Te Ara Paerangi | Future Pathways – UniServices Position Paper

This position paper by Auckland UniServices Limited (UniServices), the wholly owned research commercialisation and knowledge mobilisation company of the Waipapa Taumata Rau | University of Auckland, focuses on the Knowledge Exchange section of Te Ara Paerangi. We welcome the opportunity to contribute to the national debate on these important matters and we look forward to further engagement with this process for the betterment of New Zealand's research and innovation system.

Summary of Key Points

- Successful knowledge exchange requires consistent, long-term engagement between researchers and those who seek to deploy research-based knowledge for financial and/or societal benefits.
- Knowledge exchange encompasses tangible intellectual property, know-how, trade secrets, skills, expertise, and talent; all are required for success.
- In New Zealand, we already have highly effective mechanisms to support knowledge exchange, with the Pre-seed Accelerator Fund (PSAF) and the Commercialisation Partner Network (CPN) demonstrating significant success throughout the life of each programme. Both programmes should be dramatically expanded if we seek to deliver greater benefits of research and innovation to New Zealand.
- There is a growing need to expand our collective focus on societal and policy benefits from research in New Zealand and we recommend that PSAF and the CPN could serve as highly relevant models for research translation and knowledge exchange leading to stronger, more vibrant and more equitable communities for all New Zealanders – not just financial benefits.
- In our view, there are widespread misunderstandings of the research translation process and the relative contribution of tangible intellectual property, e.g. patents and plant variety rights, to successful translation into impact. While often very important, tangible intellectual property (IP) rarely stands on its own, which is why the connections to talent and the ongoing research context are so critical. For this reason, we do not support IP clearinghouses or other mechanisms that break these vital connections.

Delivering Commercial and Social Impact through Research Translation

This paper reflects the views of UniServices, which carries out a significant part of the knowledge management, industry engagement, research strategy and IP commercialisation at Waipapa Taumata Rau | University of Auckland. UniServices manages the $20m University of Auckland Inventors' Fund and runs Return On Science on behalf of the Government. UniServices also owns and operates business activities that translate and deploy research knowledge into national service offerings such as the Immunisation Advisory Centre, which is making a substantial contribution to the infectious diseases challenges facing New Zealand today. We welcome the review of the national research, science and innovation system and the emphasis on designing a future-focused system to equip Aotearoa with the skills, knowledge, capabilities and infrastructure to tackle the major challenges that lie ahead.

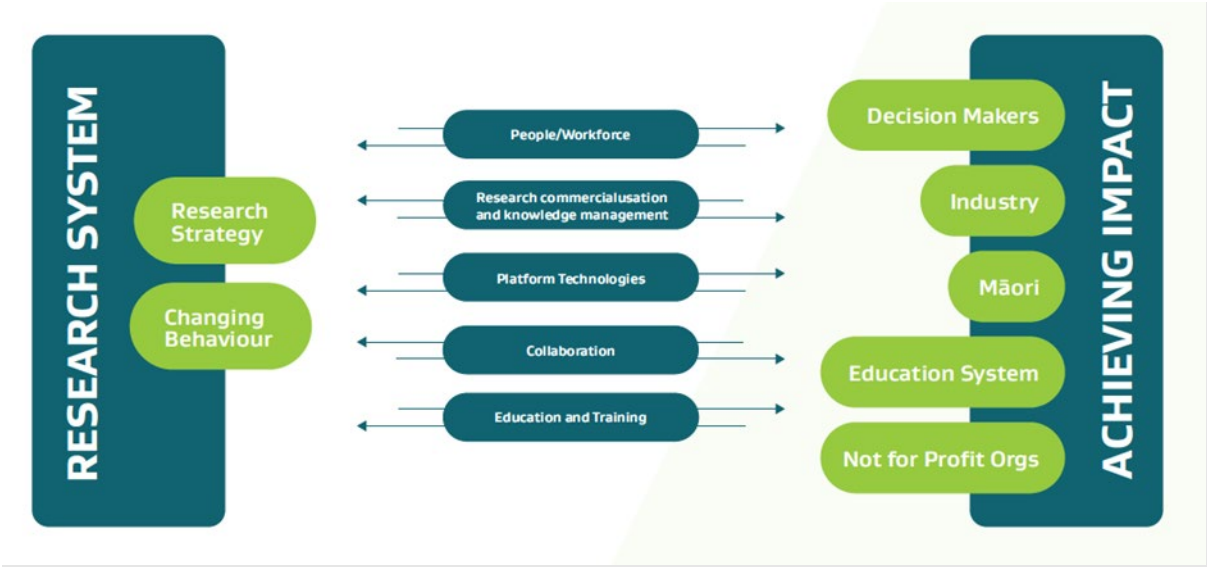
UniServices participates across the whole R&D spectrum

UniServices has significant expertise in developing and building scale through starting and running collaborative technology incubation, investment programmes and funds in the research and development (R&D) sector in New Zealand and Australia – translating research knowledge, expertise and skills into commercial licenses and start-up companies.

