PSGR
Physicians & Scientists for Global Responsibility

Email: info@PSGR.org.nz
Social: @PSGRNZ
Website: PSGR.org.nz

The Science System Advisory Group has been established by the Ministry of Business, Innovation and Employment to provide advice to the government on strengthening the science, innovation and technology system. https://ssag.org.nz/

Phase 2, Deadline for responses: Friday 4 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?**

- Minerals and materials engineering
- Infrastructure
- Arable, horticulture and livestock agriculture, forestry, fishery
- Medicine
- Human health and nutrition
- Robotics and electrical for industry (including agricultural) applications.
- Digital/in silico
- Policy and governance: based around ethics, stewardship and the rule of law.

This must be a larger process than a one month input to the SSAG committee who lack a broad cross-industry background, who include prominent political advocates for particular technology sectors, and are hence not appropriate for this purpose.

Question [1] does not ask *qui bono – what is the intended outcome of RSIT funding?* New Zealand has had no overarching ethics based value to drive the RSIT budget. The principles drive *innovation, excellence* and *impact* drive funding decisions, and the researchers must fit any public benefit inside these parameters. Public benefit is tertiary. As the principles are the primary concern, the secondary concern is economic growth. People then fit public good values underneath these other priorities as they understand that if they do not do this, they will not be funded.

Question [1] fails to ask – *how do we identify what research needs to be undertaken?* Current funding paradigms ignore how we identify much needed research. Currently prioritisation in the main, is centred around a wild hope of IP, as patents are a proxy for growth.

The past three decades has shown that large funding pots of over $500k will only go to research that is tied to an innovation outcome. All scientists know that their funding proposal must be innovative and promise some sort of IP as an outcome, and they know to be 'excellent' that their research must accord with convention in their discipline. As to impact, this is the 'hope' factor and in medical terms is often associated with the temporary suppression of a disease.

RSIT researchers are calculating, and they must protect their 'patch' because innovation and commercialisation are key features of success.

In the 25 years since innovation and excellence became the guiding principles for the research, science, innovation and technology (RSI&T) system, New Zealand's population has increased by 2 million. The innovation focus has

shunted the RSIT sector into a closed loop paradigm, where the laboratory heads spend 20% of their work hours designing funding applications, based on their existing expertise, that will be conservative (a bit 'fringe') and not challenge any normative scientific perspective. There cannot be any challenge of established scientific consensus and there cannot be any challenge or explicit or implicit criticism of government policy or of the large industries that work closely with governments and political parties to establish policies.

Current policies have effectively established a conservative policy police, where convention must not be challenged. This produces a downward spiral where innovation can 'think' smaller and smaller (often as applied tweaks to known concepts), but not address large problems.

The research, science, innovation and technology (RSI&T) system is blinkered because the 'areas' that can be selected must be politically acceptable. The RSIT is tame and blinkered. It is effectively castrated and unable to serve the public purpose.

Funding is so tightly managed and conservatively controlled, that large funding pots for multi-year research over $5 million will never become available for groups that would proposal a critical investigation of the following issues: non-chemical integrated pest management for forestry, agriculture and aquaculture; soil biology; chemical contamination of wastewater; nutrition for infant health; dietary (non-medical) drivers of cancer and/or chronic illness and/or mental illness; the safety of vaccines and medicines; the safety of electromagnetic fields by age and stage; anthropogenic climate change; and the management of livestock and crops for a changing climate to feed the New Zealand people; long term research to understand contract secrecy for public infrastructure development, from water services, to roading; research groups to critically evaluate security and privacy of digital services that are either owned and controlled by governments or contracted by foreign corporations.

Many people recognise the fate of Gravida, for example, and we've watched how the Sustainable Farming Fund has become more closely tied to innovation outcomes, rather than the original purpose of supporting soil fertility, livestock health and protecting surrounding systems, over the long term. We've observed how the ESR are kept on a tight budget. For example, the scientists re-evaluating drinking water standards had no capacity to critique the out-dated nature of the current World Health Organization standards and guideline levels. There was no effort to understand mixture effects, nor assess whether current drinking water services had capacity to filter out environmentally relevant levels of chemicals that may have contaminated local water sources.

The problem has been compounded by tight managerial focus and oversight, and the extraction of overhead costs has resulted in exploitation by institutions where scientists achieve funding success. However, the short-term nature of funding and overhead costs 'mining' results in short termism around laboratory equipment and instrumentation, and the inability to retain skills.

a. At what levels should research prioritisation occur?

