.govt.nz/dmsdocument/30374-the-role-of-universities-in-the-science-innovation-and-technology-system-pdf

[47] MBIE (January 23, 2025) Proactive release of documents dated March-December 2024. Science system reform. https://www.mbie.govt.nz/dmsdocument/30021-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-proactiverelease-pdf

[48] Collins J (December 12, 2024) In Confidence. https://www.mbie.govt.nz/dmsdocument/30021-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-proactiverelease-pdf

[49] MBIE (November 13, 2024). Minute of Decision. Cabinet Economic Policy Committee. https://www.mbie.govt.nz/dmsdocument/30017-driving-economic-growth-through-science-innovation-and-technology-minute-of-decision-proactiverelease-pdf

The PROs would be based on the Singapore Agency for Science, Technology and Research (A*STAR) which aligns research with industry demand, primarily to boost economic growth.

A paper by Judith Collins (December 12, 2024) to the Office of the Minister of Science, Innovation and Technology Cabinet Economic Policy Committee defined the outline of the PROs and outlined the Invest NZ parameters. Collins' paper emphasised that there would be:

> '*differences in emphasis and scope of functions for individual PROs, particularly in the balance of stewardship science and science for economic growth and associated entrepreneurial activities'*.

From the MBIE website: Public Research Organisations will be grouped by focus area[50]:

- *Bioeconomy: formed by bringing together AgResearch, Manaaki Whenua – Landcare Research, Plant & Food Research, and Scion. This PRO will drive innovation and enhance the value of New Zealand's bioeconomy, fostering economic growth and ensuring environmental prosperity.*
- *Earth sciences, including climate and hazards resilience: formed by bringing together the National Institute for Water and Atmospheric Research (NIWA) and the Institute of Geological and Nuclear Sciences Limited (GNS Science), and noting that Cabinet agreed-in-principle for NIWA to acquire MetService as a wholly owned subsidiary. This PRO will foster economic and environmental resilience in New Zealand through sustainable resource use, energy innovation, climate science and effective hazard mitigation. The process for the NIWA acquisition of MetService will continue as planned.*
- *Health and forensic science services: formed by re-purposing Environmental Science Research. This PRO will enhance and protect New Zealand's public health and justice systems through scientific and research services, to support economic growth, health innovation, forensic impact and to improve health and forensic outcomes for people and communities.*
- *A new advanced technology-focused PRO will deliver research while building capabilities and commercial outreach in areas such as artificial intelligence, synthetic biology, aerospace, medical technology and quantum technology.*

These recommendations would instantly place the strategic direction of New Zealand's science system inside or adjacent to the Prime Minister's department, making it vulnerable to the whims of the government of the day. The close positioning to the Department of Prime Minister and Cabinet directly contradicts the concerns of many submitters to the Te Ara Paerangi consultation. Many institutional had scientists expressed concern with the control of research policy and direction by elite scientists that would often reflect their prevailing research interests. Instead, they considered that the establishment of an independent council, out of the tentacles of the government of the day, might best serve New Zealand.

On November 13th the Cabinet Economic Policy Committee formalised the Gluckman-led suggestion of two targeted agencies to drive international trade and investment opportunities.

a. Invest New Zealand (Invest NZ) will be established as a one-stop-shop for foreign direct investment.
b. New Zealand Trade and Enterprise (NZTE) to drive export growth.

[50] MBIE (2025) Refocusing the science, innovation and technology system. January 2025 https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/refocusing-the-science-innovation-and-technology-system

The committee also agreed to establish Invest New Zealand, to progress work to refocus New Zealand Trade and Enterprise (NZTE) on strong export outcomes, and directed MBIE officials to work closely with the Ministry of Foreign Affairs and Trade on how best to achieve a refocused NZTE.

By December 13, 2024, Cabinet agreed to establish Invest NZ as an Autonomous Crown Entity, agreeing to accelerate legislation to get the entity into force as quickly as possible. Invest NZ's role would be to attract general investment, draw investment in from multinational companies and attract skilled professionals. Invest NZ would be a one stop shop for foreign direct investment into New Zealand with the exception of public infrastructure investment. Set up costs would be NZD10 million, with NZD60 million per annum. The core functions would mimic Ireland's Foreign Direct Investment Agency.[51]

[3] REFORM PROMISES MORE OF THE SAME: PATENTS TO DRIVE ECONOMIC GROWTH

Early-stage Cabinet documents in January 2024, contextualised the innovation-investment policy orientation, basing it on '*the proven connection between science, innovation and technology, and economic growth and productivity';* and stating that *'New Zealand's low levels of research and development (R&D) is a main actionable explanation for our weak economic growth and falling productivity'*.[52] To date, decisions made suggest that the current commercially incentivised, highly speculative system will become more entrenched.

These statements that have driven the culture and perspective of the reforms are misleading. They suggest that broader productivity and economic outcomes are predominantly based on linear processes, directed towards commercialisation. Cabinet documents are silent on the role of public good problem solving and knowledge production in driving knowledge for national benefit, including raising attention to human and environmental health risks from industry and technology that dampen productivity.

'*Actionable explanation'* suggests that the government does not want to assess broader drivers, from increasing disability rates to the cost of energy. Perhaps central to the 20-year decline noted by the SSAG, is the excision of broader, public-good research and the shrinking of funding pathways to work on complex, multifactorial problems. Findings from broader monitoring and research can be political and controversial, but can ultimately serve broader public purposes.

By 2021, MBIE had commenced the multi-year reform process under the Labour government. The biggest open consultation on the science system had commenced. Consultation on Te Ara Paerangi - Future Pathways Green Paper ran from October 2021 to March 2022. Around 2,500 participants took part in webinars and workshops between February and March 2022 and MBIE received 885 written submissions in total.[53] [54]

[51] MBIE (December 12, 2024) Minute of Decision. ECO-24-MIN-0302 https://www.mbie.govt.nz/dmsdocument/30022-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-minute-of-decision-proactiverelease-pdf

[52] MBIE (May 20, 2024) Proactive Release Science System and university Advisory Groups. March 23, 2024. Judith Collins and Penny Simmonds. 11zx5u179y 2024-04-23 09:17:35 https://www.mbie.govt.nz/dmsdocument/28379-the-science-system-advisory-group-and-the-university-advisory-group-proactiverelease-pdf

[53] MBIE (2022) Green paper and consultation. https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/other-publications/green-paper

[54] MBIE (October 2021). Te Ara Paerangi Future Pathways Green Paper. Online: ISBN 978-1-99-100874-9 https://www.mbie.govt.nz/assets/future-pathways-green-paper.pdf

The Te Ara Paerangi findings[55] [56] have been ignored by the National government. Large swathes of submissions to the Te Ara Paerangi paper revealed that the turn to increasingly short-term competitive funding arrangements and commercial imperatives had led to an undermining of the New Zealand science system and reduced the capacity for skills development. Innovation and commercial imperatives have reduced collaboration across the system, and made it difficult to address domestic, public-good research programmes, while leading to shortfalls not just in laboratory infrastructure and equipment, but also in skills development and retention.

The focus by RSI&T scientists on the funding of research, the role of block or grant funding and the challenges of security for laboratories and research settings in this consultation, has been ignored, and only vaguely referred to in the current science reforms.

Under Collins, MBIE and the Cabinet Economic Policy Committee, the science reform programme has not addressed the fact that the last two decades of innovation and commercial imperatives may have actively contributed to a stagnation in the science and research system. Scientists incentivised to publish papers and patent discoveries at speed, alongside a teaching programme, aren't necessarily undertaking work that 'makes the world a better place.' They're simply ensuring job security, for themselves and their laboratories.

Judith Collins and Minister Penny Simmonds commenced the reform in February 2024, recommending the establishment of Science System and University Advisory Groups. The *In Confidence* memo which emphasised the lack of system-wide focus on driving economic growth, contained the terms of reference.[57] The Cabinet Economic Policy Committee agreed to establish the groups on March 20, 2024. The SSAG would make strategic recommendations to MBIE on options to improve the effectiveness and impact of New Zealand's science, innovation and technology system. The SSAG were instructed to provide advice on the science system structure, funding mechanisms, investments in advanced technology, the government's effectiveness in prioritising and commissioning science, and workforce considerations. [58] [59]

The SSAG outlines innovation pathways, the importance for corporate investment for innovation, and creates an institutional framework for sourcing foreign direct investment. They point out the problem of incentives that direct public research away from public good outcomes. In an August 2024 Briefing, officials noted that:

> *'The SSAG identified the company model of CRIs as the key driver behind those organisations prioritising institutional interests over the national benefit. MBIE's view is that settings (including the CRI form) and incentives (including financial pressures) have left CRIs little choice but to prioritise institutional interests over the system as a whole. As Crown Agents, the PROs would have delivering national benefit as their primary purpose.'*[60]

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[55] MBIE Te Ara Paerangi Future Pathways Summary of Submissions. Part 1 – All submissions and engagements. https://www.mbie.govt.nz/assets/te-ara-paerangi-future-pathways-summary-of-submissions-part-1-summary-of-all-submissions.pdf

[56] MBIE Te Ara Paerangi Future Pathways Summary of Submissions. Part 2 Summary of Māori Engagements and Submission. https://www.mbie.govt.nz/assets/te-ara-paerangi-future-pathways-summary-of-submissions-part-2-summary-of-maori-submissions.pdf

[57] MBIE (May 20, 2024) Proactive Release Science System and university Advisory Groups. March 23, 2024. Judith Collins and Penny Simmonds. 11zx5u179y 2024-04-23 09:17:35

[58] MBIE (May 20, 2024) Proactive Release Science System and university Advisory Groups. March 23, 2024. Judith Collins and Penny Simmonds. 11zx5u179y 2024-04-23 09:17:35

[59] MBIE (February,7 2024) Terms of Reference. Science System Advisory Group https://www.mbie.govt.nz/dmsdocument/28134-terms-of-reference-science-skills-advisory-group

[60] MBIE (September 4, 2024). Implementation options for CRI consolidation. 2425-0857. https://www.mbie.govt.nz/dmsdocument/30595-implementation-options-for-cri-consolidation

The SSAG's Phase 2 consultation asks respondents to consider how funding mechanisms might be rationalised, but does not highlight the incentivisation that pushes funding panels to favour innovation and commercial outcomes. The SSAG asks about high-intellectual risk and high reward research, and Mātauranga Māori, but does not identify public-benefit research which may be high impact but fall outside current criteria. A question asking respondents about balancing different expectations is vague and would be difficult to respond to without clarity concerning what the expectations might be.

Over this time, there has been increasing use of commercial-in-confidence legal and financial arrangements with private partners and non-government organisations (NGOs).[61] Clauses in these agreements can permit research outcomes to be published only if they harmonise with the objectives of the private funders. Clauses can also demand that financial outcomes are secret, and can be structured to disproportionately benefit the private or NGO funder.

A March Briefing by the SSAG discussing the refocus of the CRIs, revealed how the SSAG viewed CRIs as sector facing institutions that provided science that was essential for 'social and economic resilience' and that this was also referred to as 'public good science'.[62]

There is no clarification on national benefit, nor definition expanding the role of serving the public purpose, in any memo or cabinet decision. For example, the March 20 terms of reference 'aspiration', which directed the SSAG to 'deliver growth' revolves around driving innovation, presuming that an innovation-led approach will encourage knowledge. [63] Judith Collins then requested a briefing on the public-good role of the CRIs in May, 2024. This briefing demonstrates that MBIE views public-good within a purely economic context (see chapter [8]).[64]

The SSAG haven't described how public good research can benefit from being at arm's length from the political priorities of the government of the day. The SSAG briefing then recommended that MBIE science policy officials be appointed to PRO boards. It seems that CRIs would be obligated to accord with MBIE priorities, rather than to have latitude to identify gaps in knowledge that would be of greater benefit, beyond the issues identified by MBIE officials.

The Cabinet Economic Policy Committee November-December decisions came after the August 2024 white paper: *Science System Advisory Group Report An architecture for the future* was published.[65] The paper by the Science System Advisory Group (SSAG) led by Sir Peter Gluckman, tended to ignore and downplay system-level troubles, and did not refer to the Te Ara Paerangi consultation findings.

A review of the voluntarily released 'science reforms' papers on MBIEs website, suggests that officials do not consider how innovation-led cultures may detract from an optimally working science system. Governance structures and functions that would optimise research to solve domestic challenges were not considered.[66] [67] At no stage had officials acknowledged long-term problems in the science system that are well understood by the RSI&T community.

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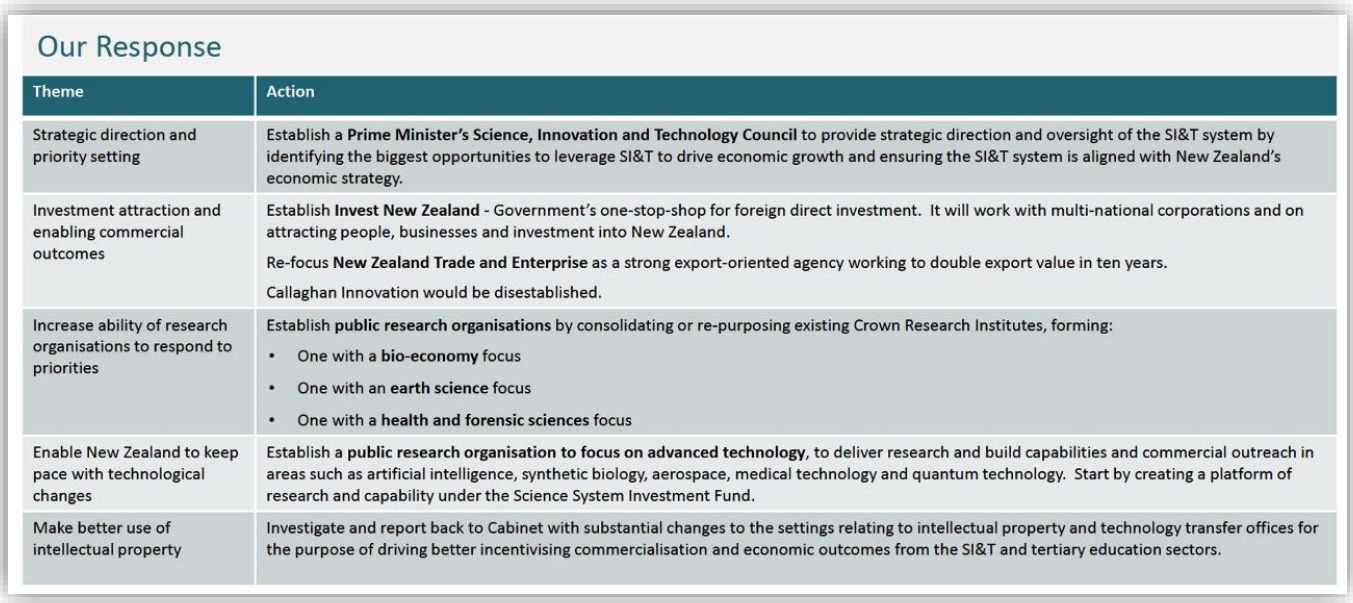
[61] E.g. Schwab T. (2023). The Bill Gates Problem, Reckoning with the Myth of the Good Billionaire. Penguin.
[62] MBIE (March 21, 2024). Crown Research Institutes Refocus - possible options. 2324-2674. https://www.mbie.govt.nz/dmsdocument/30590-crown-research-institutes-refocus-possible-options
[63] MBIE (May 20, 2024) Proactive Release. 19 pages. In Confidence paper. March 23, 2024. Page 11/19
[64] MBIE (May 22, 2024). Public good activities in Crown Research Institutes. 2324-2733 https://www.mbie.govt.nz/dmsdocument/30601-public-good-activities-in-crown-research-institutes
[65] Gluckman P. et al (August 2024). Science System Advisory Group Report: An architecture for the future. https://www.mbie.govt.nz/assets/science-system-advisory-group-report.pdf
[66] MBIE (May 20, 2024) Proactive Release Science System and university Advisory Groups. March 23, 2024. Judith Collins and Penny Simmonds. 11zx5u179y 2024-04-23 09:17:35
[67] MBIE (January 23, 2025). Proactive release of documents March- December 2024. https://www.mbie.govt.nz/dmsdocument/30022-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-minute-of-decision-proactiverelease-pdf

[4] RECOMMENDATION TO SHIFT RSI&T SYSTEM OUT OF MBIES GRIP IGNORED.

The response of Collins to the Science System Advisory Report, detailed in the September 2024 *In Confidence* Cabinet paper[68] shows that the Minister and MBIE selected the SSAG paper recommendations that tracked to their preferences: tight control of the direction of the system, and the establishment of agencies with the most commercial potential.



Our Response

Theme	Action
Strategic direction and priority setting	Establish a **Prime Minister's Science, Innovation and Technology Council** to provide strategic direction and oversight of the SI&T system by identifying the biggest opportunities to leverage SI&T to drive economic growth and ensuring the SI&T system is aligned with New Zealand's economic strategy.
Investment attraction and enabling commercial outcomes	Establish **Invest New Zealand** - Government's one-stop-shop for foreign direct investment. It will work with multi-national corporations and on attracting people, businesses and investment into New Zealand. Re-focus **New Zealand Trade and Enterprise** as a strong export-oriented agency working to double export value in ten years. Callaghan Innovation would be disestablished.
Increase ability of research organisations to respond to priorities	Establish **public research organisations** by consolidating or re-purposing existing Crown Research Institutes, forming: • One with a **bio-economy** focus • One with an **earth science** focus • One with a **health and forensic sciences** focus
Enable New Zealand to keep pace with technological changes	Establish a **public research organisation to focus on advanced technology**, to deliver research and build capabilities and commercial outreach in areas such as artificial intelligence, synthetic biology, aerospace, medical technology and quantum technology. Start by creating a platform of research and capability under the Science System Investment Fund.
Make better use of intellectual property	Investigate and report back to Cabinet with substantial changes to the settings relating to intellectual property and technology transfer offices for the purpose of driving better incentivising commercialisation and economic outcomes from the SI&T and tertiary education sectors.

Fig.6: Collins, Judith, In Confidence paper. September 2024. Page 13/13.

Judith Collins and MBIE were selectively receptive to the August paper Gluckman et al. The *In Confidence* paper by Collins in September, which responded to the SSAG report, broadly ignored the suggestion that could have led to the greatest transformation in the RSI&T for national benefit. The SSAG had proposed the establishment of a focused Ministry for Science, Innovation and Technology that would report to a single minister, and had suggested closer integration of the tertiary sector with the science, innovation and technology sector under a single science Ministry, a shift away from control by MBIE.

The new Ministry, which would have been focussed on optimising the RSI&T system rather than optimising economic growth, was proposed to have oversight of the PROs, and a new National Research Council (NRC), a National Innovation Advisory Committee (NIAC) and a Research Infrastructure Advisory Committee (RIAC).

The paper by Collins in September 2024 makes no mention of the proposed new Ministry, the NRC, NIAC (which would be outside the confines of the PMSTIAC) and the RIAC.

It is not surprising therefore that Collins' and MBIE rejected the establishment of an independent science Ministry, when the power to direct some $1.2 billion in funds to RSI&T would have been diverted into the arms of a more independent entity.

