

KIWINET SUBMISSION ON TE ARA PAERANGI FUTURE PATHWAYS CONSULTATION PROCESS

Kiwi Innovation Network (KiwiNet)

KiwiNet is an independent entity formed as a collaboration between eight Crown Research Institutes (CRIs), seven Universities, three independent research organisations and Callaghan Innovation. This represents 80 percent of New Zealand's publicly-funded researchers. Through KiwiNet these organisations pool PreSeed Accelerator funding to achieve economy of scale for the commercialisation of publicly-funded research.

This submission is the view of Kiwi Innovation Network (KiwiNet). It does not purport to reflect the views of the individual entities which are KiwiNet shareholders.

Principles

The Te Ara Paerangi Future Pathways consultation process and the development of the research, science and innovation system should be guided by principles of:

- Honouring Te Tiriti o Waitangi
- Consistent recognition of what constitutes 'benefit to New Zealand'
- Mutual understanding and collaboration
- Empowerment and authority
- People-focused
- Respect, fairness, trust, openness and
- Sustainability.

Assumptions

We have based this submission on the following assumptions:

- New Zealand Government is seeking greater impact from publicly-funded research activity for the benefit of New Zealand.
- Government funding will be available to contribute to this endeavour but will remain constrained.
- The available capital for start-up companies may fluctuate in the future subject to government policy decisions around New Zealand Growth Capital Partners (NZGCP) and their funds.

Introduction

Thank you for the opportunity to provide a submission to the Te Ara Paerangi Future Pathways consultation process. We applaud the Government's commitment to create a research, science and innovation system that vitally contributes to New Zealand's success. In light of this commitment, MBIE has requested input into determining national priorities and the ways to best support these priorities through the restructure of the research science and innovation sector.

We believe there are overarching issues to be addressed in order to achieve any potential gains through future priority setting and/or restructure. These issues are related to the effectiveness of knowledge exchange pathways which lead to impact generation.

Firstly, we believe it is the Government's intention to develop a research, science and innovation system which is funded by New Zealanders and in turn, creates impact for New Zealanders. Impact from the sector may be defined and derived in many ways. Academic papers contribute to academic communities nationally, and globally, spur further research, and support the international rankings of our institutions. Academic researchers provide commentary as critics and conscience of society adding weight and perspective to national conversations. This has been particularly notable throughout the COVID-19 pandemic.

Nonetheless, we believe the impact desired by the Government is the impact which reaches the lives of all New Zealanders. The impact created by commercialisation is the process of moving world class scientific research discoveries from our public research organisations out into the world as new products and services. Commercialisation is, in part, the strategic planning and further development of new knowledge which, once protected, developed and licensed can attract investment, and then begin transformation into the technology solutions to solve some of the world's greatest challenges.

It is within this process of commercialisation, often unseen and misunderstood across the system, that the greatest gains are to be made. Within the current operating model, New Zealand's institutions are **funded for research** which can deliver impact, **yet disincentivised to commercialise** their research discoveries.

This anomaly is unresolved. Internal funding mechanisms do not sufficiently deliver resource to parts of the system involved in commercialisation. Commercial capabilities across institutions are often disparate and uneven. This key process in creating knowledge exchange for impact generation, is in fact, our weakest link.

Despite systemic challenges and limited resources, New Zealand's public research organisations have delivered successful outcomes through the collaborative Commercialisation Partner Network (CPN) model that has evolved nationally over 10 years. PreSeed Accelerator Funding, from organisations accessing KiwiNet's devolved fund from MBIE, has delivered a return to New Zealand over eight-times greater than the PreSeed invested, including over 60 spin-out companies and generating over 600 employment opportunities. Yet there is significant unrealised potential in the system.

Our submission explores some of the system attributes and their unintended consequences on the process of commercialisation.

