CAWTHRON

CAWTHRON'S VISION FOR A REVITALISED RESEARCH, SCIENCE AND INNOVATION SYSTEM FOR AOTEAROA NEW ZEALAND

World-class science for a better future.

Cawthron Institute's Submission to MBIE on Te Ara Paerangi – Future Pathways Green Paper.

16 March 2022

Cawthron Institute sincerely thanks MBIE for the opportunity to provide our feedback on Te Ara Paerangi, and particularly for the informative papers, workshops and ability to voice our thoughts throughout this excellent consultation process.

Cawthron's submission provides an overview of our vision for a revitalised research system for Aotearoa New Zealand, a system that empowers researchers, research organisations and the broad community of interest, makes a real difference to the lives of New Zealanders today and creates opportunities for a better tomorrow.

Cawthron is a unique organisation so we have a different story to tell and view the world through a distinct lens. We hope our perspective will support MBIE's fulsome consideration of the future research system.

We would warmly welcome the opportunity to walk MBIE through our vision at any stage. Please don't hesitate to reach out if this would be helpful.

1. Introduction to Cawthron Institute

Cawthron Institute is the largest independent research organisation in Aotearoa New Zealand, employing around 300 scientists, technicians and support staff. The Cawthron Institute is based in Te Tau Ihu, spread across five sites within the Nelson region, and boasts an amazing diversity of talented staff, with 35 nationalities, an equal gender split, and a significant proportion (47%) of staff under the age of 40.

Cawthron works collaboratively with a plethora of partners and stakeholders, together we strive to achieve three outcomes for Aotearoa: (1) Healthy Ecosystems; (2) Thriving People and Communities; and (3) A Prosperous Blue Economy. To achieve these outcomes Cawthron delivers science across seven themes: aquaculture, healthy oceans, biosecurity, molecular algal ecology, food and bioactives, freshwater ecology and social science.

To support the delivery of excellent science across these themes Cawthron has world-class cross-cutting capabilities including: commercial and research laboratories (chemistry; microbiology; molecular ecology, natural toxins and phytoplankton); blue technology (instrumentation and sensors, aquaculture structures); and data science.

Some of our capabilities are unique in Aotearoa New Zealand's science landscape e.g. we have developed novel testing approaches which contribute to the safety of the food supply chain, and Cawthron hosts the national culture collection of microalgae – a globally significant taonga for Aotearoa.

Cawthron is passionate about delivering research and services that support Māori (at all levels including iwi, hapū and whānau) to achieve their aspirations and address challenges, whether their focus is environmental, economic, social or cultural. Our vision for how the RSI system can better support the aspirations of Māori is outlined in Cawthron Institute's Te Kāhui Āio team submission entitled 'He ōu whakaaro o Te Kāhui Āio i te kaupapa Te Ara Paerangi'.

Cawthron Institute's structural model is unusual for a science organisation in Aotearoa New Zealand and has served the Institute well for 100 years. Cawthron is owned by The Cawthron Institute Trust Board, a charitable trust established following a bequest in Thomas Cawthron's will. Unusually, the trust deed is a private Act of Parliament. We achieve profit for purpose: proceeds are purposefully invested by the Cawthron Trust Board into community based projects and, internally, into capability and infrastructure development and Cawthron research programmes.

2. What has worked well for Cawthron?

Some elements of the current RSI system work well for Cawthron, our partners and stakeholders. These might serve as a model for the future system.

Cawthron's revenue is generated from a varied combination of: commercial laboratory testing, public and private science consultancy, research through contestable funds (e.g. Endeavour Research Programmes and Smart Ideas, Marsden, and local and central government tender processes), the National Science Challenges, government funding for three SSIF platforms (shellfish aquaculture, seafood safety, and the Cawthron microalgal culture collection).

For an organisation heavily reliant on competitive and end-user funding, SSIF in particular has provided stability for Cawthron and given us confidence to invest in our people and infrastructure.

Another key positive of the current platform funding Cawthron has received is that it has enabled us to further develop and cement enduring partnerships with Māori, industry and regulators. These relationships are maturing and culminating in the co-design and co-funding of science solutions to address the challenges faced by our partners. We believe that this end-user focused science plays a large role in delivering a better future.

