



SUBMISSION TO THE SCIENCE SYSTEM ADVISORY GROUP ON SCIENCE SYSTEM REFORM: PHASE 1 17 May 2024

The Executive Council of BioTech New Zealand (BioTechNZ) thanks the Science System Advisory Group (SSAG) for the opportunity to submit on its Science System Reform process.

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About BioTech New Zealand

BioTechNZ is a purpose driven, membership-funded sector representative body. Our vision is to maximise New Zealand's bioscience and technology capability to create a strong New Zealand bioeconomy. Our diverse range of members all share a desire to maximise the ways biotechnology can help address the world's agricultural, environmental, and health problems.

BioTechNZ raises awareness and increases understanding of biotechnology to enable the nation to embrace the best opportunities biotech offers, helping New Zealanders to live better, healthier, and more productive lives.

We connect innovators, investors, regulators, researchers, social entrepreneurs and the public, and acts as a neutral centre of gravity for discussion, debate, policy development and collaboration around biotechnology in New Zealand.

BioTechNZ is a member of NZTech, a member-funded, not-for-profit, non-governmental organisation that represents 20 tech associations (the Tech Alliance) with over 2,000 members who collectively employ more than 100,000 New Zealanders – more than 10% of New Zealand's workforce.

Summary

BioTechNZ welcomes a review of the science, innovation and technology system as it is significantly outdated. We are highly supportive of the *Response to Te Ara Paerangi – Future Pathways Green Paper* by Sir Peter Gluckman, Director of Kōi Tū: The Centre for Informed Futures, University of Auckland (15 March 2022).

Due to the diverse membership base, many of our members will be submitting on behalf of their research institution, or company. This submission represents the views of BioTechNZ and does not purport to reflect the views of individual entities which are BioTechNZ stakeholders.

Despite the industry's vast potential to increase economic and social wellbeing, New Zealand's ability to support long-term a viable biotech sector is uncertain. The need to address this problem is quite critical. We believe that failure to do so will see many of our best and brightest researchers and biotech entrepreneurs leave New Zealand for more supportive environments overseas.

NZ has lost many biotech companies, e.g. Lanzatech and Neuren Pharmaceuticals, with many bought by large international companies, e.g. Bayer buying Bomac, with no intention to keep the R&D here as there are no incentives to do so. We have grave concerns that the next crop of startups will leave NZ.

We believe that upgrading New Zealand's innovation ecosystem is fundamental to the reform process, and would welcome an opportunity to speak with the Science System Advisory Group (SSAG) about this submission, to support further work required around creating a fit-for-purpose, robust science system.

Our key messaging to the SSAG is that we need to:

- Recognize that New Zealand needs to be a knowledge economy.
- Increase R&D investment.
- Reduce fragmentation across the whole ecosystem.
- Clearly define each player's role in the ecosystem to reduce doubling up of resources.
- Recognize that funding for both basic and applied research & development is key.

- Reduce barriers for companies to engage with research institutions.
- Create a mechanism for ideas to be translated out of the research system.
- Address the IP issues holding back innovation.
- Introduce longer time horizons to ensure funding and policy certainty.
- Accept that restructuring the science system will require bipartisan agreement.
- Support the next generation by providing them with new skills through education and training.

1. What future should be envisaged for a publicly supported science, innovation and technology systems?

BioTechNZ firmly believes that to succeed and fully realise its potential, New Zealand needs to be a knowledge economy. We need innovation and productivity growth through the creation of knowledge-based industries which help to improve our wellbeing. This can be done by:

(1) Investing in education

We need to invest in people and education for all New Zealanders.

- Lift our school curriculum to a higher standard, teaching the core subjects – English, maths, biology, chemistry, physics – using technology.
- Encourage students who don't want to go to university to train at highly-renowned technical institutes to gain sought-after skills, such as bioprocessing and other technical skills, and have future-focused courses within the curriculum. We also need to re-build where necessary the credibility of these institutions.

2. What are the opportunities, challenges and barriers that need to be addressed to build a more thriving research, science, innovation, and technology system that delivers positive sustainable growth and prosperity for New Zealand?

