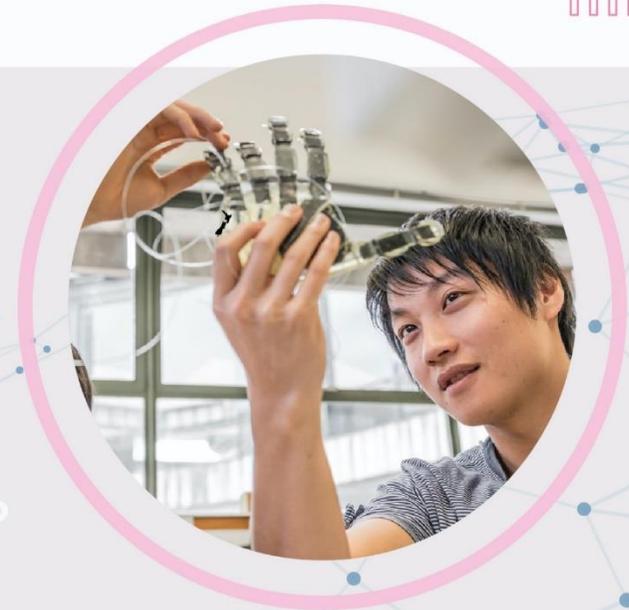


Medtech-iQ

A Strategic and Economic Case for a National Medical Devices and Digital Health Innovation Hub for Aotearoa





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Foreword

Medtech-iQ is a national medical devices and digital health innovation hub initiative that brings together universities, government entities, health providers, the technology industry, investors and communities to advance the MedTech sector for a prosperous Aotearoa.

Tēnā koutou katoa,

Firstly, we would like to acknowledge the many partners who have shared their time and engaged with us across the MedTech ecosystem through the development of this report. The feedback we have received from our partners demonstrates the tremendous work that is already underway across the country and supports the need to coordinate activities via a national innovation hub to foster and advance collaboration across the sector, to improve health outcomes and create a vibrant and accelerated commercialisation pathway for medical devices and digital health companies.

We heard from Māori community and Iwi leaders that a critical success factor for Medtech-iQ is in reflecting Te Tiriti on the outset through partnership, tikanga, ownership and governance. This should ensure equitable access to commercial opportunities, a role in governance and the opportunity to meaningfully improve health outcomes for their communities. There was a recognition that there will be innovative solutions that lie within these communities which can be commercialised, creating both new national and international business opportunities.

Medtech-iQ will create genuine partnerships with Pacific communities to advance innovation and commercial opportunities for Pacific MedTech businesses. As part of the development of this report, we heard from Pacific community representatives that Medtech-iQ, if developed with the right governance structures and inclusive design, can bring positive outcomes to their communities across health, new employment pathways and economic opportunities.

Throughout this engagement, industry stakeholders including start-ups and investors indicated that Medtech-iQ must provide a platform that supports the creation and growth of new business opportunities. A connected infrastructure, through Medtech-iQ, that enables cross-sector partnerships and access to necessary resources will amplify the success of future medical devices and digital health businesses.

The Opportunity

The MedTech sector is a significant growth area for New Zealand (NZ), generating \$2.1b in revenue and a 7-year CAGR of 11.1%¹ and employing over 7,500 people.² NZ has transformed from a 40-50 home-grown MedTech company industry in 10 years to a country with over 200 plus companies today. In 2010, digital health was not known to consumers or talked about in healthcare delivery – now we are amid a digital health revolution.

While aspects of NZ's recent economic performance have been strong, productivity growth has been persistently weak and a significant drag on living standards and wellbeing. A focus on innovation policy, execution and helping innovations diffuse more effectively from frontier firms to other NZ firms were identified in the recent NZ Productivity Commission inquiry in 2021.³

In 2012, the University of Auckland via its Auckland Bioengineering Institute led the establishment of the Consortium for Medical Device Technologies (CMDT) to create a collaborative network across the country to grow the MedTech sector. Today it leads the development of Medtech-iQ, a national virtual and physical innovation 'space' that brings together researchers, scientists, investors, health professionals, students and industry to collaborate on the development of medical technology and to together create a thriving ecosystem of successful companies at various stages of commercialisation.

Research and innovation is fundamental to health system transformation and the future competitiveness, and sustainability of NZ's MedTech sector on the global stage relies on us building on our existing success with partners across the country to have a significant future impact on our economy.

What's Next?

Medtech-iQ has the potential to accelerate and scale our MedTech innovation to generate substantial positive impacts for NZ's economy and be part of the USD\$815 billion⁴ global industry growing at around 20% annually.

Medtech-iQ builds on the successful foundations of the CMDT partnership. Extending this into a national backbone of linked regional hubs with local presence will provide a physical and virtual place for multi-disciplinary and cross-industry collaboration to develop and deliver new health technology at pace and at scale.

The CMDT partners invite you to join us in delivering this economic impact to the NZ economy, leveraging this investment to create new employment opportunities and improving the health outcomes for New Zealanders. We look forward to partnering with key agencies to realise the full potential Medtech-iQ has to create an innovation ecosystem and world-class MedTech organisations that thrive both here and abroad.

Ngā mihi nui



Consortium for Medical
Device Technologies

AUT, Universities of Auckland, Canterbury and Otago,
Victoria University of Wellington, and Callaghan
Innovation, Ara Manawa – Te Whatu Ora Te Toka
Tumai Auckland, i3 – Te Whatu Ora Waitemata
District

Why Invest Now?

NZ's MedTech industry is a high value export sector that can contribute strongly to productivity growth post the COVID-19 pandemic. We can take a larger slice of the USD \$815 Billion¹² global MedTech market within the next decade if our Government takes a more deliberate approach to innovation policy as evidenced in successful small advanced economies (SAEs) such as Sweden, Denmark, Ireland, the Netherlands, Israel and Singapore.¹³

New Zealand is in the midst of a once-in-a-generation transformation of the health system. Transformational innovation delivered by the likes of 'Medtech-iQ Aotearoa' will be a key driver in the success of that transformation.

The time is now to invest into growing NZ's local talent and innovation ecosystem. There are strong centers of research and commercialisation activity with established clinical partnerships across Auckland, Wellington, Christchurch and Dunedin. Medtech-iQ will bring together NZ's existing capabilities and infrastructure into one prominent platform to showcase the entire sector to the world.

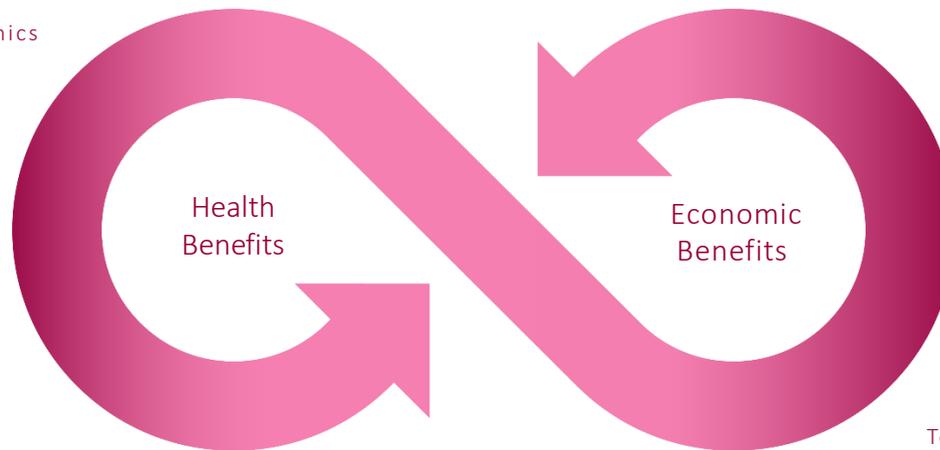
NZ health delivery will be strongly positioned to shift from hospitals, clinics and labs to the home

To make real impact in equity of access and ownership of health solutions in NZ context

To focus on Talent Development & Retention throughout the education and employment pipeline

To accelerate consumer-led design and patient-centred care models

To support the health transformations underway in NZ by relieving pressure on primary health organisations



New Research Funding & New Private Sector Investment

“All eyes are on NZ” has never been so true. With heightened global interest from local and global investors and multi-national industry players, NZ's MedTech sector is experiencing record growth.

Infrastructure efficiencies

To generate New GDP and New Jobs and uplift in real Wages

To increase Productivity

To acknowledge NZ's scientific ingenuity, and catalyse more scientific breakthroughs and innovations,

Future Competitiveness and sustainability of NZ's MedTech sector is rooted in the establishment of deep-tech enterprises founded on sound translational research and a strong commercialisation strategy for clinical translation.

Medtech-iQ **Why Aotearoa?**

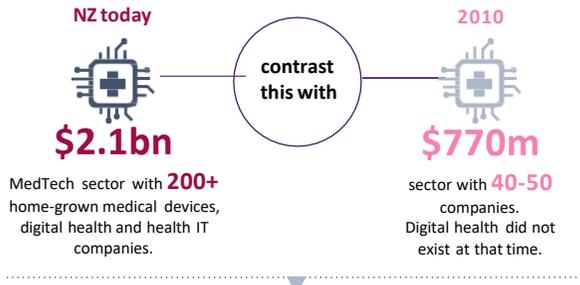
- ✓ Medtech-iQ is a “country-wide initiative”, the first of its kind in the world building on a linked ecosystem and a strong track-record in MedTech collaboration and innovation
- ✓ Unique relationships with Māori underpinned by principles of Te Tiriti o Waitangi allows Aotearoa to take a genuinely different approach to partnership and innovation creating new impactful ‘Indigitech’ for improved health and wealth of the population as well as export opportunities
- ✓ As the Pacific's hotbed of MedTech innovation, Medtech-iQ will partner to deliver education, business and health benefits to our Pacific nation neighbours
- ✓ We have a strong science and research translation capability supporting MedTech development
- ✓ A comparatively friendly regulatory environment



Kaupapa - Purpose

To accelerate the success of the entire MedTech sector, driving prosperity and increased productivity across New Zealand

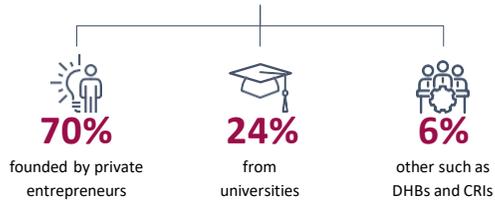
The current MedTech sector*:



Although our MedTech sector has grown substantially, the industry is still dominated by two entities:



But behind them today are **180** start-ups and emerging companies, roughly:

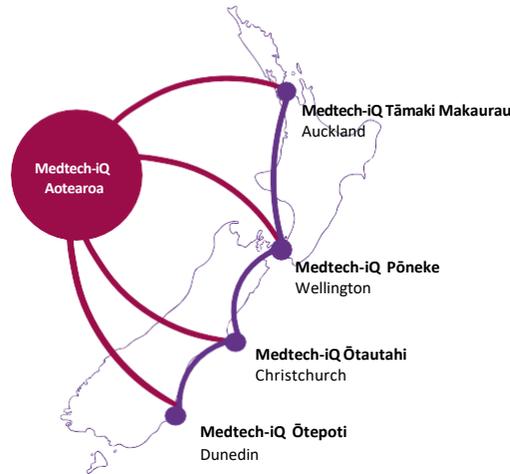


Medtech CoRE Translational Outcomes



Medtech-iQ: Creating tomorrow, today:

Purpose: Accelerate the success of the entire medical devices and digital health sector, driving prosperity and increased productivity across all of Aotearoa.

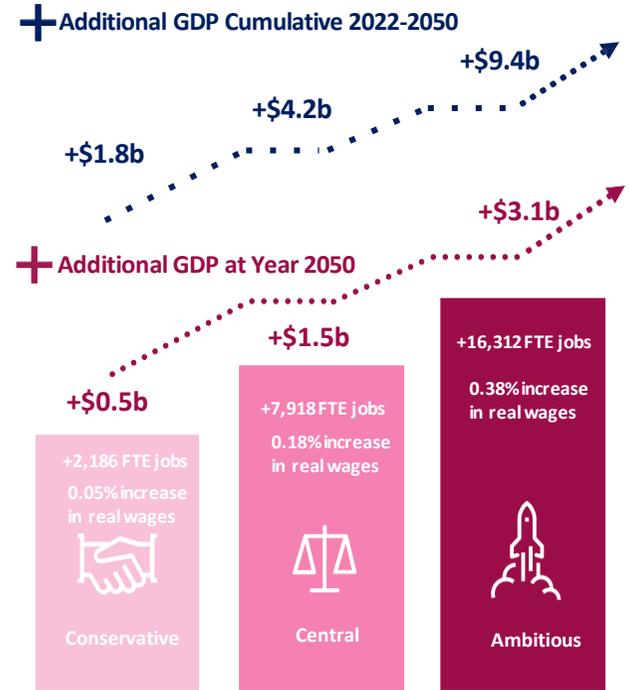


On the national stage, 'Medtech-iQ Aotearoa' acts as the umbrella that helps provide direction, influence policy, coordinate activities and run programmes which everyone across NZ can access. In the first instance, this is connected to four main regional hubs that are led locally to form a visible backbone for MedTech innovation based on the concentration of universities, hospitals and medtech industry.

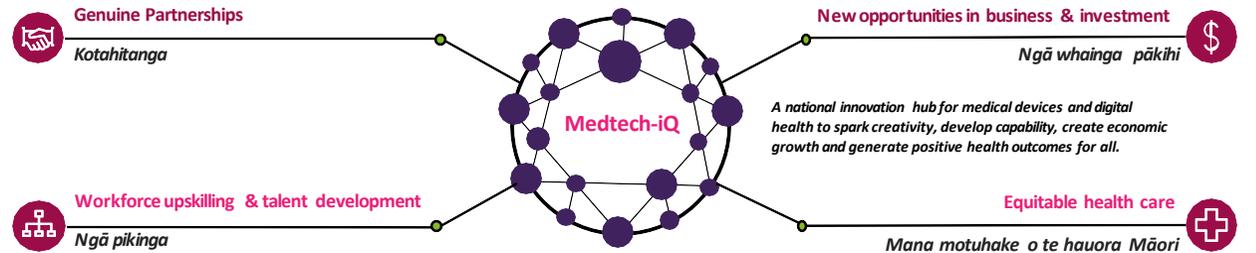
At the local level, partners and communities work together to coordinate and provide specific expertise into the national ecosystem so this is shared. When taken together, these linked regional hubs create a huge innovation ripple across New Zealand – the sum being greater than the individual parts.

Economic impact if we deliver the vision:

In the central scenario, Deloitte Access Economics estimates that Medtech-iQ will increase NZ's GDP by \$1.5 billion in the year 2050 (in present value real terms using a real discount rate of 6%, relative to the base case). By 2050, additional employment due to Medtech-iQ rises to 7,918 FTE jobs. In addition to GDP and employment gains, wages are expected to increase as a result of Medtech-iQ. In the central scenario, by 2050, wages in NZ are expected to be 0.18% higher.



*Based on the 2021 TIN Report, CMDT, Callahan Innovation 2021.



Conclusion and next steps

NZ has a broad-ranging MedTech landscape which has developed quickly over the last few years. There is now an opportunity to look at how a more coordinated cross-country collaboration can uplift and scale the translation of knowledge, start-up success and growth of the MedTech sector in NZ.

New Zealand is an attractive location to perform first in person studies. It is also rated as the easiest place in the world to do business, with low corruption, a culturally and genetically diverse population, an integrated health information infrastructure, a highly educated workforce, economic and political stability, and local experts with experience in developing and testing innovative Medtech products. The time is right to invest in Medtech-iQ in New Zealand for the mutual benefit of our MedTech businesses, the healthcare system and ultimately the patient.

Looking at the successes of precincts internationally and building on the foundations of the CMDT, we know Medtech-iQ can connect, support, and propel community, academic, industry and entrepreneurial stakeholders onto the global stage. Medtech-iQ will lead the way in creating equitable, genuine partnerships through representative governance that enables innovation, collaboration and puts the health consumer at the centre.