3. What hasn't worked well for Cawthron?

Cawthron has a significant reliance on revenue through contestable funds (e.g. Endeavour). We have a good track record in this area stemming from our close relationships with stakeholders and iwi, careful appraisal of the bids we put forward, including internal policy experts that have a good understanding of the success criteria plus significant effort from bid leaders. Despite our good track record, there are several aspects of the system that are challenging:

a. Overall the competitive funding processes are costly to Aotearoa New Zealand e.g. the effort expended collectively in establishing the process, developing the bids, assessing the bids, managing the investment process, etc is likely higher than (or at least equivalent to) the funding paid out to successful bids.

b. Current funding mechanisms typically favour established scientists with track records of submitting bids, limiting opportunities for early and mid-career scientists.

c. Although we work as collaboratively as possible with other research organisations, we often end up preparing bids for contestable funds that overlap and become directly competitive, as organisations are motivated to 'chase the money' rather than focusing on growing their unique areas of expertise.

d. Many of our excellent proposals that are not funded receive very similar scores to those that are funded. Currently this scoring system does not sufficiently discriminate between proposals.

e. Bid leaders find the process exhausting.

We affirm the need for and the value of competitive funding processes. However, we advocate for

the proportion of competitive funding to be much lower than platform funding (base-funding), and to always incorporate a two-stage process as used for Smart Ideas or Marsden – whereby short form concepts are used as a filter. This could reduce the level of effort currently "wasted" on unsuccessful proposals.

Another major challenge we face as an independent research organisation is the maintenance of our infrastructure and equipment – some of which is critical to the functioning of Aotearoa's food and aquaculture sectors (e.g. Cawthron's vessels, the National Algal Research Centre, and our laboratories which support food safety and exports). Cawthron receives very limited government support for facility maintenance and upgrading to keep up with the challenges and issues that critical New Zealand sectors are facing. This is becoming increasingly challenging to internally support. An example of an area that Cawthron has recently lost funding in is salmon aquaculture, this endangers our ability to maintain both infrastructure and staff and to support the governments Accelerating Aquaculture strategy.

4. Cawthron's Vision for a Revitalised Research, Science and Innovation System for Aotearoa

The diagram below shows a possible framework for a new research system. The overarching aim of the system is:

To deliver excellent science that makes a real difference to the lives of New Zealanders today and creates opportunities for a better tomorrow.

The key features of the proposed system are:

1. A semi-autonomous government-funded entity, probably under the umbrella of MBIE, is established ('Science Aotearoa').

2. Science Aotearoa embodies a 'uniquely Aotearoa' research system, which places equal value on Māori and tangata tiriti perspectives side-by-side;

3. Science Aotearoa has a governance board which reflects the diversity in Aotearoa today and provides governance oversight of the research system.

4. The system is mission-based and Science Aotearoa sets and coordinates science priorities, and allocates funding to those science priorities, including national infrastructure development and the capability/talent pipeline.

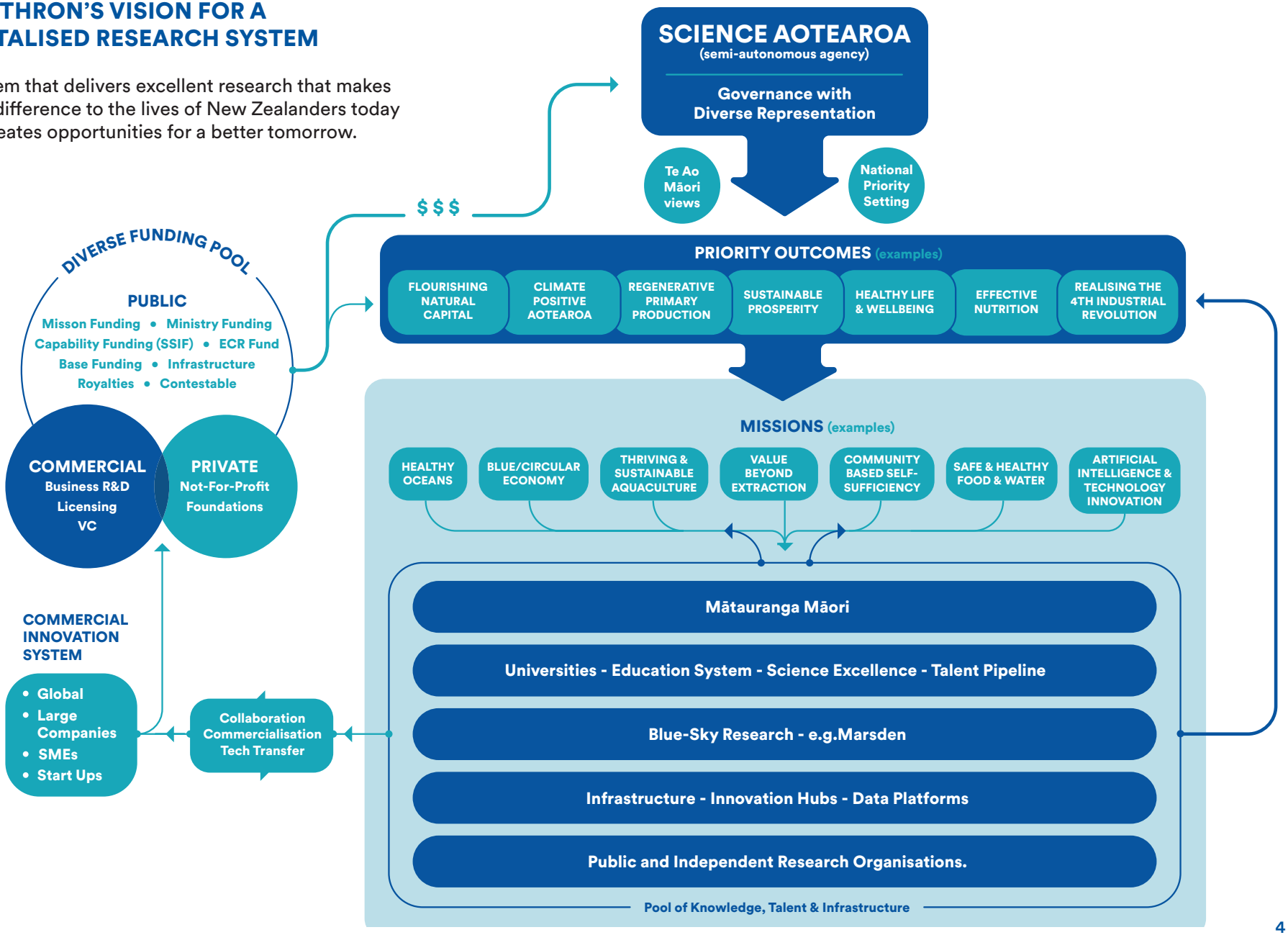
5. External co-investment into science priorities from non-government entities is able to supplement government investment where desired outcomes are aligned, and the flow of benefits would be shared accordingly.