Remove the responsibility from the Ministry of Business, Innovation and Employment.
The past 3 decades have prevented scientists from actively thinking and collaborating to address large issues. RSI&T system staff are not used to discussing politically controversial issues. Conduct a three-week open science symposium where researchers, scholars and scientists discuss New Zealand's biggest problems.

That symposium should address:

- The overall purpose of national RSI&T.
- The 8 sectors and the major problems addressed by each sector.
- Block funding and long term funding.
- Increasing cross-talk between researchers and (a) public officials, (b) small/medium sized New Zealand businesses (including farmers and growers) with scientific and technical problems, (c) regulatory agencies.
- Developing research capacity to assess the state of science and knowledge with common interdisciplinary issues and ensure this information is openly accessible.
- The capacity of research knowledge systems to address public problems.
- What are universities for, and should they be engaged in public-private partnerships where contract agreements, and research outcomes are commercial in confidence.
- Ring fencing funding for health-based, infrastructure and environmental research to ensure that

- The problem of censorship of scientific ideas, particularly concerning large problems and the politicisation of science funding.
- Peer problems: the problem of 'dead wood', narrow expertise, replication, dominance, unwillingness to address politically controversial problems.
- The limitations on managerial power.
- A review of whether nations where scientists are incentivised to own the patents and IP from the work they do, are able to demonstrably scitentifically and technologically addressing socio-scientific problems which include chronic disease, pollution and infrastructure erosion and
- The potential for ongoing large nationally-based surveys that can inform the RSIT and policy community and shape the national priorities.
- Public access of responses to surveys to enable the public to understand the challenges and concerns of the RSIT sector.
- The potential for AI to sort and evaluate

b. What are some criteria for research selection?

Is this a worthy topic that addresses a known problem? This cannot be answered for example, because many of the problems are not politically acceptable to be discussed in New Zealand.

- For example, a multidisciplinary research proposal to reverse metabolic syndrome would fail because the Ministry of Health does not recognise metabolic syndrome. The same for cancer, because the prevention and reversal of cancer is more tightly related to environmental exposures than genetic status.
- Proposals to undertake research to identify back door, and surveillance and governance risks that arise from the New Zealand/Microsoft contract would fail because Microsoft would not approve.
- A multidisciplinary research proposal to assess chemical toxins and trace element pollutions in agricultural soil would fail because there is no innovation outcome, even thought it may relate to long-term soil productivity.
- A research proposal to consider the drivers of autism and neurodevelopmental delay would be rejected because it would involve to many different areas of expertise, traversing molecular biology, toxicology, neuroendocrine, data analysis and so on.

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

Research roadmaps promote transparency and help outsiders understand the extent to which the research is worthy and relevant.
But research roadmaps must occur in a larger framework of serving the public purpose.

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

New Zealand needs to re-evaluate the purpose of the RSI&T system and rationalise funding mechanisms to ensure that public resourcing fulfils the public purpose.

For three decades mission-oriented RSI&T has only occurred within a politically acceptable framework that harmonises with innovation mindsets, or cultures. RSI&T operators have been hamstrung as many large interdisciplinary problems which require a mission-led approach would also challenge scientific paradigms and the political status-quo of successive governments and agencies.

This cannot be undertaken through the SSAG committee who have failed to articulate many of the problems outlined in the Te Ara Paerangi consultation, particularly the way competitive funding has been managed which has encouraged fragmentation, distrust while reducing the collegiality necessary for addressing large problems.

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

An over-arching Ministry of RSI&T.

Universities should shift back to their core purpose of knowledge and education and not have commercialisation arms.

CRIs/PROs must revert to transparently and publicly addressing big issues for the industry sectors that they serve. CRIs/PROs must not be ordered to maximise innovation, but to serve the public interest with particular focus on problem solving services for small and medium sized New Zealand businesses, and New Zealand farmers and growers. CRIs/PROs must own all IP, and this must not be owned by the scientists, but be considered a public asset.

Private public partnerships in the RSI&T system with foreign corporations must not exist. There must be no secret contractual arrangements with corporations.

There must be priority around developing New Zealand owned businesses and problem solving to enhance New Zealand owned industry.

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

Block funding: Interdisciplinary research for long-term problems which is led by cohorts with varied levels of expertise.

Short term funding: new grants, small projects.

Remove commercial and innovation imperatives from all but 3 institutions which are explicitly designed to commercialise inventions with loan facilities at the proof of concept stage. There are to be no secret agreements with corporate partners. These 3 institutions must interface with universities/polytechs and CRIs/PROs. The profits from these 3 institutions must be publicly declared and return from the public. The development stage can be funded by investors, but these investors must be New Zealand citizens, reside in New Zealand and/or be small to medium size companies. Large monopoly-like institutions require competition for market economies to work, and policies that promote competition in smaller market players can help prevent abuse of power by large monopolistic/cartel-like industries.