Scope of this report and next steps

The purpose of this report was to identify the strategic opportunities and benefits that justify Medtech-iQ for the future of MedTech innovation, as well as the potential economic gains that Medtech-iQ can provide for New Zealand. This report sets the foundation of the benefits of this venture, however further analysis will be undertaken to assess the investment required. The near-term activities are;

- Continued socialisation of Medtech-iQ with stakeholders
- Engagement with partners in Auckland, Wellington, Christchurch and Dunedin to create regional hubs
- Formulate implementation plan for Medtech-iQ Aotearoa with founding partners

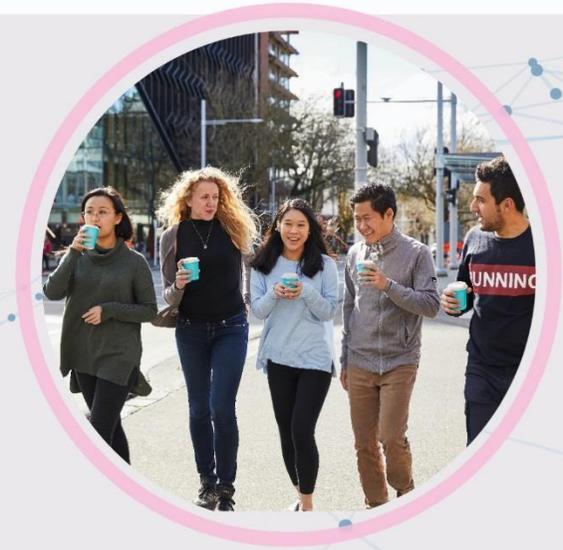


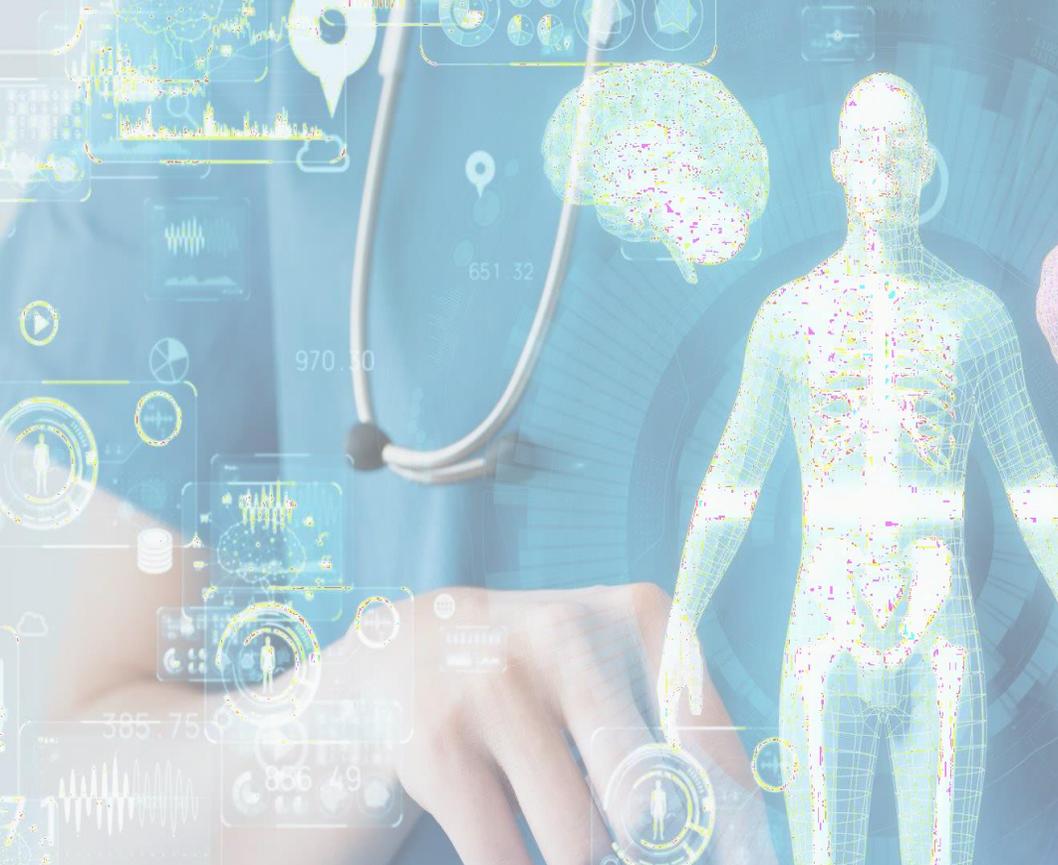
Glossary of Terms

Term	Description
Angel Investment	Financing from <i>angel investors</i> – high net worth individuals who provide financial backing for small start-ups or entrepreneurs, typically in exchange for ownership equity in the company. The money they invest is typically their own, either personal wealth or business funds, and the investment typically takes place during the early stages of a start-ups.
Connected Hubs Model	The national backbone of connected regional hubs with local presence underpinning Medtech-iQ.
CRI	Crown Research Institutes (CRIs) are Crown-owned companies that carry out scientific research for the benefit of NZ.
Medtech-iQ	The virtual and physical nationally born and locally led initiative.
MedTech	The sector and industry of medical devices and digital health technologies.
Pre-Seed Funding	This stage is the earliest stage of funding that a new company comes to, and typically refers to the period in which a company’s founders are first getting their operations off the ground. Funders typically are the founders themselves, their support networks or start-up accelerators such as the Ministry of Business, Innovation, and Employment’s Pre-Seed Accelerator Fund for early stage technology commercialisation activities.
Real Wages	Refers to wages that have been adjusted for inflation, or, equivalently, wages in terms of the amount of goods and services that can be bought. This term is used in contrast to nominal wages or unadjusted wages.
Seed Funding	This stage is the first official equity funding stage, typically representing the first official money that a start-ups raises. Potential investors include founders, friends, family, incubators, public funding/grants, venture capital companies and angel investors .
Start-up	A company in its initial stages of business.
Series A Round	The name typically given to a start-up company’s first <i>significant</i> round of venture capital financing. This round typically takes place once the company has developed an established user base, consistent revenue figures and other key performance indicators, and are seeking funding to support further growth, expansion and product offering optimisation.
Series B+ Round	Series B funding rounds and subsequent rounds (Series C,D, etc.) are about taking revenue-generating start-ups to the next level past the development stage. Funding at this point is focused on expanding the company’s market reach, after having already developed a substantial user base(s) and have proven to investors that they are ready to scale. Series C+ funding focuses heavily on scaling, including the development of new products, expansion into new markets, or even to acquire other companies to grow the company’s tangible and intangible assets.

Strategic Context

The MedTech sector and our vision for Medtech-iQ





Medtech-iQ

Creating Tomorrow, Today

Kaupapa - Purpose

To accelerate the success of the entire MedTech sector, driving prosperity and increased productivity across Aotearoa



Positive health and wellbeing outcomes for NZ addressing equity and accessibility of care

Deep-tech exports drive NZ's economic growth and global reputation in MedTech and personalised care

Developing a diverse new workforce and the creation of new, high value jobs in the medical devices and digital health sector



An Introduction to MedTech

Medical devices and digital health technologies play a key role in improving health outcomes for our population and in creating a prosperous MedTech industry.

Medical technology (MedTech) encompasses the products, services and solutions that are used in healthcare systems to save and improve peoples' lives by preventing, diagnosing, treating and monitoring disease.⁵ MedTech – defined in this report as being inclusive of medical devices and digital health technologies – are essential tools for improving patient outcomes and increase the value of healthcare being delivered, ultimately driving better patient outcomes.

Benefits of MedTech

New innovations in medical technologies present opportunities to improve the way that healthcare is delivered and experienced. They have a vital role to play in:

- The continuous improvement and expansion of treatment and care options to improve patient outcomes and health-related quality of life;
- Enabling earlier and more accurate diagnoses of health conditions;
- Facilitating more timely and preventative interventions to improve patient and population health outcomes; and
- Supporting patients in the 21st century and their healthcare providers to better self-manage and experience 'hospital-at-home' models of care through remote monitoring technologies and IoT enabled medical devices.

Furthermore, MedTech innovations are critical for the long-term strategy to alleviate the burden of healthcare costs, of which is currently unsustainable in the face of a rapidly ageing global population and chronic disease burden, as well as increased longevity thanks to modern medicine and care innovations.⁶⁻⁷

The NZ MedTech Sector

NZ has a sizeable and rapidly expanding MedTech sector, with leading players like Fisher and Paykel Healthcare and Orion Health not only being the largest MedTech companies, but two of the largest technology companies in NZ overall.

As a part of the country's HealthTech sector, with MedTech companies comprising 72.7% of companies and 75.6% of revenue, this is the largest secondary sector in the Technology Investment Network.

NZ's MedTech sector is also global-facing and a strong export market contributor. Global export sales account for 87.5% of the sector's revenue, reaching far and wide to North America (38%), Europe (24%), Asia (15%), and Australia (7%). **Devices make up the bulk of sector exports (62.7%)**, attributable to the success of Fisher & Paykel Healthcare. Digital health & health IT companies share 24.4% of revenue (with companies such as Biomatters and Volpara Health Technologies), and diagnostics and therapeutics expanding to 12.9% primarily from the growth of Douglas Pharmaceuticals and AFT Pharmaceuticals into the US and Australian markets.

The MedTech sector is also essential for growing the knowledge-based economy, with the average sector wage in 2020 being **41.5% higher** than the national average.⁸

An Introduction to MedTech

The Current NZ MedTech Ecosystem

The current MedTech ecosystem in NZ comprises a strong network of entities, institutions and programmes that form a strong backbone to drive the development and commercialisation of medical device and digital health innovations, and the growth of emerging MedTech companies.

These include the Consortium for Medical Device Technologies (CMDT), Te Titoki Mataora MedTech Research Translator, and HealthTech Activator (a new initiative launched by Callaghan Innovation in 2020) as national programmes, industry alliances such as the Medical Technology Association of NZ (MTANZ) and Digital Health Association (DHA), and clinical innovation hubs like the Institute for Innovation & Improvement (i3, Waitemata District Health Board) and Ara Manawa (Auckland District Health Board), NZ Health Innovation Hub, and Te Papa Hauora (Health Precinct Christchurch).⁹

NZ's academic institutions also play a critical role in the MedTech ecosystem – with the country's eight Top 500 QS World University ranked institutions being home to a wide range of student and staff talent, skill, and innovation that stimulates the growth of Aotearoa's vibrant MedTech Ecosystem. There is a high-level of commercialisation success already, with 30 MedTech intensive university spinouts being established over the last 5 years, creating more than 220 jobs and attracting \$120 million in investment⁹, **but there is still more to do.**

A Snapshot of NZ MedTech Successes



Catalysts of Change

Catalysts of change in the MedTech sector have seen success overseas, with the likes of Melbourne Biomedical Precinct (Parkville), the Liverpool Innovation Precinct in Sydney, the Center for Innovative Medical Technology between Odense University Hospital and the University of Southern Denmark, Texas Medical Centre in the USA, enabling world-class collaboration between researchers, clinicians and innovators in healthcare. Clinicians and researchers have lacked adequate support in NZ and need a similar national MedTech innovation hub to foster research and innovation, provide the infrastructure and pathway for commercialisation and ensure we have a flourishing MedTech industry that scales and is competitive on the global stage. NZ's MedTech sector provides an ideal specialised, high value 'weightless' economy, with rich potential for innovation and job creation to lift NZ's productivity performance.

*NZ has **the skills and capability** to increase its share of the **global USD\$815 Billion¹⁰ MedTech market**, with our existing companies focusing on ground-breaking innovations in areas like cancer screening, health data management, and specialist diagnostics and treatments. To achieve this, more **catalyst investment and support from sector stakeholders** is needed to scale and activate our full potential.*

*As the **national enabler** to build on years of existing work previously done, Medtech-iQ will **further foster talent and commercial opportunities** to grow the brand of NZ Inc and drive prosperity and increased productivity across the country, to ultimately contribute to **improving patient care and health outcomes** for every New Zealander.*

The MedTech sector is facing significant disruption

By 2040, we expect six global forces of change to transform the global healthcare market. The future of health is facing a paradigm shift from clinical care to patient-centred care. This shift towards an informed consumer-driven market and emphasis on preventative care presents a tremendous opportunity for NZ medical devices and digital health companies.

1.



EQUITABLE ACCESS

SOCIOECONOMICS DO NOT DICTATE ACCESS TO HEALTHCARE

Traditional barriers to accessing healthcare such as geography, usability and lack of resources are significantly reduced thanks to a radically transformed health system. The cost of wellness and care can be significantly reduced due to the utilisation of interoperable data and data sharing to drive insight driven healthcare. As more patients have more and equal access to medical devices and digital health tools to support their own health management, more patients will achieve better health and wellbeing.

Medtech-iQ is a significant enabler of equitable access, bringing care to all populations of NZ as well as globally. Not only that, but **equitable participation and ownership will be a central aim** through Medtech-iQ's intended partnership model with local iwi, Māori and Pacific communities. The codesign of innovations will be proactively enabled and facilitated to address the health inequities impacting NZ's most vulnerable populations in the way that best suits them. This in turn supports the growth of a product pipeline that is inclusive of different indigenous communities and cultures that can be readily taken up by global communities.

Medtech-iQ promotes universal design features of products and services, acting as an enabler for disabled persons to experience similar health outcomes to non disabled persons.

Barriers to commercialisation and global market entry are also reduced through extensive NZ prototyping with healthcare providers, creating well-designed technologies and devices that can be piloted and commercialised with **Medtech-iQ's** global partners, networks, and connected ecosystem of investors, regulatory specialists and policy advisors.

2.



INTEROPERABLE DATA

DATA ARCHITECTURE AND ANALYSIS ARE RADICALLY TRANSFORMING HEALTHCARE

Large, aggregated data sets provide a real-time and holistic view of consumers' health and their environment. These actionable datasets can enable advanced analytics to generate novel, real-time insights to drive high-value care. Incoming data from various sources can be standardised, aggregated, stored, continuously updated and shared with healthcare providers to drive the delivery of informed care.

Medtech-iQ provides the 'national connected hubs model' to support the collaborative design, prototyping, and commercialisation of MedTech solutions between **innovators** (MedTech organisations, academic researchers, clinicians), and the **people and communities they are serving**. These data-driven, patient-centred innovations will be built in alignment with industry-leading data standards for interoperability, providing not only strong health benefits onshore for iwi, Māori, Pacific Peoples, and other vulnerable communities, but also for global export markets.

This is also an opportunity to connect into and support the widespread implementation of Hira (the new national health information platform). Hira will provide a wealth of information for IoT enabled devices and collected patient-generated health data to be connected to and analysed with, driving better health for New Zealanders and improving the way that health information is accessed and shared across the country.

The MedTech sector is facing significant disruption

3.



DATA SHARING

STRONG PARTICIPATION IN DATA SHARING

As consumer devices and personalised healthcare options increase, consumers are increasingly willing to capture and share their healthcare data with healthcare providers (HCPs) and device companies. The **market for healthcare data is significant** - and transparency in data use and collection is now standard practice.

With increasing consumer trust and willingness to share additional information, data sharing will enable these rich data sets to help inform care delivery, treatment planning, and consumer-led health management.

This is an **opportunity** to create a data sharing model that truly reflects the principles of Te Tiriti through **partnership and programme governance** to ensure the protection of Mātauranga Māori throughout the commercialisation process. Furthermore, as the world moves into an increasingly open data environment, Medtech-iQ has the opportunity to **demonstrate truly respectful data sovereignty**, by ensuring that Māori data sovereignty principles are not only upheld but intrinsically woven into the design of Medtech-iQ governance and processes.

This includes **realising Māori rights and interests** in data as it is their inherent right as the Indigenous peoples of Aotearoa NZ, and recognising and upholding their rangatiratanga (authority) over Māori data and data ecosystem. Furthermore, Medtech-iQ would take a strong role in supporting the companies and organisations partaking in the ecosystem to uphold the principles of **kotahitanga** (collective benefit), **manaakitanga** (reciprocity), and **kaitiakitanga** (guardianship) in the design, development and implementation of their technologies.

Medtech-iQ also has the opportunity to champion new career pathways in data ethics and management, IP management, and MedTech regulation and compliance.

4.



EMPOWERED CONSUMER

CONSUMERS DEMAND CONVENIENCE AND TRANSPARENCY

Consumers are now, more than ever, driving the pace of change. No longer passive recipients of healthcare, the consumers today are engaged, informed, and demand transparency, convenience, and ease of access in the healthcare services they purchase. The proportionately large and growing population of elderly and disabled people are actively engaged in managing their health outcomes. Through adoption of new technologies, they experience a good quality of life.