6. Financial benefits derived from government investment will be used with purpose by Science Aotearoa, and where possible it will invest back into capability, infrastructure of national importance and achieving impactful outcomes.

7. A system such as this, with intentional focus on high priority areas of research, science and innovation, which fosters collaboration between community, science and industry (rather than competition), will provide a robust pathway towards a more prosperous and resilient future for all of Aotearoa New Zealand.

CAWTHRON'S VISION FOR A REVITALISED RESEARCH SYSTEM

A system that delivers excellent research that makes a real difference to the lives of New Zealanders today and creates opportunities for a better tomorrow.



4.1 The Opportunity for Aotearoa New Zealand

The world is facing huge environmental and social challenges - climate change, population increase, degradation of natural ecosystems, and the rise of emerging infectious diseases such as COVID-19, to name a few. These challenges are changing life as we know it, we need to adapt to these changes and address the underlying issues. Bold measures are required to halt and reverse the impacts we are facing.

Aotearoa New Zealand is a unique country and is in the enviable position to make a significant contribution to improving livelihoods globally. We are culturally diverse, geographically isolated, and enjoy an extremely productive environment. The ocean in Aotearoa is 96% of our total exclusive economic zone.

Our significant oceanic zone is a major opportunity for Aotearoa New Zealand to establish a substantive marine based economy, an economy that not only produces food, creates jobs and supports one of the most diverse natural ecosystems and marine lifeforms, but will also lead Aotearoa to a net climate positive status within a generation.

This is the opportunity Cawthron sees and wants to realise – however, we need a conducive science system to support us to: **(a)** experiment with new ideas, **(b)** trial promising solutions, **(c)** accelerate collaboration and innovation with industry and regional communities, **(d)** accelerate implementation of high impact solutions, and **(e)** ultimately deliver the priority outcomes we all desire:

- Flourishing natural capital
- Climate positive Aotearoa New Zealand
- Regenerative primary production
- Sustainable prosperity
- Healthy life and wellbeing
- Effective nutrition; and
- Realising the fourth industrial revolution

Investment in research, science and innovation should be a major priority for the government as a key enabler of the outcomes above. Furthermore, Cawthron Institute's experience is that government-funded research programmes generate diverse and far-reaching economic, environmental, social and cultural benefits, far beyond the specific project objectives and outcomes. They contribute to building RSI system capability, high-value job creation, building a sense of shared cultural identity, and support a wide range of private commercial enterprises within or adjacent to the RSI ecosystem and therefore could be conceived of in the same way as the Government's 'shovel ready' infrastructure investments or 'jobs for nature' programme. Two examples of research fuelling commercial enterprise include the SPATnz Greenshell mussel hatchery and the Moana NZ oyster nursery, which are commercial operations producing a significant proportion of Aotearoa's oyster and mussel spat. These were born out of Cawthron's government-funded research programmes.