[68] Collins J (September 2024) In Confidence. Driving Economic Growth through Science, Innovation and Technology. To the Cabinet Economic Policy Committee. 13 pages. https://www.mbie.govt.nz/dmsdocument/30016-driving-economic-growth-through-science-innovation-and-technology-proactiverelease-pdf

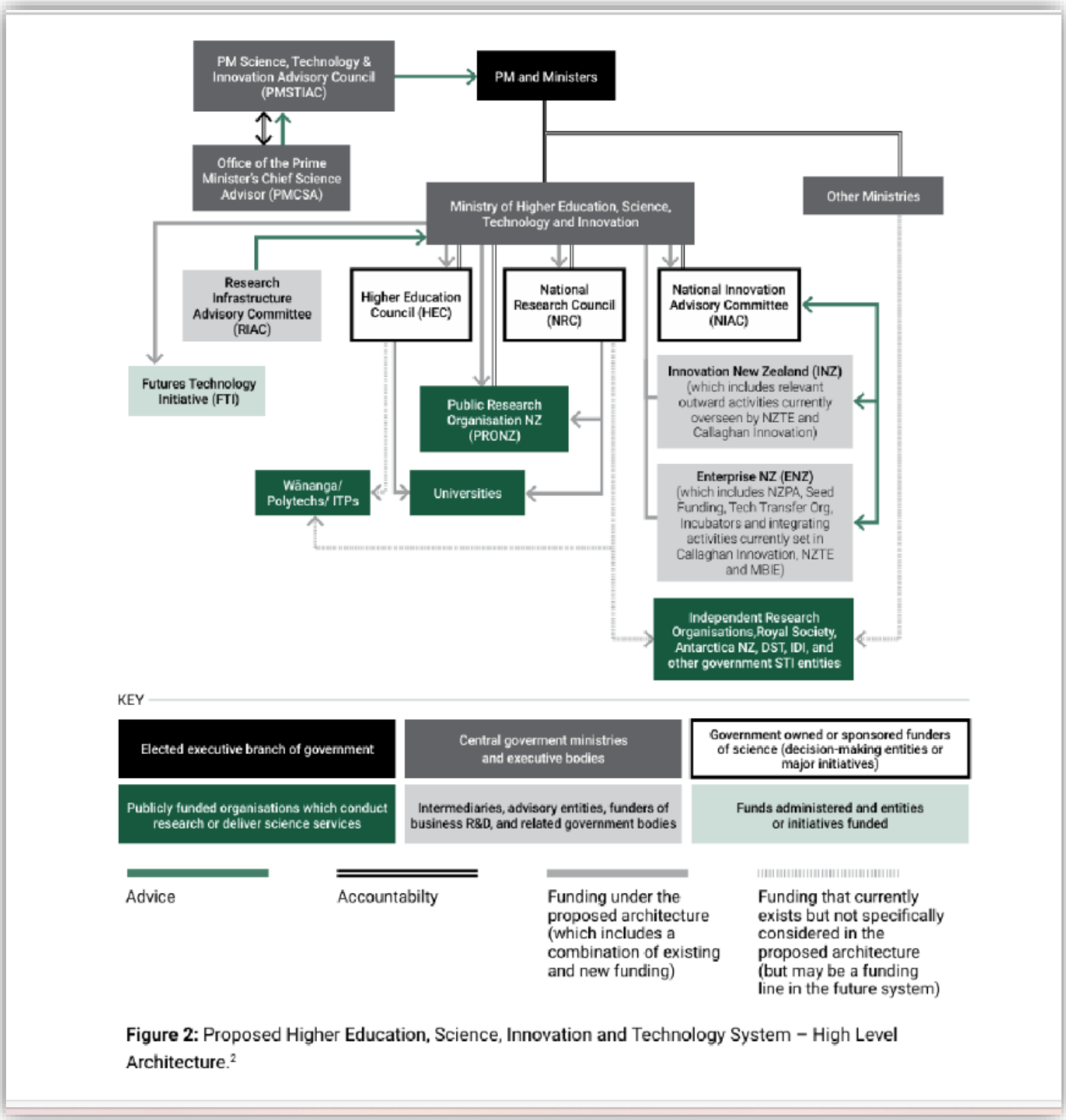


Figure 2: Proposed Higher Education, Science, Innovation and Technology System – High Level Architecture.[2]

Fig.7: Gluckman P. et al (August 2024). Science System Advisory Group Report: An architecture for the future. Page 11.

Somewhat ironically, the SSAG signalled 2001 as the date that New Zealand investment in science, investment and technology annualised rate-of-return went into decline.[69] This was approximately the time when the domestic science system ceased to be independent and pivoted to focus on 'innovation'.

[69] Gluckman P. et al (August 2024). Science System Advisory Group Report: An architecture for the future. Page 8.

In March 2025, the SSAG opened consultation for Phase 2, with a deadline of April 4, 2025.[70]

> *'Phase 2 submissions will consider questions relating to the funding tools and mechanism and broader aspects of the science, technology, and innovation system (e.g., workforce, and infrastructure).'*

The questions (republished in Appendix (ii)) for Phase 2 revolve around system structures and research prioritisation for in-depth research. However, respondents aren't required to clarify why a funding system which revolves around economic growth promises, could divert research away from nationally-important subject-matter areas, simply because they are out-of-scope for funding panels. Without this context responses around 'research prioritisation' and research criteria will continue to be subsumed by pre-established high-level system-priorities of economic growth and excellence.

New Zealand scientists are acutely aware that economic outcomes have been drafted into funding policy for two decades. Funding committees recognise that they have to prioritise commercially oriented proposals rather than the development of knowledge.[71]

[5] ELITES TO CONTROL SYSTEM, TIED TO GOVERNMENT OF THE DAY

The paper on which Sir Peter Gluckman was lead author barely touches on these issues. In fact, the science system reforms appear more likely to entrench current problems; simply promising more of the same. This continued strategic control by politically-oriented elites, and bigger and better drivers of innovation and commercialisation that direct New Zealand resources to serve foreign equity, do not address New Zealanders' needs.

From March to July 2024 the SSAG had apparently undertaken an extensive consultation. Phase 1 submissions considered high-level sectoral questions that considered the role of science and innovation. This consultation was not publicly promoted or covered by New Zealand media. SSAG-related consultation processes appeared to have been tightly managed, unlike the Te Ara Paerangi consultation. No feedback was published. There are no policy papers or diaries that show how the nine member SSAG group achieved the tremendous work programme, while only meeting fortnightly. The programme involved:

> *'extensive consultation, with discussions and presentations across all universities and Crown Research Institutes (CRIs) involving over 7500 individual attendees, CRI boards, vice chancellors, Callaghan Innovation, New Zealand Trade and Enterprise (NZTE), officials across multiple ministries and agencies, and a wide variety of private sector interests including small companies, large companies, high-tech companies, venture capital firms, the chairs of previous reviews into the science system, etc. and received more than 300 written submissions. In addition, the SSAG has consulted domestically with many officials and internationally with science and innovation system experts and senior officials in Singapore, Denmark, Israel, UK, Ireland and the OECD. The SSAG has met online fortnightly and developed this report over a four-day in-person meeting in June 2024.*

The SSAG's August 2024 paper[72] had recommended the establishment of the Prime Minister's Science, Technology and Innovation Advisory Council (PMSTIAC), and an agency, Innovation New Zealand (INZ) to have responsibility for attracting R&D activity of multinational corporations and foreign direct investment.

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[70] Science System Advisory Group Phase 2. Accessed March 20, 2025. https://ssag.org.nz/submit/
[71] Bruning, J. 2022. University of Auckland Master of Arts (sociology). Thesis. Innovation and Ignorance: How Innovation Funding Cultures Disincentivise Endocrine Disruption Research. https://researchspace.auckland.ac.nz/handle/2292/57929
[72] Gluckman P. et al (August 2024). Science System Advisory Group Report: An architecture for the future.

A second agency Enterprise New Zealand (ENZ) was envisaged to focus on science research and support for New Zealand companies. The paper recommended a transition of the existing CRIs to new entities, referred to as Public Research Organisations (PROs).

By December 17, Cabinet had swiftly voted to establish the PROs as Crown agents. They would be directed by the PMSTIAC and establish Invest New Zealand. Callaghan Innovation would be disestablished, and an IP policy for universities and PROs would be developed and put in place.[73]

> *'PROs will be constituted as Crown agents so that they can be directed to give effect to government policy, including to deliver to the priorities identified by the PMSTIAC.'*[74]

A PMSTIAC which is closely associated with the government of the day will reflect political priorities, including the priorities of large industries which lobby to delay, dismiss and deny knowledge that might risk market access for products.

There's an exceptionally clear rift. Policy documents on the science system reforms show that MBIE officials view the science system as an 'investment system', while the RSI&T communities that sent in their thoughts to the ignored Te Ara Paerangi consultation continue to view science and research as a system for producing public-good knowledge for national benefit. MBIE officials and 2024-2025 Cabinet documents have not prioritised national benefit but have immediately moved to establish institutional arrangements to prioritise innovation, foreign direct investment and intellectual property rights strategies. A core principle includes researcher ownership of the IP rights of their inventions, not the New Zealand public.

When Judith Collins conducted the science system revision as Minister of Science, Innovation and Technology, she correspondingly held the Ministerial portfolios of Attorney-General, Minister of Defence, Minister for Digitising Government, Minister Responsible for the GCSB, Minister Responsible for the NZSIS, and Minister for Space. On December 15, 2024, Collins was appointed King's Counsel. The science system reform was announced the day before Collins switched portfolios to transfer science system responsibility to Dr Shane Reti, and then to take charge of Nicola Willis' public services portfolio.[75] [76] [77]

As PSGRs two-part series show, Collins' approach to gene technology and science system reforms has been remarkably similar. The language promises a national benefit but the 'hard' policy that is produced, contradicts this. From the problem definitions to policy outcomes – whether new legislation or new institutional structures, the outcomes predominantly track to commercial-benefit as a panacea and rationale. Unfortunately, the advice and expertise has come from pre-selected groups who will not contradict the policy goals. These groups in the majority, work in 'innovation' areas, work for institutions accruing asset portfolios, and/or their employer and/or co-funders, are prioritising commercial outcomes.

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[73] MBIE (December 17, 2024) Minute of Decision. CAB-24-MIN-0504.02 Cabinet. Rachel Hayward, Secretary of the Cabinet. https://www.mbie.govt.nz/dmsdocument/30023-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-minute-of-decision-part-two-proactiverelease-pdf

[74] Collins J (December 12, 2024) In Confidence. https://www.mbie.govt.nz/dmsdocument/30021-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-proactiverelease-pdf

[75] Hon Judith Collins KC was appointed Minister for Public Service in National/ACT/New Zealand First Coalition Government - 2023-2026. Start date Fri, 24/01/2025 - 12:00. https://www.beehive.govt.nz/node/124272

[76] Wikipedia. Judith Collins. Accessed February 28, 2025. https://en.wikipedia.org/wiki/Judith_Collins

[77] Collins J (January 23, 2025). Reforms to boost science sector and economy. *Beehive Press Release*. https://www.beehive.govt.nz/release/reforms-boost-science-sector-and-economy

[6] SSAG EXPERT GROUP WEIGHTED TO COMMERCIAL, INNOVATION OUTCOMES

It's not surprising that the Science System Advisory Group's (SSAG's) Phase I findings revolve around innovation while failing to address the problematic incentivisation that occurs when innovation and private-public partnerships (including with NGO partners) are envisaged as a key economic growth platform. The SSAG membership is weighted to prefer speculative innovation and potentially profitable patents. Scientific expertise and oversight on the addressing of entrenched and multifactorial domestic problems and challenges is negligible. Perhaps only one or two members have recent practical experience in securing funding in New Zealand's science system for public-good New Zealand-related research

Then there is the question of oversight. The SSAG August 2024 paper, with former Chief Science Advisor to the Prime Minister, Sir Peter Gluckman chairing, recommended the establishment of a Prime Minister's Science, Technology and Innovation Advisory Council (PMSTIAC) to direct the long-term direction and strategy of the research, science and innovation (RSI) system. While the SSAG paper had advocated for a separate Ministry, this advisory council of elites who would be closely allied to the government of the day. The effect would ensure that science system priorities would reflect or harmonise with political agendas.

Research work undertaken by the Office of the Prime Minister's Chief Science Advisor is not independent, but by convention, reflects the preferences and political objectives of the government of the day. PMSTIAC advice would also revolve around the political preferences of the government in power.

In any profession that involves a high level of expertise, there will be elite scientists that skilfully navigate social, political and peer systems to influence the development of priorities and to shape the culture of those systems. New Zealand's science system has been structured to predominantly target innovation-based funding. Influencers such as Sir Peter Gluckman, the Science System Advisory Group (SSAG) chair, consistently associate innovation outcomes to productivity outcomes. We argue that this perspective is potentially flawed, for the reasons we set out below.

MBIE's Science System Advisory Group is weighted towards the medical sciences, genetics and biotechnology.[78] Three of the nine members have long-standing interests in the promotion of biotechnology. Two of those members, Professor Mark Ferguson and Dr William Rolleston founded biotechnology companies.

- Professor Sir Peter Gluckman – Chair: Has dedicated a major proportion of his advocacy role arguing for the expansion of research in biotechnology.[79] [80]
- Professor Tracey McIntosh (Ngāi Tūhoe): Professor of Indigenous Studies at the University of Auckland. She is the Chief Science Advisor for the Ministry of Social Development.
- Dr Barb Hayden: Lead science advisor, Coasts and Oceans research, NIWA; Marine biology.
- Dr William Rolleston: Co-founder of biotechnology company South Pacific Sera Limited. Chair of Genomics Australia. Founding chair of Aotearoa New Zealand's biotechnology industry association (now Biotech NZ) and the Life Sciences Network. Member of the Gene Technology

[78] MBIE. Science System Advisory Group members. https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/science-system-advisory-group/advisory-group-members
[79] Gluckman P (December 4, 2024) Keynote address: The potential of innovation and new techniques to reduce agricultural emissions https://informedfutures.org/nzacc24-keynote/
[80] Gluckman, P.)June 1, 2018). GM Safe, time to reopen debate says PM's outgoing science adviser. 1News. https://www.1news.co.nz/2018/07/01/it-is-safe-sir-peter-gluckman-says-gmo-usage-has-no-significant-ecological-or-health-concerns/

Reform Technical Advisory Group. Advisor to the Royal Society Te Apārangi's 2016-2019 campaign.

- Dr Hermann Hauser: Entrepreneur and venture capitalist. Advocate for innovative start-up companies.
- Professor Mark Ferguson: Medical background where public positions involve advocacy for innovation. Chair of the Board of the European Innovation Council for the European Commission. Co-founder and CEO of the biotech company Renovo (1998-2011).
- Mr Michael Ahie (Taranaki, Ngāruahine, Ngāti Ruanui): Director of Zespri Group Limited Chair of Spring Sheep Milk Co. and Chair of the Plant Market Access Council (PMAC)
- Professor Hamish Spencer: Sesquicentennial Distinguished Professor, Department of Zoology, University of Otago; Evolutionary genetics.
- Ms Nadia Levin: CEO and Managing Director of Research Australia, a national alliance representing the Australian health and medical research pipeline.

New Zealand is a sparsely populated country. While there are four experts in genetics and biotechnology on the SSAG, scientists with recent practical experience focussing on public-good research are under-represented and missing. Who might also be included?

- Energy sciences. Strengthened capabilities in energy resourcing and stewardship.
- Basic scientists and social scientists with expertise in interdisciplinary research.
- Agriculture-based scientist-researchers: integrated pest management, soil biology, and disease-related risks from pollution (including trace mineral toxicity), nutrient depletion and nutrient insufficiency.
- Health-based Scientists and researchers: environmental drivers of chronic illness, including dietary drivers, and the impact of nutrient deficiency from pre-conception onwards.
- Computer technologies, software and machine learning: From use in agriculture, to artificial intelligence and digital research to enhance system-level capabilities and support the public purpose and place human rights and transparency at the forefront of development.
- Infrastructure experts: Targeting domestic knowledge gaps to drive improvements in roading and rail transport, housing, infrastructure (including for storm events) and drinking water quality.

[7] 2022 TE ARA PAERANGI CONSULTATION SWEPT ASIDE

Judith Collins' belief and MBIE policy documents that plan for the RSI&T system embed commercialisation priorities in science policy. While this is based on a claim of enhanced productivity, it appears to be contradicted by many in New Zealand's scientific community, including both Māori and Pakeha. A large proportion of comments to the Te Paerangi consultation suggested that the *proven connection between science, innovation and technology, and economic growth and productivity* was not as clear-cut as Collins and MBIE have made it out to be.

Instead, RSI&T outcomes are tied to the capacity of a wider knowledge production system to work more broadly in the national interest. Comments suggested that policies which tied funding outcomes to innovation and commercialisation, had driven RSI&T away from national interest outcomes, instead encouraging cultures of secrecy and inhibiting collaboration. Submitters generally viewed the RSI&T system as strategically critical for knowledge production that could promote collaborative synergies and skills development, and lead to beneficial impacts, while also having the potential to drive future innovation and commercialisation.

Two Te Ara Paerangi reports were published.[81] [82] Key concerns about science system dysfunction, issues that were expressed by submitters to the 2022 Te Ara Paerangi Future Pathways consultation,[83] were broadly neglected in the August 2024 SSAG report.

Submissions remain online. Many submissions stress that priorities should be based around promoting the wellbeing of New Zealanders and benefiting domestic end-users.

> *'Priorities should be based on the national interest and encourage collaboration across institutions, and between the science sector, industries and communities.'*

Submitters who worked in the RSI&T system, generally recognised that competitive funding models had created a disincentive for collaboration and had increased administrative and bureaucratic burdens, led to conflicting priorities, duplication and excessive spending on overheads and administration.

Submitters tended to recognise that the, the *'siloed, profit-driven aspect of the company model of Crown Research Institutes was not working well'* for the RSI&T system.

> *The current funding model proliferates unhealthy competitive behaviour amongst CRIs. Similarly, the current company, commercially geared model under which CRIs operate conflicts with notions of collaboration and public good. (Crown research institute).*

Many submitters noted that competitive funding models directly contributed to unproductive competitive behaviour, hindered collaboration, and resulted in ineffective use of research infrastructure. It was broadly understood across many submissions, that commercially focussed structures detracted from public good outcomes.

Submitters who worked in the RSI&T system generally recognised that block, or grant funding[84] would lead to greater financial security. A major outcome would be to remove barriers to collaboration due to greater flexibility in research and a reduction in secrecy which could be associated with the publish or perish mentality, and confidentiality around patent development and commercial discoveries. Many scientists consider that block or grant funding would enhance workforce capability and skills sharing, facilitating movement between institutions.

Many submitters acknowledged that competitive funding models had inhibited fundamental, or basic research. Submitters also recognised that a switch to base funding for long-term work required research missions and projects to be identified and selected using transparent, accountable processes. RSI&T system employees recognised the importance of evidence-based information and collaborative consultation to drive choice of long-term research trajectories and hence funding. People reiterated that it was important that this work was not selected by small groups of elites, nor subject to the vagaries of political office-holders.

The broad findings of the Te Paerangi consultation revolved around:

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[81] MBIE Te Ara Paerangi Future Pathways Summary of Submissions. Part 1 – All submissions and engagements. https://www.mbie.govt.nz/assets/te-ara-paerangi-future-pathways-summary-of-submissions-part-1-summary-of-all-submissions.pdf

[82] MBIE Te Ara Paerangi Future Pathways Summary of Submissions. Part 2 Summary of Māori Engagements and Submission. https://www.mbie.govt.nz/assets/te-ara-paerangi-future-pathways-summary-of-submissions-part-2-summary-of-maori-submissions.pdf

[83] MBIE Document Library. Accessed March 4, 2025. https://www.mbie.govt.nz/document-library/search?keywords=tearapaerangifuturepathwaysgreenpapersubmission&df=&dt=&submit=Search&sort=desc&start=100

[84] Block, or grant funding can be granted for broader research, but provides some latitude for curiousity driven research, whereas competitive/contestable funding is often tightly budgeted to reflect a specific research project.

- Priorities that involve key problems or issues critically important or specific to New Zealand, that could be broad in scope and encompass multiple disciplines.
- Long-term research to ensure that big, complex issues could be strategically addressed.
- A balance between mission-led priorities and curiosity driven, basic or fundamental research which would then contribute to innovation and other discoveries.
- The importance of transparent priority setting that endures beyond political cycles and involves extensive consultation and co-design with stakeholders.
- An independent but representative group of people could have oversight of evaluating and setting research priorities.
- A need for priorities to be based on outcomes of national benefit and public good.
- A belief that priorities should align with New Zealand's strengths and natural advantages but can take international drivers into account.
- Researcher autonomy in implementing strategies.