These demands require the market to respond with a fundamentally patient-centric approach, ensuring all consumers can benefit from modern innovations. Ensuring access across socio-economic and ethnic groups is vital, and only achieved through thoughtful consumer co-design. Specifically for the NZ context, engagement and co-design with local iwi, Māori, and other communities including Pacific people and people with diverse abilities to create consumer-first, community-led medical devices and health technologies.

Medtech-iQ will be a driving force behind the continued development and commercialisation of consumer-health focused medical devices and digital health products. Companies – both established and future start-ups to be nurtured by the **Medtech-iQ** ecosystem – will be designed with patient and community engagement, participation and co-design, and will fit into modern models of care to support the delivery of high-value healthcare services that drive better patient and population health outcomes.

Medtech-iQ can be the national model for consumer and community engagement with medical devices and digital health companies, academic researchers and clinicians to drive consumer-led design and patient-centred care models as healthcare systems and the healthcare market is rapidly being transformed.

Medtech-iQ can promote equitable use through embedding universal design practices within prototyping methodologies to enable people of all ability levels to access, understand and use medical technologies to the greatest extent possible. New product design will be useful and marketable to people with diverse abilities.

SHIFT EXPECTED BY 2040

RELEVANCE FOR MEDTECH-iQ

The MedTech sector is facing significant disruption

5.



BEHAVIOUR CHANGE

CONSUMERS ARE EMPOWERED BY DIGITAL TOOLS

Many diseases and conditions can be better managed through behaviour modifications¹ and patient education to take preventative actions. However, many patients do not feel adequately supported to or knowledgeable enough, or simply the ability to take a leading role in their own health management.

Through the development of innovative technologies that deliver health related information in new ways to improve health literacy and adherence, patients are increasingly more empowered to under their conditions better. This equips them with the necessary tools to then systematically and accurately collect their own health data, share it with their HCP, and practice evidence-based advocacy for the outcomes that matter most to them.

Through the introduction of AI/ML, remote monitoring devices and sensors, and other tools and mHealth apps that are tailored to consumer interests and health status, patients will be more than ever equipped to take control of their own holistic wellbeing and take a seat at the table of their own healthcare decision-making.

Medtech-iQ provides a welcoming and supportive collaboration space for consumers to participate and help shape the future of health. Consumer feedback is critical in developing medical devices and digital health innovations that are tailored to the needs of their end-users. By providing a **national network** connecting researchers, healthcare institutions and clinicians, and patients and their communities, Medtech-iQ will provide the partners to facilitate the trial and development of patient-centred medical devices and digital health solutions to drive patient engagement and education.

6.



SCIENTIFIC INNOVATION

BREAKTHROUGHS AND COMMERCIALISATION WILL HAPPEN AT AN EXPONENTIAL PACE

Scientific breakthroughs, innovations, and their subsequent commercialisation onto the global market will occur at an exponential pace with the right supportive ecosystem and funding structures.

Deep-technologies such as AI diagnostic algorithms, stem cells, nanobots, biomedical sensors and implantable will be developed and commercialised by building on the insights derived from interoperable data, empowered consumers who participate in their healthcare and the development & design process, and **by leaning on the talent and skills provided by a skilled workforce.**

The innovative culture that has emerged across NZ, needs **fostering and stewardship**. The development and growth of NZ's knowledge-based economy is supported by the national connected hub model with local presence bringing together communities, students, researchers, university technology transfer offices, clinicians, accelerators, design innovators, investors, local authorities and international partners and the other industry professionals vital to the commercialisation pathway of deep and high-tech companies.

This will facilitate true collaboration, knowledge-sharing, and the growth of a thriving innovation ecosystem that produces high-value export and on-shore products to benefit NZ's local communities as well as global ones.

SHIFT EXPECTED BY 2040

RELEVANCE FOR MEDTECH-IQ

Medtech-iQ Value Proposition Enablers

The design of Medtech-iQ is underpinned by four key focus areas: *sector, technology, services and location*.

These areas will enable the realisation of Medtech-iQ's value propositions of genuine partnerships, new opportunities in business and investment, workforce upskilling, talent development, and equitable health care.

Technology Focus

Technology solutions to meet health and clinical needs. This focus will be within Medical Devices and Digital Health start up companies which specialise in health apps, devices, screening/diagnostic technologies, interventional technologies and emerging new technologies.

Technology Focus

The types of technology and technology companies Medtech-iQ will assist and prioritise



Types of Services

Commercial translation and pathways to commercialisation, and connections to international innovation and investment networks. Within NZ, Medtech-iQ will facilitate access to service users and communities across Māori health provider networks and Pacific Peoples health provider networks.

Types of Services

The service Medtech-iQ will offer to technology companies



Medtech-iQ will support growth of the MedTech sector infrastructure and enabling resources, helping to develop academic programmes within universities to grow graduate opportunities and build the local talent pipeline.



National Sector Focus

The parts of the economy Medtech-iQ will focus on

Sector Focus

- Health and Science
- Digital Technology
- Data Science
- Design
- Business and Enterprise
- Policy and Law
- Education
- Bio-engineering
- Engineering and Manufacturing
- Labour and Employment



Location

Where in NZ Medtech-iQ will be established

Present & Short term

National HQ with regional innovation hubs located in Auckland, Wellington, Christchurch and Dunedin.

Long term

Locations extend to innovation centres embedded within existing communities and infrastructure for equitable access, extensive global Innovation partners for collaboration with NZ entities.

The Strategic Importance of MedTech Collaboration

The MedTech sector is rapidly growing and it is time to bring together all parts of the sector in a common space to enhance this trajectory.

A high-growth, knowledge-based industry

MedTech was reported as NZ's largest technology sub-sector in 2020 alongside biotech and therapeutics, generating \$1.9 billion in revenue in 2019. This represents a \$92 million revenue growth from the previous year, and this strong year on year growth is also reflected in a 9.1% 5-year CAGR (compound annual growth rate). The national and international partnerships and collaboration already in place have contributed to this growth.

There is a strong focus on innovation, with \$226 million – or 12.1% of revenue – collectively invested into Research and Development (R&D) in 2019. The NZ MedTech sector is also a significant employer, with 7,636 employees globally, with over half (53.6%) domestically.

The sector is 'young' – with only 22 companies generating more than \$3.6 million in annual revenue (the threshold required for inclusion in the TIN200). However, the sector is also rapidly growing, with 163 other companies reported in the 2020 NZ HealthTech Insights Report, providing a rich pipeline of early-stage innovation and investment opportunity.

NZ is uniquely placed to set a world-leading example of indigenous partnership by working with Māori, for Māori, to develop equitable commercialisation partnership models. Medtech-iQ can support iwi to commercialise Mātauranga Māori on their terms, attract international investment and facilitate taking indigenous partnership onto the global stage.

Accelerated sector growth during the COVID-19 pandemic

The COVID-19 pandemic provided a unique opportunity for the medical technology sector. At a time where physical interaction with the healthcare system was limited by COVID-19 restrictions, medical technology was incredibly important for engaging the general public with health services. As such, development and deployment of medical technology occurred at a rapid pace. This succeeded in reinforcing the value of MedTech in the evolution of health systems.

More importantly, COVID-19 has elevated the need to give health consumers more ownership in their healthcare, through appointment bookings, access to diagnostic and test results and digital ways of engaging with their health providers.

Pfizer's recent offer of \$100 million for ResApp, a digital health start-up in Australia, is just one recent signal of the incredible growth that the MedTech sector has seen over the COVID-19 pandemic. The industry will continue to grow with increasing funding opportunities and the exposure brought about during COVID-19.

We heard from interviews with Māori stakeholders through this engagement that ***“COVID-19 has changed everything, and it's forced not only Māori health providers, but the entire primary health sector to adjust. Any innovation in the MedTech space is therefore incredibly relevant to us”***

Commercial success requires close and trusting relationships between academics, clinicians, patients, funders and vulnerable community representatives

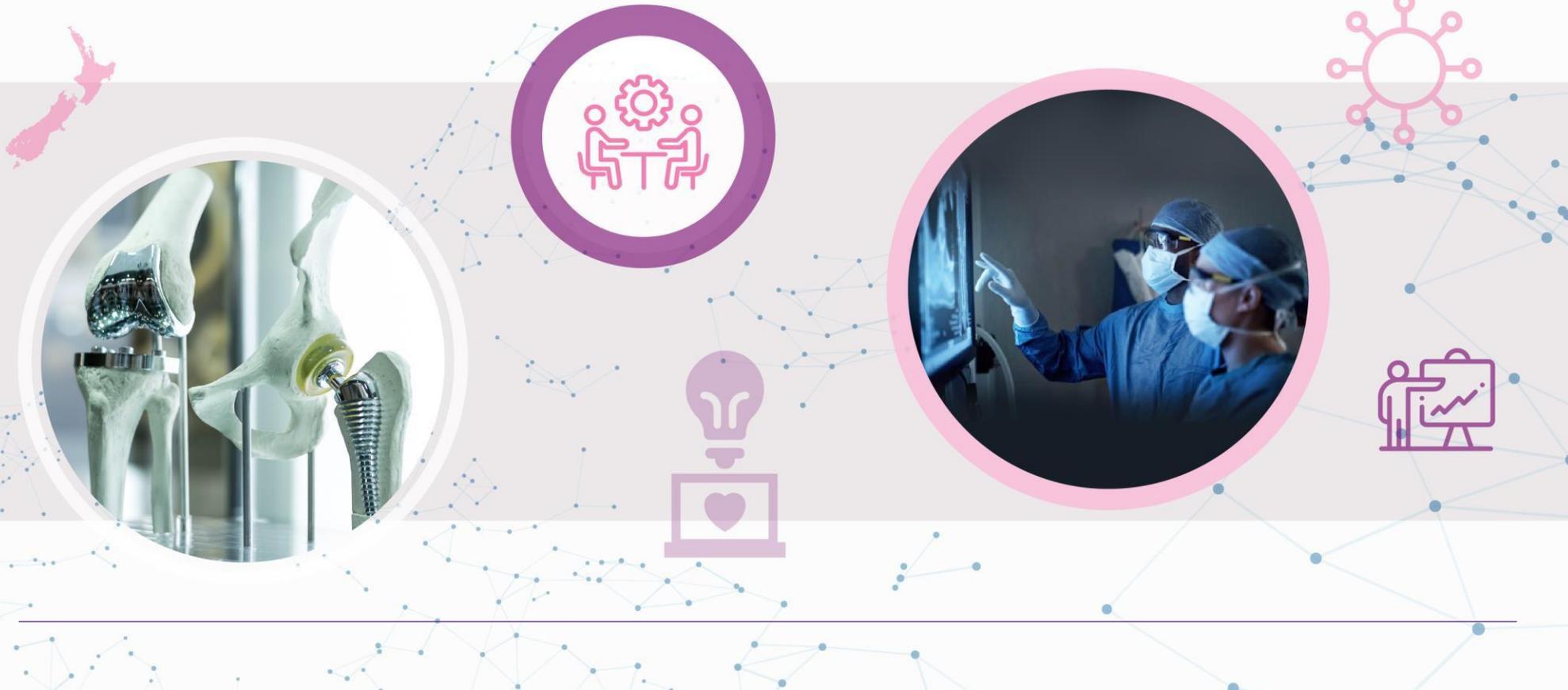
As shown through COVID-19, medical technology provides an essential opportunity to NZ's post-Covid economic recovery. With so much uncertainty – around the recovery efforts of other countries, and border and migration restrictions – MedTech needs to think differently with a commercially driven attitude to make the most of this opportunity.

Aimed specifically at growing the entire Medtech sector, Medtech-iQ has the potential to position NZ as a leader in the development of medical technologies. New spinout companies and associated innovations, owing to Medtech-iQ will help improve the health and wellbeing of New Zealanders, generate employment, and attract additional funding into medical research and development.

The purpose of Medtech-iQ is to accelerate the success of the entire MedTech sector. The enhancement of research, translation, commercialisation, investment, and employment pathways all fall under that purpose. If that goal is to be realised, it will need to start as a place-based initiative, with a regional hub model across Aotearoa, where all of the key elements of the innovation ecosystem can be brought together.

Current State

Current challenges in the MedTech sector and the key shifts required



The Challenges Medtech-iQ Seeks to Address

There are six key areas Medtech-iQ seeks to address including consideration of Māori and Pacific communities, market forces, resources, and regulation.



Challenge #1

There are many players in MedTech, but there are limitations to accessing collaboration, partnerships, and investment.

NZ has only very recently seen an increase in the number of active investors in the medical devices and health technology space. These investors are those familiar with the complex development pipelines of these technologies and who have the risk appetite and investment thesis to support MedTech start-ups through the lengthy commercialisation pathway.

While the number of these MedTech experienced domestic investors is increasing, it is not at a rate that will provide enough capital to sustain a high volume of innovation, particularly after the Series A stage.

Medtech-iQ will extend the focus and reach of NZ's MedTech sector to international investors – who can offer more capital – and bring with them connections to global organisations in the biotech/pharmaceutical, medical devices, health systems, and digital health technologies sectors that are vital for the globalisation of NZ MedTech start-ups.

How Medtech-iQ seeks to address the challenge

Medtech-iQ will have a governance structure with representation that reflects the core principles of Medtech-iQ – partnerships, business opportunities, equitable health outcomes and workforce upskilling and talent development.

This governance structure will clearly define the national priorities of Medtech-iQ, which will then translate into national and regional programs through hubs and localised programmes all underpinned by an overarching Medtech-iQ.

The challenge Medtech-iQ may face is in the balance of addressing health outcomes while also enabling the economic viability and commercial successes of the businesses looking for growth, both domestically and internationally.

The dual overarching outputs of Medtech-iQ – improved health outcomes and economic growth will require clear alignment, agreement and balance across the ecosystem of stakeholders to ensure Medtech-iQ's success.

The Challenges Medtech-iQ Seeks to Address

Challenge #2

Market complexity and barriers to entry

There are high barriers to market entry for medical devices and digital health technologies. The inherent complexity of the technologies themselves and complex and lengthy regulatory approval processes for each major market exist.

Finding suitable investors who understand market complexities and have the necessary risk appetite to invest in MedTech start-ups is a significant impediment.

There is a challenge for under-represented groups like Māori and Pacific Peoples to contribute to the design of solutions for conditions disproportionately affecting their communities, and their ability to contribute equally to MedTech developments and commercialisation.

The structure for reimbursement and healthcare funding is a critical component impacting adoption and use of technology. Meaning that even if health providers are interested in adopting a new technology, a barrier to entry can exist. The consumer is not necessarily the payor and does not have a say in what technologies are available to them.

Unique to the MedTech industry, innovations in medical devices and health technologies often require a change in clinical practice or the current 'gold-standard' of care. This is a significant hurdle for start-ups, given that healthcare systems are not rapidly responsive to revolutionary innovations. Innovations that cause significant disruptions to ways of working face a major adoption barrier due to the complexity of the procurement and clinical environments in which these technologies are trying to become established in.

How Medtech-iQ seeks to address the challenge

Medtech-iQ will bring together the necessary workforce with expertise and experience in navigating the complex commercialisation landscape for MedTech devices, connecting start-ups with the necessary skilled workforce to support their commercialisation process and de-risk their go-to-market strategy.

This will help attract investors – also through Medtech-iQ's network – of whom themselves can then provide further expertise and support to take NZ's MedTech start-ups onto the global stage.



The Challenges Medtech-iQ Seeks to Address



Domestic expertise and talent for both the business and science sides of MedTech start-ups is a common issue. Not only needing to hire staff with an in-depth technical understanding of the technology itself, MedTech companies require talent who know the complex processes of the clinical, regulatory and commercial environments.

How Medtech-iQ seeks to address the challenge

Playing in a 'chicken and egg' cycle with investment and partnerships, the risk of not having sufficiently skilled staff numbers and capabilities to drive the technical and business development growth of start-ups hinders their ability to raise capital from international investors and make the critical partnerships with end-users needed to validate and commercialise their technologies. Medtech-iQ will tackle this challenge in two ways.

First, by attracting more students and graduates into academic programmes at NZ's universities that provide the training and internships to develop MedTech commercialisation and regulatory strategy, business development, go-to-market strategy, and IP management skills. This will directly contribute to the growth of the domestic talent pipeline.