(2) Consolidating our research organisations

Consolidation is needed across the research sector, including our eight universities and eight CRIs.

- Consolidate around courses – not every degree programme needs to be offered at every university. A good example is the country's sole veterinarian school, at Massey University. Different universities should be encouraged to be expert in certain areas, which creates consolidation and true centres of excellences.
- CRIs commit too many resources competing with one another for contestable research funding. This fragmentation and misalignment drive competitive and short-term behaviours that undermine connection and lead to inefficiency within the system.

(3) Increasing R&D investment

The Government has set a target of raising the total amount of R&D carried out in New Zealand to 2% of GDP by 2028.

- It is essential to recognize that R&D expenditure varies significantly across industries, and that manufacturing needs higher R&D investment.
- Government spending needs to be additional new money, not just repurposing current money from projects and programmes that have been discontinued.
- We cannot leave the heavy lifting to the large companies as we don't have any here in the biotech sector. This is due to many factors, including Pharmac's model and a lack of tax incentives. This constitutes a gap which may require government help to close.
- This lack of investment, and the existence of only a small number of high-growth companies, has encouraged emigration of skilled professionals and researchers as we have no jobs for them. This is impacting our ability to retain talent and drive innovation.

(4) Reducing fragmentation across the whole ecosystem

Many agencies have similar roles; this duplication of resources is wasteful.

- Agencies need to be set clear deliverables be clear about their roles and boundaries, as "scope creep" has occurred over many years. This has increased costs and inefficiencies and has led to confusion as to where companies should go to get advice.
- Siloed strategies need to be removed, replaced by strategies that sit across government agencies.

(5) Supporting the full research spectrum, from fundamental to applied

- There is a misunderstanding that applied research is innovative and that fundamental research is not. This is not the case as a strong fundamental research base creates a health pipeline of innovation.

(6) Improving funding models and allocations

Current research funding is too fragmented, weakening the ability of the science sector to work together for the common good of New Zealanders. Also, an international focus is needed.

- Consolidation of funding agencies.
- Funding for the future is not just for three years. The 2002 taskforce, and industry training programmes (ITPs), were successful because they had a common goal with all government agencies working together with a common purpose. An example of the dangers of short-term thinking: if New Zealand had continued to fund the biotechnology taskforce started in 2003 we would now have 20 years of innovation in NZ. Instead, we have only small pockets of greatness.
- New Zealand cannot fund every sector – we do need to pick winners, but we have to be very careful not to just fund what is fashionable, but instead support those sectors in which we have world-leading capabilities.
- We need to reduce unhelpful competition.
- We need to ensure research grants don't have huge "scope creep", e.g. international engagement to outreach in schools, and everything in between.

3. The Innovation System

(7) Increasing interconnectedness between research organisations

- A healthier focus on relationships between different research institutions, and on relationships within research institutions, is needed.
- The boundaries of science are now blurred, e.g. animal health is interconnected with human and environmental health in a "one health" concept. We need to be careful not to create silos, as has happened with the CRIs due to cost cutting.

(8) Increasing engagement between research organisation and companies

- Globally, universities are at the centre of innovation hubs, with companies engaging with universities to help build and create their technologies. The process of moving world-class scientific research discoveries from our public research organisations out into the world as new products and services is key for New Zealand.
- However, there is a significant misalignment between government, research institutions and the private sector regarding their basic premise to commercialise and who benefits from commercialisation. New Zealand institutions are funded for research, which can deliver impact, yet they are not incentivised to commercialise their research discoveries.
- We need to make it easier for companies to work with universities and CRI by:
 - Reducing the cost barriers to engaging with universities and removing the large overheads on projects. Internationally there is a lot more engagement with universities and companies, which increases knowledge transfer.
 - Reducing the pain points around intellectual property.
- Academics are not rewarded for taking time out to work in companies to grow new innovative technology; instead they are penalised, and this must change.
- Emeritus Professor Joerg Kistler's model of the Institute for Innovation in Biotechnology (IIB) was groundbreaking. Companies received highly technical support and were able to use high-end equipment co-located in the biology building at the University of Auckland. The Bioscience Enterprise Programme was set up to feed the growing biotech sector, off the back of the Biotech Taskforce. This programme is still running and provides science-based students with commercial skills, with over 300 alumni students working around the world in very diverse and successful roles.