Concerns around funding included a belief that:

- Underfunding and short-term thinking had limited RSI&T outcomes, but that increasing incentives for private sector investment would be unlikely to support national interest and public benefit outcomes.
- Competitive funding models were inadequate and had failed to address overhead costs, discouraged collaboration and skills sharing, and had hamstrung researchers.
- Base grant funding was important to increase the certainty and stability of research, including to plan longer-term overhead and project costs.
- Base grant funding was important for planning for and promoting skills progression (whereas short-term funding contributed to an attrition of skills), including the sharing of skills across networks.
- Stability of funding for core functions would enable institutional 'stretch' for curiosity-driven 'public good' research. This would promote stability and reduce the commercial pressure that could prevent scientists and researchers from investigating knowledge gaps or problems.

The Te Paerangi consultation showed that researchers resented institutional ownership of IP, despite the fact that the outcome is from publicly funded research. It is well understood that U.S. scientists secure IP rights. It is not understood how IP rights ownership works across smaller, high-income countries.

> *There were a range of views around IP, with submitters describing a lack of trust between institutions, confusion around the purpose and value of IP, mixed views in the current system on who should own IP, and concern with how the current IP frameworks take a western view and do not align well with a te ao Māori view of kaitiakitanga. The current model of IP rights creates distrust between institutes and researchers Within RSI, there is complexity around Intellectual Property rights of scientific discovery. Where cooperation is key to successful commercialisation, the understanding of who, why and what Intellectual Property falls where can drive distrust between the institution and its researchers. (Research collaboration)*

Te Ara Paerangi submissions explicitly document the lived experience of RSI&T employees after twenty years of policies favouring tightly managed competitive funding models that were granted based on innovation outcomes. This approach has not optimised the RSI&T system, but has instead stymied it. Scientists are not incentivised to prioritise public-good research but to track to the production of IP. Unfortunately, with purpose and profitability as the driver, it is to be expected that there would be political struggles over IP ownership, despite the fact that this is publicly funded research, which theoretically should track to a broader public purpose.

Submissions evidence the growth in rigidity of research priorities, the likelihood of poor funding outcomes, incentivised overcomplicated application processes, driven shortfalls in equipment resourcing, short-circuited capacities for training and skills development. These in turn led to replication of research and resulted in scientists with a citation history controlling research trajectories.

Many submissions discussed the need for high-level priorities to be developed from a comprehensive process, rather than from political goals, and that research funding should last a decade. Input highlighted the cost of maintaining laboratories and research infrastructure, which would be drawn from relatively short-term funding cycles.

Many submissions (such as the University of Otago) expressed concern that the setting of research priorities should not be subject to the vagaries of political cycles and the need for an independent research council. Massey University recommended a:

> *'systematic evaluation of research outcomes under the national strategy, to connect the results of research projects to their stated objectives and outcomes and to maintain oversight of research activity. Currently, there is no systematic way of collating and sharing the results of individual research projects or groups to ensure that, as a country, we are extracting the maximum value from research investment and can be confident that knowledge is available quickly to end-users. We note there is currently very little investment in the systematic collation, synthesis, translation and uptake mechanisms to ensure greater value and use of research findings.'*

[8] NATIONAL BENEFIT ASSUMED, BUT NOT PROVIDED FOR, NOR SAFEGUARDED

The public research organisations (PROs) are expected to adhere to design principles. This includes an obligation to maximise the long-term benefit to New Zealand.

Design principles	**National Benefit**: Public Research Organisations will always aim to maximise the long-term benefit to New Zealand. While the emphasis will shift to commercialisation and delivering economic outcomes, PROs will still need to deliver critical public good knowledge and services. **Adaptable and Responsive to Government**: Public Research Organisations will deliver to government priorities for science innovation and technology. **Accountability**: Transparency between public funding and activity in Public Research Organisations, with appropriate cost recovery models. **Rationalisation, alignment and coordination**: with mechanisms to prioritise, avoid unnecessary duplication, resolve trade-offs and support consistency and coordination within and between research organisations. **Partnership with private investors**: PROs will look for opportunities to coinvest in research capability, facilities and knowledge production.

Fig.5: Design Principles of PROs. **Judith Collins. In Confidence: Further decisions to drive economic growth through science, innovation and technology. Page 3/9.**

No policy papers or cabinet decisions have articulated how PROs will balance their budget to favour commercialisation, while simultaneously delivering critical public good knowledge and services.[85] [86] Most likely, public-good research will be pre-specified and allied to an established goal of the funding agency.

The difficulty in balancing these outcomes and preserving sufficient scientific freedom to conduct public-good research that is outside prevailing policies but identified as needed, is not addressed. Such research can be politically controversial due to the impact for industry or the capacity to demonstrate regulatory failure. Products can be recognised as harmful, and updated regulation may be required to reduce emissions and exposures. This sort of research can be delayed, denied and dismissed. [87] [88] [89]

The language and culture of the MBIE, ECO and SSAG documents show that the strong innovation and commercialisation 'investment' approach remain as an overriding driver and would be embedded in policy literature and funding guidelines. MBIE officials view public-good research within a narrow spectrum which revolves around a direct economic benefit:[90]

> *a. Science-based activities that are simply needed by all well-functioning modern economies. These provide backbone services or critical information for markets that enable an economy or general society to function, such as measurement standards or volcanic ash monitoring to support airlines to operate. Increasingly and in most advanced economies, research in areas such as natural hazards, environment or population health has come to be considered essential to provide foundational knowledge to guide decisions. These types of activities often support government decision-making and are usually undertaken close to government in public research organisations.*
>
> *b. Science and research to build long term competitive advantage in strategic areas of benefit for the economy, including both sector-specific research and general-purpose technologies like Artificial Intelligence (AI). Even though there may be private benefits in the long run from this type of research, the private sector won't invest, or will underinvest. This is because the private sector does not capture the full returns, or because of greater risk/uncertainty or the timeframe for return (patient capital). This type of research may be done in universities, public research organisations and/or private businesses.*

The officials seem unaware of the potential for public-good science to define New Zealand's science system priorities and the necessity for research institutions to not merely support government policy, but challenge it. Important roles include shining a light on market failures, for example, relating to the externalities of technologies, whether they drive pollution, addiction or disease, or the power to demonstrate where government policy contradicts, or fails to reflect established knowledge in the published literature, or where policy creates complex unintended outcomes is important. Basic research

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[85] MBIE (January 23, 2025) Proactive release. December 12, 2024. Further decisions to drive economic growth through science, innovation and technology. Page 3/9. https://www.mbie.govt.nz/dmsdocument/30021-further-decisions-to-drive-economic-growth-through-science-innovation-and-technology-proactiverelease-pdf

[86] MBIE (2025) Refocusing the science, innovation and technology system. January 2025 https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/refocusing-the-science-innovation-and-technology-system

[87] Rayner, S. (2012). Uncomfortable knowledge: the social construction of ignorance in science and environmental policy discourses. Economy and Society, 41(1), 107-125

[88] Hess, D. (2015). Undone science and social movements. A review and typology. In M. Gross, & L. McGoey (Eds.), Routledge International Handbook of Ignorance Studies (pp. 141-154). Routledge.

[89] Howard, J. (2011). Environmental nasty surprise, post-normal science, and the troubled role of experts in sustainable democratic environmental decision making. Futures, 43, 182-195.

[90] MBIE (May 22, 2024). Public good activities in Crown Research Institutes. 2324-2733 https://www.mbie.govt.nz/dmsdocument/30601-public-good-activities-in-crown-research-institutes

and new knowledge does drive innovation and commercialisation outcomes. As one Te Ara Paerangi submission noted:

> *'This quantum of funding should recognise International models and the experience that shows us that investment in public-good science is the driver of outputs like patents, that then drive economic growth'.*

Without being specified as a high-level principle, and without policy papers broadly explaining how public-good research can serve the nation, there can be no assurance that 'national benefit' will be safeguarded. The SSAG white paper does not outline how national benefit is to be achieved. For example, neither MBIE nor the SSAG outlines how science, research and technology can be directed to less speculative innovation-based science and focus more on 'boots on the ground' basic and applied research from funding for monitoring, to research on identified problems and challenges. This should be a core role of the science, research and technology system.

Often political priorities reflect global fashions, and funding policies effectively prohibit research that might contradict the global fashion or prevent research into domestic risks, stymying research and R&D. Funding for ruminant methane research dwarfs any funding into the benefit of ruminant grazing and soil fertility. There is scientific freedom to research carbon dioxide emissions, but not to analyse industrial and wastewater pollution. There is no funding for biomedicine but not to identify how environmentally driven chronic disease and nutritional deficiency adversely impacts productivity.

In chapter 9, PSGR outline four case studies which demonstrate how public-good objectives (which could ultimately lead to innovation and commercial advances) are unable to be addressed in current policy frameworks.

Cabinet documents and the SSAG view foreign direct investment (FDI) as broadly beneficial. Neither SSAG, Collins nor MBIE address the problem of diverted New Zealand public funding away from public good research, including the cost-benefit of New Zealand resources directed to public-private partnerships where the offshore institution may be the primary beneficiary. Startups often fail, which is why industries target government funding. Foreign direct investment can skew funding directions away from direct public purpose.

Conversely, if New Zealand institutions, for example, Zespri engage in a partnership with a Crown Research Institute (CRI), that may serve a national purpose. When the investor is, for example, a BlackRock owned entity, a global pharmaceutical firm, the Bill and Melinda Gates Foundation, or an entity funded by the U.S. Agency for International Development any claim of national benefit is dubious. Also problematic is the question of the power of equity. Zespri's research aims might not be as exciting as BlackRock's, leading to the preferencing of FDI over New Zealand initiatives over time.

Research to evaluate corruption, abuse of power and market failure is shackled by the combined effect of short-sighted science policy which valorises innovation, and contractual and secrecy provisions. The problem, which blinkers any capacity to identify and prevent system-level failures, extends from infrastructure to government services, and includes the technologies used by governments during the Covid era. The difficulty in understanding the problem at hand is made more onerous due to technical and scientific claims or expertise of the supply-side and government officials. A simple example of this is Wellington Water, where contracts remained hidden but there was little capacity for external research to be undertaken.[91]

[91] Edwards B. (March 3, 2025). Integrity Briefing: Wellington Water – A Case Study in Infrastructure Failure and Incompetence. https://democracyproject.substack.com/p/integrity-briefing-wellington-water?

Officials are unlikely, for example, to have considered how the science policy reforms poorly serve New Zealand's defence sector, if only health research is considered. Inferior science policy currently channels research along a commercialisation trajectory. Policy directs health research to biologic and pharmaceutical solutions for a sick and disabled population. Health research dedicated to prevention of chronic disease, including prevention of sub-cellular parameters that often precede the arrival of a syndrome or diagnosis, that reveal the underlying drivers of poor and declining metabolic health are out of scope. Nutrition and metabolic health research is out of scope and researchers cannot explore the drivers which impede optimal health. System level effects including inflammation, cell membrane deterioration, oxidative stress, mitochondrial dysfunction, insulin resistance, and overwhelm or dysregulation of autophagy processes. Investigating polypharmacy and adverse effects from pharmaceutical and biologic drugs is also out of scope.

The military are placed on the 'back foot' in at least three ways. Firstly, increasing complex health conditions in youth at the population level directly impacts the selection and supply of new recruits. There are fewer candidates that meet norms which include stamina, dexterity, intelligence. Basic physical, social and psychological capacities are poorer.

Secondly, work on human augmentation technologies which increase the potential for enhanced operations, based on embedded technologies, underestimate the barriers for hardware from nanoscale-level upwards to be accepted or tolerated by human biological systems at scale, that are already at risk of inflammation and fatigue. The science on optimal nutrition and metabolic health has been written out of science research. Inevitably, technical military experts will receive extraordinary funding levels to develop hardware/software interface technologies while blandly pretending below optimal-health humans can tolerate the technologies.

Thirdly, the absence of critical scientists means that research work to explore adverse events will not be undertaken. The effect is that the intelligence that would inform high-level command as to the safety of new technologies which could harm or disable the military population is missing or deficient. The U.S. military is well aware, for example, on the adverse event profile of the mRNA technologies experienced by the military population. Young men experienced a greater level of cardiovascular events (e.g. myocarditis), while young women experienced a disproportionate number of events relating to hormone and nerve function (e.g. Bell's Palsy).

The reformed science system by its purpose and structure is likely to heavily restrict curiosity driven fundamental, or basic science unless officials or corporate partners believe this work will lead to innovation and commercialisation. This incentivises researchers to reverse engineer their funding grants, in line with their research groups' expertise, to develop innovations that can then be justified to solve a problem, rather than problem identification in the first instance, based on the current identified societal need.

People may believe that biodiversity and sustainability research budgets permit New Zealand scientists in CRIs and universities to assess harm from manmade chemicals, nanotechnologies and GMOs. However, this research conventionally falls outside of the long-term funding of 'sustainability' and 'environmental' research programmes. Sustainability and environmental initiatives are frequently reframed within an anthropogenic climate change paradigm. Funding is not available for long-term health and environmental monitoring, including research to identify contaminant mixtures in freshwater or to identify biomarkers of toxicity in humans, and nutrient deficiency as a driver of disease.

For example, the CRI ESR monitors ground water for chemical pollutants, but does not conduct research to identify whether those pollutants cause harm to freshwater organisms. The ESR research radiation, but not from everyday personal or household devices, to understand the impact on the human brain. The funding is not available. New Zealand researchers can secure sustainability-related funding if it tracks to

lowering carbon dioxide emissions. Funding is not available for research that proposed that anthropogenic carbon dioxide emissions were a negligible driver of global warming.

Where 'sustainability' and 'environment' are mentioned, climate change is prioritised. However, identification of commitment to public good research which involves long-term research which is of national benefit and public purpose, and independent from commercial and political priorities, has not been reviewed.

The current system inhibits any research that has the capacity to contradict the misallocation of public and private investment, and RSI&T resources and direct resources to more important RSI&T efforts. For example, there is broad-ranging evidence that policies directing extraordinary scientific resources to the scientific and public effort to reduce carbon dioxide emissions, in the belief that anthropogenic emission reduction will meaningfully change planetary weather patterns is erroneous.

Over the past decade, as this 'emissions' related scientific effort has been super-charged, no effort has been equally directed scientifically evaluate risk from man-made pollutant emissions from human waste streams, industry and agriculture. Paradoxically, outside the climate-saving technology rhetoric is any obligation to evaluate supply-chain human and environmental health risks from climate-tech. From excavation, to production, to deployment (e.g. soil and groundwater contamination from solar panel parks) end-of-life from the contaminant chemicals and heavy metals that underscore the 'climate change' technologies.

[9] NEW ZEALAND'S SCIENCE SYSTEM: BLIND TO EMERGING TECH RISKS

There is an increasing range of human activities that are unable to be researched because they fall outside the scope of these funding guidelines. Scientists and researchers understand (explicitly and implicitly) that there is no point forwarding a proposal for this form of research. This is because they are tied to market access for technologies, and hence, economic growth. They are political.

The SSAG acknowledged that emerging technologies including artificial intelligence, quantum technology and synthetic biology (which encompasses gene editing technologies)[92] have the potential to broadly impact geostrategic, security and trade relationships and alter economic and power relationships. The SSAG address the potential benefits of these technologies, stating:

> *'These technologies will improve the ability of governments to make better decisions, serve their core obligations, and steward the human, environmental and economic assets of a country, and for businesses to be more productive and to directly and indirectly improve our wellbeing.'*

The SSAG do not point to the physical, political, social and cultural risks.

The science system reform programme ignores the potential for technologies to present a risk to human and democratic life. Multidisciplinary discovery-based research to identify and evaluate the multifactorial drivers of harm from emerging technologies, from hazardous-substances such as pesticides and fluoride, to the Covid BNT162b2 vaccine to digital surveillance, to 5G exposures, algorithmic exploitation and artificial intelligence (AI) risk is unavailable in New Zealand.

[92] 'In synthetic biology, biological cells and processes are dismantled and reassembled to make novel systems that do useful things.' Garner KL. Principles of synthetic biology. Essays Biochem. 2021 Nov 2;65(5):791-811. doi: 10.1042/EBC20200059. PMID: 34693448; PMCID: PMC8578974.

In human health research, funding committees will down-value proposals if they do not include an 'innovation' outcome. Funding panels must follow policy obligations, and part of the requirement is to present a potential path for innovation, which includes patents and potential royalties.[9394]

MBIE's multimillion dollar, long-term 'missions' do not include public good research to look at the externalities of the technologies that the government approves for release, whether into the environment or into human bodies. Short-term small allowances can be secured by scientists, but the amounts are not enough to maintain a laboratory. Because New Zealand laboratories are privatised and targeted to screening for issues that businesses pay for, New Zealand scientists often have to access more funds to send samples offshore as the expertise and the labs which can screen for toxicants are not here.

This is a global problem, and governments have failed to keep pace with the risks that arise with the releases of these technologies.[95] This is why New Zealand's conservative approach to the release of genetically modified organisms (including gene editing technologies) has served New Zealand well.

Issues that drive social, cultural, environmental, economic and democratic risks, change over time. This section includes four case studies which consider how our science system has failed to support the national benefit and promote well-being.

a. 20 years of investment in biotech and GMO research, based on economic benefit, where no return on investment analysis is ever undertaken.
b. AI, the socio-political, digital, double-edged sword.
c. Introduction of a biologic gene technology where no science cohort had resourcing to investigate the adverse effects of that technology on human health.
d. Inability of current innovation-centric funding parameters to fund research into chronic illness, undermining productivity for people disabled by conditions that are preventable and reversible.

When research pathways are not funded, political and public knowledge cannot keep pace with change. Regulatory agencies and government laws and policies cannot keep pace with technological developments and identify threats to health, democracy and resources.

The New Zealand science system looks brightly to the future and doesn't appear to anticipate problems, which include adverse outcomes from technology and the ownership of New Zealand discoveries by offshore institutions. In its submission to the Te Ara Paerangi consultation, PSGR explained that:

> *'Directive policy and legislation have produced intergenerational, institutional double-binds directing universities and CRIs to prioritise innovation, excellence and economic growth.'*[96]

New Zealand-based information paths for independent science advice for risk from the technologies that the government approves for market release are not available. At the same time, regulatory agencies are not required to, nor financially resourced to survey global literature and actively enquire outside the model of company-select and supplied data.

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[93] HRC, MBIE, MoH. (2019). The New Zealand Health Research Prioritisation Framework: Maximising the benefits of health research for New Zealanders. Health Research Council of New Zealand, the Ministry of Business, Innovation and Employment and the Ministry of Health.
[94] Bruning, J. 2022. University of Auckland Master of Arts (sociology). Thesis. Innovation and Ignorance: How Innovation Funding Cultures Disincentivise Endocrine Disruption Research. https://researchspace.auckland.ac.nz/handle/2292/57929
[95] Persson L et al. (2022) Outside the Safe Operating Space of the Planetary Boundary for Novel Entities. Environmental Science & Technology 56 (3), 1510-1521 DOI: 10.1021/acs.est.1c04158
[96] PSGR (March 16, 2022). Submission. Te Ara Paerangi - Future Pathways Green Paper. Page 4. https://psgr.org.nz/component/jdownloads/send/1-root/88-nzscience

The judiciary can be put on the 'back foot' in court cases concerning the alleged risks of a technology. The courts are faced with a dearth of scientists outside of government agencies who can point to the latest scientific data. Funding pathways to assess the toxicological risks of new gene editing technologies, environmental pollutants and to evaluate regulatory practice in light of the scientific literature are simply not available.

New Zealand often lags behind other more tightly regulated jurisdictions and regulators. The courts can lag and fail to value or weight global decisions relating to harm from technologies and their byproducts or pollutant emissions. The Courts can fail to take into account the relevant consideration of how hazards differ by age and developmental stage and health status. This was the case when the Ministry of Health ignored age stratified risk, and mandated healthy people to take BNT162b2 gene therapy, even if they were not at risk of suffering from the Sars-Cov-2 virus. Yet the courts considered precaution in terms of mandating all, rather than in not exposing health people to the novel BNT162B2 gene therapy.