Furthermore, this is also a key avenue to engage with Māori and Pacific students – by ensuring their inclusion into these student cohorts, Medtech-iQ can strongly support the growth of Māori and Pacific start-ups and economies and bring their unique perspectives into the mainstream workforce to drive the change in the way that traditional western business models collaborate and engage with the communities they are trying to serve.

Secondly, Medtech-iQ as a national platform for MedTech in NZ, will help attract international talent and expertise. Both through digital connections and immigration of a highly skilled workforce, this is an opportunity to grow the economy alongside providing the necessary skills to support the commercialisation of NZ MedTech start-ups.

Challenge #3



Talent and expertise

The Challenges Medtech-iQ Seeks to Address

Challenge #4

Industry regulation

The global healthcare industry is tightly regulated, with stringent safety, efficacy, privacy and security requirements.

Markets such as the US, Europe, and Australia are a long-term goal for most MedTech companies. A significant challenge exists in the need for a deep understanding of the regulatory requirements of the associated FDA, EMA and TGA regulatory bodies. We need the capacity and ability to design strategies to accelerate market entry, clinical trials, quality management systems, and information security management systems to meet these regulatory needs.

Furthermore, as medical device and health technology innovations continue to grow at pace, these regulatory systems are having to adapt and develop new legislation in response, presenting a challenging pathway to navigate for both established and nascent MedTech companies.

How Medtech-iQ seeks to address the challenge

Medtech-iQ will host the latest regulatory information and support MedTech start-ups across NZ to navigate these complex and constantly changing regulatory landscapes.

Medtech-iQ will facilitate relationships with regulatory authorities, and with field specialists who have the expertise and know-how to develop regulatory strategies. Support programmes will help both established and nascent MedTech companies understand new changes to regulatory requirements. In this way Medtech-iQ will become the national keystone for NZ's MedTech companies who are developing and executing their regulatory strategies.



The Challenges Medtech-iQ Seeks to Address

Challenge#5

Te Tiriti principles, Māori communities and Kaupapa Māori should be considered at the forefront



The NZ Productivity Commission inquiry into Frontier firms, has emphasised the importance of Government support for a Māori-led approach to optimise a Māori business ecosystem and ensure adequate legal protections and processes are in place to protect Mātauranga Māori and Māori brand assets.¹¹

Māori have higher incidence and registration rates of a number of serious illnesses (cancer, cardiovascular disease, respiratory disease) than other ethnicities across NZ, and a distrust of our current health system.

How Medtech-iQ seeks to address the challenge

Any developments in medical technologies to meet Māori health aspirations must be co-designed, co-constructed and co-delivered to ensure solutions to improve Māori health outcomes are tailored to their community.

The theme of cultural collaboration was clear throughout our engagement with Māori. Medtech-iQ will create a structure that reflects Te Tiriti and marries up commerciality with Kaupapa Māori, supporting the enormous innovation and export potential inherent in Māori firms who look to serve the multiple bottom lines e.g., commercial, environmental and social objectives. This brand differentiation will be valuable to all NZ firms.



The Challenges Medtech-iQ Seeks to Address

Challenge#6

Consideration of Pacific communities is essential



The theme of ‘solutions for our issues lie within our own communities’ was clear throughout our engagement with Pacific community representatives. To empower Pacific Peoples to create solutions for their communities’, Medtech-iQ will ensure there is appropriate Pacific Peoples representation & ownership at all levels. Given the past trauma of unequal partnerships, the Pacific Peoples community were clear on the importance of building trust first.

How Medtech-iQ seeks to address the challenge

Medtech-iQ will create a structure to protect cultural innovation for Pacific Peoples by creating the opportunities for ownership, governance, business growth, upskilling and ultimately programmes that truly improve the outcomes for their communities.



How will Medtech-iQ shift the dial?

Medtech-iQ will play a role in the key shifts needed to scale the MedTech sector opportunity for NZ.

The key shifts needed & how Medtech-iQ will enable this



Skilled, adaptable life-long learners are nurtured and grow the knowledge-based economy workforce. This means businesses can access the right skills at the right time, onshore in NZ.

Medtech-iQ can enable this through promoting relevant study pathways and engaging with a diverse range of students, particularly underrepresented groups like Māori and Pacific students, to drive the entry of skilled graduates from the Medtech-iQ ecosystem into the NZ workforce.

These students will support the growth of NZ health sector in its totality, including MedTech, healthcare and government services. In doing this, Medtech-iQ has the potential to drive employment in NZ, retain home-grown talent and help manage future local skills shortages.

Growing NZ's productive MedTech assets is achieved by improving access to capital, overseas experience and expertise and innovation. This facilitates more investment in infrastructure to support and grow NZ's assets in the MedTech sector.

Medtech-iQ can enable this by providing the interface between market participants, driving collaboration and establishing partnerships to create technologies.

By attracting complementary medical devices and digital health technology firms within the next decade, Medtech-iQ is expected to increase revenue generated in NZ's scientific research, industry, and professional services sector.

Improved health outcomes for NZ communities is vital. As greater advances in the MedTech industry are achieved, home-grown medical devices and digital health companies have the opportunity to tackle the health issues impacting our local communities.

Medtech-iQ can enable this by bringing more visibility and accessibility to the MedTech sector for communities who bear the biggest burdens of poor health outcomes.

As medical devices and digital health technologies become increasingly advanced, Medtech-iQ can provide a platform upon which direct stakeholder engagement, participation and ownership in healthcare can take place – to ensure both short and long-term focus on addressing local health inequities and poor health outcomes.

How will Medtech-iQ shift the dial?

The key shifts needed & how Medtech-iQ will enable this



Enabling a step change for Māori economies is a critical shift needed in order to scale MedTech sector opportunities for NZ. With the **biggest burden of poor health outcomes**, there needs to be a drive for **higher economic, social, environmental and cultural wellbeing** for iwi and Māori communities, working to build **stronger relationships** between Māori and the Crown.

For our Pacific Peoples, there needs to be focus and dedicated effort to working in collaboration to understand how their specific health needs can be addressed. This includes targeted community participation to understand how healthcare is best experienced by their communities.

Medtech-iQ can enable this by contributing directly to helping these communities access skills, innovation and capital.

With a front-footed approach to enabling further establishment and growth of Māori and Pacific businesses, Medtech-iQ can further **create clearer pathways for Māori and Pacific talent development**. This is achieved through ensuring a **strong representation and active voice** present throughout governance levels of Medtech-iQ, and a **dedicated effort to engaging with and upskilling young talent** to build a pipeline to further stimulate these economies.

Increased investment into **research and development** is vital for connecting the world-leading research being conducted in NZ with the domestic and international partnerships, networks and investment needed to commercialise the IP and attract further investment in R&D.

Medtech-iQ can enable this by **connecting NZ's MedTech sector to the world**. Medtech-iQ will grow economic activity by catalysing new forms of wealth and income through increasing the commercial translation and application of NZ research.

This translation success is expected to exponentially attract R&D investment.

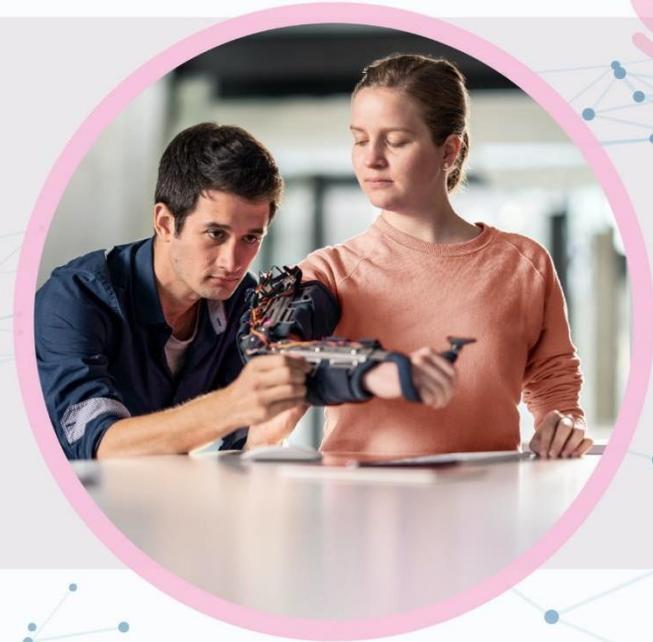
Strong and revitalized regions driven by thriving people and businesses. This change should be driven in all regions, with all regions being connected, having modern and resilient infrastructure, and the ability to leverage the region's competitive advantage.

Medtech-iQ can enable this by being embedded in regions across the country leading effective and efficient programs and networks. Medtech-iQ will connect hubs across Auckland, Wellington, Christchurch and Dunedin in its national model. Collaboration will be encouraged with regions contributing toward and participating in national programs. The regional hubs will build and grow a strong local presence to drive the creation of well-paying jobs and skills development where they are needed.

There would be **value** in keeping close to the action – *'on the ground'* – and staying well-attuned to the MedTech industry's pain points and issues.

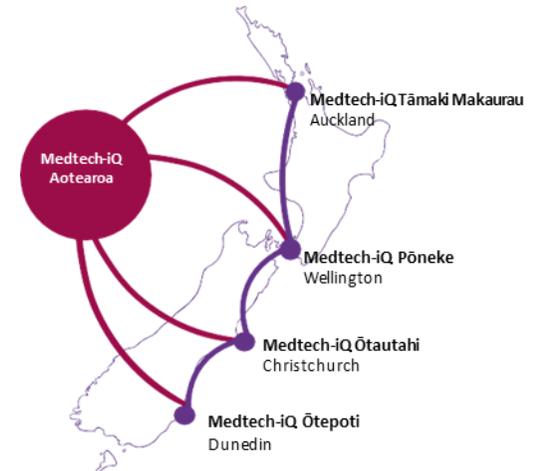
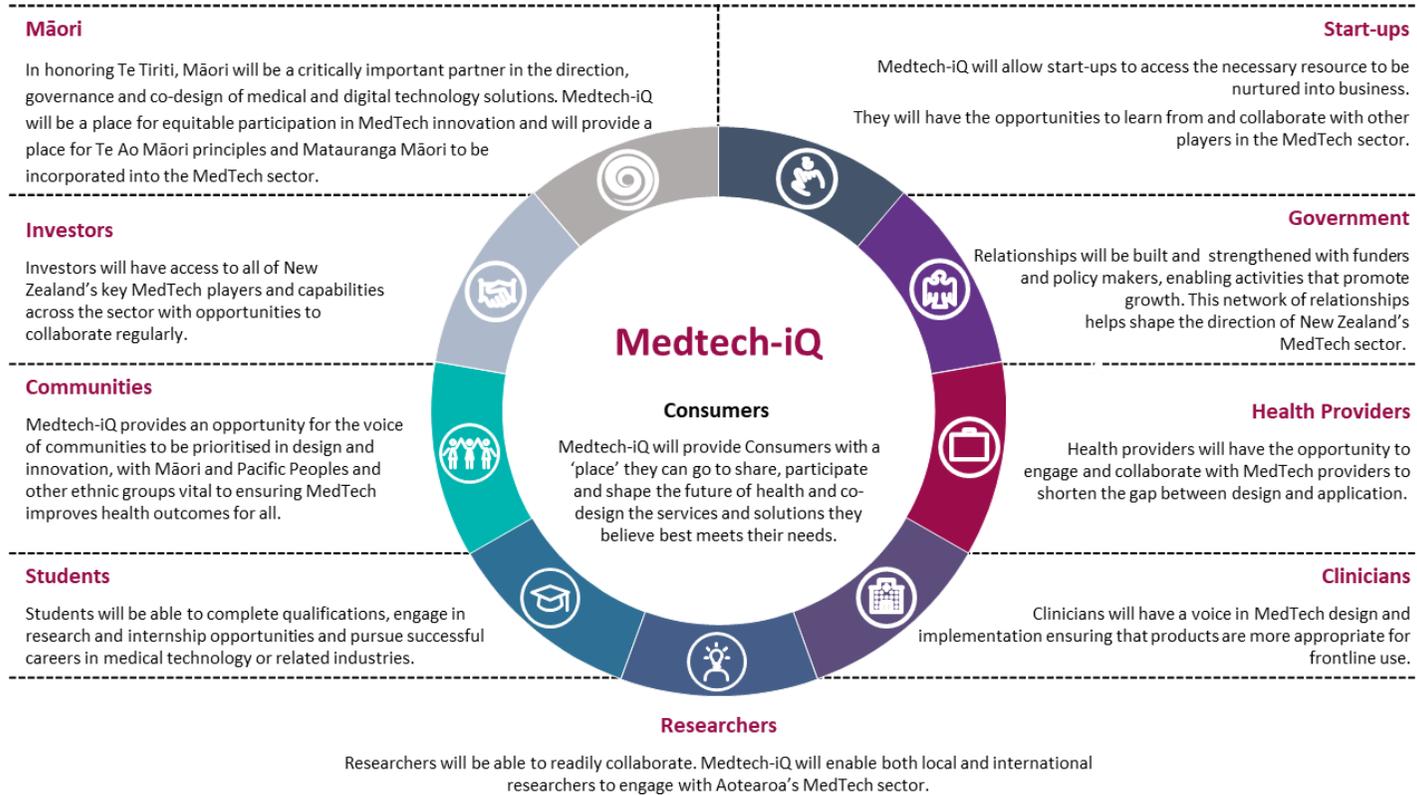
Opportunities

Medtech-iQ as a national innovation ecosystem



An Evolving Vision for the MedTech Sector through Medtech-iQ

Distributed Medtech-iQ hubs already exist to drive innovation within a national ecosystem to allow for ongoing collaboration and immediacy.



Medtech-iQ's Key Roles in the Current Ecosystem

Medtech-iQ plays a key role in maintaining and building momentum in the current ecosystem.

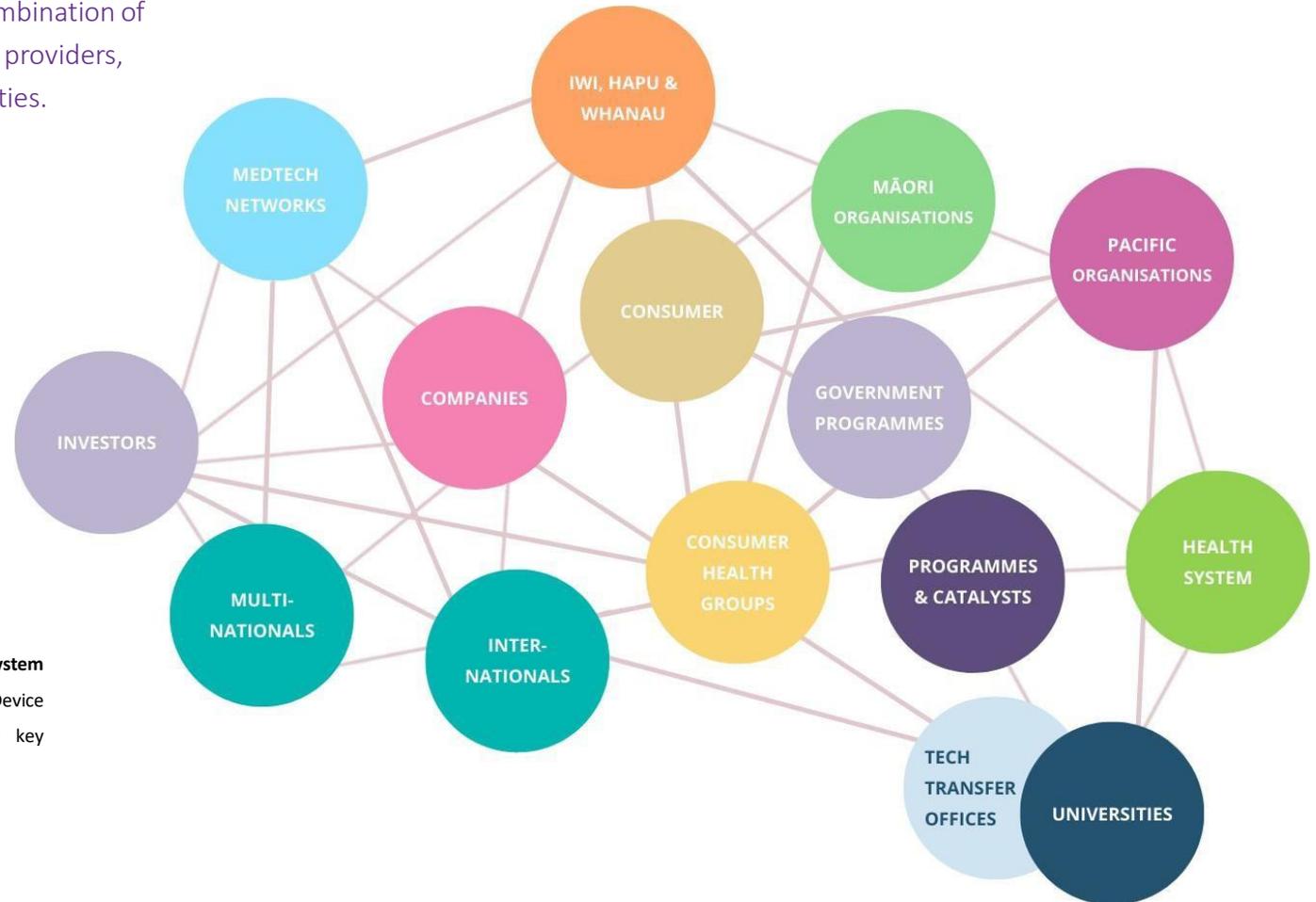
The medical technology ecosystem is a combination of not-for-profits, start-ups, investors, health providers, education providers and Government entities.

