SUBMISSION – DRAFT RESEARCH, SCIENCE AND INNOVATION STRATEGY

Summary

I am making this submission as an individual. While I am not representing the views of any specific organisation, I am drawing on perspectives gained through my roles in (i) a national science challenge, (ii) a regional research institute, and (iii) a science-government research collaboration, as well as more than 25 years involvement in RSI policy and strategy.

The main points made in this submission are:

- Orientation – the strategy suggests RSI *for* New Zealand/New Zealanders, whereas a strategy that placed New Zealanders at the centre of the RSI system would likely garner more active engagement
- Focus – while appropriately focusing on Government priorities, it is unclear how prioritisation across these priorities will be achieved
- Actions – these point to marginal changes for the RSI system, rather than tackling deep-seated challenges through a sustained, long-term approach.

At various points, alternatives to the suggested framework and/or actions are suggested. One action that could have a significant impact is to introduce a '*National Innovation Challenges*' initiative, whereby innovation challenges are aligned to the Government's strategic priorities in a way that fosters collective impact – across businesses, communities and individuals – through innovation, in turn creating demand for relevant research and science.

While this submission does not respond directly to the questions set out in the draft RSI strategy, it is generally structured according to the main sections/headings.

Strategic context

A long-standing innovation conundrum

The draft strategy does not adequately address the most critical innovation conundrum being experienced across New Zealand – why in the face of substantial social, environmental and economic challenges facing our communities, does our collective engagement with, demand for and investment in research, science and innovation remain relatively low by international standards?

On various measures, it is clear that New Zealand has significant challenges ahead, if a 'productive, sustainable and inclusive future' is to be secured; for example:

- Labour productivity remains low by international (OECD) standards, as represented by a median wage of $25.50/hour, in turn reflecting low rates of business innovation (e.g. proportion of revenue derived from 'new to market' products and services), and relatively low rates of business expenditure on R&D. Furthermore, income and wealth disparities continue to grow in New Zealand;
- New Zealand' large 'biological economy' (e.g. agribusiness accounts for 72% of merchandise exports, 15% of employment, 10% of GDP) focuses many of the resources (land, capital, labour) employed on low value commodity production (e.g. the value chain for infant formula – ostensibly a high value-added product – derived from New Zealand milk shows about 10% of the market value returning to New Zealand enterprises even though these enterprises account for more than 50% of the total capital employed in the value chain);
- While New Zealanders generally identify strongly with distinctive environments, landscapes and biota, we continue to experience degradation of our biodiversity and soil/water/air quality, alongside growing waste and pollution.

While the draft strategy focuses on a 'productive, sustainable and inclusive future' for New Zealand, the strategic logic does not adequately link proposed actions to this aspirational goal. Indeed, the

strategy does not refer to tangible and/or measurable indicators of productivity, sustainability or inclusivity, so it is difficult to evaluate proposed actions against this goal.

Perhaps more critically, the strategy suggests a narrow view of the 'research, science and innovation' system, based on actions from and by a discrete sector intended to impact/benefit others across the community.

Time for a fresh perspective?

The innovation conundrum (referred to above) is not new; it has continued in spite of major research, science and innovation policy reforms over at least the last 30 years. Maybe it is time to acknowledge that a new approach is needed if we are to cut through persisting challenges and constraints.

The draft strategy understates (if not overlooks) the option of placing all New Zealanders (as individuals, communities, enterprises and sectors) at the centre of this system. Alternatively, an 'innovation system of 5 million New Zealanders' could drive a change in our collective aspiration and actions for a 'productive, sustainable and inclusive future', in turn creating new and enhanced demand for research and science to enable such community-led and community-wide innovation.

Such a shift in perspective – placing all New Zealanders at the centre of research, science and innovation system – would in turn drive a different approach for a 'Research, Science and Innovation Strategy'. In particular, the currently strong focus on actions that Government can lead or take directly would be complemented (if not substantially outweighed by) a focus on enabling, facilitating and supporting much expanded community-led and community-wide innovation, in turn driving a much stronger 'demand' perspective for research and science.