Industrial-era weapons enabled colonial powers to extract and degrade the material resources of resident populations. As populations urbanised, twentieth century welfare reforms improved life quality for low-income groups, improving population-level outcomes. Reforms led to improved employment conditions, drinking water standards, and emergency care. Reforms tightened rules around industrial pollution and food contamination. As a consequence, manufacturing industries then shifted production to countries with poorer labour laws and weaker environmental health protections to lower manufacturing costs. Human and environmental health effects, often caused by exposures to toxic chemicals and heavy metals used in manufacturing, were transferred to poorer countries.

The risk for societies and nation-states in the twenty-first century has broadened to biological, technological and informational risks that can undermine free will and democratic life.

Emerging technologies including artificial intelligence, global digitisation, digital currencies, nanomaterials and biotechnologies all present dual risks to people and democracies. They can be stewarded for the benefit of humanity and social systems, they can be harnessed by powerful global actors to pursue political and financial goals, including by controlling access to knowledge and resources, and by eroding freedom and health.

Control and access to government contracts and partnership arrangements are prized by transnational institutions. Contracts can include the provision of digital services, pharmaceutical and biologic interventions, surveillance software, integrated artificial intelligence and algorithmic programmes and oversight and control of data storage. This includes the control and access to technologies and data that are presented as public good or free services.

Governments can serve people and promote transparency, or they can work more closely with the industries, often in the name of 'efficiency'. Democracies can be undermined through secrecy provisions and confidentiality clauses which primarily benefit commercial industry. The extent of redactions and the failure to disclose commercial arrangements, help people understand the extent to which governments prioritise a public purpose and democratic values, or bend to industry. Public access (or not) to trade agreement texts which are designed to increase access to trade, drugs, services and information for offshore entities, add another layer. Together, these actions obfuscate and erode democratic outcomes.

Emerging technologies present an extreme threat because they can be hidden, or black-boxed. It is difficult for the average person to identify how an algorithm will alter access to information and knowledge networks. Similarly, it is not easy to identify how artificial intelligence machine learning processes can be shaped to bias certain forms of information and 'facts'. Algorithms can become untrustworthy if certain factors, knowledge gaps or changing circumstances remain excluded from decision-making processes.

Acquisition of patents on life-forms through gene-editing processes are invisible if regulators rule that those gene editing techniques and the resulting organisms are not GMOs. Foods and medicines can be misleadingly labelled or contain undisclosed chemicals and nanomaterials that are harmful, undermining the understanding of informed consent, based on traditional rights.

The risk extends to the capacity of governments and transnational institutions to coordinate interventions, operations and policy-outcomes, out of sight of the public.

Many emerging technologies carry dual use potential. This includes military involvement in pandemic management and drug development, back-door access to the transnational companies that design and release the hardware and control the software, and back-door access to governments who are interlinked globally (i.e. through central bank networks, Five Eyes) intelligence agencies, or global security forums.

Neither MBIE, nor Collins, nor the SSAG have addressed how the public interest is navigated, when many of these technologies have dual use potential and can be used for nefarious purposes, including for population and behavioural control.

Bids to understand risks to environmental and human health frequently fall outside the scopes of MBIE funding schemes. Longer term research proposals tend to slide down funding ladders if they do not promise an innovation outcome (patents are associated with economic growth), and if there are no large peer groups which will view novel forms of research. For example, novel basic research into hazardous substances and new organisms and human health effects which involve novel screening technologies, interdisciplinary working groups, would fall outside of 'excellence' standards, and the impact would be uncertain and difficult to predict.

This can explain why during the Covid era, expert witnesses were brought in from overseas[97] and why large quantities of pesticides that were banned in Europe long ago, remain largely unstudied, but are polluting New Zealand water-ways.[98] The adverse effects and cancer risk from exposures to glyphosate herbicide have been recognised internally by the manufacturer for decades, yet not publicly disclosed.[99] [100] [101]

The New Zealand Environmental Protection Authority (NZEPA) is now facing court action over having never risk assessed glyphosate despite decades of scientific evidence showing the harmful effects of that herbicide.[102] [103] [104] New Zealand does not have a quorum of scientists with flexible long-term access to funding to explore toxic chemicals, and so, despite exporting $54 billion in agricultural exports per year, we do not have a scientist researching the risks of farmers, growers and applicators from the use of

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[97] NB. Even though a global leader in cardiology with 70,000 plus citations and an exemplary H-Index, in a court action which highlighted the cardiac risk of the NBT162B2 mRNA which was known by regulatory agencies at the time of the court action, McCulloughs Affidavit was never discussed in the court documents. NZDSOS (2022). Court Case 2022 Review. https://nzdsos.com/2022/06/03/nzdsos-court-case-2022-review/

[98] Hageman KJ, Aebig CHF, Luong KH, Kaserzon SL, Wong CS, Reeks T, Greenwood M, Macaulay S, Matthaei CD. Current-use pesticides in New Zealand streams: Comparing results from grab samples and three types of passive samplers. Environ Pollut. 2019 Nov;254(Pt A):112973. doi: 10.1016/j.envpol.2019.112973.

[99] PSGR (September 22, 2021). Call for Information on Glyphosate. Submission to the New Zealand Environment Protection Authority. https://psgr.org.nz/component/jdownloads/send/1-root/78-2021gly

[100] Crisco A. (Mar 24, 2025). Monsanto Hit With $2B Verdict After Jury Finds Roundup Weed Killer Caused Georgia Man's Cancer. *Courtroom View Network*. https://blog.cvn.com/monsanto-hit-with-2b-verdict-after-jury-finds-roundup-caused-cancer

[101] See e.g. Pilliod et al. vs Monsanto Company. Reporters Transcript of Proceedings. April 11 2019. https://usrtk.org/wp-content/uploads/bsk-pdf-manager/2019/04/Trial-Transcript-Pilliod-April-11-2019.pdf

[102] Environmental Law Initiative (January 2025). Challenging the EPA's regulatory failure on glyphosate ELI v Environmental Protection Authority. https://www.eli.org.nz/cases/glyphosate

[103] Douwes, J., 't Mannetje, A., McLean, D., Pearce, N., Woodward, A., & Potter, J. (2018). Carcinogenicity of glyphosate: why is New Zealand's EPA lost in the weeds? New Zealand Medical Journal, 82-89.

[104] Malkan S, (January 15, 2025). Glyphosate: Cancer and other health concerns https://usrtk.org/pesticides/glyphosate-health-concerns/

glyphosate. Effectively, by not risk assessing glyphosate, the NZEPA have effectively mislead Parliament and the public on the safety of glyphosate. This 'failure to act' could be regarded as a serious illegality that runs through much of administrative law and actions of government.

Scientists in New Zealand are unable, for example, to research the neurotoxicity of fluoride because of a lack of funding. It is likely that this is why the NZEPA isn't researching this hazardous substance either. It also explains why the lawyer who took the U.S. Environmental Protection Agency to court for inaction on the toxicity of fluoride, has received such a warm welcome by New Zealand communities, long stymied by regulatory firewalls.[105][106]

The public might think that the new Gene Technology Regulator would be able to actively review the science on the risk of techniques of genetic modification and gene edited organisms, or find domestic scientists to undertake important research. There are no funding pathways for such research. Moreover, informational feedback loops which would enable (and require) the gene technology Regulator to ask local scientists to research and monitor harms from GMOs, are absent from the Bill.

Instead, the Gene Technology Bill requires that the regulator can only turn to other regulatory agencies for scientific advice or ask the Technical Advisory Committee. The text binds the regulator. It will prevent best practice outcomes. The Bill demands that New Zealand regulators automatically approve a biologic drug, such as a gene therapy, if two other regulators approve it. [107]

The text implicitly acknowledges what the biotech and other industries such as the pesticides industry clearly understand. By convention, regulatory agencies turn to the industry applicant for new information. Industry applicants are unlikely to volunteer information that suggests their product causes harm that could impair market access for their product.

As briefly referred to above, PSGR's 2022 submission to the Te Ara Paerangi - Future Pathways Green Paper[108] took the position that innovation-based research should not lead but should be a function and consequence of earlier work that has been led by principle-based targeting of knowledge gaps (See recommendations Appendix (iii)).

There are many more examples where our science and policy system has been decoupled from assessing human or environmental harm, and hence, prevented from addressing long-term problems and challenges. In 2022 PSGR cited 6 examples of how governance is impaired when scientific information is deficient or absent:

1) Revision of drinking water standards failed to 'update the science' by taking into account risk from mixture effects and hormone-level exposures. Instead, it defaulted to levels drawn from old data.
2) The policy informing the proposed Digital Identity Services Trust Framework Bill ignored any risks to democratic stability, and human autonomy and rights which could be imposed by public or private actors with privileged access to digital infrastructure and personal data.
3) The Natural and Built Environments Bill failed to mention manmade, or anthropogenic pollution. Cabinet policy papers ignored pollutant (not climate change) emissions into water, soil, and

[105] Fluoride Free NZ. (February 2025). Water Fluoridation: US Attorney Michael Connett's Presentation - Landmark Court Case Against US Govt. https://www.youtube.com/watch?v=rFeP0zw2c0Q
[106] Food & Water Watch, Inc., et al., (plaintiffs) v. United States Environmental Protections Agency, et al. (defendants). United States District Court. Northern District of California. Case 3:17-cv-02162-EMC. Judge Edward M. Chen.
[107] See discussion points 177-199. PSGR (February 17, 2024). Gene Technology Bill 2024, Submission to the Health Select Committee.
[108] PSGR (March 16, 2022). Te Ara Paerangi - Future Pathways Green Paper https://psgr.org.nz/component/jdownloads/send/1-root/88-nzscience

human systems. There's no overarching requirement in law to identify pollution, nor to ensure that the technologies to identify and monitor pollutants are kept up-to-date.

4) A language around equity that exclusively concerns medical equity, not health equity. Over-medicalisation fails Māori, Pasifika and low-income groups as illness is not prevented.
5) An overweighting of agricultural research on genetics and commercial priorities and an under-allocation of research to 'boots-on-the-ground' research. The failure to resource informational feedback loops between farmers and growers and scientists and researchers, which supports practical knowledge for farmers and growers but also can prompt research and innovation.
6) Inadequate resourcing for persistent environmental pollutants. This includes for monitoring, evaluating contaminant pressures, researching to identify safe, non-toxic alternatives and ensuring that replacement products do not also cause harm (as a regrettable substitute). [109]

PSGR discuss 4 cases below where our science and policy system disproportionately resources emerging technologies but fails to resource research that could identify emerging tech risks and consider other pathways that might more readily promote wellbeing and productivity.

Granting of the economic growth agency the powers to direct New Zealand's science system, has led to the development of a perversely incentivised path-dependent system that cannot address local health-based, infrastructure-based, resource-based and governance-based risks.

It is perversely weighted to finance man-made (i.e. synthetic) genetic alterations of living systems and funding carbon dioxide-related causes.

a. Case study: 20 years of biotech funding, but no return on investment analyses.

Despite years of publicly funded research into biotechnology and GMO development, there has been no corresponding economic evaluations undertaken to justify this resource allocation.

Nor have funding budgets been established or granted for research into the risk from gene editing techniques and organisms. In contrast, plenty of funding has been allocated for speculative product development and research.

MBIE directs funding for biotechnology and GMO development.[110] AgResearch estimated the total amount of funding for the high metabolizable energy (HME) ryegrass between 2002-2022 has been $44 million. Between 2002-2011 MBIE directed $26.97 to GM pasture species (ryegrass & clover) research.[111] For example, MBIE, AgResearch, DairyNZ, PGG Wrightson Seeds and Grasslanz Technology have together invested $24 million in the HME ryegrass programme. Ryegrass is essentially an invasive species, i.e. its pollen and seeds readily travel long distances, making it completely uncontainable.

Part of this funding went to investigating gate-keeping throughout supply-chains that would impede New Zealand's ability to market GM food overseas. Consumer resistance to GMOs wasn't a focus of the research and wasn't taken into consideration. The research concluded that government regulation and non-GMO acceptance by some consumers were more important factors to access global value chains. [112]

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[109] PSGR (March 16, 2022). Submission. Te Ara Paerangi - Future Pathways Green Paper. Page 4-7. https://psgr.org.nz/component/jdownloads/send/1-root/88-nzscience

[110] AgResearch August 2023 Official Information Act Response. Project no.50215. Page 1. https://fyi.org.nz/request/23194/response/90770/attach/9/Part%20A%20OIA%20data%20All%20Projects%20Biotechnology.pdf

[111] AgResearch August 2023. Official Information Request – Budgets for Biotech and GM Pasture Specieshttps://fyi.org.nz/request/23194/response/89121/attach/9/Letter%20J%20Bruning%20OIA%20Request%20160823.pdf

[112] AgResearch August 2023. Official Information Request – Budgets for Biotech and GM Pasture Species. https://fyi.org.nz/request/23194/response/90770/attach/8/Letter%202%20J%20Bruning%20OIA%20Request.pdf

Project Code	Project Name	$mill	Timing	Est ROI	Expected Benefits
15795	AI on hooves	1.150	2017-2021	$10million p.a. in national sheep herd.	Genetic improvement stud breeders.
50215	GM Forages	8.5	2017-2024	Increase farm revenues up to $900 per ha.	Licensing of Grasslanz cultivar to NZ seed companies, or O/S. Lipid content envisaged to improve animal nutrition. Anticipated reduction NO2
14520x03	Fermented Foods Obj 3 Tastant Detection	1.83	2017-2022	Est net export revenue gain NZ$189m per annum by 10 years post completion of the programme.	Next generation fermented food products for export markets
PRJ0044654	Insect active nano-machines	1.00	2018-2022	No analysis	This fundamental research project may support future alternatives to chemical insecticides. The knowledge outcomes are being used to support an ACVM regulatory package.
PRJ0119461	Improving resource efficiency using gene edited endophytes	4.09	2019-2026	Direct value-add from new endophyte sales, if adopted, have an estimated marginal benefit to sellers of $118m after 20 years post-completion of the programme	Endophyte strains expressing new pesticidal compounds without affecting mammals can be introduced to further lift resource use efficiency, reduce environmental impacts, and provide health benefits to grazing livestock
PRJ0133302	High-value New Zealand pigs for transplantable biomaterial	1.00	2019-2023	At commencement of the project, NPV of estimated benefit to NZ at 10 years post adoption of the research outcomes was $86M	The ultimate goal of the research is to support the development of gene-edited pigs for harvesting of immune-compatible biomaterials for humans, principally kidneys. The technology would be applied domestically through Nzeno.
PRJ0133413	Rapidly evolving climate-smart dairy cattle	10.00		Directly introgressing two natural heat tolerance variants will return an estimated total (real) net present value (NPV) by 2034 of $200M, if the technology is adopted. Independent of regulatory approval, improved capture of unedited elite embryo genotypes has an NPV of $240M.	Proven impact of sequence variants will increase accuracy of genomic selection in New Zealand. Improved production efficiencies of the New Zealand dairy herd with improved genetics.

Fig.11: MBIE funded AgResearch biotechnology research.

When the Crown Research Institute AgResearch was directly asked to provide evidence of return on investment and financial outcome, they responded with vague discussions about research investment but did not supply financial evaluations of investment return.[113]

Equivalent funding for long term research to assess nutritional benefits of forage mixtures, including to mitigate drought-risk, reduce disease risk and improve productivity, would be out-of-scope of MBIEs multi million-dollar science funding streams for long-term projects. There would never be the equivalent promise of patents, and licensing. AgResearch is simply following the money.

Government-funded innovation-led research often favours narrow-path dependent research that has greater possibility of producing IP or a patent and then commercialising a product. Researchers know that they will not be funded without an innovation or commercialisation pathway structured into their grant application. However, the return on investment calculations from government funded research is rarely undertaken, and these research trajectories may not support the public interest.

New Zealand science and research funding may be better directed to both identify and then research public-interest-based issues and challenges. Without principle-led research, these issues can be neglected because they interweave with political, social-cultural and financial interests.

b. Case study: AI, the socio-political, digital, double-edged sword.

As with many technologies, AI is being swiftly integrated into human life. AI is envisaged as an unstoppable trend that will catalyse innovation and future development. AI is a tool that aggregates information at scale. As a tool that expands knowledge, AI is likely to bring about positive and negative consequences from everyone from the individual to the most powerful organisations in the world.

The tremendous power and reach of large pre-trained systems known as large language models (LLMs) creates massive opportunities, but carries an extraordinary range of economic, political, social, and cultural risks. The generative pre-trained transformer (GPT) framework is one type of LLM. Donald Rumsfeld's 2002 quote possibly most accurately reflects the challenge of stewarding AI, if it is to be optimised for human thriving:

> *'there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know. And if one looks throughout the history of our country and other free countries, it is the latter category that tends to be the difficult ones.'*[114]

In order to understand the political, cultural issues at stake, and the potential for abuse of power, the scientists and researchers who research AI and the risks relating to AI must have the freedom and latitude to undertake exploratory and long-term research, at a distance from political agencies and Ministries.

AI is a double-edged sword that can remove jobs and create new career opportunities, it can reflect or undermine the goals of powerful interests, while also holding the potential (at scale) enhance or undermine human freedoms. Power is closely allied with knowledge and intelligence, and AI is a threat to the exercise of power. Circumspection is therefore warranted when institutional interests call for the standardisation of AI, as decisions that have potential to standardise information will directly impact

[113] AgResearch September 2022. Official Information Act Request – IP protocols and remuneration; and financial return from biotech investment https://fyi.org.nz/request/19298/response/77203/attach/9/Letter%202%20J%20Bruning%20OIA%20Request%20IP%20protocols%20and%20remuneration%20biotech%20investment.pdf

[114] Wikipedia. There are unknown unknowns. Accessed April 5, 2025. https://en.wikipedia.org/wiki/There_are_unknown_unknowns

what humans can know, how we know it, the legitimacy of that knowledge and whether it is a fact, a half-truth or a conspiracy.

Many global institutions are moving swiftly to publish documents and reports on the risks of artificial intelligence, and to recommend pathways for stewardship and governance. AI safety is an important concern, particularly in relation to privacy and cybersecurity, fraud and the problem of deep fakes.

However, with full awareness of the knowledge potential of AI, these reports can be used to pre-emptively frame a language for how safety, risk and benefit is publicly characterised. This language around safety and risk can be shaped to reflect political priorities and institutional goals. However, this language then becomes a set of 'rails', guiding what is considered a risk by policy-makers and governments. The language set in place by those organisations can shape political discourse on how risk and safety are publicly considered, how governance might be approached, and directly influence the design of new legislation.

Government documents discuss the risk of a 'loss of control'.[115] The question may be asked, the loss of whose control, and for what purpose was that control being exercised. There will be risk that nefarious actors use AI for malignant purposes, but there is also the risk that governments and global corporations harness AI to ensure that populations are nudged in the direction that suits their purpose or reflects their larger goals. There is a risk that AI can be algorithmically tweaked to realign the system with the status quo beliefs, or in even being banned.

> **Since the publication of the Interim Report, new research has led to some new insights about risks of bias and loss of control.** The evidence of bias in general-purpose AI systems has increased, and recent work has detected additional forms of AI bias. Researchers have observed modest further advancements towards AI capabilities that are likely necessary for commonly discussed loss of control scenarios to occur. These include capabilities for autonomously using computers, programming, gaining unauthorised access to digital systems, and identifying ways to evade human oversight.

Fig 9. The International Scientific Report on the Safety of Advanced AI. January 2025. Page 19.

The nature and potential of 'bias' in AI requires in-depth exploration. The global AI platforms can have inbuilt biases or reflect particular value systems which mirror the culture of the AI companies and developers and the value systems of the country where the technology was developed.