These stakeholders play a crucial role in advancing the development of the sector, but more can be done to connect these organisations and to spark innovation. Medtech-iQ will play a key role in maintaining and building momentum in the current ecosystem by driving collaboration and cohesion across the ecosystem and facilitating strong national connectivity across all regions.

The following page presents a **NZ Health Tech Ecosystem Pathfinder** created by the Consortium for Medical Device Technologies (CMDT). The pathfinder highlights the key players within NZ's health innovation ecosystem.



Please note that this is not an exhaustive list and only covers the primary functions of each organisation.

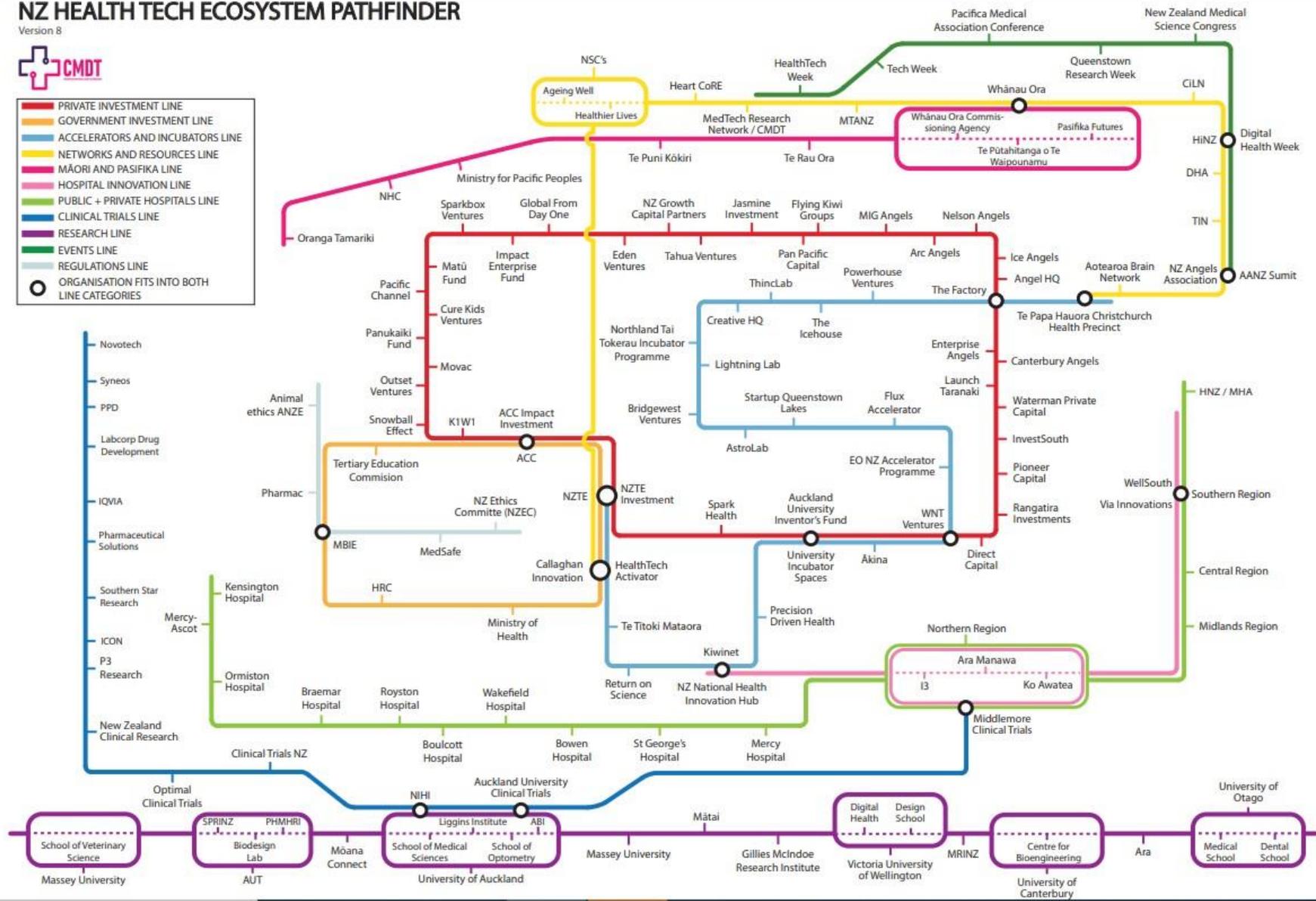


NZ HEALTH TECH ECOSYSTEM PATHFINDER

Version 8



- PRIVATE INVESTMENT LINE
- GOVERNMENT INVESTMENT LINE
- ACCELERATORS AND INCUBATORS LINE
- NETWORKS AND RESOURCES LINE
- MĀORI AND PASIFIKA LINE
- HOSPITAL INNOVATION LINE
- PUBLIC + PRIVATE HOSPITALS LINE
- CLINICAL TRIALS LINE
- RESEARCH LINE
- EVENTS LINE
- REGULATIONS LINE
- ORGANISATION FITS INTO BOTH LINE CATEGORIES



Opportunities and Concerns: Iwi and Māori Engagement

Through engagement with local iwi and Māori groups, we captured insights around how Medtech-iQ could deliver benefits for their communities, as well as key considerations and concerns in the set up of Medtech-iQ.

A series of interviews were held with key stakeholders including mana whenua, iwi, Māori health providers, and Māori land trusts.

Opportunities



Commercial structure with activated investment streams for iwi and Māori.



Consistent opportunities for iwi and Māori to be involved as the kaupapa progresses.



Multiple pathways for rangatahi to enter the Medtech-iQ ecosystem.



Tailored health devices built by and for our communities.



Indigenous procurement opportunities.

Concerns



Honouring Te Tiriti through the structure of Medtech-iQ.



Māori representation at the governance level to ensure co-design, co-construction and co-delivery.



Emphasis on building authentic relationships and partnerships with all involved.



Indigenous Data Sovereignty. Opportunities for Māori data to be subject to Māori governance.



Commercial structure that aligns with our cultural foundations and principles.

Opportunities and Concerns: Pacific Community Representatives

Engaging with Pacific leaders we captured the voice of the Pacific Peoples and what benefits Medtech-iQ could deliver for them. A series of interviews were held with key stakeholders, including Pacific Peoples health providers, educators, health workers, entrepreneurs and students.

Opportunities



Alternative educational pathways for Pacific Peoples youth via Medtech-iQ.



Medtech-iQ network can be a space of leverage for Pacific Peoples entrepreneurs.



Commercial value proposition for Pacific Digital Health businesses.



Opportunity to advance innovation used within the Pacific Health Sector.



Culture of collaboration within the NZ MedTech sector ultimately improving Pacific Peoples health aspirations.

Concerns



Limited accessibility to the proposed physical headquarters in Grafton.



Can a national connected hub model be set up to bring Medtech-iQ to communities where Pacific Peoples already are?



Pacific Peoples representation across all levels of Medtech-iQ. From governance all the way to the day-to-day roles.



What measures will be put in place to protect Pacific cultural innovation and IP?



Where is the value-add for Pacific partners that will remain engaged in Medtech-iQ?

Medtech-iQ Investment Logic

NZ is well poised to accelerate investment into establishing and growing Medtech-iQ with our world-class education system that is efficiently linked to private sector innovation. The objectives and benefits of Medtech-iQ below:

Objectives

1. Support the commercialisation pathway for MedTech organisations already in flight to accelerate their pace of growth and export market potential.
2. Develop net new businesses who offer innovative healthcare solutions (through medical technologies) and increased GDP.
3. Embed innovation and research and internship opportunities into undergraduate & postgraduate courses.
4. Diverse workforce with Māori researchers, Pacifica researchers, technologists and business experts.
5. Increase number of Māori and Pacific Peoples owned entities creating new export streams that address health equity in indigenous communities, strengthening our Indigi-Tech exports.
6. Healthcare professionals supported by relevant new technologies and expertise to improve health and wellbeing for all New Zealanders.
7. Drive novel models of care improving health and wellbeing outcomes for all of Aotearoa.

What are the benefits?

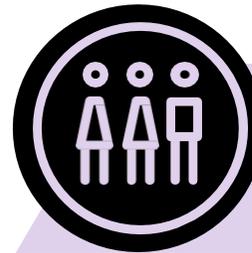
- Increase in number of deep-tech spin-out companies operating globally for job creation and to meet government goals of knowledge-based exports and building a strong R&D talent pool.
- Improvements to international university rankings to attract domestic and international undergraduate and postgraduate students.
- Ability to increase the scale and number of co-locating companies that create internship and employment opportunities for graduates and collaborate and share knowledge.
- Innovative and cost-effective ways to use digital health delivery for primary and community healthcare and well-being that benefits all, but particularly for iwi and indigenous peoples.
- Ability to bridge the "bench to bedside" translation gap more quickly by working with clinicians to undertake relevant research and design leading edge medical devices.
- To place value in the perspectives of patients and communities and integrate their involvement and engagement into all aspects of research activity and innovations in MedTech.

Medtech-iQ Investment Logic



The benefits also align and contribute to the Living Standards Framework.

Higher living standards for all New Zealanders is the goal of many government investments, and the basis for effective central funding and policy decisions. Investment in Medtech-iQ will contribute to NZ's wellbeing domains – specifically, those of knowledge and skills, jobs and earnings, and income and consumption.



Domain: *Knowledge and skills*

Benefit: *Upskilling and Education*

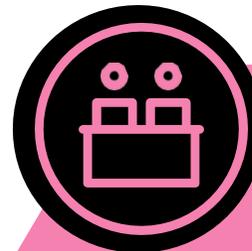
Medtech-iQ will help not only upskill graduates and employees in those companies, it may also increase the cohort of young people and rangatahi interested in pursuing a career in the sector.



Domain: *Jobs and earnings*

Benefit: *High-skill opportunities*

The opportunity to develop and commercialise technology means people can create jobs, particularly in the regions close to key growing hubs. Highly skilled jobs also require the right people, and the ability to grow earning potential also increases.



Domain: *Income and consumption*

Benefit: *Production and exports*

Increasing commercialisation of medical technology can have several impacts on income and consumption: by lifting average wages in NZ, and by increasing the types of technology able to be exported to other markets.

Risks and Mitigations

A high-level risk assessment for the implementation of Medtech-iQ



Risks and Mitigations

Material risks for Medtech-iQ are outlined below. The likelihood and impact of each risk has been assessed as low, medium or high, and a high-level strategy for mitigating the risk has been considered.

Risk	Risk Likelihood	Risk Impact (if unmitigated)	Mitigation Strategy
<p>Insufficient collaboration with stakeholders locally and internationally to build local opportunities as well as critical mass:</p> <p>Local partnerships will be critical to the success of Medtech-iQ and there is risk that this national model will not reach into local communities due to potential resourcing constraints and other barriers to access.</p> <p>Additionally, to reach global markets and support the vast myriad of NZ entities and investment initiatives, Medtech-iQ will need to invest significantly in supporting strong collaboration and communications with all stakeholders.</p> <p>Stakeholders may consider this initiative a low priority over running their business if limited personal value is evident in the short term, making this more difficult for Medtech-iQ to develop local and international relationships.</p>			<ul style="list-style-type: none"> • Maintain a strong relationship with stakeholders (local and international), and invest in relationship management and communications. • Invest in regular collaborative showcases with stakeholders and promote the value of MedTech in NZ. • Focus on the network effect through the development of a MedTech Ecosystem, leveraging and incentivising MedTech Frontier companies to create a platform for new entrants to be discovered internationally. • Seek feedback for continuous improvement from all stakeholders.
<p>Not achieving desired impact or scale of change with immediacy:</p> <p>Medtech-iQ requires experienced governance, skilled management, effective marketing, buy-in from stakeholders and it needs to finalise this established way of working at pace.</p> <p>There is a risk that lack of seed funding or investment will stall the necessary work programme and implementation of the activities that will impact the sector the most.</p> <p>Medtech-iQ is a significant transformation from how the MedTech sector works today and will only deliver on the key benefits if all stakeholders align around the common purpose and move with immediacy.</p>			<ul style="list-style-type: none"> • Maintain a strong relationship with stakeholders (local and international), and invest in relationship management and communications. • Promoting a shared vision for Medtech-iQ that resonates with all stakeholders and the public of NZ will help to create confidence and acceleration of Medtech-iQ.

Risks and Mitigations

Risk	Risk Likelihood	Risk Impact (if unmitigated)	Mitigation Strategy
<p>Lack of enduring government support:</p> <p>Medtech-iQ will require significant investments in infrastructure, research and people to complement investments made by the public sector and industry. This government financial support will need to be immediate and sustained to ensure Medtech-iQ can execute and reach its potential.</p> <p>This includes long-term support for current programmes that are underpinning MedTech innovation, Te Tītoki Mataora MedTech Research Translator and HealthTech Activator, which are forming the foundations of Medtech-iQ while it is being fully formed.</p> <p>There is also the risk Medtech-iQ will not receive adequate funding to enable a sustainable model. This risk could be compounded with potential government spending decisions, such as the current Health Reform, the long-run impact from Covid-19 and newly introduced debt ceilings and change of government focus.</p>	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> High</div> <div style="display: flex; align-items: center;"> Medium</div> <div style="display: flex; align-items: center;"> Low</div> </div>	<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> High</div> <div style="display: flex; align-items: center;"> Medium</div> <div style="display: flex; align-items: center;"> Low</div> </div>	<ul style="list-style-type: none"> • A commitment of long run capital and operating costs will be sought once the costs are confirmed. • An audit of existing fragmented investment and support across the MedTech sector will be required so a coordinated investment approach can be realised and we build momentum rather than duplicate effort or spread our investment too thin to be of value. • With government commitment, Medtech-iQ becomes a more attractive investment vehicle for private equity and offshore investors. This ambition should be shared and showcasing successes a joint expense.



Risks and Mitigations

Risk

Risk Likelihood

Risk Impact (if unmitigated)

Mitigation Strategy

People and Talent - Loss of key individuals and inability to recruit skilled talent:

There is the risk of a loss of key individuals such as the current establishment team of Medtech-iQ and research staff. In addition, as our borders open to the world, there is a risk we can't attract skilled talent to staff Medtech-iQ.



- Active succession planning in all locations nationally, including staff rotation to key regional nodes and into different roles to cross fertilise and increase long term retention.
- Attractive remuneration packages as well as additional support staff.
- Nurture new opportunities with effective on-boarding and support services.
- Incrementally building talent to reduce risk and offering international partnership exchanges with Health Innovation Precincts around the world.

The digital divide and ensuring equitable access:

There is a **gap** that exists in our society between those who have **access to digital technology** and those who do not.

A risk Medtech-iQ may face is missing an opportunity to bridge this gap and truly allow for improved health outcomes and equitable participation in MedTech.