Long-term Objective

Following observations made above, regarding the strategic context, there is a need to broaden the long-term objective to ensure it focuses more directly on innovation by, for and with all New Zealanders.

The long-term objective (*By 2027, New Zealand will be a world-class generator of new ideas for a productive, sustainable and inclusive future*) is narrowly focused on a 'supply-side' perspective ('generator of new ideas') rather than on a more balanced 'supply + demand' perspective, where the generation of new ideas is complemented by innovation using such ideas to create impact and value for New Zealanders. This constraint seems especially significant, given the overall focus on a productive, sustainable and inclusive future.

Elsewhere, the strategy frequently references 'demand-side' constraints (e.g. relatively low business sector R&D expenditure) and perspectives (e.g. 'share of our collective resources dedicated to knowledge creation **and use**[1] must grow quickly to enable us to achieve the future we want').

The long-term objective should therefore be revised, to ensure it is relevant to both the demand and supply sides of New Zealand's RSI system.

An alternative 'long-term objective' could be:

By 2027, New Zealander will be a world-class generator and user of new ideas for a productive, sustainable and inclusive future.

Such a change would have knock-on impacts for other aspects of the draft strategy. For example, the 'basic building blocks of our RSI system' would need to be seen more broadly than simply the 'research organisations and infrastructure'. While those components are clearly important, their

[1] Emphasis added

potential impact and value will be constrained if we overlook the importance of other components, such as technology and business organisations and infrastructure.

Contribution to Government Priorities

As a Government-led initiative, it is both logical and sensible that the RSI Strategy should focus on Government priorities. Two caveats need to be recognised, however:

- While Government priorities at any time tend to have a long-term orientation (e.g. 'transition to a clean, green, carbon-neutral New Zealand'), a change of Government often brings a new set of priorities. While RSI strategy should respond to such periodic changes, it will be important to do in a way that retains appropriate focus on the long-term challenges underpinning Government priorities at any time.
- Many attributes of the RSI system reflect development over long periods of time. It will be important therefore to ensure initiatives to strengthen 'building blocks' of the RSI system underpin the capacity of the system to respond to evolving or changing priorities.

Innovation Challenges

One option for strengthening the focus of the RSI system could be to foster a set of national *Innovation Challenges*, aimed at engaging a wide range of New Zealanders (individuals, communities and enterprises) in collective action to address Government priorities (such as a 'transition to a clean, green, carbon-neutral New Zealand'). Such challenges could focus mainly on achieving real change in the day-to-day lives of New Zealanders, through innovation – the adoption and use of new ideas, technologies and/or practices. If such national *Innovation Challenges* strengthened the demand for new ideas, technologies and practices, they would also drive a sharper focus for research organisations to supply such new ideas, technologies and practices.

The success of such an approach however will depend on widespread understanding of how research, science and innovation can enable and drive progress towards long-term and challenging national priorities. This in turn reinforces the logic (and urgency) of putting New Zealanders at the centre of the RSI system.

Researching and Innovating at the 'Frontier'

As a small nation, remote geographically, New Zealand faces many distinctive challenges in pursuing a productive, sustainable and inclusive future. With limited resources, there is a clear need for focus – making sometimes difficult choices about where to invest and where not to invest. Such choices need to focus not only on what we can be good at, but what we can be better at, relative to other nations/regions in the world. This in turn should lead us to focus innovation on areas where we have distinctive challenges, strengths and opportunities.

Prioritisation

The draft strategy sets out a sound approach for identifying areas where we can innovate at the frontier; *viz*. problems that nobody has solved (or is inclined to solve), new opportunities where nobody else is yet successful, making the most of our unique opportunities, areas where New Zealand is the only country likely to focus. But this range is still potentially very wide, so further prioritisation will almost certainly be required.

Such prioritisation may be helped by having a set of criteria (which themselves could be decided/changed as the Government of the day sets its strategic priorities); for example:

- Potential for strengthening productivity, sustainability, inclusivity;
- International distinctiveness of challenge, strength or opportunity.