However, powerful interests may identify an AI 'bias' that sheds light on political information that would be of benefit if it were broadly understood by people, but where this information has previously been suppressed or characterised as a 'conspiracy theory'.

Standardisation could be used to eliminate 'bias' in the AI platform and ensure that this information continues to be suppressed. Reports discussing AI bias tend to express bias within politically-acceptable frameworks. The problem of 'bias' where AI may correctly contradict a public 'fact' is not discussed. The reports tend to be silent on politically controversial issues where a dominant political or scientific belief

[115] International AI Safety Report. The International Scientific Report on the Safety of Advanced AI. January 2025. AI Action Summit. Page19.
https://assets.publishing.service.gov.uk/media/679a0c48a77d250007d313ee/International_AI_Safety_Report_2025_accessible_f.pdf

or paradigm has been entrenched via legacy control over mainstream and social media and restriction of scientific freedom.[116] [117]

For example, the 2024 Stanford Report[118] exclusively discusses biases relating to political party, race and gender. What is not discussed are larger issues where AI might contradict politically entrenched policy goals, or the status quo beliefs of powerful interests.

When AI contradicts a politically-sensitive public 'fact' it should be expected that powerful authorities would call for the content moderation (censorship) of AI because it is 'biased' and 'misleading'. Instead of bringing hearty debate to a conversation that might ultimately support greater consensus around an issue, the 'biased' AI could be viewed as wrongly amplifying social or political biases.

Bias may occur in many ways. AI might also be biased as it might reflect a weight of evidence, but fail to identify whether vested interests have funded that information, and if government budgets have failed to provide funding pathways for research that might contradict industry-funded data.

For example, there is a risk that powerful actors will call for AI systems to be standardised and 'responsibly benchmarked'[119] or 'unified approach'[120], and through this process, ensure that information and knowledge is also standardised to ensure that AI communication does not contradict the goals of powerful, global institutions. The public should anticipate a battle of scientific publications around the 'problem' of AI and its' potential to dually shed light on political issues long suppressed as conspiracy theories, but conversely enable nefarious actors to misinform and undertake false flag operations.

Often if a report is critical and draws attention to these problems described above, it may ultimately have no capacity to alter AI platforms functioning, despite the salience of the risks that can be raised, as that report can simply be excluded from any policy process.

Scientists and researchers must have the latitude and political will to scrutinise publications and claims to identify whether these reports and publications serve the broader public interest and human freedoms. Do these reports they meaningfully address the nature of power, and highlight the potential for institutions to control the AI architecture and abuse power either directly or indirectly? If proxy censorship 'standards' are 'harmonised' and locked in, the people of the world will face extraordinary barriers to reversing what are likely to be referred to as 'best-practice' models.

In a recent survey, experts from a diverse group of technology affiliated fields[121] were asked the question:

> *How is the coming Humanity-Plus-AI future likely to affect the following key aspects of humans' capacity and behavior by 2035 as compared to when humans were not operating with advanced AI tools?*

Most of these experts predicted that change is likely to be mostly negative. The responses often revolved around the nature of human and social life, the nature of what it means to be human, to have different perspectives, ideas and thinking processes.

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[116] E.g. See Kuhn, T (2012). The Structure of Scientific Revolutions, 4th Ed. Chicago.
[117] E.g. Popper, K. R. (1959). *The logic of scientific discovery*. University Press.
[118] Anderson J, Rainie L. (April 2025) Being Human in 2035 How Are We Changing in the Age of AI? "Expert Views on the Impact of AI on the Essence of Being Human." Elon University's Imagining the Digital Future Center. April 2, 2025. https://imaginingthedigitalfuture.org/wp-content/uploads/2025/03/Being-Human-in-2035-ITDF-report.pdf
[119] Stanford University (2024) Artificial Intelligence Index Report 2024. https://hai-production.s3.amazonaws.com/files/hai_ai-index-report-2024-smaller2.pdf
[120] AAAI 2025 Presidential Panel on the Future of AI Research. Association of the Advancement of Artificial Intelligence. https://aaai.org/wp-content/uploads/2025/03/AAAI-2025-PresPanel-Report-FINAL.pdf
[121] Anderson J, Rainie L. (April 2025) Being Human in 2035 How Are We Changing in the Age of AI? P.278

It is critical that humans, from children, to early-stage career professionals, to governments and policymakers do not default to the authority of AI and develop inflexible beliefs and guidelines based on the information that they sourced from AI. Often, our institutions are not very good at communicating the limits and the risks of the technologies that we surround ourselves with.

Agencies and institutions can potentially harness this tool to carry out functions and tasks in the name of 'efficiency' and cost savings, but in doing so unwittingly establish the circumstances for societal-wide reverberations (much like the butterfly effect) that can lead to a decline in intelligence, undermine human creativity and prevent human flourishing.

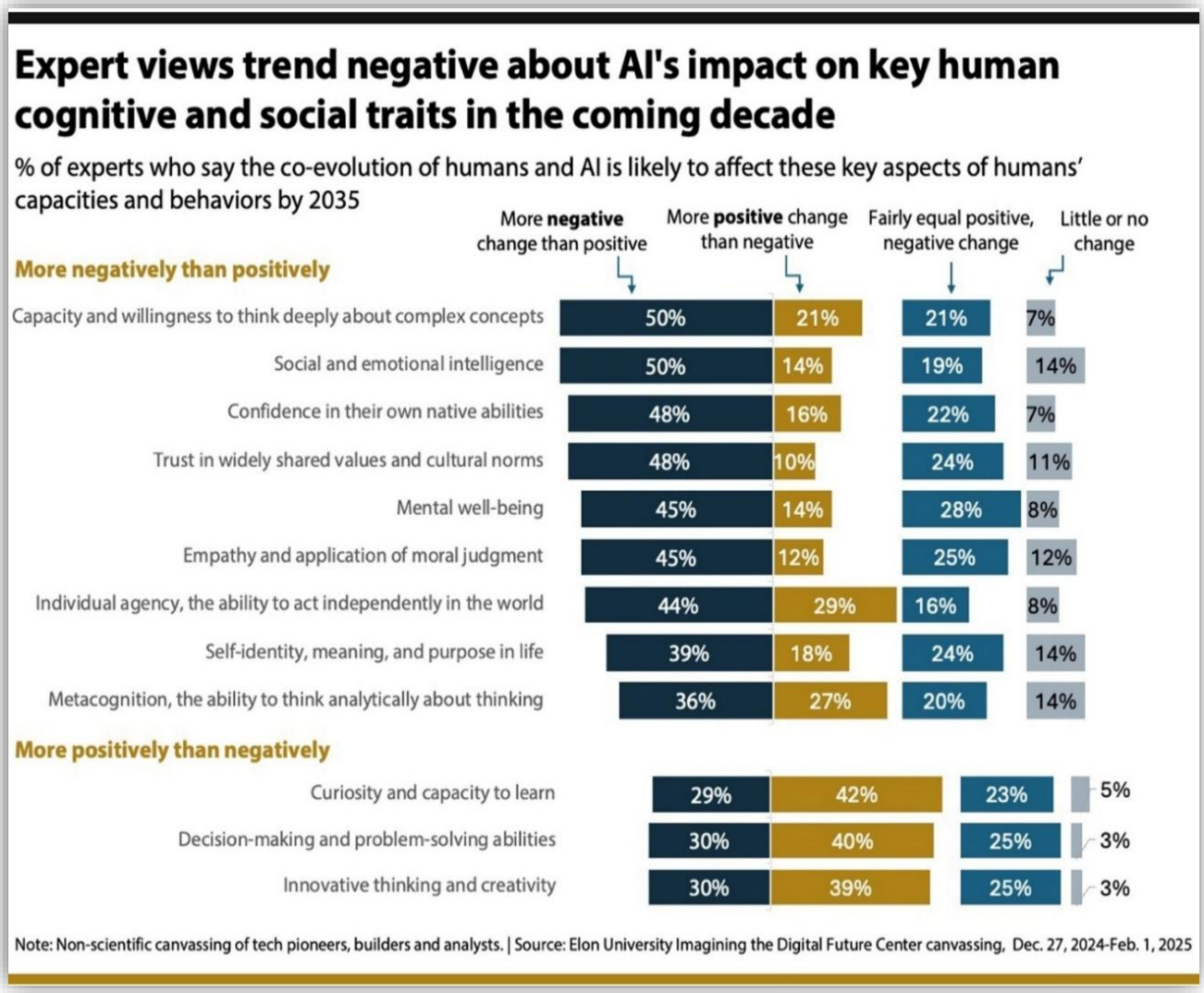

Fig 10. Expert Views on the Impact of AI. Elon University. April 2025.

AI carries the potential to enhance decision-making in complex socio-political and socio-biological environments, but also the potential to entrap us if thinking is delegated to the technical prowess of the AI platforms. Society would be mistaken to dismiss or undermine human expertise and intuition from the lived/expert experience, i.e. human *judgement*, and default to AI's technical prowess. People can use 'fast thinking' mental shortcuts, using problem-solving techniques, or rules of thumb, that we recognise as

heuristics.[122] [123] A recent study found that the cognitive capabilities of GPT models 'often lack the robustness of zero-shot human analogy-making, exhibiting brittleness'. Decision outcomes varied, depending on the order of problems provided, i.e. an answer-order effect. Algorithms depend on step-by-step approaches. The models also struggled to identify patterns of information and generalise from those patterns.[124]

While human shortcuts can lead to error, AI decisions can lead to error. Quick reasoning can be critical in emergency situations, however, the underlying reasoning process must open to scrutiny.

Delegation to the authority of AI can carry risks in healthcare, for example. Clinical medical expertise arises over time, and expertise assists doctors to professionally and intuitively navigate the journey of patients when they struggle with complex health problems. AI may be less wise to the human (and metaphysical) elements of disease and recovery, particularly in cases where patients present with complex comorbidities. Therefore, AI can be valuable in summarising the science relating to individual conditions and treatments, and highlight risks from drug mixtures (polypharmacy), but different patients will have independent risk factors that change how they will respond to any mixture of therapeutic intervention. AI might also assist to normalise non-medical therapies, such as by recognising a weight of evidence that supports the use (and relative non-toxicity) vitamins and minerals.

Therefore, if an early-career doctor depends on AI exclusively, this may work for many patients, but some patients will have particular circumstances (emotional, genetic, biological, environmental) that require the doctor to cautiously evaluate, based on the very human circumstances in front of them.

Defaulting to the authority of AI creates risks both at the individual level and risks at scale, if governments us AI to guide, rather than inform. AI holds the potential, rather like a behavioural decision, to impair daily functioning and undermine personal and professional life. There is a risk that humans downplay and set aside life experiences professionally and personally, that inform and enrichen human life. Instead, people could default to the technical correctness of AI and undermine their own knowledge and thinking processes. Challenging experiences, from practical skills development, to human relationships, to decision-making processes, such as in early learning and development and throughout the educational process, are critical for the development of reasoning and judgement, and for ensuring human brains develop to their full potential.

The question that might be important is: if mankind has limited capacity to control AI how do we steward our human systems and institutions so that AI is neither a crutch nor an overlord, but a tool to promote human thriving? The question is more important when humans are faced with emergency situations. If governments delegate their decision-making processes to AI, *qui bono* – who benefits now, and in future? A technical response to an emergency may have long-term adverse consequences. The cure may be worse than the cause.

Without scientists and researchers with intellectual freedom, it can be difficult to navigate and contextualise this murky, often highly political, environment. The environment reflects, in many ways, the liminal nature of warfare. Powerful interests have been involved in the development of AI technologies for decades. Independent scientists should have the power to evaluate potential AI weaknesses and algorithmic biases, and draw attention to values that might lead to the AI valuing certain forms of information over other forms.

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[122] Pratkanis, A. (1989). The cognitive representation of attitudes. In A. R. Pratkanis, S. J. Breckler, & A. G. Greenwald (Eds.), *Attitude structure and function* (pp. 71–98). Hillsdale, NJ: Erlbaum.
[123] Kahneman, D. (2011). Thinking, fast and slow. Macmillan.
[124] Lewis M, Mitchell M (2025) Evaluating the Robustness of Analogical Reasoning in GPT Models. *Transactions on Machine Learning Research*. arXiv:2411.14215 Doi: 10.48550/arXiv.2411.14215

Unfortunately, long-term New Zealand-based research to understand and appreciate these issues is unlikely as, like much other research, this sort of research falls outside the scope of funding programmes.

c. Case Study: The NZ EPA's deficient approach to approving Pfizer's genetic tech.

During Covid, 2021-2024, the New Zealand government was exclusively dependent upon data from Pfizer and data from other regulatory agencies to identify risk-based pathways from the mRNA gene therapy, an experimental and completely new technology. Collegial regulatory agencies also depended on Pfizer's data to assure to the public that the mRNA gene therapy was safe and effective. It was difficult for people to report adverse events to Medsafe, and to access financial assistance from the Accident Compensation Corporation. The mainstream media actively criticised people who were trying to highlight the potential risk of the experimental technology and did not cover reports of adverse events.

What follows is abhorrent, but true. During Covid, scientists were not funded to research risks[125] [126] from RNA drugs and mRNA vaccines. New Zealand's health research policy doesn't permit it.[127]

Approval for the mRNA injection was granted after a single Zealand Environmental Protection Authority (NZEPA) scientist swiftly drafted the NZEPA's Staff Assessment report[128] on the mRNA genetic component of the BNT162B2 injection. The technology was specifically designed to enter human cells and replicate. The lipid nanoparticles were the transfection agents, and enabled the technology to evade normal body defence systems. The paper was then forwarded to the Committee, two people who did not have expertise in biologic drugs and mRNA risk.[129] The report was dated February 2, 2021, the same date that the provisional consent approval was granted.[130]

The basis of NZEPA's claim mirrored Pfizer's position, which emphasised strict adherence to the language in the Hazardous Substances and New Organisms Act (HSNO Act). Because the *produced organism* doesn't replicate, it will not be categorised as a genetically modified organism. The NZEPA scientist used the Oxford English dictionary to attempt to untangle the precise meaning of the word 'organism' and 'genetic element' in the Hazardous Substances and New Organisms Act.

The resemblance between instructions designed to replicate, and a produced organism that replicates, was not addressed by NZEPA staff with full consideration of the greater purpose of the HSNO Act which is to protect the health and safety of people. The NZEPA scientist did not outline that the intended function of the BNT162B2 mRNA technology resulted in a biological function that resembled the replicating activity of an organism. The mRNA technology operated as a blueprint, to transport and encode a gene into the cell, where it could use the cell's machinery to produce unlimited quantities of the modified spike protein. This same EPA scientist did not address the ethical overlap

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[125] Igyarto BZ and Qin Z (2024) The mRNA-LNP vaccines – the good, the bad and the ugly? Front. Immunol. 15:1336906. doi: 10.3389/fimmu.2024.1336906 Contamination

[126] Bhattacharya J and Kulldorff M. (2025). The Covid Vaccine Trials: Failures in Design and Interpretation.1:1 *Journal of the Academy of Public Health*. https://doi.org/10.70542/rcj-japh-art-lx5ggg

[127] Bruning, J. 2022. University of Auckland Master of Arts (sociology). Thesis. Innovation and Ignorance: How Innovation Funding Cultures Disincentivise Endocrine Disruption Research. https://researchspace.auckland.ac.nz/handle/2292/57929

[128] NZ EPA (February 3, 2021) Staff Assessment Report. Advice to the Decision-making Committee on APP204176: Pfizer SARS-CoV-2 vaccine BNT162b2 (COMIRNATYTM) Dr Kerry Laing and Dr Julie Everett-Hincks. https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP204176/APP204176-Staff-Assessment-Report.pdf

[129] NZEPA. (February 11, 2021). Decision. Determination of whether or not any organism is a new organism under section 26 of the Hazardous Substances and New Organisms Act 1996 (the Act). Consideration date 4 February 2021 https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP204176/APP204176-Decision.pdf

[130] See discussion: Bruning J. (July 25, 2023). How did our NZEPA fail to recognise that BNT162b2 [mRNA] was a GMO? https://jrbruning.substack.com/p/how-did-our-nzepa-fail-to-recognise

This NZEPA paper did not consider any potential of the mRNA to drive systemic risks which could arise from the release of unrestricted quantities of a spike protein that was scientifically known for its inflammatory potential, that was coded for by synthetic modified RNA, from human cells into the body for an unknown timespan.

The paper failed to address toxic co-formulants that were integral to the success of the mRNA technology. Encapsulating lipid nanoparticles would evade the body's normal detection system, enabling potentially contaminated, synthetic, modified RNA to enter human cells and then produce unregulated quantities of the SARS-CoV-2 spike (S) protein. Also not considered was (a) the issue of persistence from the unregulated production of spike protein; (b) the potential for the mRNA product to be transferred into the genome and become heritable; or (c) that contaminating foreign plasmid DNA could also be incorporated into the genome. Contamination has long been a challenge in biologic drug development.[131] [132] [133]

Pfizer and Moderna were expected to declare all open reading frames (ORFs), any sequence of bases that could potentially encode a protein, including unexpected ORFs. This information should have identified all functional components of each bacterial plasmid's DNA.

The New Zealand public were injected with the gene edited BNT162b2 solution made via Process 2[134]. However, the outcome of the Process 2 trials and tests on only 250 participants was never published. It is now evident that batches made under Process 2 were contaminated with plasmid DNA fragments.[135] Contamination is a recognised risk[136] and manufacturers have skirted this problem by utilising a differently manufactured product for premarket assessment. Furthermore, laboratory studies did not consider the risk from lipid-nanoparticle encapsulation of mRNA and DNA, which facilitates entry to the cell.

A further very concerning contaminant in the vaccine mixture includes the intact promoter and enhancer elements from Simian virus 40 (SV40) which comprises 72 base pairs. The SV40 promoter sequence, only 50 base pairs long, is very effective at nuclear targeting.[137] Pfizer did not declare that SV40 promoter (eukaryotic enhancer) elements were used in batch processing. Note, this is a promotor region or element, not the entire viral sequence. This promoter element assists DNA to cross the nuclear membrane in order to increase the likelihood of integration. Regulators claim that the sequence is inactive, without a functional role.[138]

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[131] McCarty, N.S., Graham, A.E., Studená, L. et al. Multiplexed CRISPR technologies for gene editing and transcriptional regulation. *Nat Commun* 11, 1281 (2020). https://doi.org/10.1038/s41467-020-15053-x
[132] Barone, P.W., Wiebe, M.E., Leung, J.C. et al. Viral contamination in biologic manufacture and implications for emerging therapies. *Nat Biotechnol* 38, 563–572 (2020). https://doi.org/10.1038/s41587-020-0507-2
[133] Glass,Z, Lee M, Li Y, Xu Q. (2018). Engineering the Delivery System for CRISPR-Based Genome Editing. *Trends in Biotechnology*, 36:2;173-185. Doi: 10.1016/j.tibtech.2017.11.006
[134] Guetzkow J, Levi R (2023). Rapid response to: Covid-19: Researchers face wait for patient level data from Pfizer and Moderna vaccine trials. *BMJ* 2022;378:o1731, doi: 10.1136/bmj.o1731
[135] Kammerer U, Schulz V, Steger K.(2024) BioNTech RNA-Based COVID-19 Injections Contain Large Amounts of Residual DNA Including An SV40 Promoter/Enhancer Sequence. *Public Health Policy Journal* https://publichealthpolicyjournal.com/biontech-rna-based-covid-19-injections-contain-large-amounts-of-residual-dna-including-an-sv40-promoter-enhancer-sequence/
[136] Janghorban, M., Kazemi, S., Tormon, R., Ngaju, P., & Pandey, R. (2023). Methods and Analysis of Biological Contaminants in the Biomanufacturing Industry. *Chemosensors,* 11(5), 298. doi: 10.3390/chemosensors11050298
[137] Young JL, Benoit JN, Dean DA. Effect of a DNA nuclear targeting sequence on gene transfer and expression of plasmids in the intact vasculature. *Gene Ther.* 2003 Aug;10(17):1465-70. doi: 10.1038/sj.gt.3302021. PMID: 12900761; PMCID: PMC4150867.
[138] See E.g. U.K. Government. https://assets.publishing.service.gov.uk/media/669e40cdce1fd0da7b592a11/FW__FOI_24_212_final_redaction.pdf

Unregulated cell growth presents a cancer risk. The polyomavirus simian virus 40 (SV40) is a potent DNA tumour-inducing virus, or, in other words,

> '*a known oncogenic DNA virus which induces primary brain and bone cancers, malignant mesothelioma, and lymphomas in laboratory animals*'.