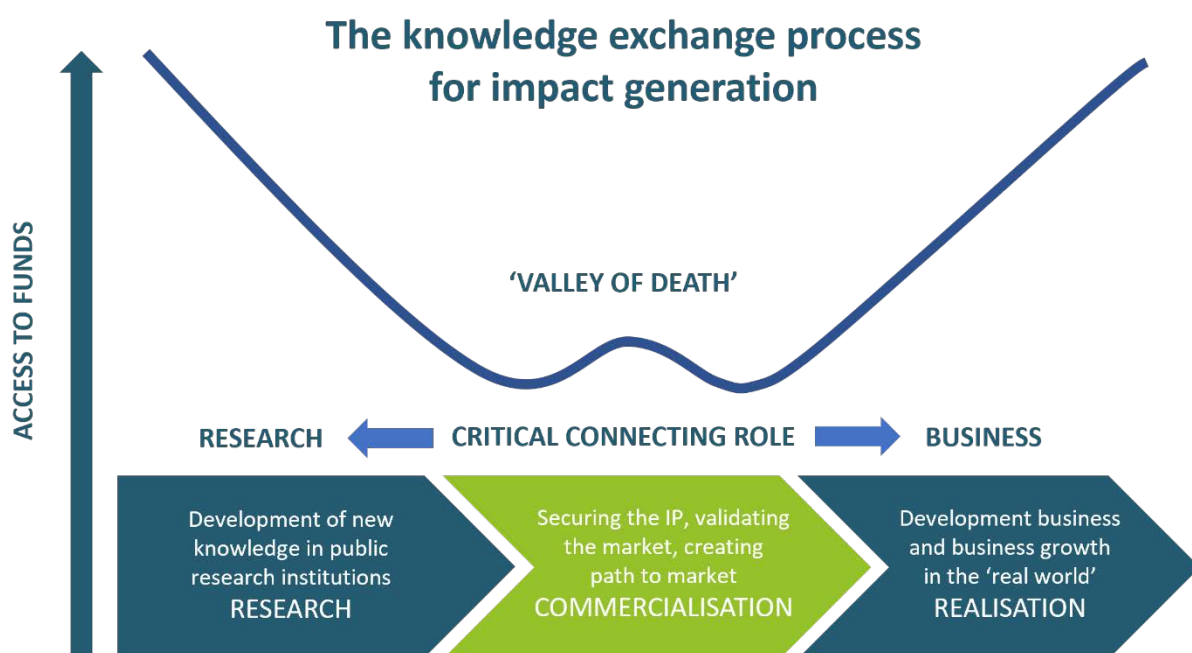
Summary

1. Fundamental misalignment between Government, research institutions, and the private sector exists about the basic premise to commercialise for the benefit of New Zealand. This misalignment drives competitive and short-term behaviours which undermine connection and lead to much inefficiency within the system. This leaves Intellectual Property (IP) and impact potential unrealised. **MBIE must provide the research, science, and innovation sector with clear performance expectations around benefit to New Zealand and what constitutes success as a nation.**
2. The current system of Intellectual Property ownership and management does not serve the research, science, and innovation community well. **Open, honest discussion about IP ownership and management is needed to develop a 'no surprises' culture and address misalignment in expectations between researchers, institutions, and investors.**
3. Institutions have a key role in deciding the priorities to be placed on commercialisation activity within their institution, and to address inherent system disincentives with MBIE as the funder to 'de-risk' knowledge exchange within institutions. **De-risking the knowledge exchange process within institutions could be the single biggest driver toward more knowledge exchange and improved potential impact generation.**
4. **A slow commercialisation process is a lose-lose scenario for institutions, researchers, founders, the private sector, and New Zealand. Simultaneous action is required across the sector to accelerate knowledge exchange.** This looks like: clear direction and performance expectations from Government, a greater share of government and/or institutional funds to the parts of the system responsible for commercialisation, mechanisms to support the smooth exit of IP into the private sector and uptake in society.
5. **System dis/incentives and differing expectations around intellectual property monetisation must be addressed in order for greater investment into the new system to deliver better results.**

The knowledge exchange and impact generation process

To begin our discussion, we draw attention to the knowledge exchange and impact generation process for the commercialisation pathway. This extends out of our public research organisations reaching deeply into our businesses, corporates, industries, and investor communities.