UniServices also has significant expertise in the direct translation of research into societal impact through our growing portfolio of wholly owned business services and products that materially impact on public health and education in New Zealand every day. Both channels for commercialisation share a **fundamental requirement for consistent, long-term engagement** between the research leaders and their teams at the University and the commercial licensees, start-ups and business services that translate world-class research into economic and social benefits for New Zealand. More information about our research translation and implementation activities can be found in Appendix 1.

Critical Factors for Effective Knowledge Exchange

Knowledge exchange is the transfer of ideas, research, expertise or skills between universities and business, communities, iwi, NGOs and government. Knowledge exchange spans translational research, social and creative enterprises, and research-informed policy and interventions alongside what is conventionally considered commercialisation.



We would suggest that there is more overlap and interconnectedness than the diagram in Te Ara Paerangi – Future Pathways would imply, and that the "pipeline" concept of knowledge exchange with handover points is outdated and unhelpful. Based on the success we have had for many years, we would strongly argue that it is the recognition and enhancement of the overlaps and interconnectedness that makes a successful knowledge transfer environment.

For New Zealand to prosper more widely in this arena, there is a need to build a networked, connected, inclusive and flexible system and approach where universities (who are also involved in education, training and workforce development) are deeply involved and incentivised in the transfer of knowledge and knowledge exchange. As we have shown, this is demonstrably far more successful than one where one group is defined or designated to be more involved than the other, or where single agencies are directed to play one isolated part or another in the exchange. Whilst superficially attractive, single points and handovers between exclusive actors almost inevitably lead to choke points and increase transaction costs without leading to better outcomes. They also prevent the development and transition of talent and this delays the overall workforce development required for new industries. The result is the loss of continuing intellectual input and engagement with inventors and their teams.

In the past, leading companies used to take knowledge and IP and forge it almost entirely in their own R&D and product development departments, using graduates and postgraduate researchers trained by universities and using what the companies could glean by reading the latest academic papers. In the first part of this millennium, as companies realised they couldn't hire all the smartest people and amass everything in-house that successful innovation required, they began to pay research organisations for research, consultancy and to a lesser extent for rights to use IP. These critical assets would still be "finished" within the company, with some crossover of talent between research organisations and the private sector.

However, this process remained inefficient in the rapidly changing digital world where disruptive technologies can transform sectors overnight, highlighting a gap in the pace and effectiveness of innovation on the global stage.

The R&D innovation sector gap has been filled by start-up ecosystems and venture capital. These days, large companies spend more on acquiring companies that have "ready to trade" products, markets and teams in place than they spend on their own internal R&D. As an example, a global mega-tech company we work with buys a company a week, often placing as much or more value on the **talent they bring with them** (many of whom came from the original university research team) as on the products that come with the start-up. This means that mergers and acquisitions are now a cornerstone of successful companies' R&D strategies. As a result, direct licensing of patents and IP as standalone assets has become less and less common.

The acquiring companies typically stay close to the key technology fountainhead and develop ongoing, strategic relationships with the founding university because the companies want to continue to acquire the key talent and trained staff that universities can provide, and they want to have an early look at the **new technologies and the new start-ups being generated near the research**. We have numerous examples of this in Auckland.

The case for building absorptive capacity in New Zealand

Building absorptive capacity in the business/industry sector is as important as the transfer of knowledge into the sector. This is particularly true in New Zealand, with its very low business expenditure on R&D and comparative lack of global frontier firms. (Over 70 percent of NZTE companies only trade in NZ and are often in regulated monopoly markets with a lack of competitive tension to drive innovation.) Therefore, we view education and training as being inextricably linked to the People/Workforce stream, especially because knowledge and people transfer into and out of industry has evolved rapidly in the digital, globalised age. In New Zealand we must build capability within all parts of the ecosystem if we are to maximise our investments in R&D.