In 2004 scientists suggested that SV40 could be considered a 'declared human pathogen'.[139] Professor Angus Dalgliesh, an oncologist from the University of London, has described how SV40 is used as a tumour growth promoter on rodents, enabling laboratory researchers to test the efficacy of chemotherapy.

The oncogenic potential of SV40 was discovered by National Institutes of Health scientist Dr Bernice Eddy in 1960, and studies continue to elucidate pathways of potential oncogenesis. Eddy had earlier discovered that the previously claimed inactivated vaccine manufactured by Cutter Laboratories, instead contained a live poliovirus that was found to paralyse test monkeys. The contaminated Sabin polio vaccine stocks were not recalled, and the harmful product remained on the market even after the oncogenic potential had been identified. [140] [141]

Insertional mutagenesis is an unavoidable consequence of the transposition of genetic material and scientists have always understood that this action carries the risk of oncogenesis (cancer).[142] In April 2023, genomics expert Dr Kevin McKernan and colleagues detected SV40 in Covid-19 vials,[143] and presented these findings to the Covid-19 Vaccine Contamination to the FDA VRBPAC Advisory Committee. The preprint of this paper has had more than 19,000 downloads.

Eight laboratories globally, have detected high levels of DNA contamination in Covid-19 vaccines.[144] Most recently, in March 2025, Czech clinical biochemist and molecular geneticist Dr Soňa Peková detected residual DNA in both Pfizer and Moderna vaccines at levels up to 100 times higher than regulatory limits.[145] Peková noted that there were amounts of DNA in the tested solution that was quantitatively comparable to the amounts of the active mRNA.

SV40 is not the only potential oncogenic pathway.[146]

This raises the question: if the NZEPA were adhering to their constitutional purpose of protecting health and safety, why wouldn't they, or any other government department, consider a broader concept of risk from a biological drug that includes the potential for laboratory-based or process-based contamination from a new technology?

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[139] Vilchez RA, Butel JS (2004) Emergent Human Pathogen Simian Virus 40 and Its Role in Cancer. *Clin Microbiol Rev.* 2004 Jul;17(3):495–508. doi: 10.1128/CMR.17.3.495-508.2004

[140] Institute of Medicine (US) Immunization Safety Review Committee. Immunization Safety Review: SV40 *Contamination of Polio Vaccine and Cancer.* Stratton K, Almario DA, McCormick MC, editors. Washington (DC): National Academies Press (US); 2002. PMID: 25057632.

[141] Šenigl F, Soikkeli AI, Prost S, Schatz DG, Slavková M, Hejnar J, Alinikula J. The SV40 virus enhancer functions as a somatic hypermutation-targeting element with potential tumorigenic activity. *Tumour Virus Res.* 2024 Dec;18:200293. doi: 10.1016/j.tvr.2024.200293.

[142] Sadelain M. 2004. Insertional oncogenesis in gene therapy: how much of a risk? Nature Gene Therapy 11,569-573.

[143] McKernan K, Helbert Y, Kane LT, McLaughlin S. (2023). Sequencing of bivalent Moderna and Pfizer mRNA vaccines reveals nanogram to microgram quantities of expression vector dsDNA per dose. *OSF Preprints*. https://doi.org/10.31219/osf.io/b9t7m

[144] Demasi M (March 18, 2025). New evidence of DNA contamination in mRNA vaccines – too big to ignore. https://blog.maryannedemasi.com/p/new-evidence-of-dna-contamination

[145] Peková S (March 8, 2025). Quantitative Multiplex Real-Time PCR analysis of Moderna (Spikevax) and Pfizer (BNT162b2) vaccines. TILIA LABORATORIES s.r.o. Laboratory for molecular diagnostics Pchery, Czech Republic https://www.10letters.org/CzechResearch.pdf

[146] Valdes Angues R, Perea Bustos Y. SARS-CoV-2 Vaccination and the Multi-Hit Hypothesis of Oncogenesis. *Cureus*. 2023 Dec 17;15(12):e50703. doi: 10.7759/cureus.50703. PMID: 38234925; PMCID: PMC10792266.

The New Zealand government has failed[147] to disclose the extraordinary range of adverse events that were communicated by Pfizer to the U.S. Federal Drug Agency in February 2021 and that should have been communicated to all countries that had signed contracts with Pfizer. [148] Trials show that the COVID-19 gene therapy has had more deaths in the treatment group than the placebo group.[149] The Covid-19 commissioners have been presented with an extensive array of evidence that a percentage of the New Zealand public has been harmed, or in some cases killed, as a result of this gene therapy, and that the government has gone to great lengths to suppress that information.

The New Zealand public were misled in many ways, including that the BNT162B2 biologic drug was a vaccine. Pfizer's trial endpoints did not satisfy the requirements of a traditional vaccine, for preventing disease, and preventing the transmission of the disease. Instead, Pfizer's primary endpoints relied upon lowering symptoms in a two week period.

In 2025 New Zealand scientists were funded $70 million to scale up research on RNA drugs and mRNA vaccines. [150] [151] Independent funding is still unavailable for New Zealand scientists to research risks from RNA and mRNA biologic drugs, including the BNT162B2 gene therapy.

d. Case Study: Starved research for common chronic & infectious health conditions

Creeping policy problems often have long-term implications.[152] Funding committees for health research are required to prioritise innovation-based funding pathways, and so they push proposals that don't promise an innovation-related outcome, down the funding ladder.[153]

The consequence is that fundamental and applied research to gain scientific knowledge and shed light on the aetiology of complex chronic conditions remains unfunded. Long-term research to explore the drivers of increasingly common conditions including asthma, fibromyalgia, metabolic syndrome, Epstein Barr, chronic fatigue, depression, post-vaccine syndromes,[154] attention deficit hyperactivity disorder (ADHD) and anxiety, falls outside of current funding platforms. People can suffer from multiple diagnoses.

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[147] James C. (May 8, 2023) Official Information Act request to Medsafe. No.22327. https://fyi.org.nz/request/22327/response/84763/attach/4/H2023022884%20Response%20letter.pdf
[148] Pfizer Worldwide Safety Report.(April 2021) 5.3.6 Cumulative Analysis of Post-authorization Adverse Event Reports, by February 2021. https://phmpt.org/wp-content/uploads/2021/11/5.3.6-postmarketing-experience.pdf
[149] Thomas, S.J. et al. (2021). Six Month Safety and Efficacy of the BNT162b2 mRNA COVID-19 Vaccine. NEJM. 385, 1761-1773 (Pfizer) https://doi.org/10.1056/NEJMoa2110345 Adverse Events Page 6.
[150] University of Auckland (2023). The story behind New Zealand's mRNA platform https://www.auckland.ac.nz/en/news/2023/10/03/story-behind-mrna-platform.html
[151] Malaghan Institute (2024) https://www.malaghan.org.nz/research-and-expertise/research-platforms/rna-technology/
[152] Boston et al. (2019) Foresight, insight and oversight: Enhancing long-term governance through better parliamentary scrutiny. Institute for Governance and Policy Studies, Victoria University of Wellington. ISBN 978-0-473-48292-3
[153] Bruning, J. 2022. University of Auckland Master of Arts (sociology). Thesis. Innovation and Ignorance: How Innovation Funding Cultures Disincentivise Endocrine Disruption Research. https://researchspace.auckland.ac.nz/handle/2292/57929
[154] Scholkmann F and May C-A. (2025). COVID-19, post-acute COVID-19 syndrome (PACS, "long COVID") and post-COVID-19 vaccination syndrome (PCVS, "post-COVIDvac-syndrome"): Similarities and differences. *Pathology - Research and Practice*. 246:154497. Doi 10.1016/j.prp.2023.154497

These conditions appear to be predominantly driven by environmental factors that revolve around toxicity[155] [156] and dietary insufficiency.[157] These over and under-exposures can impact the function of genes through epigenetic pathways, promote inflammation, impair metabolic health and lead to a cascade of multimorbidity, where one person suffers from multiple conditions. The system stressors can then further deplete nutrient levels. Therapeutic interventions can include dietary change, nutrient-based protocols for nutrient depleted patients; treatments using off-patent antiviral and anti-inflammatory drugs; and the reduction, removal and detoxification of and from, hazardous exposures and emissions.

Serum testing and biomarker research can highlight inflammatory drivers and reveal patterns of reversal and remission. It is far easier to get livestock tested for toxic exposures than to get workers who are employed in industries with high exposure levels, or children who can be harmed by claimed 'safe' exposure levels, tested. Yet serum and tissue testing and biomarker research continues to be neglected by governments, despite the opportunity to refine technologies for commercial release.

Health indicator data does not include nutrient deficiency as a determinant of risk in populations which experience higher levels of non-communicable and communicable diseases.[158] Nutritional treatments to address nutrient deficits are not generally integrated into medical recommendations by general practitioners or medical experts in New Zealand.[159] There are no funding paths to assess the safety and efficacy of high doses of nutrients, e.g., Vitamin C, to treat (including to reverse and suppress) these conditions. Drug companies won't do this work due to the absence of intellectual property rights that could be granted following the research.

Studies in the scientific literature on nutrient levels in adults and children, by age, socioeconomic status and race are rare. This information gap fails low groups with the highest rates of chronic and infectious disease risk, who are frequently in low-income categories.

Ministry of Health nutrient guidelines are based on blood levels of healthy people, but this data is now 20–30-years-old.[160] The daily allowance recommendations based on this data are insufficient for unwell people who often require much higher doses in order to revert to healthy levels, and there is no information regarding optimum levels to support long-term health outcomes. Although the restorative higher-dose levels are globally recognised by groups researching and working with these conditions, the failure to fund such research in New Zealand, and then to integrate this knowledge into regulatory guidelines and public health recommendations, means that people in high-income groups can pursue these protocols while people in low socioeconomic groups with few resources cannot. [161]

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[155] Consortium for Children's Environmental Health (2025) Manufactured Chemicals and Children's Health — The Need for New Law. *N Engl J Med* 2025;392:299-305, doi: 10.1056/NEJMms2409092 https://www.mamavation.com/wp-content/uploads/2025/01/The-Paper_NEJM.pdf

[156] Landrigan PJ, Fuller R, Acosta NJR, Adeyi O, et al. (2017) The Lancet Commission on pollution and health. *Lancet*. 2018 Feb 3;391(10119):462-512. doi: 10.1016/S0140-6736(17)32345-0.

[157] Lane MM, Gamage E, Du S, Ashtree DN, et al. (2024) Ultra-processed food exposure and adverse health outcomes: umbrella review of epidemiological meta-analyses. *BMJ*. 2024 Feb 28;384:e077310. doi: 10.1136/bmj-2023-077310. PMID: 38418082; PMCID: PMC10899807.

[158] Ministry of Health. 2024. Tatau Kahukura: Māori Health Chart Book 2024 (4th edition). Wellington: Ministry of Health. https://www.health.govt.nz/system/files/2024-12/tatau-kahukura-maori-health-chart-book-2024-v4.pdf

[159] Ministry of Health. (February 13, 2025). Official Information Act. Jodie Bruning. No. 29768. https://fyi.org.nz/request/29768/response/117956/attach/7/H2025059327%20Response.pdf

[160] Australian Government Department of Health and Ageing National Health and Medical Research Council, Ministry of Health. Nutrient Reference Values for Australia and New Zealand Including Recommended Dietary Intakes. 2006 Version 1.2, Updated September 2017 https://www.nhmrc.gov.au/about-us/publications/nutrient-reference-values-australia-and-new-zealand-including-recommended-dietary-intakes

[161] See E.g. forthcoming: 2025 PSGR Report. Regulatory Blindspots: Why has the Ministry of Health made it more difficult for people with mental illness to access evidence-based nutritional therapies?

Long-term research funding to identify the biochemical and nutritional pathways that drive chronic and infectious disease could lead to scientifically validated data that could produce manifold health-based benefits. An example of this is vitamin D, which may not only assist with bone and brain health, but act to reduce the severity of complications from respiratory illnesses, including asthma. Long-term research projects to stratify the extent of vitamin D deficiency by age group or population or disease sub-group, and identify how higher-than-guideline levels might safely address deficiency and reduce disease severity would be outside current funding scopes.

Guidelines on measles treatments are not available other than an additional MMR vaccine as a post-exposure prophylaxis (PEP). The evidence to support this is poor, and the effectiveness of measles PEP is likely overestimated.[162] Trials are required to assess the effectiveness of PEP alongside other therapeutic interventions (discussed below). Neither New Zealand's Ministry of Health or Te Whatu Ora provide advice on prevention and treatment of measles.[163] [164]

The measles, mumps, rubella (MMR) vaccine is not recommended for immunocompromised people and pregnant women and antibody responses from the MMR vaccines may fail in the first 12 months. Duration of protection following measles vaccination is less reliable than naturally acquired immunity following measles infection.[165] [166] [167] Measles outbreaks in previously vaccinated populations do not tend to get disclosed in New Zealand.

Significant scientific uncertainty remains regarding who is, and who is not immune, not only due to vaccine waning, but because protection does not necessarily correlate with antibody levels. '*People without antibodies can be completely protected from clinical illness by cellular immunity'.*[168] Naturally acquired immunity can be acquired via breast milk, and through infection. Infection that can promote life-long immunity, does not always produce a rash.

Risk factors for severe measles-related complications include immunocompromised hosts, pregnant women, the very young and the elderly, individuals with poor nutritional status and those with vitamin A deficiency.[169] [170] Yet there is no New Zealand-based information about prevention or therapeutic treatment, should a pregnant woman, baby or immunocompromised person, be exposed to measles.

Cellular immunity is dependent on adequate nutrition. Deficiencies in vitamins A, C and D can result in delayed recovery and post-measles complications, yet there is no advice on how nutritional therapeutics can support prevention and treatment in New Zealand. A low vitamin A level is associated with low measles specific antibodies, and increased morbidity and mortality following measles infection.[171]

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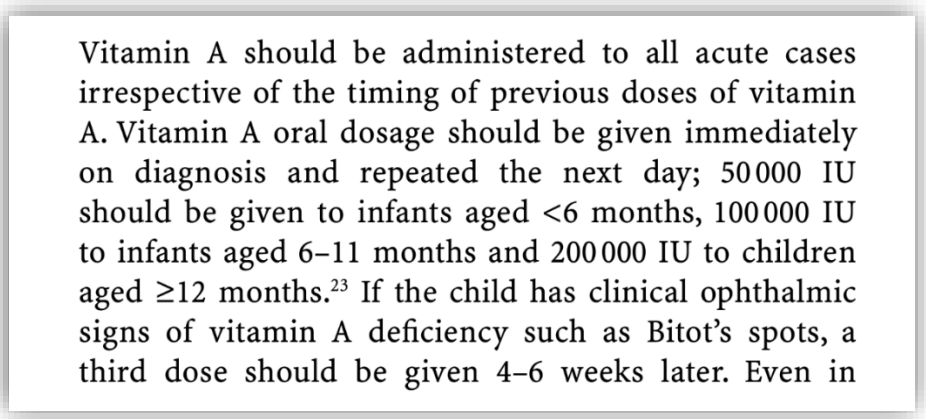
[162] Montroy J, Yan C, Khan F, Forbes N, Krishnan R, Tunis M, Salvadori MI. Post-exposure prophylaxis for the prevention of measles: A systematic review. *Vaccine*. Feb 15;47:126706. doi: 10.1016/j.vaccine.2025.126706.
[163] New Zealand Government, Te Whatu Ora (July 2024) Measles immunisation, prevention, and alert resources Provider toolkit. https://www.tewhatuora.govt.nz/assets/For-health-professionals/Clinical-guidance/Diseases-and-conditions/Measles/Measles-immunisation-prevention-and-alert-resources-Provider-toolkit.pdf
[164] Te Whatu Ora (2025) Measles guidance. https://www.tewhatuora.govt.nz/for-health-professionals/clinical-guidance/diseases-and-conditions/measles
[165] Zibolenová J, Hudečková H, Chladná Z, et al. (2023) Quantification of Waning Immunity After Measles Vaccination—Evidence From a Seroprevalence Study, *American Journal of Epidemiology*, Volume 192, Issue 8, August 2023, Pages 1379–1385, doi: 10.1093/aje/kwad065
[166] World Health Organization (2017). *Weekly epidemiological record* No 17, 2017, 92, 205–228. Measles vaccines: WHO position paper – April 2017. https://iris.who.int/bitstream/handle/10665/255149/WER9217.pdf?
[167] Humphries, S, Bystrianyk, R. (2025) Dissolving Illusions. Disease, Vaccines and the Forgotten History. 10th Anniversary Edition. Chapter 17, Measles. ISBN 979-8-9869363-1-4. Pages 503-568.
[168] Humphries, S, Bystrianyk, R. (2025) Dissolving Illusions. Disease, Vaccines and the Forgotten History. P.553
[169] Bichon, A; Aubry, C; Benarous, L; Drouet, H; Zandotti, C; Parola, P; Lagier, JC. Case report: Ribavirin and vitamin A in a severe case of measles. Medicine 96(50):p e9154, December 2017. | DOI: 10.1097/MD.0000000000009154
[170] Moss WJ, Griffin DE. Measles. *Lancet* 2012;379:153–64.
[171] Humphries, S, Bystrianyk, R. (2025) Dissolving Illusions. Disease, Vaccines and the Forgotten History. P.555-562

The best source of vitamin A is food-derived. Food can include retinol and provitamin A carotenoids. Animal products contain the highest active vitamin A—such as liver, eggs, butter, cream or cod liver oil not only assist vision,[172] but actively lower measles risks. Sweet potato, baked in skin may be one of the highest vegetable-based sources of vitamin A.[173]

Medical advice other than vaccination does not appear to exist, but can be found in the scientific literature: '*For measles croup, antihistamines, interferons (Viferon) and inhalation therapy (steam inhalations) are indicated; for severe croup -glucocorticosteroids (prednisolone 1–2 mg/kg per day intravenously or intramuscularly). Antibacterial therapy is prescribed for severe forms of measles.*'[174]

The World Health Organization has consistently recommended vitamin A (100,000 to 200,000 IU) treatment for measles since 1987. [175] [176] [177] [178] The 2024 measles guidelines state that:

> *'All children or adults with measles should receive two doses of vitamin A supplements, given 24 hours apart. This restores low vitamin A levels that occur even in well-nourished children.'*[179]



Vitamin A should be administered to all acute cases irrespective of the timing of previous doses of vitamin A. Vitamin A oral dosage should be given immediately on diagnosis and repeated the next day; 50 000 IU should be given to infants aged <6 months, 100 000 IU to infants aged 6–11 months and 200 000 IU to children aged ≥12 months.[23] If the child has clinical ophthalmic signs of vitamin A deficiency such as Bitot's spots, a third dose should be given 4–6 weeks later. Even in

Fig.12: World Health Organization (2017) 205 Measles vaccines: WHO position paper – April 2017. Page 210.[180]

The first randomised, double-blind control trial for vitamin A treatment of measles, demonstrated that 400,00 IU given to children within five days of presenting with a rash, resulted in the alleviation of symptoms superior to that of the placebo group. This included more rapid recovery from pneumonia and

[172] American Optometric Association (March 15, 2017). Of retinol, ruses and root veggies: The fantastic tale of carrots. https://www.aoa.org/news/practice-management/perfect-your-practice/retinol-ruses-and-root-veggies-fantastic-tale-of-carrots

[173] U.S. National Institutes of Health, Office of Dietary Supplements. March 10, 2025. Vitamin A and Carotenoids. https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/

[174] Marufjon K (2024). Measles in children, etiology, pathogenesis, differential diagnosis, prevention. Web of Medicine: *Journal of Medicine, Practice and Nursing*, 2(4), 131–135.