KiwiNet has a broad and unique view of the systems, processes and people engaged in knowledge exchange and impact generation. KiwiNet is situated in the middle ground between research generation and impact generation and provides touch points for all actors in this process. In its current structure, the knowledge exchange and impact generation process involves three phases: research, commercialisation, and realisation. Each phase is critical to realise the latent potential of research discovery from New Zealand’s research institutions. All phases are required for success.



Research Phase

Research institutions undertake research, which can be categorised as investigator-, mission- or sector-led. A percentage of research has real-world application and Intellectual Property potential. Institutions own the IP where the research has been publicly-funded (versus contract research) and they hold power and control over access and opportunity for research and researchers to explore and participate in the commercialisation process.

Commercialisation Phase

New Zealand universities often employ a technology-first approach to commercialisation whereby scientists develop novel technology or IP emerging from their research and are in search of a real-world problem it can solve. CRIs more commonly pursue sector-led research with a solution in mind. All research can give rise to IP with the potential for development into new products and services (sometimes this will be an unintended output) and will require institutions to undertake early-stage commercialisation to determine an impactful application and to develop the technology for private sector uptake.

Commercialisation professionals are not researchers, investors, or venture capitalists. They are a specialist workforce with a broad knowledge base to devise IP strategy and project manage the research idea with the researcher toward the best route to investor readiness – whether via a spin-out company, joint venture or

licensing deal. Technology transfer offices (often subsidiaries of the institutions) and CRI commercialisation professionals, and KiwiNet are engaged in core commercialisation activities. Here public research institutions, researchers and IP connect with industry and investors. The commercialisation professional holds a central relationship role to straddle the cultures and languages of scientific researchers on one side and industry, corporates and investors on the other.

Knowledge exchange through commercialisation is often not deemed to be core business for universities. CRIs participate in knowledge exchange largely via contract research with private sector customers. The former university scenario may leave many research discoveries as latent or wasted potential. This wastage or delay severely inhibits the translation of public research discoveries into goods and services which can enrich the lives of the general population and/or environment. The latter CRI approach disincentivises blue sky thinking and the pursuit of technology-first opportunities where an existing customer for the IP is not apparent. This results in a poorer national economic and social position.

Realisation Phase

The Realisation Phase through licensing usually connects directly with industry – but this path does not suit all technologies. The Realisation Phase through start-ups and spin-outs is capital intensive. It is resourced via personal funds of the founder, Technology Incubators, Angel Investors, Venture Capital Funds and numerous rounds of capital raising. During this phase the commercial asset must attract significant investment and resourcing to be developed into a viable product. Successful investment is predicated on a raft of factors which balance value and risk. ‘Deep-tech’ technology is capital intensive, with high risk and long lead times, but with the potential for transformational impact and very high returns. Typically, deep-tech solutions may not make a return on investment for at least 10-20 years, compared with 5-7 years for software-as-a-service (SaaS) solutions. Impact happens after the commercial asset has been developed into a technology product, marketed, distributed, sold and delivered to the end consumer.

We define ‘deep-tech’ as technology that is based on scientific advances and discoveries or tangible engineering innovation.

Knowledge exchange and impact generation support

Discussion on definition

One major stumbling block for the sector is the absence of precise definitions. Entities often talk at cross purposes. Key terms and sector jargon are widely misconstrued leading to misalignment in expectations, funding, delivery, and trust. For the purpose of our submission, we offer the following discussions on what we mean by ‘knowledge exchange’, ‘impact generation’ and ‘benefit for New Zealand’.