Reflecting on the Government's current priorities, areas that are likely to emerge strongly in such a prioritisation process include:

- Our biological economy – how to build on our international reputation for clean, safe and sustainable food production, in food industries globally seek ways to be more consumer-centric, enhance health attributes, become carbon neutral, while also increasing food security and reducing costs along the value chain
- Our cultural identity – how to draw more effectively on our Māori culture, history and resources, to create distinctive solutions to current social, economic and environmental challenges

Indeed, there are potential synergies between the two examples suggested above, in that the naturally long-term, intergenerational perspectives of Māori could hold the key to innovation required to address New Zealand's most significant and distinctive economic, environmental and social challenges.

Public sector

It is unclear why the draft strategy draws out a specific focus on innovation in the public sector?

If the RSI strategy placed New Zealanders at the centre, then the public sector could be seen simply as one of many parties/agents involved in innovation through the generation and use of new ideas. The various policy and delivery functions of public sector organisations would accordingly sit within an overall 'system' view, involving businesses, communities and individuals also contributing.

Key Challenges

The draft RSI strategy appropriately highlights a need to strengthen connections across the RSI system. However, this focus would be more likely to drive effective and enduring shifts in behaviour where the purpose of strengthening connections was more prominently defined and communicated.

Indeed, the draft RSI strategy tends to reinforce a narrow 'linear' perspective of innovation, by emphasising the need for better connections from our research organisations to users of research, implying that better connections would lead to better utilisation of the knowledge currently being generated by a generally productive (by international standards) research community.

If the strategy instead focused on the connections needed for New Zealanders (at the centre of the RSI system) to better express their innovation demand and have better access to new ideas, it would likely generate different engagement across the RSI system.

The draft strategy draws on international comparative data to highlight the challenge of connecting better with business, where R&D expenditure is relatively low (e.g. Fig. 3, p23). This is undoubtedly an important (and long-standing) issue. But it would be shame if a focus on connections with business overlooked other critical areas in our innovation system, including:

- Connections with Māori – who hold distinctive knowledge and long-term perspectives, and who are important custodians of resources and landscapes across New Zealand
- Connections with communities – who are practically engaged in solving local challenges that collectively can have national (and global) significance (e.g. restoring biodiversity)

Actions

This part of the draft RSI strategy is disappointingly narrow and therefore weak. While elsewhere the draft strategy attempts to focus on how the RSI system as a whole works and could be strengthened, the actions proposed are marginal and disconnected.

Making New Zealand a Magnet for Talent

This focus on attracting talent to New Zealand does the opposite of placing New Zealanders at the centre of the RSI system. The strategy is likely to garner much more engagement where the focus instead is placed on enabling and empowering New Zealanders to strengthen their own capacity for innovation.

Connecting research and innovation

The focus on research commercialisation implies adding new dimensions to our RSI system without tackling the core barriers to innovation applying to business currently operating in New Zealand. Any gains are therefore likely to be marginal, against enduring 'low' innovation across the bulk of New Zealand's economy.

It might be helpful to promote an 'innovation index' measure (e.g. proportion of revenue from products/services new to market over previous x years) as a way of better highlighting links between innovation and productivity/sustainability/inclusivity. Such active measurement and reporting could in turn incentivise businesses across the economy to lift their rate of innovation. This would foster the demand for research commercialisation so that actions in that area would have greater impact across (rather than at the margins of) the economy.

International connections

The logic for a focus on Australia and Singapore is unclear. If the RSI system is to focus on productivity, sustainability and inclusiveness, it would in turn make sense to focus international connections on countries/regions from where New Zealand can derive the greatest impact.

It might be helpful to include criteria for identifying/selecting such priorities, rather than settling on focus countries in such a definitive way? Alternatively, there would be a compelling case to focus on those countries where New Zealand sees greatest engagement, through trade in products and services, as well as for political/diplomatic strategic outcomes. Any such consideration would inevitably see China (New Zealand's largest trading partner) included as a priority.