Overseas experience in several countries has demonstrated that thriving start-up ecosystems linked to universities and their students are key to economic transformation and knowledge exchange. Examples include the Boston area, Pittsburgh, the Pacific Northwest, San Diego and the Bay Area in the US, Waterloo in Canada, Oxford, Cambridge and London in the UK, Wageningen University and Research Centre in the Netherlands, and so on, where universities and research organisations are both significant contributors to knowledge exchange and developers of absorptive capacity along with start-ups and their acquirers. These ecosystems attract entrepreneurial staff and students in a positive spiral that translates into improved research as new companies seek

answers to new problems and recruit better-trained staff. This networked approach also builds the capability of existing businesses in the areas that supply these companies.

A thriving start-up ecosystem also provides for improved career opportunities for researchers, as described in a recent *Nature* article highlighting a New Zealand example, and creates an environment where more scientists gain commercial experience and a positive feedback loop is created.

Again, we would reinforce that the concept of linearity in the system is perhaps unhelpful. We welcome the recognition that pathways to impact are neither linear nor exclusive to a particular research organisational type (i.e., we reject the premise that "some do basic research and others do development research"). **A thriving ecosystem works best when all the participants are networked and incentivised to work together**.

PSAF and CPN are programmes that work exceptionally well

We are very encouraged that there is recognition in Te Ara Paerangi of the success of programmes, such as the Pre-Seed Accelerator Fund (PSAF) and the Commercialisation Partner Network (CPN), that have enabled universities and other research organisations to improve and drive commercialisation. PSAF and CPN have worked principally because of their devolved nature, enabling significant progress to be made in terms of quality, collaboration, specialisation, skill development and scale without additional overhead or complexity. Their flexibility and lack of overhead have enabled founding institutes and inventors to move fast and ensure that global competitiveness is maintained.

CPN has enabled a significant improvement in building collaborative behaviour and pooling of commercialisation expertise, with KiwiNet building scale for smaller research organisations and Return On Science providing specialist advice that has been used by all research organisations in New Zealand.

In addition, at Waipapa Taumata Rau | University of Auckland, both programmes have driven a greater connectedness between the Faculty of Business and Economics and other faculties to drive increasing awareness of innovation, entrepreneurial thinking and impact generation for staff and students on campus. These combined activities involve almost 4,000 participants every year, adding substantially to the potential pool of founders, investors and policy makers for New Zealand's future. It is interesting to note that the recent announcement in Australia of a massive boost for "commercial ready" universities borrows several key features from PSAF and CPN – albeit at much larger scale, even when adjusted for population.

Both the PSAF and CPN are regularly oversubscribed, with far more fund-worthy opportunities than the network can support. More projects

and value-adding programmes could easily be developed within existing frameworks without significant requirements for structural change to these two highly effective programmes. An increase in funding to these programmes would substantially increase the number of commercial-ready technologies and people that are required to fully leverage the interventions that the Government has made in the venture capital market in New Zealand. Where once we might have been starved for investment capital, the New Zealand Growth Capital Partners programme has been successful in the development of an early-stage venture capital market in New Zealand that is ready and able to invest in innovation. We now need to focus on the ideation, incentive and capability stages of the ecosystem to take the next major step forward.

In our view, a critical plank of any reform of the research ecosystem would be to **expand the Pre-Seed Accelerator Fund and Commercialisation Partner Network**. The Australian government's recent commitment of A$2.2bn into a similar programme to PSAF and CPN recognises the size of the opportunity for commercialisation and industry engagement and would equate to an investment of $440m in New Zealand. We need to increase our commitment to these programmes to avoid losing our high-quality entrepreneurial academics and students to more attractive markets for their talent.

Expand the translation of research into impact to include benefits to New Zealand

A similar model to PSAF could be applied for the **development of non-traditional knowledge exchange/deployment vehicles** (i.e. are apart from licensing and spin-outs). This would encourage and share risk between the Government and research organisations. It would also drive the development of resources akin to the development of commercialisation resources and units.

Encouraging the sharing of risk between the Government and research organisations will build collaborative networks focused on meeting private **and** public good outcomes. Knowledge management and impact managers in fields and disciplines that lead to more direct research-to-impact enterprises like the Immunisation Advisory Centre, NetworkZ and the Centre for Advanced MRI deliver social good in the widest possible sense **as well as** economic good from cutting-edge research in New Zealand.