Knowledge exchange

- Research institutions create knowledge through research and subsequent research discovery. Institutions may share and distribute these research findings through publication, conferencing, media promotion and as critics and conscience of society. We suggest this is one-way knowledge dissemination (or broadcast). **Publications, media promotion, and societal engagement are not knowledge exchange.**
- **Knowledge exchange is a two-way process** by which knowledge that has been claimed and identified as a discrete and quantifiable product is then traded, sold, or licensed.

Impact generation

The impact we strive to create is well beyond the academic knowledge and expertise housed within our public research institutions. The impact generation which we seek refers to activities that create a notable and positive change to our economy, society, culture or environment. These are the impacts which can directly increase prosperity and improve quality of life for New Zealanders:

- Impact may be something that creates value (such as GDP, job creation, increased brand position, new company formations such as spin-outs and start-ups, new or strengthened virtual and physical networks).

- Impact may look like an environment where deep-tech start-up companies emerge and thrive.
- Impact may be something that reduces a deficit (removes/converts waste, reduces pollution, mitigates climate change, reduces diseases, accelerates a system, requiring fewer financial resources or inputs).

Our broad view of impact is supported by the Living Standards Framework supplemented with the unique character of mātauranga Māori as expressed in the Vision Mātauranga policy and the Ngā Tūtohu Aotearoa | Indicators Aotearoa New Zealand developed by Stats NZ.

Benefit to New Zealand

There is huge misalignment across the sector, including within MBIE as the funder, as to what constitutes 'benefit to New Zealand'. This is most evident when high-profile IP, spun out of a public research organisation, is sold overseas – to ultimately deliver global impact alongside significant national benefit. However, a belief exists that when this happens New Zealand has lost an advantage. Institutional reputations are at the mercy of the mob. Funders are questioned.

To address this misalignment of the nature of benefit, firstly we must accept that impact from commercialisation is most visibly realised in the private sector and is only felt after considerable risk, investment, development, and production of the technology solution. Secondly, we must accept that size matters. New Zealand is a small country, and this brings benefits as well as limitations.

International markets are attractive for deep-tech innovation, not because New Zealand founders are in search of greater dollars, but because the size of the New Zealand market is too small to generate sufficient revenue and return to attract the large capital investment necessary to develop the product and create a sustainable business model. This may be an uncomfortable truth but the challenge here is a persistent one.

Even the more sizeable Australian market needs support. Recently the Australian Government announced an additional \$2.2B of investment into research commercialisation over 10 years, with a focus on strengthening flows of IP into priority national manufacturing sectors and uptake by existing corporates. Compared with Australia, New Zealand lacks the critical mass of businesses, including corporates, to absorb the R&D or IP flowing from our public research organisations.

With the limitations of a small market, we have some obvious alternatives:

- don't do science – give up, leave it to the big players
- think small – only develop IP which can be absorbed in our domestic market or
- grow a start-up ecosystem and focus on developing an environment which will nurture deep-tech start-ups supported by licensing, corporate venturing or investment – a nursery of deep-tech startups, some of which will become global and some which will develop into a next-generation of local deep-tech firms.

In any case, **exports of our science and technology smarts to the world, even at a fledgling stage, will deliver national benefit from inward investment, plus capability and reputational gains.**

Takeaway

Fundamental misalignment between Government, research institutions, and the private sector exists about the basic premise to commercialise for the benefit of New Zealand. This misalignment drives competitive and short-term behaviours which undermine connection and lead to much inefficiency within the system. This leaves intellectual property and impact potential unrealised. MBIE must provide the research, science and innovation sector with clear performance expectations around benefit to New Zealand and what constitutes success as a nation.