Start-up – Scale-up

A focus on start-up businesses, with appropriate support at different developmental stages, makes sense. However, the aggregate impact of accelerating innovation through start-ups is likely to be relatively small compared to the impact possible if businesses across the entire economy sped up (and scaled-up) their rates of innovation. It would make sense therefore to include actions focused on incentivising and fostering existing businesses across the economy to accelerate their innovation.

The R&D tax incentive programme, and proposed amendments to this, are therefore important; but are they sufficient? A core focus on engaging New Zealand businesses with the Government's strategic priorities, challenging businesses (e.g. through 'innovation challenges') to identify how they might contribute could have substantial down-stream impact on business-sector R&D. Some possible areas for enhanced/accelerated business sector innovation (and R&D) could include:

- Grow and share New Zealand's prosperity – how can our major biological industry sectors develop substantially new and high-value products and services, that are attractive to global consumers and can capture more long-term economic value?
- Supporting thriving and sustainable regions – how can businesses drive innovation across regions, e.g. leveraging long-term value from regional assets, communities and networks?
- Deliver responsible governance with a broader measure of success – how can New Zealand design and implement governance models that demonstrate integration of productivity, sustainability and inclusivity, in a way that promotes innovation and attracts global demand for associated products and services?
- Transition to a clean, green carbon neutral New Zealand – how can business innovation drive commercially viable and internationally competitive innovations across all sectors of the economy?

Choosing Areas of Focus

As noted in various points in this submission, focus and prioritisation will be critical for our RSI system. The two basic criteria set out in the draft RSI strategy (where we can genuinely expect that

New Zealand has, or will be able to build, a sustainable competitive advantage on the world stage, and where New Zealand faces a unique challenge or has a specific need) make sense.

However, it is unclear how these two criteria could lead directly and/or exclusively to the priority areas suggested (aerospace, renewable energy, health technologies). It is surprising that other areas – more consistent with the two basic criteria, are not mentioned. Areas that should be considered at least as important as those suggested could include:

- Innovation for our biological economy, to ensure it generates products and services attractive to future global consumers, as well as underpinning international competitiveness of New Zealand enterprises
- Mātauranga Māori as a basis for distinctive innovation for addressing social, environmental and economic challenges
- Innovative solutions for restoring, protecting and enhancing our globally distinctive and culturally important environments, landscapes and biodiversity, to underpin future well-being and prosperity for New Zealanders

Building Firm Foundations

Following the logic running through this submission and the various suggestions already made, it appears the scope of foundations considered is too narrow. In particular, there is a bias towards 'supply side' (research institutions and infrastructure), with little reference to the 'demand side' (enterprises, communities and individuals using new ideas to innovate).

Given the low rates of business sector R&D and the substantial innovation challenges facing New Zealand generally if it is to achieve a productive, sustainable and inclusive future, some critical focus on demand-side infrastructure seems fundamental. Options for addressing this might include:

- Exploring what other opportunities, besides tax-based incentives, might be considered to stimulate innovation across New Zealand businesses and communities. These could include infrastructure for defining and 'hosting' innovation challenges, or regulatory settings influencing the development and adoption of emerging technologies.
- Strengthening the incentives for capital support for innovation, particularly where uncertainty and risk regarding short-term returns stifle demand for innovation-based investment options. This could include infrastructure for distributing short-term risk across a long-term portfolio of innovation-based investments.

Measuring Success

Most of the measures suggested (Annex 2) focus on the 'supply side' of the RSI system – the research end of the system and how outputs from research are applied. There is relatively little focus on the demand side (e.g. businesses and communities signalling need for solutions to their innovation challenges) or on the overall outcomes – in terms of a productive, sustainable and inclusive future.

Impact and outcome measurement for RSI is undoubtedly complex and challenging. However, clearly defining measures that relate logically to the ultimate outcomes sought will be vital to help focus people throughout the innovation system and therefore increase the likelihood of materially positive change driven by this RSI strategy.

Some areas or opportunities to sharpen the measurement of success could include:

- Developing measures for tracking progress towards a 'productive, sustainable and inclusive future for New Zealand' attributable to innovation
- Developing 'innovation index' measures, by which sectors, businesses and community groups can understand and monitor the rate or extent of innovation