The structure of service funding itself needs to provide space for funding the core infrastructure for services to go along with agreed outcomes and KPIs to support re-investment to secure infrastructure and encourage innovation. Sinking-lid funding structures provide little capacity for this, and the risk is that services are whittled away, diminishing the overall value that the investment in research is intending to create. Time spent on determining the impact these services can provide is more valuable than counting the number of FTEs in the

programme – a move to design for outcomes and impact, and agreeing measures to determine this, would **create a step change in impact generation**.

Programmes to change the game

We would like to suggest several programmes we believe are essential to building scale and capability in commercial knowledge exchange and translation of research into impact:

- **Building industry or public sector experience into PhDs**: Three-year PhD programmes are not sufficient in many disciplines to allow for the development of both the disciplinary excellence required for the degree and the skills required to engage seamlessly with the private sector or with government and policy. Government should consider funding an extra year of PhD programmes to enable certain disciplines to build in experiential learning and a commercial skills component to encourage the development of industry-ready graduates for those interested in joining private sector or policy and public benefit experience for those targeting the public sector.
- **Commercialisation postdocs / internships**: Provide support mechanisms to co-fund PhD graduates or teams of PhD graduates to spend six to 12 months working on the commercialisation of an idea in collaboration with an industry partner or to develop a start-up after their PhD.
- **Co-fund on-campus curricular and extracurricular opportunities for university students** to develop knowledge exchange, impact and commercial capability alongside technical training. These important activities on campuses are currently cross-subsidised or funded by philanthropy and there is a need for government incentives and programmes to build scale. Examples include:
    - Maker spaces on campus and the development of incubation foundries
    - Master's and PhD commercialisation workshops
    - At Auckland, the Centre for Innovation and Entrepreneurship reaches almost ten percent of the entire student body with one or more of their programs (almost 4,000 students per year) and could do much more if they were funded to do so.
- **Co-fund and incentivise commercialisation, research translation and skill development opportunities for university staff**. Examples include:
    - Development of sector ecosystem clusters – e.g. medical technologies, infrastructure, AI
    - Incentives for non-commercial knowledge exchange and impact – e.g. public benefit initiatives and public policy formation

    - Training and opportunities to build impact and knowledge translation development expertise
- **Create innovation vouchers**: Used by policymakers in the Netherlands, Ireland and the UK to improve the competitiveness and growth of small and medium-sized enterprises, innovation vouchers are credits provided by governments to firms to purchase R&D services from universities to introduce innovation.
- **Create a Pre-seed Accelerator Fund equivalent for public benefit and social enterprises** to support impact investing in new services and businesses focused on sustainable gains in health, wellbeing, education and equity for all New Zealanders – effectively an ESG fund. This "ESG Accelerator Fund" should be devolved like PSAF and could easily work alongside the Commercialisation Partner Network to encourage and invest in opportunities to benefit society, based on leading research in New Zealand.
- **Using government procurement to support innovation**: Many new technologies and services created in New Zealand have the potential to create value for both the private and public sectors in our country, but it can often be hard to make the **first sale** to the **first customer**; this can be especially difficult if that first customer is Government. We suggest that central Government adjust its appetite for technology and execution risk to allow it to be an early, validating customer for new technologies and services developed here. This real-world support would be complementary to the R&D support provided to emerging companies today.
- **Equity in innovation**: Māori and Pacific people are underrepresented in many current programmes and the following would be helpful to address this:
    - The development of specific Tikanga Māori entrepreneurial and innovation ecosystems and investment programmes that build on a rich history of Māori innovation and Mātauranga Māori.
    - Expanded funding to improve accessibility to cover extracurricular programmes often requiring participation during semester breaks, placing financial demands on whānau and iwi. PhD students from Māori and Pacific backgrounds often have additional, non-financial demands on their time, which can be a deterrent to participation.
    - A recognition and celebration of the fact that innovation by and for Māori has the potential to unlock fields of endeavour that can **only** be addressed with unlimited timelines.

Incentives for Greater End-User Engagement

Incentives are perhaps the strongest driver of improved knowledge exchange. In 2016, UniServices actively changed the benefit sharing model for the proceeds

of IP commercialisation. Staff and students now receive 85 to 90 percent of the value derived from start-up capital at formation, up from one-third previously. This change saw a long-run, three-fold increase in the numbers of academic staff and PhD students interested in directly commercialising their research. This, combined with several extracurricular programmes run by the Centre for Innovation and Entrepreneurship, is best demonstrated by the development of Cloud 9 at the Auckland Bioengineering Institute, which is brimming with new companies that are attracting commercial partners and investors at record pace.