Actions to increase knowledge exchange and impact generation

Accelerate commercialisation

Commercialisation is the primary activity that allows for knowledge to be protected, packaged and exchanged in a way which will precipitate impact. A slow commercialisation process is a lose-lose scenario for institutions, researchers, founders, the private sector, and New Zealand. A slowed process can degrade the value (and therefore impact) of technology assets and adds operational and opportunity costs for research institutions. Even though New Zealand enjoys a reputation for world class science, the model to realise impact from this science is flawed. The commercialisation process as a function within an institution suffers from a value-destroying dilemma of running as a cost centre or a profit centre.

Institutions that view the commercialisation function as a cost centre.

The technology transfer team works with researchers and manages IP development without requiring a return to the institution. This development cost sits as an operational expense. As the function is not core business for the institution, funding to operate this function is at the whim of the executive. International comparisons show New Zealand commercialisation arms are woefully underfunded and only \$13M or 0.7% of the annual government research and development spend of \$1.8B goes into the commercialisation phase which transforms research discoveries into commercial investor-ready assets. During periods of fiscal tightening, when arguably commercialisation may be seen as prudent investment for New Zealand, financial resourcing from the institution is squeezed further.

Institutions that view the commercialisation function as a profit centre.

The expectation to maximise financial returns to the institution can impact IP ownership negotiations and relationships between the researcher and the institution and between the institution and downstream investors. Operational costs can be artificially hidden, or the commercial asset value perceived as inflated. An inflated asset value paired with a tech transfer team whose success is determined on institutional profit, can inadvertently set up dysfunctional negotiations with potential investors, creating frustration and delay.

Indeed, a more current phenomenon in New Zealand is the development of investment models which allow institutions to work around inherent profit-driven challenges. These include follow-on investment by the institution themselves at a later stage and/or using private capital to help reintroduce funds into the institution's commercialisation process.

Unfortunately, the institutional desire for profit is misguided. A misconception exists in the RSI sector that research commercialisation can drive institutional profit and therefore does not require strong funding input. A profit generating commercialisation phase is a rare exception. This phase is a cost centre for institutions. However, many institutions need to recoup these costs during the sale of the asset.

Over the last two decades, 87% of research commercialisation offices globally, have operated at a loss. The Kauffman Institution suggests a portfolio of 100 investments at start up stage is required to reliably deliver a return to an angel investor investing in early-stage entities. Few (if any) New Zealand research institutions have the deal flow to deliver 100 investor ready projects at start-up stage. Institutions which do spin out start-ups are then subjected to massive balance sheet risk as entities need to be revalued every year – noting 60% of start-ups fail.

Despite valiant efforts, both scenarios of running a technology transfer office or commercialisation function as a cost centre, or as a profit centre, are likely to result in financial disincentives for the institution and will hamper the agility and alacrity of quality IP attracting investment and exiting the institution.

Intellectual Property rights

Who should own the IP from publicly-funded research? Presently the default position rests with research institutions.

IP issues start early. These can create differing expectations between researchers, institutions, and investors, particularly when monetisation is a primary driver. Issues can create discord across key relationships and

erode trust across the research, science, and innovation system. Discoverers, students, staff, or a mix of students and staff, students who have sought support from an institutional commercialisation professional, all may have claims to IP – all claims of different natures and weight. These negotiations are managed at institution level via institutional policy. But policy may be buried within the bureaucracy – as a clause in a business entrepreneurship competition, or through a forced choice - as a requirement to enrol in a PhD.

Institutional IP ownership encourages institutions to monetise the IP via licensing fees and/or holding equity in a spin-out. These actions can become barriers to moving IP out of the institutions.

TTOs/Commercialisation Offices often find themselves in an unenviable position as mediators in managing IP rights and claims, doing their best to balance the diverse needs of different stakeholders.

Takeaway

There is no right answer to the question of IP ownership and management. Nevertheless, the current system does not serve the research, science and innovation community well. Open, honest discussion about IP ownership and management is needed to develop a 'no surprises' culture.

A related matter is the relationship between IP and Te Tiriti o Waitangi obligations.