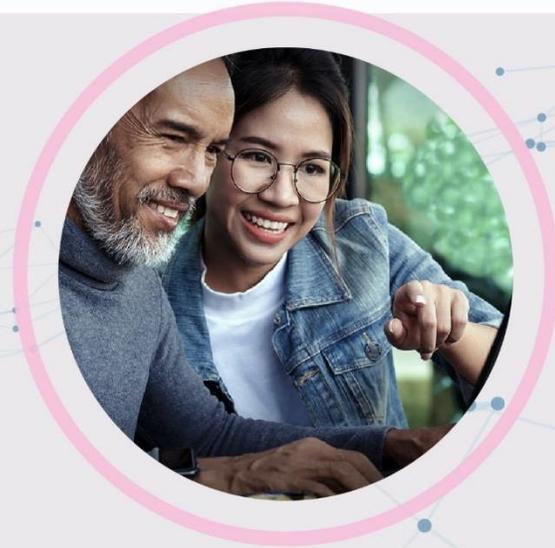


- Genuine partnerships and enabling resourcing and funding structures that allow local communities to enable their populations to access medical technology and digital health programmes.



NZ Success Stories

An overview of MedTech innovation in Aotearoa



NZ MedTech Frontier Company Spotlight

NZ's MedTech Sector is dominated by two large companies with >\$100 million revenue per annum – Fisher & Paykel Healthcare (medical devices) and Orion Health (digital health). Notably, F&P Healthcare and Orion Health were both founded through deep collaboration with clinicians and their NZ health sector partners, and provide excellent examples of how promising the future can be for “weightless”¹ industries, such as software and health technology.



Fisher & Paykel
HEALTHCARE

- A leading designer, manufacturer and marketer of products and systems for use in acute and chronic respiratory care, surgery and the treatment of obstructive sleep apnoea.
- Headquartered in Auckland, NZ, their products and systems are sold in around 120 countries worldwide.
- 5,081 employees
- Revenue of \$1.263 billion NZD (2020), 6-10% global market for product category
- Founded in collaboration between Dr Matthew Spence, the head of Auckland Hospital's critical care unit, electronics engineer Alf Melville, of the former Department of scientific and Industrial Research (DSIR), and R&D team leader Dave O'Hare at Fisher & Paykel.

Fisher & Paykel Healthcare is one of only three TIN200 companies to reach the \$1 billion revenue mark, with the total HealthTech sector revenue in 2019 only being \$1.9 billion. They are also a major exporter of high-value goods, generating 99% of their revenue outside of NZ.



ORION
HEALTH

- Digital healthcare (clinical workflow) software for healthcare providers from integration through to population health management and precision medicine.
- Headquartered in Auckland, NZ, their software is sold in 15 countries worldwide.
- 500+ employees
- Operating revenue of \$83 million NZD (2019)
- In the early years, Orion Systems as it was then known, partnered with Counties Manukau District Health Board to implement their technology to provide electronic discharge summaries and disease management solutions.

Orion Health continues to innovate, establishing the Precision Driven Health (PDH) partnership in 2016. This ambitious health IT data science research initiative brings together healthcare providers, universities and commercial opportunities for NZ. This was founded alongside the University of Auckland and Waitemata District Health Board.

NZ MedTech Start-Up Success Stories

Medical technology innovation is already well advanced across NZ, delivering valuable improvements in health and wellbeing and creating export value. By connecting academic researchers, skilled students, and entrepreneurs from across NZ, we can amplify and accelerate our successes and create a vibrant, robust and sustainable innovation ecosystem.



- Developer of biomarker tests for early stage bladder cancer detection.¹⁴
- Pacific Edge has certified laboratories both locally, and in the United States. Each lab maintains a Certificate of Compliance from the Centre of Medicare and Medicaid Services for Clinical Laboratory Improvement Amendments (CLIA).
- Pacific Edge was founded in 2001 as a spin-out from the University of Otago.
- Pacific Edge is listed on the NZX and ASX as PEB.
- In 2017, Pacific Edge was named in the TIN Top 10 emerging companies and Top Bioscience Company in 2014.



- Developer and manufacturer of therapeutic chyme reinfusion solutions for patients recovering from colorectal surgery and complex intestinal disease.¹⁵
- ISO13485 certified manufacturer of medical devices.
- The Insides™ System has been granted Breakthrough Device Designation by the US FDA, has CE marking and is registered on the MedSafe WAND Database.¹⁶
- In 2017, The Insides Company was spun out of The University of Auckland Faculty of Medical and Health Sciences with support from the MedTech CoRE and Auckland UniServices.
- 12 Employees*
- The Insides™ System is commercially available in Europe, the United Kingdom, and NZ.



- A digital healthcare and diagnostic devices company, with a pioneering medical device for enabling non-invasive diagnosis of gastric diseases.¹⁷
- ISO13485 certified manufacturer of medical devices.
- Their product, Gastric Alimetry, achieved CE Mark in 2021 and is currently undergoing clinical trials in 5 countries. Alimetry is also advancing their market entry strategy into the United States and have received regulatory approval from the US FDA.¹⁸
- Alimetry was founded in 2019 as a spin-out company from the University of Auckland's Bioengineering Institute and Faculty of Medical and Health Sciences.
- 35 Employees*
- Recently raised \$16.3 million in a Series A funding round led by NZ investors.¹⁹
- 2022 NZ High Tech Award Winner in three categories: Most Innovative Deep Tech, Most Innovative Hi-Tech Creative Technology Solution, Most Innovative Hi-Tech Hardware Product
- One of five winners of the Medtronic 2022 APAC Innovation Challenge.²⁰

NZ MedTech Start-Up Success Stories

A subset of Auckland Bioengineering Institute's success stories within digital health



THE CLINICIAN
FOUNDED
IN 2015



- Digital health company with a cloud-based platform solution to help healthcare manage patient-generated health data outside traditional clinical settings and help replace manual, inefficient processes with digitally-enabled care pathways.
- The ZEDOC platform is aligned with leading health interoperability standards including HL7 c2.x, FHIR and open EHR. The Clinician has also achieved ISO 27001 certification for information security management.²¹
- The Clinician was nurtured at Auckland Bioengineering Institute during their start-up phase. Since then, they have established their headquarters in Auckland, NZ, and have offices in Australia and Singapore.
- 53 Employees*
- One of five winners of the Medtronic 2022 APAC Innovation Challenge.²²



FORMUS LABS
FOUNDED
IN 2016



- Formus Labs has created the world's first automated 3D planner for joint replacement surgeries, reducing traditional template times of ~3 weeks down to the same day. The Formus cloud platform uses artificial intelligence (AI) and biomechanics to produce fully interactive 3D models that provides surgeons with unprecedented insight into the pre-operative planning process.
- Partnered with Zimmer Biomet, a globally leading orthopaedic innovator, for co-development and commercialisation in NZ and Australia, as well as investigation of international markets.²³
- Formus Labs was founded in 2016 from within the University of Auckland's Bioengineering Institute and was supported by the MedTech CoRE in its early stages, and the Auckland Inventors Fund.²⁴
- 13 Employees*
- Raising USD\$5 million in February 2022, Formus Labs officially launched their hip product offering in AUS & NZ the same month. They expect to obtain US FDA approval in mid-2022.²⁴

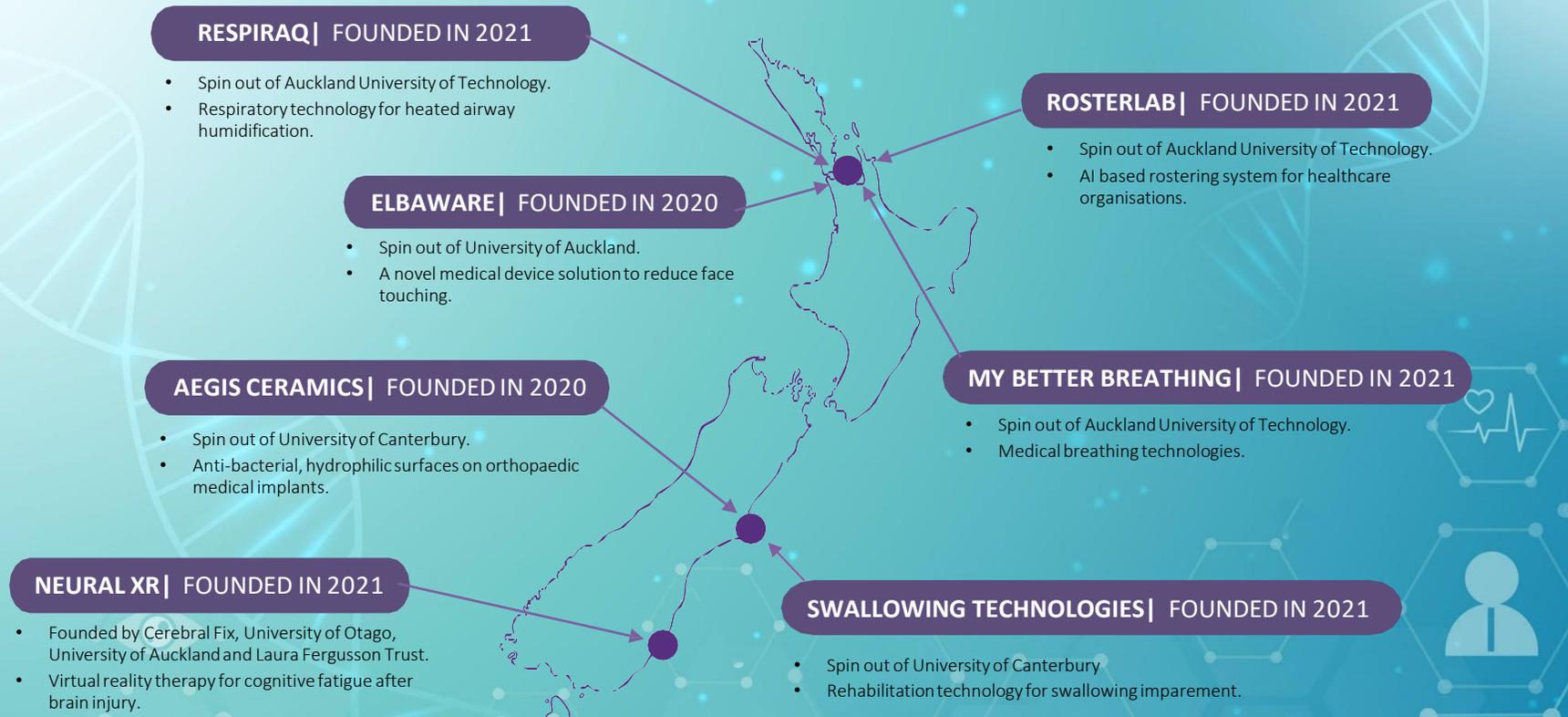


SOUL MACHINES
FOUNDED
IN 2016



- Soul Machines' goal is to define the user experience for Artificial Intelligence (AI) systems and platforms. As a highlight of the possibilities when digital and medical technologies cross-over, Soul Machines is creating the digital workforce of tomorrow.
- Their conversational AI when implemented in the healthcare setting has proven valuable for providing a workforce of virtual assistants and caregivers which augment the healthcare system. With a scalable digital workforce, patient experience can be significantly improved through greater accessibility options, and 24/7/365 digital support throughout their healthcare journey.²⁵
- In 2021, Soul Machines' 'Digital People' AI Product Environment was announced for three research proposals through the MBIE Catalyst: Strategic funding stream. These projects will be internationally connected research projects that explore the potential for the 'Digital People'™ Human OS Platform in one of the three priority research areas of mental health, metabolic disease, or medical triage. The investment rationale focuses on the NZ Health Research Strategy and the opportunity to build health-related AI capability within NZ and strengthen existing relationships with NZ's largest research and trading partners.²⁶
- Soul Machines was spun-out of the University of Auckland's Bioengineering Institute in 2016 with support from UniServices. Currently headquartered in San Francisco, USA their Research and Innovation Lab is still based in Auckland.²⁷
- 190 Employees*

NZ MedTech Start-Ups Our Newest Companies



The Power of Creating a Digital Healthcare Ecosystem

The NZ Productivity Commission's inquiry into Frontier firms revealed how vital they are to lifting national productivity and wellbeing. While NZ does have some world-leading firms in the Medical and Digital Technology sector, we do not have enough of them operating at or near the global productivity frontier; in other words, world leading.¹

The rise of new business models and MedTech ecosystems – a force multiplier in health

The emergence of a newly empowered health consumer, combined with the development of radically interoperable data sets on open and secure platforms and the related digital revolution in healthcare, will help define the Future of Health. While healthcare organisations have traditionally used M&A to expand into new services via vertical and horizontal integration, these organisations are increasingly turning to and creating healthcare ecosystems to acquire capability beyond their core and achieve similar ends.²⁸

It will be vital for our NZ MedTech entities to have deep experience of this ecosystem business model to compete globally.

Medtech-iQ creates a national, coordinated ecosystem, a landing pad for this ecosystem collaboration to occur and stewardship and oversight to provide essential policy, infrastructure and investment that will be required to support the ventures to flourish.

If we get this right, we will avoid the failures of past efforts and create a powerful NZ networked ecosystem, with significant long-term investment in focused areas, coordinated effort across government, researchers, industry, Māori and government working together and transparent, adaptive implementation.²⁹

Healthcare incumbents, or our Frontier MedTech companies are uniquely placed to play a leading role in the transition ecosystems and capture new value because of their historical relationship and brand permission with the patient (now the consumer). However, they will need the support of Medtech-iQ, to provide the scaffold and incentives that encourage our MedTech Frontier companies to continue to innovate, embrace these models and organically accelerate the partnerships with newer entrants. In turn this will help shape our NZ MedTech ecosystem more rapidly, foster meaningful and commercially viable participation, support talent and digital skills uplift and create the network effect that will position NZ MedTech organisations on the global stage. Certainly, health tech investor trends indicate that platform-enabled ecosystems are among the most impactful investment areas.³⁰

Frontier firms exist within ecosystems of deep capabilities

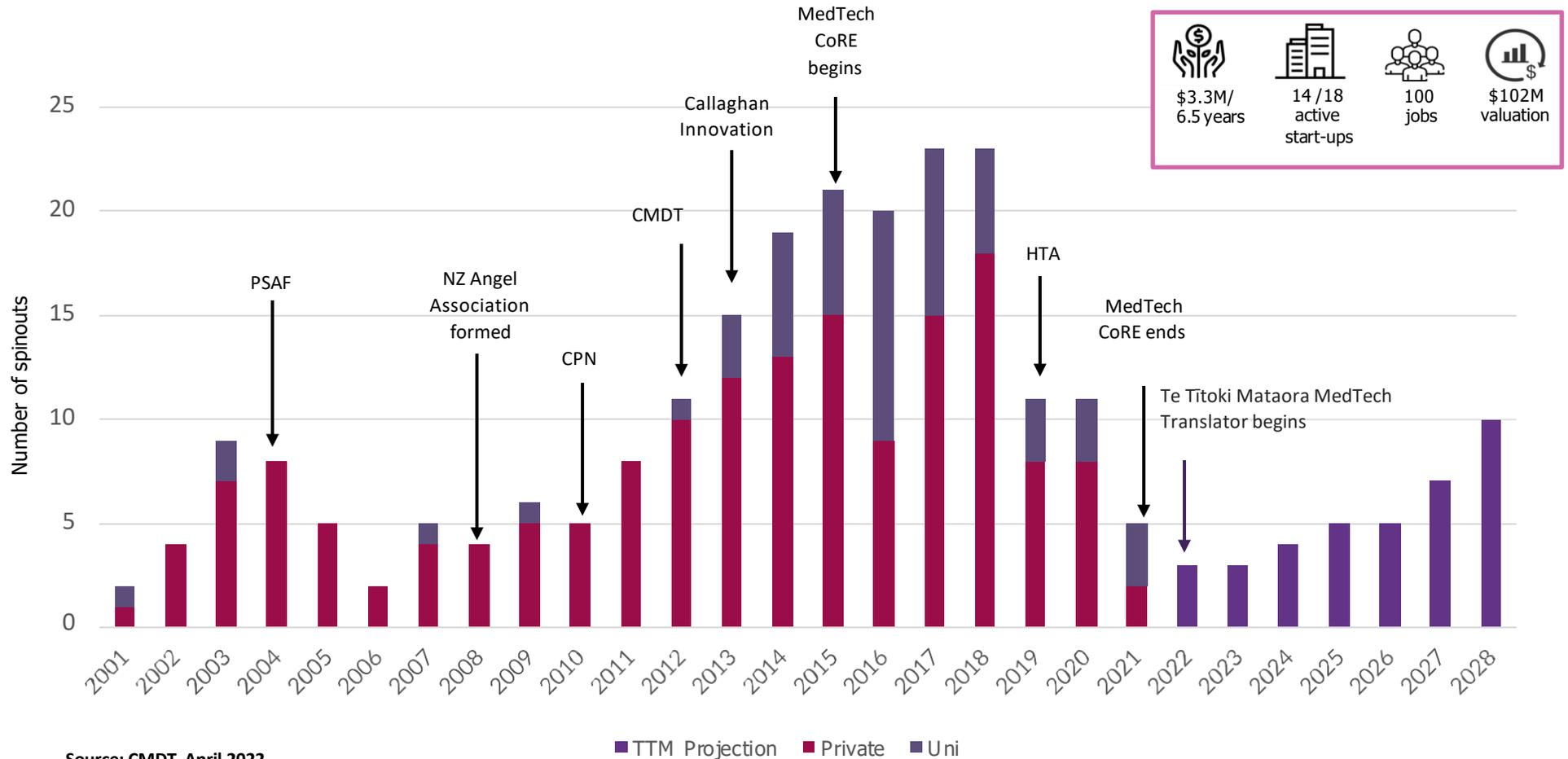


Source: The New Zealand Productivity Commission, Te Komihana Whai Hua o Aotearoa. Reaching for the frontier. Final report 2021

28. (New Zealand Productivity Commission, 2021)
29. (Gisby et al., 2021)
30. (Micca et al., 2021)

Increasing the Rate and Extent of Innovation in MedTech Will Drive Success

A representation of the number of companies formed over a 20-year period across both private sector and from universities. Interventions were mapped over this period to see how these might have affected the commercialisation activities from universities.