One of the most successful aspects of PSAF and CPN has been the incentives the programmes provide to set up and contribute to the development of knowledge transfer, industry engagement and commercialisation beyond simply academic publication and teaching. PSAF and CPN encourage:

- The development of commercialisation professionals.
- Development of pre-seed and seed funds aligned to research organisations (TTCF, MRCF, IP Group, The University of Auckland Inventors' Fund, etc.).
- The development of specialist investment committees and networks.

Intellectual Property Policies

Access to IP is mentioned in public discourse as a barrier to knowledge transfer. In our view, this perception exists mostly because tangible IP is not well understood, the stakes are not well understood and there is a mismatch of expectations about the risks and costs versus the commercial returns from developing and deploying IP.

With the exception of copyright, universities do not typically practice their tangible IP commercially themselves. Rather, they conduct additional research in support of the expansion and implementation of the IP. Furthermore, the costs of protection almost always exceed the meagre returns for purely licensing IP to existing businesses as described above. In addition, there is little return in creating a start-up business, which is financially risky, when there is an existing business or user who can put the idea into practice. In these cases, we simply package the IP into consultancy or research contracts with business.

In our experience, there are only two scenarios where it is critically important for a university or research organisation to have an interest in IP and its commercial deployment.

The first is critical in the development of a healthy start-up ecosystem. Tangible intellectual property that can be licensed or transferred to a start-up company is critical to the development of a research-based (deep tech) start-up. At the start-up point, the IP is often the only economic moat that will satisfy early-stage investors to risk supporting the company by financing founders,

technology development, market development, etc. These foundation patents become less important later as the company develops other intellectual capital (its own patents, business models, know-how, team and so on).

It is important that the universities hold an interest in foundation IP at this stage for two reasons. The first is that it provides an incentive for university departments to encourage start-up activity (they have some skin in the game) as well as an incentive for academic contributors to work on the project, despite not intending to work in the start-up.

The second and perhaps most important reason is that, as the enduring institution, the IP is returned to the university in the event that a start-up fails for any number of reasons – wrong business model, market timing risk, financial risk, management risk, etc. The university is then incentivised to seek a new management team or new pathway to take the IP to the market, which often leads to success the second or third time around. We have several examples of this, including our recent exit from a publicly listed technology company that was the third start-up "home" for the core IP.

Finally, having a university named on a patent can sometimes provide extra weight to a patent application, because potentially infringing, competing companies typically do not wish to stand in court against universities backing their start-ups.

The second case where IP and licensing is important is where the intellectual property is in effect the product itself. This is best demonstrated by Plant and Food Research's exceptional record in developing and licensing plant variety rights. These scenarios are uncommon in the totality of knowledge exchange.

At UniServices, we operate a triage system when we receive or become aware of a result that may lead to tangible IP. Within 90 days, unless the results fit into something that can contribute to a start-up company or be sold as IP (as described above), the IP is published and made freely available to all. In our experience, more than 90 percent of IP can simply be made open source.

In addition, in many cases where a spin-out company is not being started, the IP is provided as background knowledge for collaborative research programmes with industry.

Therefore, it is important that any change to IP settings continue to provide universities with incentives to support the ability to create a thriving start-up ecosystem.

Appendix 1

Enabling a Vibrant Start-up Ecosystem – Commercialisation via Licensing and New Company Creation

UniServices has been successfully innovating in this space for over 15 years and now has considerable experience in developing novel national research commercialisation ecosystems. We founded and are responsible for the direction of Return On Science, which is part of the Ministry of Business, Innovation and Economic Development's Commercialisation Partner Network (CPN). More recently, UniServices founded and developed Momentum, a unique national student-led investment and start-up funding process that allocates money from the University of Auckland Inventors' Fund to student ventures.

UniServices has been deliberately designed to manage the stream of outputs from research and the commercialisation of economically sustainable start-ups and services that recognise the value of the intimate relationships between UniServices and researchers. This connected and networked ecosystem requires active leadership and development.

In 2007, UniServices joined four Australian universities in setting up the TransTasman Commercialisation Fund, an A$30 million seed fund. We also sat on the investment committee of the fund. The fund had an internal rate of return of around 32 percent.

In 2016, UniServices founded the University of Auckland Inventors' Fund, a $20m evergreen fund dedicated to start-ups generated by staff and students at the University of Auckland. In the last five years alone, UniServices has started, supported and invested in 40 technology-based companies that have raised over $400 million in venture and seed funding for their continued development. The Inventors' Fund, which is still managed by UniServices, currently has assets valued at $70m, a 3.5-fold uplift on capital deployed, and the market capitalisation of our portfolio companies stands at $1.2 billion.