It is inevitable and expected that scientists, researchers, and commercialisation professionals will work with technologies that have a relationship with Mātauranga Māori. While all New Zealand's publicly-funded research institutions are committed to being good Treaty partners and committed to engaging effectively with Māori, Western IP frameworks of ownership and monetisation of knowledge misalign with a te ao Māori view of kaitiakitanga and commitment to the principles of Te Tiriti o Waitangi. We have a Western legal framework for selling access to and exclusive ownership of tangible and intangible intellectual assets which is inconsistent with tikanga in te ao Māori providing for kaitiakitanga of taonga and restricted access to knowledge.

Within New Zealand's institutions, there is a genuine desire to conduct knowledge exchange and impact generation activity in a way that delivers on the principles of te tiriti, in a way which does not create future claims under the Waitangi Tribunal, and which creates certainty for the current and future owners and investors of the IP. However, a gap exists around how to navigate this.

Takeaway

There is a gap between the Western legal framework for IP and public research organisations' obligations to Te Tiriti o Waitangi, particularly in honouring the principle of kaitiakitanga | guardianship. This gap creates uncertainty. Uncertainty is a considerable challenge for IP investment which is necessary for impact generation. While institutions and the wider sector need to build capability around te ao Māori, there is an overarching need for Government, Māori and the science, research and innovation sector need to explore possible frameworks which can work in partnership.

Address funding disparity

Currently most Government focus is given to the research phase. **Approximately 99.3% of the annual government research and development spend of \$1.8B goes into the research phase.** Direct funding of Technology Transfer Offices (universities) and Commercialisation Offices (CRIs) which manage the commercialisation phase is determined by their parent institutions.

MBIE provides PreSeed Accelerator Funds and a small percentage of institutional operational budgets support this activity but overall, government funding to the commercialisation phase (via research institutions) is less than 1% of the annual government R&D spend. Commitment could be improved at institutions' governance levels to engage in knowledge exchange leading to impact generation for the benefit of New Zealand.

The Commercialisation Partner Network fund supports collaboration, best practice, and expert oversight to approve funding into projects and the PreSeed Accelerator Fund provides matched funding for institutions to undertake early-stage commercialisation.

The PreSeed and Commercialisation Partner Network model works well firstly as a separate fund with an objective to deliver benefit for New Zealand. In the case of PreSeed, the fund channels commercialisation resources to the Technology Transfer Officers and commercialisation teams with the necessary expertise to plan and execute a commercialisation strategy, and places the PreSeed investment approvals with a semi-independent investment committee.

Nevertheless, KiwiNet suggests that in the ideal circumstances of adequate resourcing of Technology Transfer Offices and CRI commercialisation teams, incentivisation to license and spin out, and the removal of barriers driving institutions to monetise IP, could deliver four times the current number of research commercialisation projects through New Zealand's institutions.

When financial resources are unavailable the flow can be 'lumpy'. Unpredictable access to financial resource slows the knowledge exchange process, increases uncertainty and risk, and decreases trust. This can be the death knell of great technologies. A most notable period of extreme financial constraint occurs from the mid-point of the commercialisation process through to spin out and scale up in the private sector. This is most keenly felt by deep-tech innovations which are capital intensive in their early prototype and product development stages (as opposed to SaaS technologies). This constrained period, the 'Valley of Death', may extend for years and signals a time when many otherwise-sound technologies may fail.

During the Valley of Death, commercialisation projects suffer from a lack of funding. Government feels the IP is at a point of maturity that no longer requires considerable funding, investors see the IP as too immature to balance the high risk, institutions will persevere if they believe they can claw back sunk costs.