(9) Improving the regulatory environment

- The regulatory approval process for scaleup of startups needs to be made easier.
- The pathway for Phase I clinical trials is too difficult, with no options available beyond use of Good Manufacturing Practice (GMP) facilities. Some relaxation of the rules around compliance, as is available in Australia for example, would be welcome.

- On a more positive note, we support the changes to the Environmental Protection Authority (EPA) being driven by the Minister of Science, Innovation and Technology. We also believe the government's ethics controls and templates are well suited to the clinical trial process.
- Updating genetic regulations is key to New Zealand moving forward into the 21st century. However, regulations must be able to be amended to ensure that any unintended consequences have been resolved and that innovation can continue.

(10) Encouraging better pathways to commercialisation

We need a better ecosystem for scaleup and commercialisation. We need to map out a translational pathway for researchers to bring their discoveries to clinic/market.

- International comparisons show New Zealand ranks highly in generating ideas but that New Zealand firms invest relatively little and perform poorly in commercialisation. The commercialization model is not working. We lack the expertise to scale-up in NZ, and only have pockets of knowledge.
- Key elements in achieving these outcomes – some of which have been alluded to above – are:
 - Improving infrastructure and commercialisation pathways
 - Reducing duplication in the ecosystem and improving standardisation
 - Improving public sector funding models
 - Improving the regulatory environment
- New Zealand universities each operate different models for commercialisation of their technologies, with different expectations for returns. CRIs have their own models for technology transfer. This poses special challenges for investors looking to take the technology to the next stage.
- What is needed is a flattened structure where the incentives or outcomes that universities expect, or the publicly-funded research that they've developed, should accrue to the scientists that invented the technologies, or to the companies that then invested their own money into them. Effectively, most of the research has been paid for by the state through government grants, so it doesn't make sense for the universities to claim proprietary IP.

(11) Ideas for improving infrastructure

New Zealand desperately needs a competitive and accessible biotech ecosystem and infrastructure that is outside the control of the universities and CRIs.

- Currently it is too difficult for innovative startups to move beyond the R&D stage fostered by these institutions.
- We lack effective regional and national hubs for innovation that we see in Australia and elsewhere. Gracefield's infrastructure, for example, is rundown and despite the best efforts of many talented people, it does not provide an ecosystem conducive to growing biotech companies.
- A preferred option would be a single site hub, owned by government but operated privately by a collaboration of biotech and pharmaceutical companies, with corporate sponsorship and support. Hubs of this kind exist, or are being built, in major cities around the globe, and New Zealand needs to follow their examples.
- We need to be encouraged to partner where we can – we cannot do everything: finding an innovative compound, doing pre-clinical trials, proceeding to human trials, manufacturing, supplying and distributing. We need to work out what is New Zealand's sweet spot is and not build all new manufacturing facilities.
- We need to continue to invest in NZ platform funds like the RNA Platform which allow for targeted activities and services, focused on growing our health and medical industry sector by fostering collaboration, strategically building capabilities and attracting new talent and opportunity across the research, innovation and translation value chain.
- Growth centres should be put in place to measure the success of these endeavours from new discoveries/innovations to new patents filed, trademark applications and licenses filed, to new products released to the market, to jobs created from targeted investment.
- The shortage of private laboratories of GMP standard readily accessible to the private sector for manufacture for human or trial use means New Zealand startups ready for scale-up must either look to find a suitable laboratory overseas or try to raise money to build one here at prohibitive cost.
- The infrastructure for us to manufacture key biologics should be part of our pandemic preparedness response. This infrastructure could then be used by translational researchers across the country to manufacture biologics for clinical trials. Modular single-use equipment has now made manufacturing of multi products a possibility.

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