In 2017, UniServices joined the Group of Eight universities in Australia to assist in bringing the IP Group PLC to invest in an A$200m Australasian subsidiary, dedicated to nurturing and investing start-ups from the nine largest universities in Australasia, including the University of Auckland.

UniServices accounts for over half the granted patents from universities in New Zealand and almost a third from all publicly funded research organisations. A Pre-Seed Accelerator Fund (PSAF) survey performed five years ago showed that UniServices and the University of Auckland contributed to over two-thirds of the outputs from the PSAF programme, despite receiving less than one-third of the fund allocation.

UniServices also has experience in the development of a number of spin-out companies that have been acquired or listed (HaloIPT Qualcomm 2011, PowerbyProxi Apple 2017, Engender CRV 2017, Rain Therapeutics Nasdaq 2021) and the corresponding, multi-year, multi-million-dollar continuation of research arrangements with these companies.

Creating Impact through Commercialising Research-informed Services and Products

UniServices has many years of experience in the direct translation of research outputs into business services that deliver impact. This is illustrated by its growing portfolio of businesses, services and products. What these businesses have in common lies in the intimate relationships between the business and university researchers, which enables boundaries of knowledge to be pushed forward and translated into services. This link to research-evidence-informed knowledge and services is what sets these businesses apart and is core to their value.

One example of this is the Immunisation Advisory Centre (IMAC), which takes current research knowledge in vaccinology, epidemiology, public health and clinical research dissemination and turns it into workforce development programmes and pathways for vaccinators and health support workers, robust clinical advice and practice guidelines for frontline health providers, vaccination system design and support, adaptation and customisation of training and advice for multiple cultures and societal contexts. The close and ongoing dialogue between researchers and key opinion leaders at the top of their fields, with the teams translating research directly into impact, have allowed IMAC to make a critical contribution to the COVID-19 response in New Zealand and in several nations in the Pacific, just as we have done for measles, seasonal influenza and many other infectious diseases over the years. In the case of COVID, this has included delivering training for over 25,000 vaccinators and health workers, advising decision makers on the vaccination strategy, advising physicians and other frontline staff on management of adverse reactions to vaccination, tailoring training and programmes to support Māori and Pacific health providers in serving their communities, and answering many thousands of requests from the health sector for the latest information on the entire programme as well as providing real-time support to the health sector. Our performance at IMAC has attracted international attention and key personnel are highly sought-after experts who serve on key international panels and advisory bodies, including the WHO.

A second example of direct translation of research into impact is our NetworkZ business unit, which focuses on the reduction of serious treatment injuries that patients suffer in the operating theatres, A&E and trauma situations. NetworkZ builds on research into the way surgical teams struggle to communicate

effectively across disciplines when there is a surgical emergency. NetworkZ operates training simulations in a real operating theatre setting but with a highly sophisticated, animatronic manikin in place of the patient. Teams are then expected to respond to a range of surgical emergencies, with mutual learning and reinforcement post-simulation. After NetworkZ training, teams have been able to reduce the incidence of serious treatment injuries. All the current 22 New Zealand District Health Boards utilise the NetworkZ programme. The train-the-trainer approach has enabled this capability to be embedded into DHBs, with NetworkZ providing refreshed and new scenarios. The network of over 2400 surgical and trauma teams has been working together to prepare their teams to manage COVID-19 entering their operating theatres.

Both the second and third examples require investment in infrastructure – the 22 life-size animatronic manikins are critical to the NetworkZ simulation training. So too is the investment in advanced MRI technology found at another UniServices business, the Centre for Advanced MRI (CAMRI). Through the direct investment in MRI machines by UniServices, the availability of advanced MRI machines enables engineering, science and medical research discovery that is critical to non-invasive health diagnoses, new discovery of the human body and how it functions, and development of future MRI protocols and procedures. This extends further to key health provider partnerships, where the advanced infrastructure and workforce capability enable diagnostics to be provided to public and private patients and advance the science and procedures in this area through industry partnerships (e.g. with Siemens). This work results in 4600 scans a year, with approximately 25 percent focused on new research areas. CAMRI has medical translational research relationships with DHBs, specialists and a longstanding translational research partnership with Auckland City Hospital, with one of the MRI scanners based in the hospital to support this relationship. The patient services generate an economic return that enables the research and clinical service infrastructure to be invested in keeping on pushing the boundaries of knowledge. This work also creates IP and licenses that can be commercialised.