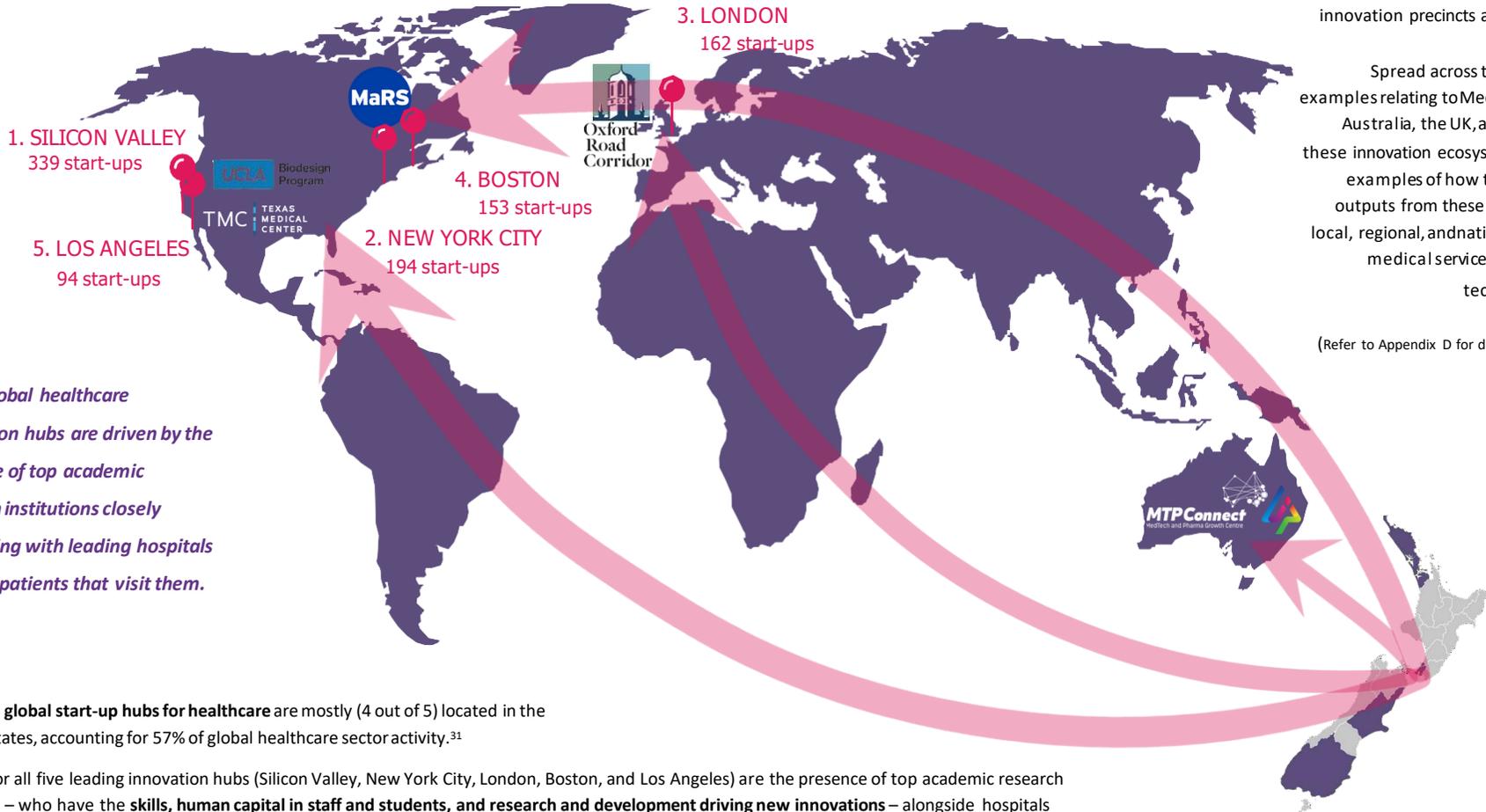
Source: CMDT, April 2022

Learnings from International MedTech Innovation Precincts and Collaborations

A number of insights can be drawn from the international case studies of MedTech innovation precincts and collaborations.

Spread across the world, with key examples relating to Medtech-iQ located in Australia, the UK, and North America, these innovation ecosystems are important examples of how to, and the possible outputs from these actions, for driving local, regional, and national growth of the medical services and digital health technologies sectors.

(Refer to Appendix D for detailed case studies)



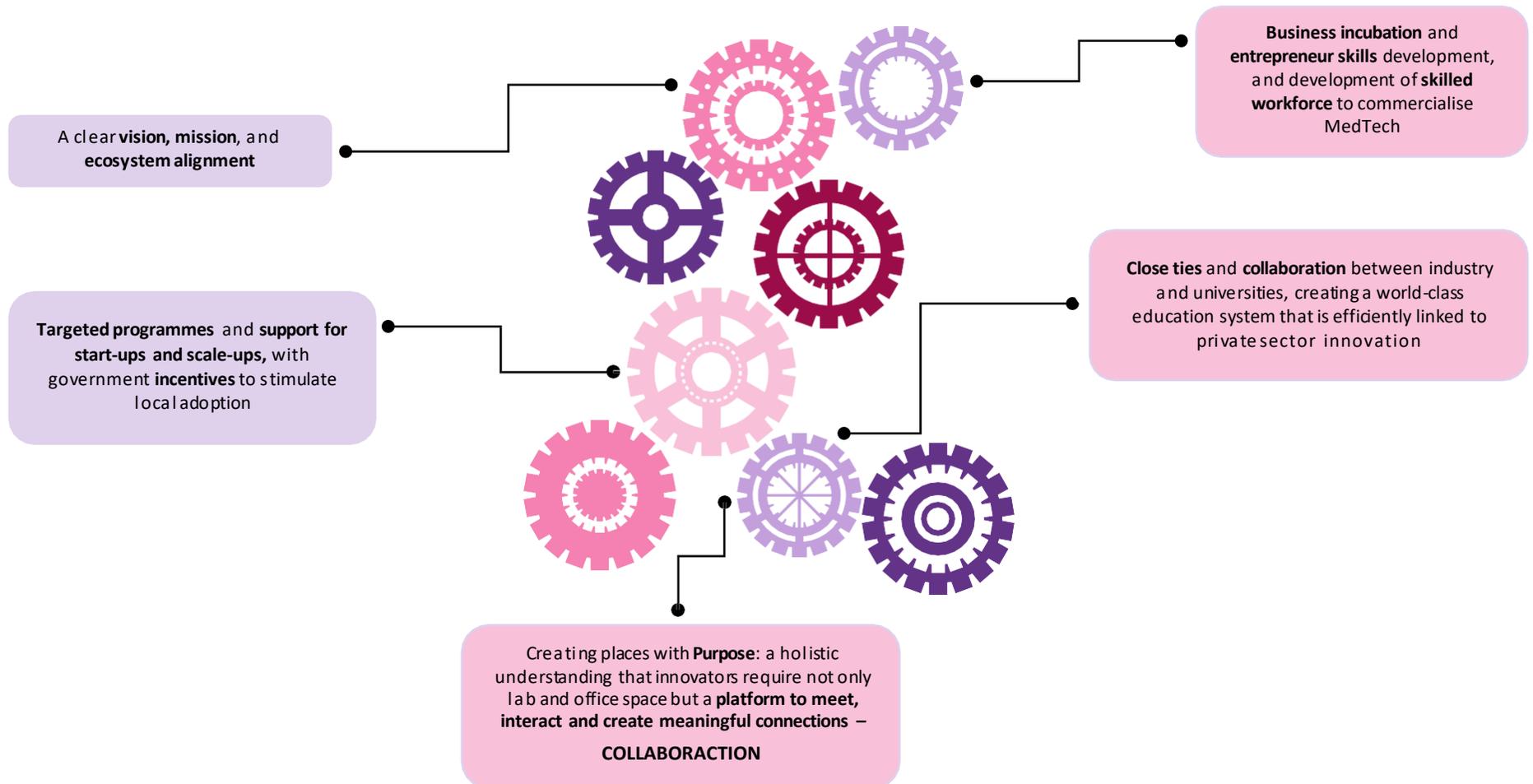
These global healthcare innovation hubs are driven by the presence of top academic research institutions closely connecting with leading hospitals and the patients that visit them.

The **top 5 global start-up hubs for healthcare** are mostly (4 out of 5) located in the United States, accounting for 57% of global healthcare sector activity.³¹

Critical for all five leading innovation hubs (Silicon Valley, New York City, London, Boston, and Los Angeles) are the presence of top academic research institutes – who have the **skills, human capital in staff and students, and research and development driving new innovations** – alongside hospitals with clinical innovators, champions, field experts and importantly, patients to participate in trials and provide critical user feedback, to **drive the design, refinement and commercialisation** of new medical devices and digital health technologies.

Learnings from International MedTech Innovation Precincts and Collaborations

Of the international case studies that were researched (Appendix D), the following insights were identified and illustrate what success for Medtech-iQ can look like:



Economic Impact

Analysis of economic benefits



Economic Impact – Purpose and Context

By enhancing opportunities for collaboration and partnership, Medtech-iQ will attract more investment into medical research and development, enabling NZ to position itself as a world leader within the health technologies sector.

Purpose of the economic impact assessment

The University of Auckland led by the Auckland Bioengineering Institute commissioned Deloitte to complete an economic case for Medtech-iQ on behalf of the Consortium for Medical Device Technologies.

The economic impact assessment (EIA) provides a view on the likely opportunity of "Medtech-iQ" for NZ. In doing so, the EIA will create awareness of the economic opportunity that Medtech-iQ can bring for NZ.

The findings presented in this section outline the projected economic impact of Medtech-iQ on NZ's economy between 2022 and 2050, based on a comparison between the base case (without Medtech-iQ) and policy scenarios (with Medtech-iQ). In particular, this analysis models the economic impact of the expected growth in NZ's Medical Technologies industry (including devices, digital and health IT), owing to Medtech-iQ. Key outputs reported in this analysis include:

- The impact on gross domestic product (GDP),
- employment, and
- wages.

A computable general equilibrium (CGE) modelling approach is used to conduct the EIA.

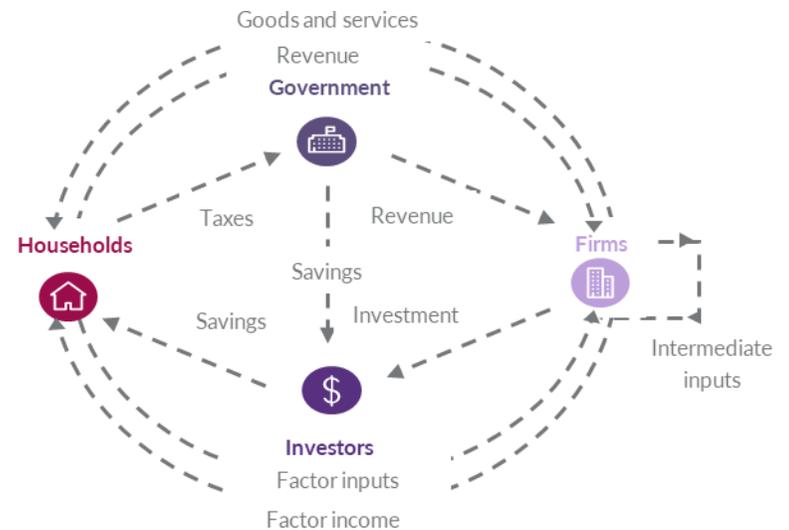
Why CGE?

A CGE model is best suited to answering the question of the economic opportunity of Medtech-iQ on NZ's economy since it provides an assessment of economy-wide impacts of an 'economic shock,' such as the development of Medtech-iQ. Taking a whole of economy view, which covers all sectors of the economy over a projected timeframe (i.e. to 2050) accounting for resource

constraints and opportunity costs, a CGE model is able to provide significant insights on the reallocation of capital and labour resulting from an economic shock.

Estimating the economic impact through the CGE model

The potential economic impact of Medtech-iQ has been estimated using Deloitte Access Economics' CGE model. This is a large-scale, dynamic, multi-region, multi-commodity model, representing the demand and supply relationships in the world economy. The model is underpinned by a set of key underlying assumptions between various agents in the economy as pictured below:



A general equilibrium model simulates an economy's response to an economic 'shock' which leads to the reallocation of capital and labour among other second round impacts. The economic impact of Medtech-iQ on NZ's economy is compared to a base case where investment into healthcare research and development, and related economic trends continue as observed today.

Mapping the MedTech Opportunity

The CGE framework has modelled the opportunity of Medtech-iQ for NZ's broader economy.

Understanding the role of Medtech-iQ

Drive revenue growth for the MedTech sector:

Medtech-iQ will help enhance the ecosystem of innovation in medical research both in NZ and globally. It will help attract **complementary** medical devices and digital health technology firms within the next decade, positioning NZ as a **world leader in MedTech innovation**.

In doing so, Medtech-iQ will drive revenue growth for the MedTech sector, taking NZ's MedTech industry to the global marketplace.

Attract additional investment in research and development:

By connecting world-leading research conducted in NZ (Medtech-iQ & Partners), Medtech-iQ will enable new commercial partnerships, resulting in the commercialisation of IP and attracting investment into R&D. This effect will grow economic activity by **catapulting new forms of wealth and income** through **increasing the commercial translation and application of research** from NZ. This translational success is expected to exponentially attract R&D investment into Medtech-iQ.

Sector talent development:

Noting that there is a shortage of expertise in NZ's MedTech sector, there is an opportunity for Medtech-iQ to enable new programmes that ensure **educational alignment, coordination of diverse workforce placements, and development of newly created skilled roles**. Skilled graduates will support the growth of NZ's health sector in its totality including healthcare and government services. In doing so, Medtech-iQ has the potential to **drive employment and to manage skills shortages** in the future.



Translating the impact of Medtech-iQ to the economy

Drive revenue growth for the MedTech sector:

Medtech-iQ will provide the interface between market participants to drive collaboration and establish partnerships to create technologies. Attracting complementary medical devices and digital health technology firms within the next decade, **Medtech-iQ is expected to increase revenue generated in NZ's scientific, research, and professional services sector** by helping current businesses mature and attract new ventures in medical research. This model estimates revenue generated from private investment only.

Attract additional investment in research and development:

Targeted investment in medical research, owing to Medtech-iQ, is expected to **improve the health and wellbeing of New Zealanders**. This will result in **increased labour force productivity**. It is assumed that an additional 0.028 full time equivalent (FTE) workers are added to the labour force for every 1 million dollars invested in healthcare research and development. Labour force productivity is expected to increase 10 years after the initial investment in healthcare research and development based on literature.

Sector talent development:

Medtech-iQ is expected to **support the creation of new career pathways and innovative roles for the skilled workforce**. The resultant impact is expected to occur through additional students graduating with a higher qualification than before, in a higher paying field such as STEM. The impact of additional graduates on NZ's economy is derived as wage premium in the scientific, research, and professional services sector.