4.2 Science Aotearoa - Guiding Aotearoa's Science Investment

* A semi-autonomous government-funded entity (probably under the umbrella of MBIE) is established ("Science Aotearoa") to coordinate and set priorities, distribute funding to support Aotearoa's science priorities, maintain our country's science infrastructure and oversee the talent pipeline.

* Science Aotearoa coordinates across government to ensure that all science funding aligns with overall government strategy and, vice versa, that strategic objectives can be sufficiently funded to enable desired outcomes. We note there are currently multiple strategically valuable but unfunded research roadmaps and strategies developed by government agencies.

* Science Aotearoa owns the science priorities, but delegates implementation to discrete science programmes called 'Missions' (that have their own governance structures).

* Science Aotearoa measures performance of the 'Missions' toward achieving the desired outcomes.

* Science Aotearoa is responsible for managing the talent pipeline to ensure capability continuity, working closely with science providers to:

    - identify skillset shortages
    - secure career pathways
    - create development opportunities.

* Science Aotearoa undertakes regular stocktakes of important infrastructure, equipment and collections of national significance to inform funding allocation.

4.3 Governance of Science Aotearoa

* The research system is aligned with Te Ao Māori views and values, so that these sit alongside government perspectives rather than within.

* The governance board structure for Science Aotearoa embraces Te Tiriti and Māori aspirations, which form the heart of our science system.

* The Governance arrangements also reflect the broader diversity of Aotearoa today – including our significant Pasifika community and responsibilities in the Pacific region.

* The Governance board provides Science Aotearoa with strategic level advice on policies for the research system and its general direction. The Board ratifies key decisions, for example, agreement of the national science priorities.

4.4 Aotearoa's Science Priorities

* Science Aotearoa establishes a formal process for national priority setting, this involves a wide consultation with all potential stakeholders, beneficiaries, cultures and end-users.

* The priority-setting process brings together Te Ao Māori and tangata tiriti values.

* A holistic view of priorities, to give balance and equity among priorities (e.g. to avoid economic growth at the cost of the environment), is essential.

* 'Science Missions' are developed to address these science priorities and deliver impactful science outcomes (e.g. 'healthy aquatic systems or 'tackling climate change'). These will have a minimum lifespan of 10 years to support workforce stability and enable a good window in which impact can be realised.

* There is a formal process of review after five years, with a refresh of priorities, to enable responsiveness to adapt to new challenges, notwithstanding the need to balance stability. This review would consider whether a Science Mission is extended beyond 10 years.

* Each Science Mission will have its own governance structure that supports collaboration between science partners, Māori, businesses and the community, determines the science strategy for the Mission and sets key performance indicators in collaboration with Science Aotearoa. This would be somewhat similar to the models used for the New Zealand Food Safety Science and Research Centre (NZFSSRC) and the Science for Technological Innovation (SfTI) National Science Challenge.

* Science Missions are staffed by both government and independent research organisations under secondment arrangements.

* Each Science Mission will incorporate a range of funding mechanisms to support research, science and innovation that contributes towards achieving the objectives of the Science Mission:

    - Base funding for scientists in line with SSIF, NSC and CORE systems. This funding would support best-fit teams of experts in the system.
    - Endeavour-like competitive processes where researcher-inspired idea generation will deliver innovative concepts for grow/transform impact.

4.5 Investment in the Science Priorities

* Science Aotearoa manages RSI funding from a diverse investment pool derived from **(a)** core government funds for research, **(b)** funds currently held for research in other ministries (e.g. MPI, MfE etc), **(c)** funds directed to CRIs, **(d)** royalties and other funds that stem from government supported inventions.

* Non-government investors are able to co-invest where desired outcomes align with Science Aotearoa's priorities. This would allow research to be accelerated and could lead to the generation of increased ecological, financial, cultural or social benefits. These investors might receive a share of future royalty income, become a shareholder of any commercial offspring and/or lift their economic/social/cultural/environmental outcomes by being better able to apply research.

* The total investment into the system is significantly higher than the current RSI spend. This increased expenditure primarily comes from increased government allocation through Science Aotearoa, but could also be enhanced by non-government investment into Missions where there is alignment of private/public ambitions.

* Science Aotearoa establishes a formal process to allocate a proportion of its total funding to each Science Mission.

* Science Aotearoa funding will cover both base capability (people) and base infrastructure under the same Science Mission framework.

* Infrastructure funding will be provided for national assets (private and government) identified in regular stocktakes that are deemed critical to the delivery of Science Missions and Aotearoa's desired science priorities.

* Where possible, efficiency is created through communal use of infrastructure hubs, open or shared access facilities, and cross-Mission visibility.