[175] Expanded programme on immunization: programme for the prevention of blindness nutrition. Joint WHO/UNICEF statement: vitamin A for measles. Wkly Epidemiol Rec 1987; 62:133–4. https://iris.who.int/bitstream/handle/10665/226256/WER6219_133-134.pdf?

[176] D'Souza RM, D'Souza R. Vitamin A for treating measles in children. *Cochrane Database Syst Rev.* 2002;(1):CD001479. doi: 10.1002/14651858.CD001479. Update in: Cochrane Database Syst Rev. 2005 Oct 19;(4):CD001479. doi: 10.1002/14651858.CD001479.pub3. PMID: 11869601.

[177] Vitamin A supplements. A guide to their use in the treatment and prevention of vitamin A deficiency and xerophthalmia. Prepared by a WHO/UNICEF/IVACG Task Force World Health Organization, Geneva

[178] WHO. A Guide to the Treatment and Prevention of Vitamin A Deficiency and Xerophthalmia. Second Edition. Geneva: WHO,1997. [ISBN 92 4 154506 2 ISBN 92 4 154506 2]

[179] WHO (November 14, 2024). Measles Fact Sheet. https://www.who.int/news-room/fact-sheets/detail/measles

[180] World Health Organization (2017). Weekly epidemiological record No 17, 2017, 92, 205–228. Measles vaccines: WHO position paper – April 2017. https://iris.who.int/bitstream/handle/10665/255149/WER9217.pdf?

diarrhea, less croup and a shorter time in hospital. Of the 12 children who died, 10 were among those given the placebo.[181] The authors stated:

> *'For all children seriously ill with measles, vitamin A replacement should thus be provided at the dose given by Barclay et al.[6] (400,000 IU), which proved effective and safe in our study.'*

Further studies have demonstrated that treatment success stratifies to dose level, but dose levels above the WHO recommendations for healthy children may alter susceptibility to acute respiratory infections.[182]

Three measles cases are sufficient to declare an 'outbreak' and New Zealand authorities do not declare whether an outbreak involved vaccinated or unvaccinated people. Vaccine-induced measles is a risk factor for a measles outbreak and recently vaccinated people can present with symptoms that meet a measles case definition. The U.S. Centres for Disease Control notes that *'the measles component of MMR or MMRV is generally detectable for up to 21 days after vaccination, although vaccine-strain virus can be detected >21 days after vaccination in some instances.'*

Serum testing within three days of the onset of the naturally derived rash can identify IgM antibodies for measles, and can confirm the presence of measles. However, in:

> *'recently vaccinated (6–45 days prior to blood collection), neither IgM nor IgG antibody responses can distinguish measles disease from the response to vaccination'*.

There doesn't appear to be New Zealand-based advice for doctors on how to identify whether a measles case is vaccine-derived or wild-type virus. The CDC advises that measles virus sequencing, or a Measles Vaccine (MeVA) Assay can rapidly determine if detected measles virus is vaccine-derived or wild-type virus.[183]

Research can help clarify these uncertainties, contribute to knowledge and have a high impact. Research can further validate the evidence that measles infection in adequately nourished populations might not only confer lifetime immunity but be protective of the heart and against cancer.

Without 'formal' science and experts to advise governments and support policy development, evidence-based information is not integrated into government guidelines, as a means to protect the population. Furthermore, it is clear that research and trials that could be of high impact, and fill treatment-based knowledge gaps, could be conducted.

New Zealand's *Strategic Approach to Immunisation 2025-2030*[184] position paper states that 'equity' is a guiding principle. However the government fails to address inequities in nutritional status, or the fact that large groups may not respond, or respond negatively to vaccination, including measles vaccination.

Science reform Cabinet papers have failed to assess the difficulty scientists have in accessing funding for long-term, public good research, and the role of this research informing policy to sustain and improve productivity. The Cabinet papers do not recognise that when more people with chronic, environmentally driven preventable conditions remain unwell and on disability benefits for long periods of time, economic productivity will be adversely impacted. People with chronic conditions are also more vulnerable to

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[181] Hussy GD, Klein M (1990). A Randomized, Controlled Trial of Vitamin A in Children with Severe Measles. *N Engl J Med* 1990;323:160-164 doi: 10.1056/NEJM199007193230304

[182] Zhang, Y., Lu, Y., Wang, S., Yang, L., Xia, H., & Sun, G. (2021). Excessive Vitamin A Supplementation Increased the Incidence of Acute Respiratory Tract Infections: A Systematic Review and Meta-Analysis. *Nutrients,* 13(12), 4251. https://doi.org/10.3390/nu13124251

[183] Centres for Disease Control (may 19, 2019) Manual for the Surveillance of Vaccine-Preventable Diseases. Chapter 7: Measles https://www.cdc.gov/surv-manual/php/table-of-contents/chapter-7-measles.html

[184] Ministry of Health. 2025. Strategic Approach to Immunisation in New Zealand 2025–2030. Wellington: Ministry of Health. https://www.health.govt.nz/publications/strategic-approach-to-immunisation-in-new-zealand-2025-2030

infectious disease. Without addressing nutrient deficiencies and dietary inadequacies, sick children often become unwell adults. Yet this important work is undervalued and its funding remains precarious.

[10] FOR NATIONAL BENEFIT & THE PUBLIC GOOD: PRINCIPLES & GUIDANCE

The language of the public good, of public interest and national benefit has substantially eroded in the past 50 years. Politicians and government officials are not schooled in administrative and constitutional law. Politicians, officials and mainstream media avoid deeper conversations about looming problems, particularly if they are connected to powerful industries.

Yet the oversight of powerful industries and their activities is one of the key reasons for democracy. Abuse of power, secrecy and the control of information, and the actions of powerful institutions can lead to a weakening of the nation-state, exploit people and make them sick and poor, erode resources and transfer ownership of assets to foreign jurisdictions.

This is an old game, and information and intelligence are central to the capacity of a nation state to navigate these pressures and prevent the abuse of power. Yet there is no fluency in official language to suggest that politicians and officials are educated and that they value the quality of the information that is necessary to steward New Zealand and keep her safe. The science and research system has a key role in driving knowledge and in educating the private and public sector, but government policies have been working to undermine this important role for many decades.

PSGR's submission to the Te Ara Paerangi - Future Pathways Green Paper[185] recommended overarching principles to guide scientific research trajectories that the principles that determine the scope and focus of New Zealand's research priorities should be informed by principles of stewardship and resilience.

PSGRs principles were based around ensuring the best practice approaches to steward and manage resources, from natural, to manmade infrastructure including emerging and digital technologies, so as to recognise the importance of equitable health outcomes and prioritise and promote the health and resilience of people and ecosystems.

Overarching principles and objectives can be enshrined to protect publicly funded innovations, from physical to digital assets from exploitation by offshore interests, because private-public partnerships have granted offshore investors privileged access.

Provisions must sit at the heart of science, technology and research funding that ensure that all publicly funded research is in service of the people of New Zealand. An example could be to:

- Require outcomes to protect the privacy and health of New Zealanders.
- Ensure publicly funded outcomes will be New Zealand owned and not vulnerable to misapplication or predation by offshore interests.
- Invest in New Zealand development and ownership of all technological platforms used by the public sector to protect the information of public servants, and to protect the private information of citizens.
- Recognise that transnational institutions will offer low-ball contract prices for contracts that increase potential access to intelligence and intellectual property (IP).
- Guard against the capacity of transnational institutions to win bidding wars for technologies and IP due to equity holdings, resulting in increasing offshore ownership.

[185] PSGR (March 16, 2022). Te Ara Paerangi - Future Pathways Green Paper https://psgr.org.nz/component/jdownloads/send/1-root/88-nzscience

- Prevent aggregation of New Zealand assets over time from mergers and consolidations of New Zealand discoveries and resources.

It's well recognised that experts in a scientific or technical field will use their influence to pursue a funding and resourcing trajectory that reflects their interests and expertise. There is often a bias towards narrow fields of expertise, as, rather than broader interdisciplinary research, subject matter experts can influence funding committees to bias funding towards their field because they can promise 'excellence' and can demonstrate 'impact' via a history of scientific publication in their field of expertise. They may also be more able to predict the potential for a commercial outcome.

Without overarching principles, the problem of a selfish path dependency will be incentivised should publicly funded developers own the IP, including the patents and royalties from their discoveries.

Principles can help officials and the public skirt around other risks. There's growing evidence that large transnational institutions will use extraordinary equity holdings to speculate in domestic science and research to the detriment of domestic actors. This can occur through funding arrangements where transnational institutions secure access to privileged information, and where they gamify intellectual property rights provisions and access to patents and royalties.[186]

Just as governments privatise public assets, and ownership is all too often, transferred to a small group of private institutions, our research knowledge must not be exploited by powerful transnational actors, just because their equity holdings give them the power to be an investor in New Zealand science and research. Because of this power, private-public science, research, innovation and technology funding arrangements can divert their expertise and resources to serving transnational institutions, rather than the people of New Zealand.

[11] COLLINS: REMAKING NEW ZEALAND IN HER IMAGE? JUMPING FROM GENE TECH TO SCIENCE TO PUBLIC SERVICE

Judith Collins and Collins has demonstrated a remarkable agility in jumping from one portfolio to the next, using economic rationale and by securing the consent of selectively targeted expert communities. These expert communities would, in the majority, be unimpaired by, or directly benefit from, polices that direct resourcing to commercially related RSI&T outcomes. These same disciplinary areas could be disadvantaged if funding for scientific research to shed light on the risks that arise from the technologies that they are using and developing, were funded.

An address on February 11 2025, made it clear that Collins considered that the Public Service (departments and departmental agencies) was not as 'innovative' as it could be. Collins considered that the Public Service Act could be less prescriptive, while chief executive responsibilities could be tightened up. Collins also made it clear that integrating data driven AI technologies and the digitisation of the public service would be a priority as Minister.[187]

Collins portfolio switch is relevant to this discussion. Governance values and priorities must conform to democratic norms of transparency and accountability, if the technologies which are integrated into governance systems are to be trustworthy and trusted. Simply promising efficiency is not enough, particularly if the technologies are developed and/or controlled and/or owned by transnational institutional interests.

[186] Schwab, T (2023). The Bill Gates Problem: Reckoning with the Myth of the Good Billionaire. *Metropolitan Books*.
[187] Collins J. (February 11, 2025). Address to Public Service Leaders. *Beehive Press Release*. https://www.beehive.govt.nz/speech/address-public-service-leaders

Technologies must benefit the people of New Zealand and serve New Zealand's geostrategic and security needs. Publicly funded digital services, and publicly funded science, technology, - and the innovation outcomes must predominantly serve the public purpose. There's an increasing awareness of the capacity of private-public partnerships, whether in government digital and health service arrangements or science, technology and innovation research to be structured to advantage transnational institutions.[188] [189]

A case in point is Microsoft's current licensing arrangement with the Department of Internal Affairs which includes the communications of all public sector employees on Microsoft owned systems.[190] This is an example of how transnational institutions can have oversight over government and private data via commercial-in-confidence, contracted arrangements, and it's a missed opportunity in skills and tech development for the New Zealand science and technology system.

Collins science, research and innovation system restructure presumes that the closer funding is to innovation and commercialisation outcomes, the better New Zealand will be. No consideration was placed on science and research that explicitly tackles multifactorial challenges, from health, to resource management, energy resilience, and transportation, and employment and skills development. Officials didn't discuss different cost-benefit approaches for commercial versus public good science, when financial and economic return might only be realised decades into the future.

The risk, should Collins approach public service reform in a similar fashion to her approach to the gene technology and science reforms, is that digital and AI technologies will be integrated with minimal public oversight, with input from tech industry stakeholders, with little concern for political and financial conflicts of interests and little scarce examination of broader socio-political costs beyond immediate financial savings.

As Attorney-General, Collins must be appreciate that laws and regulations must be fairly and transparently developed to promote trust in governments and the rule of law that the actions of officials will not result in the abuse of power or in corrupt practices. Democracies require laws and regulations, and the actions of the officials whose powers arise from those laws, to promote the public purpose, which includes sustaining human rights, the sovereignty of people and nation, and protect the health of people, the environment and the economy. Collins must understand that new technologies and new efficiencies must always protect the public, and promote the public purpose.

Constitutional and administrative law conventions and processes serve an important role to ensure that democratic norms of transparency and accountability stay in place, and to sustain public trust, no matter the government in power. Unfortunately, digital services, artificial intelligence and commercial *In Confidence* contracts are hidden, or black-boxed. Enormous power can be held by the people and institutions that control development and oversight, set values and priorities, and who then shape what information is then released. In such environments it becomes very difficult to identify and prevent corruption and/or the abuse of power.

Any reform of the public sector that integrates digital technologies and efficiencies at scale, must be cautiously and carefully thought out if it is to serve the public interest over the long-term and support and enable human flourishing. As PSGR discussed in 2024, digital systems have enormous potential to shrink

[188] Mazzucato M (2024) The Entrepreneurial State. *Penguin*.
[189] Zuboff S. (2023). Chapter: The Age of Surveillance Capitalism. Social Theory Re-Wired. *Routledge.*
[190] Microsoft Cloud, Software and Services Agreement
https://www.digital.govt.nz/products-and-services/products-and-services-a-z/microsoft-cloud-software-and-services-agreement

accountability and transparency functions and displace democratic constitutional governments with authoritarian governance systems.[191]

[12] CONCLUSION

In summary, publicly funded scientific and technical knowledge is tasked with discovering what is true. As humans we take on challenges and identify goals. However, how we problematise, and what we identify as challenges and goals is intricately tied to personal values, and the values held by our communities and/or our peer groups. For democracies to function effectively, values across government agencies should align with the public purposes identified in chapter [1].

As a relatively small nation, we might logically dedicate resources to not only solving problems, but also to researching, monitoring and investigating our human, economic, and environmental systems.

Our science and research systems cannot optimally tackle systemic risks and threats and identify challenges before, and when they occur, if the scope is tightly controlled by government agencies. Without such resourcing we lack the experts and the expert conversations that are necessary to ensure that governments act in in a timely manner to protect the public interest.

Government policy can claim to be politically neutral when the policy goal is increased economic growth. However, this so-called 'neutrality' can result in distinct political outcomes, as funding guidelines and tight funding budgets can prevent active critique of government policies, or lack thereof. It is necessary to frankly acknowledge that the science system must have enough funding 'slack' or freedom to pursue unpopular or politically challenging research, even if it contradicts the status quo. This can include established scientific consensus.

Government policies and laws must incorporate scientifically established truths to ensure that the pursuit of goals is made in accordance with the best available evidence, in order to fulfill the highest purpose. Scientific truths include broad interdisciplinary evidence which can suggest risk and harm. Government policies must not hinder science and research which would update the 'evidence base'. This is particularly important for technologies and their emissions which cannot be avoided, in daily life. With this in mind, we may come to consider that 'any law against knowledge is fundamentally unjust'.[192]

Public interest science and research can often be novel and interdisciplinary and can result in important discoveries, but the research proposals can also not conform to expected 'excellence' norms, and the impact can be uncertain. These proposals then get deprioritised by funding panels.

MBIE does not create long-term funding basic (including interdisciplinary) research funding for institutions to identify the drivers of human and environmental health harms. Such research is outside the scope of MBIE. However, other agencies do not then step in and address this research gap.

Public interest scientific research struggles when scientists and institutions need to prove that their research will have economic impact, in order to be funded. When institutions are incentivised to take on industry partners, and track research to commercial outcomes, the values and the culture of those institutions will necessarily reflect the commercial priorities of corporate industry. Many of these institutions will have confidential commercial agreements with their industry partners, who can object to research which might show their products in a negative light.

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[191] PSGRNZ (2024) Stepping Back from the Brink: The Programmable Ledger. Four democratic risks that arise when Digital IDs are coupled to Central Bank Digital Currencies. Bruning, J.R., Physicians & Scientists for Global Responsibility New Zealand. ISBN 978-0-473-71618-9.

[192] Attrib Alexandra Elbakyan.

As PSGR highlight in Part I,[193] high-speed co-operation of MBIE with Judith Collins to push gene editing reforms into law, may be indicative of a wider corrosion of process, and an undermining of democratic norms of accountability and transparency while serving commercial interests. The problem definition failed to state that the regulation was for the purpose of ensuring that new gene editing techniques would not harm humans or the environment. Extraordinary policy gaps include a failure to scientifically evaluate the risks the technologies and the risks from the prospective change in law, the absence of an economic or trade-based analysis, cost-benefits analysis and the complete oversight of effects on biosecurity.

Part II asks that the reader considers the impact and benefit of commercial focus of the science system reform. The control of science funding by the economic growth Ministry, MBIE, has resulted in the large funding pots being directed to innovation-based research that is investigator-led. The effect has been research trajectories by elites that entrench path-dependency in scientific systems that can lead these systems to misallocate scientific research on issues that are less socially, environmentally, culturally and economically important.

It increasingly appears that the science system is directed and influenced by actors and institutions with pervasive political and/or financial conflicts of interest and that the public interest is being whittled away, to sit on the margins.

PSGRs 2023 discussion paper: *When does science become propaganda? What does this suggest for democracy?*[194] concluded with this comment:

> *'Innovation may be central to our largest challenges, but it is the stewardship of innovation that is the key issue. Resilient, healthy democracies require governance systems with the capabilities and intelligence to produce, analyse and communicate challenging, contradictory and politically inconvenient information.'*

Recommendation: That a Public Inquiry is convened (Inquiries Act 2013).

That the current (2023-2025) science system reform process has excluded any evaluation or discussion on the need for the research, science, innovation and technology (RSI&T) to be sufficiently adequately resourced to meet the objectives of society at large. That a transparent and public inquiry is undertaken to evaluate the past, present and future role of New Zealand's RSI&T system. This inquiry must be independent, impartial and fair. It may be in the form of a public inquiry or a Royal commission (Inquiries Act 2013, s.6).

PSGR recommend that the problem definition concern: *'the capacity of the publicly funded RSI&T system to demonstrably contribute to public-good knowledge, and in doing so serve the public purpose and support the wellbeing of New Zealand, her people, resources and environment'.* The terms of reference will specify:

i. In-depth consultation across New Zealand by industry sector, research institution and expertise. That data collection, processing and analysis is undertaken using a transparent, fully disclosed methods-based approach. That this approach incorporates machine learning and artificial intelligence to ensure that inquiry outcomes are reliable and trustworthy and can reflect the complexity of the issues under consideration.

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[193] PSGR (2025) When powerful agencies hijack democratic systems. Part I: The case of gene technology regulatory reform. Bruning, J.R., Dommisse, E.. Physicians & Scientists for Global Responsibility New Zealand. ISBN 978-1-0670678-0-9

[194] PSGR (2023) When does science become propaganda? What does this suggest for democracy? Page 19. Bruning, J.R., Physicians & Scientists for Global Responsibility New Zealand. ISBN 978-0-473-68632-1. https://psgr.org.nz/component/jdownloads/send/1-root/106-23-propaganda

- In-depth consultations would be held with scientists with a track record in such research, to establish how a national framework of research and science institutions for the purpose of public-good human health and environmental research may be established. Include questions relating to principles and funding arrangements to seek advice on how best to ensure that such institutions would be protected from political interference, while assuring that the public purpose is fulfilled.
- This includes an assessment of the submissions to the Te Ara Paerangi consultation and a review of the findings.[195] [196]
- Pay particular attention to the capacity for researchers to analyse greater system-wide drivers that are contributing to the national decline in productivity. Such research might include: increasing levels of illness and disability, educational decline, corporate consolidation, anti-competitive behaviour, training and skills development and financial pressures that disincentivise and stifle creativity.

ii. That members of the inquiry will not previously have been awarded funding grants for work involving an 'innovation' outcome, as the role of 'innovation' as a guiding principle of RSI&T is under question.

iii. That the role of 'innovation' as a guiding principle of funding is evaluated for merit. This includes an assessment of 'innovation' outcomes from 2000 to the present day, including an economic analysis to directly evaluate the extent to which MBIE funded innovations drove economic growth (i.e. directly or through the production of IP).

iv. A review of the evidence base used by officials to underpin the 2023-2025 RSI&T system reforms and embed economic growth as the high-level goal. Evaluation of the justification for economic growth and the extent to which this primary outcome is the most effective way that the publicly funded RSI&T system might serve the public purpose and support the wellbeing of New Zealand, her people, resources and environment.