The commercial institutions would be in place to for skills development and training in challenging interdisciplinary environments, e.g. Infrastructure and geotechnical engineering; digital software, data analysis for human health and reversal of chronic illness; agriculture, electrical and robotics; artificial intelligence, algorithmic manipulation and data mining to maximise human flourishing and prevent abuse of power.

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

The absence of a language around ethics and need means that all decisions are so-called, technical. Once larger big problems are no longer censored, but may be addressed, it can become clearer to identify problems.

Funding panels of working scientists, who are tasked to base funding on solving challenges and problems in New Zealand, not allocating funding based on the likelihood of a commercial outcome, change the freedom which those panels can balance the public purpose.

The block funding mechanism will allow research over time is managed by the participating scientists. There should be slack built into the funding to allow for unexpected costs or discoveries to take place.

For example: robotics in forestry to identify and eliminate weeds and wilding pines, and prevent toxic water run-off, would involve cooperation between materials engineers, physicists, software engineers and forestry industries, and this funding could result in widespread benefit across the industry.

A similar funding pot to develop one strain of genetically engineered pine tree, which would be controversial, which could involve in wilding, or in cross-species contamination and utilise a narrow range of biotechnology skills, might not be as worthy and not carry the same cross-industry margin of benefit.

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

The question is what is 'high-intellectual risk' and 'high-reward research?' Is it for public purpose, is it permitted to challenge status quo norms? Government policy?

When RSI&T cohorts are not supressed into only researching what is politically acceptable, they can have more freedom to work out what is the most important issue.

Currently the only way this question can be answered is by picking the most elite scientist with the most proven track record. This does not allow for important work that will solve public problems and challenges.

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

Currently Māori must apply of Mātauranga Māori within an innovation framework. Anything involving equity must be within an innovation framework, as per health research if there is to be a large funding injection. Large funding pots for example, a 6 year, $60 million inter-disciplinary project to assess serum levels of basic nutrients, to identify biomarkers for disease, to evaluate risk-based dietary patterns (in New Zealand and in the scientific literature) in the 0-25 year age group, in order to create, collegially across New Zealand a pathway to reverse metabolic syndrome and diabetes in Māori would fall outside the demands of both Mātauranga Māori and innovation.

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

Recognising that Treasury and the appropriations process can equip universities and labs through the process of money creation.
The only way that this is not exploited, is to ensure that lay department managers do not have long term control over the funding mechanism, that funded cohorts must act transparently and collegially in a negotiated process, and that there are no secrecy and commercial in confidence agreements (i.e. private public partnerships) where corporations can exploit use of public assets (including knowledge assets).

By building transparency and trust into the system problems and challenges will still happen, but there is greater likelihood that they will be discussed and rectified.

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?

Three decades of innovation, commercialisation and the necessary commercial in confidence agreements have resulted in a dislocated, protective and inwards-looking RSI&T system that is hampered by short-termism and a focus on finding the next innovation to ensure that the next funding round will be successful.

A cultural shift by serving the public purpose will result in greater collegiality and collaboration across institutions.

The challenge is often 'dead wood', however, when the secrecy and commercialisation imperatives are removed, scientists are far more purposeful. collegial, and trusting of each other, and can work with colleagues to prompt them into public good work, or change their ways.

The Treasury and appropriations process should be ensuring that the New Zealand RSI&T is in place to address long term challenges.

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?

For thirty years, uncomfortable or politically inconvenient questions have been systematically deprioritised in funding rounds. Scientists on funding panels know this, and the scientists applying for the funding know this. Self-censorship is common.

Scientists are unwilling to expose their research labs to failure in a funding round. They will apply for 'safe' funding. They do not want to risk their status nor their career from a funding rejection. Research questions with difficult endpoints, that are difficult to quantify and with uncertain outcomes will not be asked, particularly if they challenge prominent industry funders to their institution.

This is producing research voids, path dependency where future funding is dedicated to the 'known problem' that is politically palatable. Larger and greater problems go unfunded.

What we also see is a decline in courage – RSI&T researchers too timid to posit, speculate or guess, across complex interdisciplinary subject-matter areas, because the single discipline sceptics will challenge their scientific authority.

We see RSI&T institutions reluctant to speak publicly, and their staff condemned if they speak publicly about a 'political' issue.

It's fine to speak about innovation and commercialisation in public, but not about something wrong with an industry sector, a research programme, a non-greenhouse gas emission (such as pesticides or EMF/5G exposures) a drug or digital technology.