Takeaway

This 'perfect storm' could be avoided. It requires activities from funders, institutions and private sector simultaneously coming to fruition to narrow and flatten the constraints experienced in the 'Valley of Death'. In practice this may look like:

Addressing commercialisation resourcing issues:

- *clear Government direction for institutions to commercialise*
- *clear Government performance expectations for institutions to move IP via licensing or spin-out mechanisms into the hands of those that can execute to market*
- *a greater share of government and/or institutional funds ringfenced for the commercialisation system.*

Accelerating the flow of IP out of institutions by empowering actors in the process:

- *mechanisms for investors to engage earlier with the IP projects*
- *mediated processes alongside commercialisation offices to support IP exit from institutions*
- *an institutional environment where researchers can be 'released' to support the commercialisation of their IP at no professional cost to themselves or the institution*
- *mechanisms to strengthen and recycle the vital entrepreneurial talent needed to lead spin-outs and start-ups to success.*

Champions, Leaders, Advocates step up

Research institutions have a pivotal role in transferring knowledge into operational environments and technologies. Institutions have a powerful leadership role to champion and advocate for knowledge exchange. However, there are serious disincentives and financial challenges to the institutions to operationalise these roles.

- **Institutions control the 'raw material'** which is the research findings, the creation of, access to and release of both the new knowledge and the researchers themselves into the commercialisation phase.

- **Institutions control a flow of funding to Technology Transfer Offices** to develop the new knowledge into a commercial asset. Notably, New Zealand commercialisation teams are poorly resourced, being second lowest in international comparisons, and with few professional development and upskilling opportunities for commercialisation professionals. The impact of this may be seen in good IP disclosure rates, but lower licensing and start-up activity when compared internationally.
- **Institutions control the workforce, professional development, including policies** around moving from research in the Research Phase to development work in the Commercialisation Phase.
- **Institutions control the policies related to Intellectual Property ownership** and the release of the commercial asset into the private sector. However, the commercialisation process is not considered core business for public research institutions. The process is expensive, with high risk of failure and potential for reputational damage (based on interpretations of ‘benefit to New Zealand’ and profit or cost models). Furthermore, the concept of commercialisation conflicts with entrenched institutional value systems of ‘education/research for education/research sake’ or research for public good.
- **The MBIE Results Chain Framework may be used to define and set performance expectations** for institutions. For example, IP is transferred from the commercialisation phase into the realisation phase and out of institutions through two dominant knowledge exchange mechanisms: licensing of IP into existing firms or licensing of IP into a new entity (e.g. spin-out, start-up) alongside private investment. MBIE has an opportunity to use policy signals, strategy and funding mechanisms to incentivise the licensing of IP out of institutions as desired ‘Outcomes’ in the Results Chain.

Takeaway

Institutions, therefore, have a role in deciding the priorities to be placed on commercialisation activity within their institution, and to address inherent system disincentives with MBIE as the funder to ‘de-risk’ knowledge exchange within institutions. De-risking the knowledge exchange process within institutions could be the single biggest driver toward more knowledge exchange and improved potential impact generation.

Building capability

There is huge scope for building capability across the research science and innovation system to support knowledge exchange for impact generation.

- **A key element is developing an entrepreneurial culture within institutions.** Successful commercialisation requires an entrepreneurial mindset that includes the qualities of being bold, driven, and decisive. Institutions need to support entrepreneurs (staff and students) especially early in their careers. However, entrepreneurial researchers are rarely equipped with the skills and knowledge to navigate the commercialisation process. If researchers pursue commercialisation, the research gap creates a challenge for the institution. Financial and workforce challenges and fear of reputational risk create a vicious cycle leading to poor cultural practices which serve to actively resist knowledge exchange activity.
- **A critical step is aligning institutional incentives and ensuring adequate funding flow** into Technology Transfer Offices, commercialisation professionals, and entrepreneurial scientists. This would help build a stronger entrepreneurial culture to support researchers to straddle the research and business world rather than force a choice. It could also increase professional development of a specialist commercialisation workforce.

Takeaway

We note that these incentives and IP monetisation issues must be addressed for more investment into the new system to deliver better results.