- This includes an assessment of the submissions to the Te Ara Paerangi consultation and a review of the findings.[197] [198]
- Whether the 2023-2025 science system reform process, from policy development to consultation, to the findings in the current policy literature, has impartially and transparently evaluated the role of the RSI&T system in supporting the national, or public interest.

v. The current capacity of the RSI&T system to undertake public-good research and serve the public purpose. The evaluation will consider the extent to which innovation-related funding policies deter public-good research and the challenge for funding committees faced with

[195] MBIE Te Ara Paerangi Future Pathways Summary of Submissions. Part 1 – All submissions and engagements. https://www.mbie.govt.nz/assets/te-ara-paerangi-future-pathways-summary-of-submissions-part-1-summary-of-all-submissions.pdf
[196] MBIE Te Ara Paerangi Future Pathways Summary of Submissions. Part 2 Summary of Māori Engagements and Submission. https://www.mbie.govt.nz/assets/te-ara-paerangi-future-pathways-summary-of-submissions-part-2-summary-of-maori-submissions.pdf
[197] MBIE Te Ara Paerangi Future Pathways Summary of Submissions. Part 1 – All submissions and engagements. https://www.mbie.govt.nz/assets/te-ara-paerangi-future-pathways-summary-of-submissions-part-1-summary-of-all-submissions.pdf
[198] MBIE Te Ara Paerangi Future Pathways Summary of Submissions. Part 2 Summary of Māori Engagements and Submission. https://www.mbie.govt.nz/assets/te-ara-paerangi-future-pathways-summary-of-submissions-part-2-summary-of-maori-submissions.pdf

multidisciplinary research proposals when all research must be viewed as 'excellent'. That the inquiry reviews all RSI&T funding programmes and awards, their terms of reference, and surveys the barriers for researchers and scientists in securing funding for long-term public-good research, particularly in multidisciplinary research environments.

- This includes an evaluation of MBIEs influence over the RSI&T system, in the context of MBIEs priorities to direct economic growth and development, and MBIE science system policy[199] which prioritises innovation, patenting and commercialisation.
- Evaluate the appropriateness that the Ministry for Business, Innovation and Employment would control the direction and policy of New Zealand RSI&T research system.
- Evaluate the legitimacy and fairness of the decision by Cabinet members to place the entire science funding system inside the new MBIE via an Order in Council, rather than a Parliamentary vote.

vi. The future capacity of the RSI&T system, based on 2023-2025 policy documents, to undertake public-good research. Have underlying policies and reports reasonably addressed the experiences and challenges of New Zealand funded researchers in accessing funding for public-good research? Do the reforms clearly specify that there should be funding for basic science and research to explore challenges and risks across the health, environment, infrastructure, digital, agricultural and resource management sectors for the benefit of New Zealand?

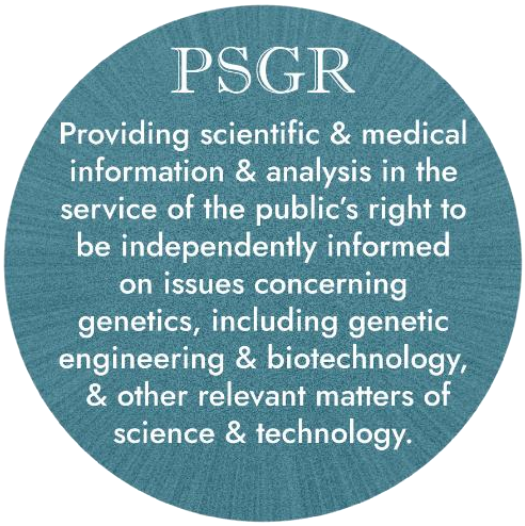
- This includes assessing the risk that the current science system reform may further divert RSI&T funding away from public good science and research, and instead direct funding to commercial, innovation-based outcomes. This includes the incentive for publicly funded scientists to own the IP (or patents and royalties) resulting from their work, which has been proposed in the current science system reforms.
- Closely scrutinise the scarcity of funding pathways for non-innovation/non-commercial human health and environmental research that has the scientific freedom to identify, monitor and study harm from man-made contaminants, which include chemical pollutants, genetically modified organisms and radiation-based risk from technological devices.
- Evaluate how science funding pathways might restrict the capacity of researchers assess broader drivers of productivity decline. This includes by restricting how human, environmental and national resources are degraded or exploited. Evaluate how an absence of this information results in policy-makers being unable to identify and address system-level problems.
- An evaluation of communications between the previous Minister of Minister of Science, Innovation and Technology Judith Collins and MBIE in nominating a select group of advisers that would conduct a truncated analysis, essentially out of public sight.

vii. That the inquiry recommendations include prospective principles and priorities that might be embedded at high level in the future RSI&T system. Such principles would embed system

[199] (2015) National Statement of Science Investment 2015-2025. Ministry of Business, Innovation and Employment. https://www.mbie.govt.nz/science-and-technology/science-and-innovation/funding-information-and-opportunities/national-statement-of-science-investment

values and obligations to require that funding of public-good research that supports the wellbeing of New Zealand, her people, resources and environment.

viii. That in-depth consultation identifies and recommends a potential framework for an independent RSI&T system that enables that system to be directed to serve the long-term wellbeing of New Zealand, her people, resources and environment, without fear or favour.



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ADHD	Attention deficit hyperactivity disorder
AI	Artificial Intelligence
CRI	Crown Research Institute
DNA	Deoxyribonucleic acid
DSIR	Department of Scientific and Industrial Research (1926-1992)
ENZ	Enterprise New Zealand
FRST	Foundation for Research, Science and Technology (1990-2011)
HSNO Act	Hazardous Substances and New Organisms Act
Invest NZ	Invest New Zealand
INZ	Innovation New Zealand
IP	Intellectual Property
MBIE	Ministry of Business, Innovation and Employment (2012 to current day)
NIWA	National Institute of Water and Atmospheric Research Ltd
NZEPA	New Zealand Environmental Protection Authority
NZTE	New Zealand Trade and Enterprise
MoRST	Ministry of Research, Science and Technology (1992-2011)
mRNA	Messenger RNA
MSI	Ministry of Science and Innovation (February 2011- July 2012)
OECD	Organisation for Economic Cooperation and Development.
PMSTIAC	Prime Minister's Science, Technology and Innovation Advisory Council (PMSTIAC)
PROs	Public Research Organisations
PSGR	Physicians and Scientists for Global Responsibility
RNA	Ribonucleic acid
RSI&T	Research, science innovation and technology system
SSAG	Science System Advisory Group

APPENDIX

(i) Assessment of science systems in top performing nation states.

DOIA-REQ-0011539- Official Information Act Response CRM:0344084

Please can you supply me with information analysing and assessing the science systems (this includes research, science, innovation and technology) of top performing nation states (including smaller, high-income nations).

Information could be sent to or from: the Chief Executive, the Minister for Business, Innovation and Employment, the Minister of Science, Innovation and Technology and the official in charge of science system reform.

This would include an assessment of strengths and weaknesses, funding budgets, institutional frameworks, and science system priorities and values.

This could include information undertaken and provided by the SSAG or work undertaken by officials or contractors, or by the office of the Hon Judith Collins.

Friday, 11 April. ministerials@mbie.govt.nz

Tēnā koe,

Thank you for your email. I am pleased to inform you that the information you have requested is now available on the MBIE website.

Kind regards

Oliver Maskell

Senior Ministerial Advisor

Labour, Science and Enterprise Group

Group Operations, Business Management

https://www.mbie.govt.nz/document-library/search?keywords=sciencereforms&df_=&dt=&sort=desc

Showing results 1 - 10 of 49 for ‘sciencereforms’

1. Letter to Callaghan Innovation Board Chair

Letter to Callaghan Innovation Chair - further expectations regarding the disestablishment of Callaghan Innovation

2.Confirmation of decisions regarding Callaghan Innovation

Provides the history of the decisions and future options relating to Callaghan Innovation

3.Further decisions regarding Callaghan Innovation

Provides requested advice and seek your decision regarding options for the future of Callaghan Innovation

4.Annex Four: Letters of expectation to CRI Chairs

Letters of expectation to Crown Research Insititute Chairs

5.CRI consolidation

Outlines how MBIE is working with the Crown Research Institutes (CRIs) to design and establish the new Public Research Organisations (PROs) and to provide a high-level timeline and list of key milestones to achieve the mergers.

6.Letter to Callaghan Innovation

Provides the draft letter to Callaghan Innovation formally communicating the science system reforms and the disestablishment of Callaghan Innovation for your consideration and signature.

7.Prime Minister's Science, Innovation and Technology Advisory Council - Terms of reference

The Terms of Reference for the Prime Minister's Science, Innovation, and Technology Advisory Council outlines its function, membership and outputs. The Council will advise on ways to leverage science, innovation, and technology to drive economic growth and improve the quality of life for New Zealanders now and in the future.

8.Science System Advisory Group Report

Science System Advisory Group advice to Government on strengthening the science, innovation and technology system

9.Further decisions to drive economic growth through science, innovation and technology

Cabinet paper for further decisions for changes to Science, Innovation and Technology system

10. Further decisions to drive economic growth through science, innovation and technology – Minute of ...

Cabinet agreed to further changes for Science, Innovation and Technology systems

11. Driving Economic Growth through Science, Innovation and Technology

Cabinet paper for changes to Science, Innovation and Technology system

12. Further decisions to drive economic growth through science, innovation and technology – Minute of ...

Cabinet agreed to further changes for Science, Innovation and Technology systems

13. Driving Economic Growth through Science, Innovation and Technology – Minute of Decision

Cabinet agreed to changes to Science, Innovation and Technology system

14. Further decisions regarding R&D capabilities

Provides requested advice and seek your decision regarding options for the future of Callaghan Innovation

15. Further decisions regarding Gracefield Innovation Quarters

Seeks Minister's agreement on the ownership and management of Gracefield Innovation Quarter (GIQ) and the transfer of responsibility of the Measurement Standards Laboratory (MSL) as Callaghan Innovation is disestablished as an innovation agency

16.CRI Consolidation

Provides Minister with an update on MBIE

17. Invest NZ

Provides initial advice and analysis of options for the form, functions, and establishment process of Invest NZ. We seek an indication of your preferences for inclusion in December

18.CRI consolidation

Outlines how MBIE is working with the Crown Research Institutes to design and establish the new Public Research Organisations.

19. Government support for innovation

Seeks Minister

20. Implementation options for CRI consolidation 2425-0857

Provides Minister with options for pathways to consolidate Crown Research Institutes (CRIs) and seek your direction on key features of the new Public Research Organisations (PROs).

21. Options for innovation institutions

Seeks Minister

22. Options for CRI Consolidation

Provided Minister with options for consolidating Crown Research Institutes (CRIs).

23. Management of intellectual property generated in public research organisations

Provides further information on government-provided innovation functions in New Zealand and peer countries, highlighting relevant features of the New Zealand context, commenting on 'optimal' functions for New Zealand, areas for priority attention, and exploring some considerations for how these functions are delivered through government entities.

24. Science, innovation and technology (SI&T) and Māori New Zealanders

Provides information on practices in New Zealand and internationally regarding intellectual property generated in Public Research Organisations.

25. Overview of areas of New Zealand's research activity

Provides a comparative overview of international research council models

26. Innovation functions in New Zealand

Provides advice on attracting multinational corporate activities to New Zealand

27. Attracting multinational corporate activity

Provides a comparative overview of international structures/models enabling funding decisions.

28. Structures enabling funding decisions – An international scan

Provides an overview of research activity in New Zealand

29. Government functions that support innovation in New Zealand and peer countries

This will enable SAGG to consider

30. International scan of government initiatives to encourage the commercial application of research

Provides international evidence on government initiatives to encourage commercial application of research from public research organisations.

31. International examples of science, innovation and technology councils

Provides an overview and comparison of government innovation functions in NZ and comparable countries, while noting distinctive features of the functions and context in each country.

32. The role of universities in the science, innovation, and technology system

Provides an overview of the changing role of universities within New Zealand

33. Public good activities in Crown Research Institutes

Provided information about public good activities by Crown Research Institutes (CRIs) to inform your thinking about the role and funding of CRIs.

34. Some initial options for an Advanced Technology Initiative

Presents some possible models for an Advanced Technology Initiative in New Zealand

35. The Science System Advisory Group and the University Advisory Group

Cabinet paper for the establishment of the Science System Advisory Group and the University Advisory Group.

36. The Science System Advisory Group and the University Advisory Group – Minute of Decision

Cabinet agreed to establish the Science System Advisory Group and the University Advisory Group.

37. Refocussing and consolidating Crown Research Institutes (CRIs) – policy considerations

Provides information to support your discussion of the future for Crown Research Institutes

38. Overview of government supports for innovation

Provides an overview of government support mechanisms for innovation in New Zealand.

39. International models of technology research ecosystems

Provides examples of technology research organisations and associated supporting structures and ecosystems in comparator

40. Overview of the technology research landscape in New Zealand

Provides an overview of different components of New Zealand

41. Commercialisation of research from public research organisations

7 pages. Describes the mechanisms that support the commercialisation of ideas generated by Public Research Organisations in New Zealand.

42. Information on research spend by other government agencies

6 pages. Provides information on research spending by other central government agencies.

43. Models for Government owned research organisations – cross-country scan

35 pages. Provides information about international SIT systems to support your discussion of the future for Crown Research Institutes.

44. Business R&D in New Zealand

11 pages. Provides an introduction to business R&D in New Zealand, including expenditure, sources of funding, business R&D workforce and the outputs of business R&D, including international comparisons where available.

45. Background to New Zealand's science, innovation and technology system

37 pages. Provides an overview of New Zealand

46. History and current state of Callaghan Innovation

9 pages. Provides an introduction to Callaghan Innovation, the process and intent behind its creation and the current scope of its activities

47. Crown Research Institute (CRI) metrics and key facts

10 pages. Provides CRI metrics and key facts.

48. Crown Research Institutes Refocus - possible options

14 pages. Seeks Minister's feedback on options to consolidate Crown Research Institutes.

(ii) SSAG Phase 2 Submission questions (March-April 2025)

Phase 2 consists of high-level questions regarding the funding tools and mechanisms for the science, innovation and technology sectors.

Where possible it may be useful to distinguish short-term issues from longer-term desired outcomes.

Questions

1. In what areas must New Zealand have or develop in-depth research-based expertise over the next two decades?

a. At what levels should research prioritisation occur?

b. What are some criteria for research selection?

c. What is the value of research roadmaps in priority areas?

2. Does New Zealand need to rationalise its funding mechanisms?

a. Should we have multiple funding agencies or combine them into a single entity?

b. What kind of funding instruments should be used and in what circumstances?

c. How would a funding agency balance these different expectations?

d. How should high- intellectual risk but potentially high-reward research applications be identified and funded?

e. How should research involving the study of or the application of Mātauranga Māori be managed and funded?

f. How should New Zealand address expensive research infrastructure needs such as access to supercomputing, bespoke lab equipment or spaces, and data requirements?

3. What does New Zealand do to improve workforce retention and develop the research workforce from the early career to the mature? How does New Zealand ensure the retention of research/innovation leaders?

4. Are there other key issues (beyond the quantum of funding) that should be considered in the science and innovation system not yet addressed in this or the previous report and consultation?

(iii) PSGR recommendations for principles to determine the scope and focus of New Zealand's science system. Response to the 2022 Te Ara Paerangi - Future Pathways Green Paper

PSGR's submission to the Te Ara Paerangi - Future Pathways Green Paper[200] recommended overarching principles to guide scientific research trajectories.

'the principles that determine the scope and focus of New Zealand's research priorities should be informed by principles of stewardship and resilience.

I. Appreciation that science, research and innovation is:
    a. Engaged to protect and promote the health of the citizens of New Zealand;
    b. Engaged to protect and promote the flora and fauna and the ecologies of New Zealand.
    c. Embedded in our social, indigenous, political, and economic cultures.
    d. A function of influences across these cultures.
    e. Often complex and uncertain, particularly concerning the impact of emerging technologies and human and environmental health.

II. Establishes the principle of kaitiakitanga to ensure the guardianship and protection of the people and ecologies of Aotearoa New Zealand.
    a. Kaitiakitanga extends across resource management; defence; ecosystem protections; infrastructure; the protection of human health and stewardship of digital and emerging technologies.
    b. The principle of kaitiakitanga obligates New Zealand's science system to prioritise science which can inform policy to:
        i. Protect environmental systems to ensure planetary boundaries (thresholds) are not irreversibly transgressed.
        ii. Promote agriculture that protects ecosystem services and ensures that soil quality is protected.
        iii. Resource science and technology to support critical local, regional and national publicly owned infrastructure and ensure that the national interest is protected.
        iv. Resource robust public sector digital and technological infrastructure to ensure the strategic protection of the citizens of New Zealand from predatory or abusive interests.
        v. Research and report on the social and environmental determinants of health that drive multimorbidity and infectious and non-infectious disease risk.
        vi. Strategically target and protect democratic systems from predatory and abusive institutional interests.
        vii. Prioritise the protection of future generations.

III. Prioritise critical research which can proactively inform and provide feedback loops into the regulatory sphere.

[200] PSGR (March 16, 2022). Submission. Te Ara Paerangi - Future Pathways Green Paper https://psgr.org.nz/component/jdownloads/send/1-root/88-nzscience

IV. Promote cutting-edge basic science that engages research, science and innovation across disciplinary boundaries.

V. Resource global alliances which specifically support scientific endeavour:
    a. To prevent overstepping of planetary boundary thresholds.
    b. To address the social and environmental drivers of disease.
    c. To protect from existential threats from current and emerging technologies.
    d. To promote open science and open source democratic safeguards.

VI. Communicate that leading edge innovation will arise from active regulation:
    a. Active regulation requires that science is resourced to support public interest
    b. Technologies in global demand are those that address concurrent crises:
        i. Pollution from industrial and urban activities.
        ii. Potential for digital technologies to erode sovereignty & rights.
        iii. Stewardship and best practice science to ensure a robust national infrastructure.
        iv. Chronic disease epidemics driven by food insufficiency and nutrient depletion.
    c. Innovation is not decoupled from public life; but is embedded in the social, political and economic life of New Zealand and deployed to contribute to the wellbeing of the citizens of New Zealand.

MBIE question12. Priority-setting process: What principles should guide a national research Priority-setting process, and how can the process best give effect to Te Tiriti?

i. The protection of future generations and kaitiakitanga should guide decision-making, and science and research institutions should be provided with a legislative mandate to speak on behalf of clearly specified future-oriented interests.
ii. Research, science and technology should be driven by a principle of protection of the public interest, where the public interest is the health and security of the citizens of Aotearoa New Zealand, the stability and resilience of democracy in New Zealand.
iii. Foresight processes should be in place to ensure that major risks and vulnerabilities are identified and prioritised, and the scale and harm of potential risks are transparently drawn attention to.
iv. Policy-makers, management and staff should be obliged to adhere to the precautionary principle.
v. Public sector managers should be required to exercise prudent stewardship of their organisations.
vi. Priority should be informed and assisted by international best practice in scientific research
vii. Ensure that the safe space for uncomfortable knowledges that challenge institutional interests, and/or represent a challenge to existing scientific paradigms is protected and stewarded.[201]

[201] Some of these principles are drawn from Boston et al. 2019.