Medtech-iQ Scenarios

To understand the economic impact of Medtech-iQ on the economy, we undertook economic modelling, out to 2050, based on a base case scenario and three additional policy scenarios – Conservative (Low), Central (Medium) and Ambitious (High).

Outcomes of the policy scenarios

Three policy scenarios have been modelled, reflecting the relative uncertainty as to how Medtech-iQ might impact its targeted sectors.

<p>Conservative (Low)</p>	<ul style="list-style-type: none"> Medtech-iQ is somewhat effective in interfacing between market participant to drive collaboration and partnership. As a virtual space only, NZ's MedTech sector continues to be dominated by a start-up ecosystem. Medtech-iQ is expected to provide a small increase in targeted investment in medical research. Medtech-iQ will offer limited support to creating career pathways and innovative roles for the skilled workforce. 	<ul style="list-style-type: none"> Medtech-iQ is less effective at growing NZ's economy, with limited growth in labour productivity, attraction of research and development to the healthcare sector. There is a smaller improvement in education alignment, development of career pathways and opportunity to create high value jobs. Medtech-iQ's impact on the overall sector growth is similar to that of ABI and maintains the momentum created by previous interventions. 	<p>Base case scenario: investment into medical healthcare sector, their level of research and development, and related economic trends continue as we observe them.</p> <p>The Medtech-iQ scenario: models the NZ economy, assuming the establishment of Medtech-iQ and commencement of related activities.</p> <p>To account for the possible uncertainty of the magnitude of the impact of Medtech-iQ, we modelled three scenarios; conservative, central, and ambitious.</p>
<p>Central (Medium)</p> <p>*virtual & physical Medtech-iQ</p>	<ul style="list-style-type: none"> Medtech-iQ is effective in interfacing between market participants to drive collaboration and partnership. As a virtual and physical space, NZ's MedTech sector begins to scale up and transition away from a start-up ecosystem. Medtech-iQ is expected to provide an increase in targeted investment in medical research. Medtech-iQ will offer moderate support to creating career pathways and innovative roles for the skilled workforce. 	<ul style="list-style-type: none"> Medtech-iQ is effective at growing NZ's economy, with growth observed in labour productivity, and attraction of research and development to the healthcare sector. There is an improvement in education alignment, development of career pathways and opportunity to create high value jobs. Medtech-iQ is able to impact the overall sector to achieve critical size by 2050. 	
<p>Ambitious (High)</p>	<ul style="list-style-type: none"> Medtech-iQ is highly effective in creating a market interface that drives collaboration and partnership helping NZ transition from a start-up dominated ecosystem to a scale-up-economy. Medtech-iQ is expected to provide a significant increase in targeted investment in medical research. Medtech-iQ will offer significant support to creating career pathways and innovative roles for the skilled workforce. 	<ul style="list-style-type: none"> Medtech-iQ is highly effective at growing NZ's economy, with high growth in labour productivity, attraction of research and development to the healthcare sector. There is a larger improvement in education alignment, development of career pathways and opportunity to create high value jobs. Medtech-iQ is able to create a high-power sector, including attracting significant Government support and funding, on top of the private sector involvement. 	

The Economic Impact of Medtech-iQ

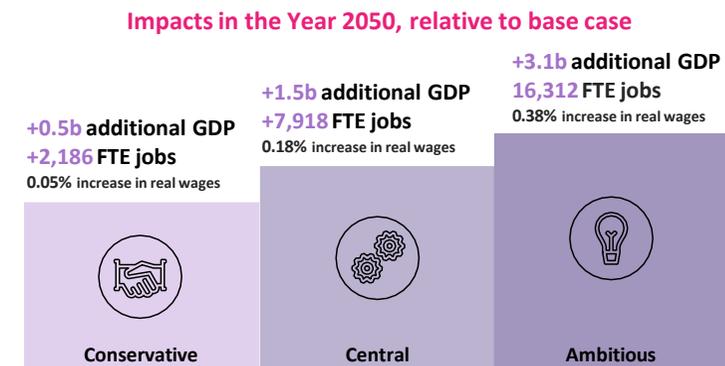
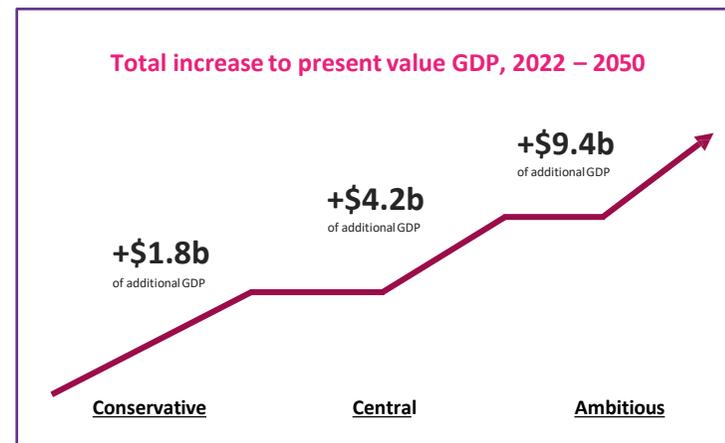
Medtech-iQ is estimated to deliver between NZ\$1.8 billion (conservative) to NZ\$9.4 billion (ambitious) in additional GDP in present value terms (between 2022 and 2050, discounted at 6%), and between 1,030 (conservative) and 5,387 (ambitious) additional FTEs on average to the NZ economy each year, over the same period.

Economic impact if we deliver the vision

Based on the information provided, Medtech-iQ has the potential to **generate substantial positive impacts** for NZ's economy. A summary of the headline impacts to Gross Domestic Product (GDP), employment, and wages is provided in the table below.

In the central scenario, Deloitte Access Economics estimates that Medtech-iQ will **increase NZ's GDP cumulatively by \$4.2 billion** between 2022 and 2050 (in present value real terms using a real discount rate of 6%), relative to the base case. Over the same period, employment is expected to be 2,581 Full Time Equivalent (FTE) jobs higher on average. By 2050, additional employment due to Medtech-iQ rises to 7,918 FTE jobs.

In addition to GDP and employment gains, wages in NZ are also expected to increase as a result of Medtech-iQ. In the central scenario, a 0.07% annual average increase in real wages is projected, relative to base case. **By 2050, wages in NZ are expected to be 0.18% higher.**



Medtech-iQ Scenarios	National GDP		National Wages		National Employment	
	Present Value Additional GDP 2022-2050 (\$m, 6% discount rate)	Additional GDP delivered in the Year 2050 (\$m)	Average increase in real wages (%)	Total change in real wages in 2050 (%)	Average annual increase in employment (FTE)	Total additional employment delivered in 2050 (FTE)
Conservative (Low)	1,842	470	0.03%	0.05%	1,030	2,186
Central	4,173	1,537	0.07%	0.18%	2,581	7,918
Ambitious (High)	9,358	3,057	0.14%	0.38%	5,387	16,132

Impacts on GDP

Relative to the base case, Medtech-iQ generates substantial gains for NZ's economy by 2050.

Key observations

Under the central scenario, Medtech-iQ is projected to **increase NZ's GDP by NZ\$4.2 billion in present value terms** (2022 dollars, discounted at 6%). This represents Medtech-iQ's reach and ability to facilitate improved outcomes for NZ's economy particularly, the scientific research sector.

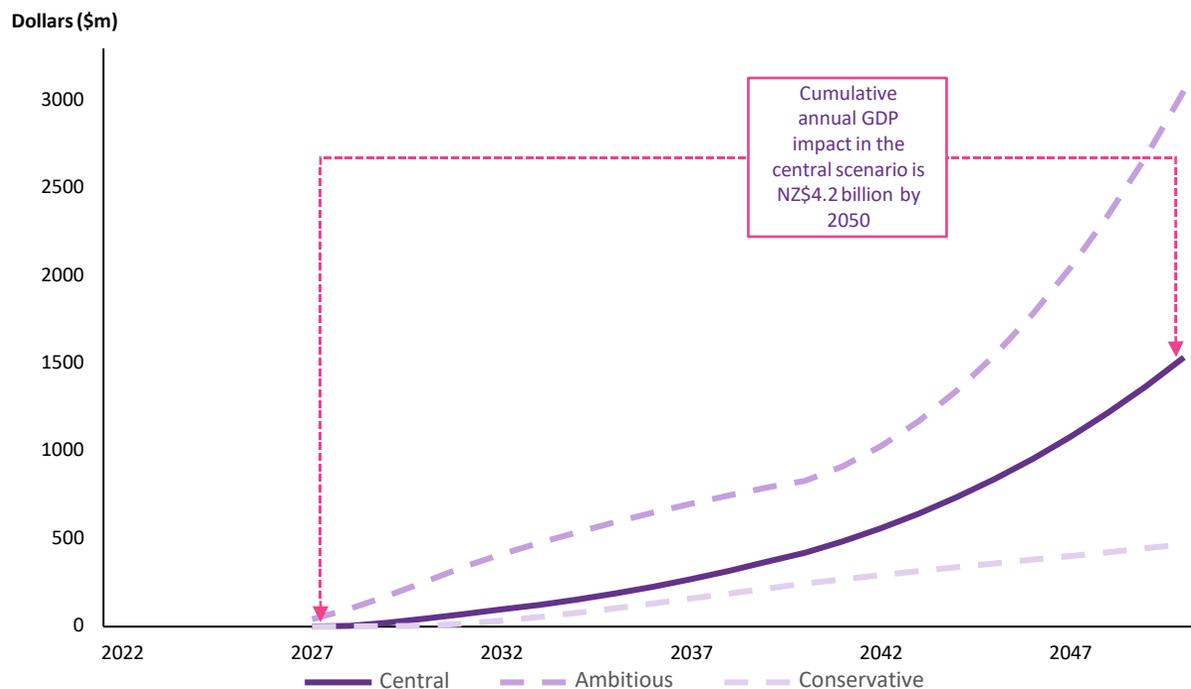
These impacts are expected to accumulate over the next 28 years, capturing the growth phase of Medtech-iQ. In 2050, **NZ's economy is expected to be 0.26% larger** than what it would have been without Medtech-iQ.

Under the conservative and ambitious scenario, Medtech-iQ is projected to increase NZ's GDP between NZ\$1.84 billion and NZ\$9.36 billion in present value terms (2022 dollars, discounted at 6%). Impacts on the economy accumulate over time since Medtech-iQ is expected to continue to **attract more investment in medical research and development, driving growth in labour productivity, student enrolments, and revenue over the next 28 years**. This analysis models the growth phase of Medtech-iQ, as such, peak impacts are not modelled.

The differences in results across scenarios represent the growth in revenue, student numbers, and labour assumed across the three scenarios. The timing with which those impacts manifest, also impacts the variation in results across scenarios.

Scenario	Conservative	Central	Ambitious
GDP impact (NPV, \$m)	1,842	4,173	9,358
Average annual increase in GDP (\$m)	207	491	1,025
Average annual increase in GDP (%)	0.03%	0.08%	0.17%
Additional GDP delivered in 2050 (\$m)	470	1,537	3,057
Total deviation in GDP at 2050 (%)	0.08%	0.26%	0.53%

Annual national GDP impact relative to the base case between 2022 and 2050



Impacts on Employment

Over the next 28 years, Medtech-iQ has the potential to boost employment and increase real wages in NZ

Key observations

Medtech-iQ is estimated to have a **positive impact on employment** in NZ. Reflecting this, annual average increase in employment in NZ over the next 28 years are projected **between 1,030 (conservative) to 5,387 (ambitious) FTE**. Medtech-iQ is also expected to increase real wages for skilled workers in NZ by 0.07% on average in the central scenario. **By 2050, real wages in the central scenarios will be 0.18% higher than the base case.**

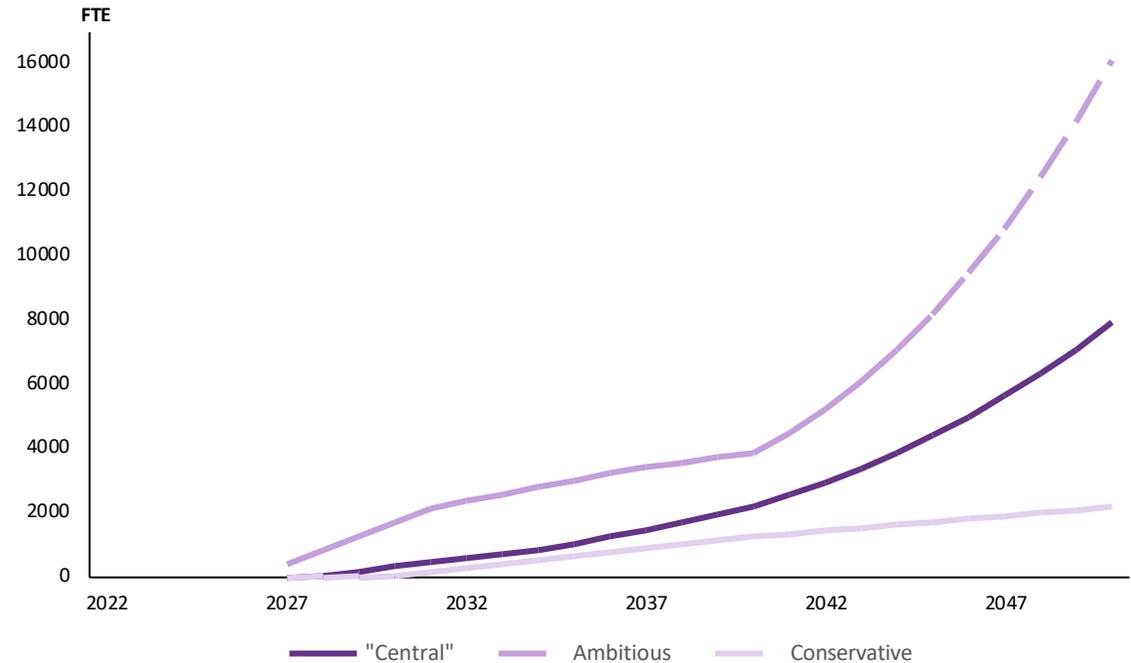
In the central scenario, average annual employment in NZ is expected to increase by 2,581 FTE workers. By 2050, it is expected NZ's workforce will be 0.20% larger (central scenario) than it would be without Medtech-iQ.

Similar to GDP, the **gains to employment are delivered later in the modelled horizon**. At 2050 the cumulative increase in employment, relative to the base case is projected between 2,186 (conservative) and 16,132 FTE (ambitious). This is a result of the time lags assumed between additional investment in medical research and labour productivity as well as between increase in student numbers and graduations. It is expected that **employment impacts of Medtech-iQ will grow beyond the modelled horizon**.

Increased labour productivity from health and well being gains owing to additional medical research, results in more efficient use of labour. This results in positive spill overs and crowding-out effect, similar to GDP.

Scenario	Conservative	Central	Ambitious
Average annual increase in employment (FTE)	1,030	2,581	5,387
Average annual increase in employment (%)	0.03%	0.06%	0.17%
Total additional employment delivered in 2050(FTE)	2,186	7,918	16,132
Total deviation in employment at 2050(%)	0.06%	0.20%	0.42%
Average annual increase in real wages (%)	0.03%	0.07%	0.14%

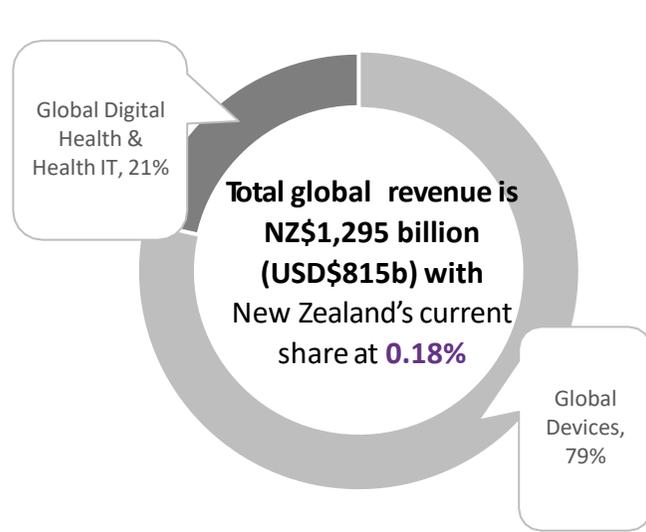
National impact on employment (FTE) relative to the base case between 2022 and 2050



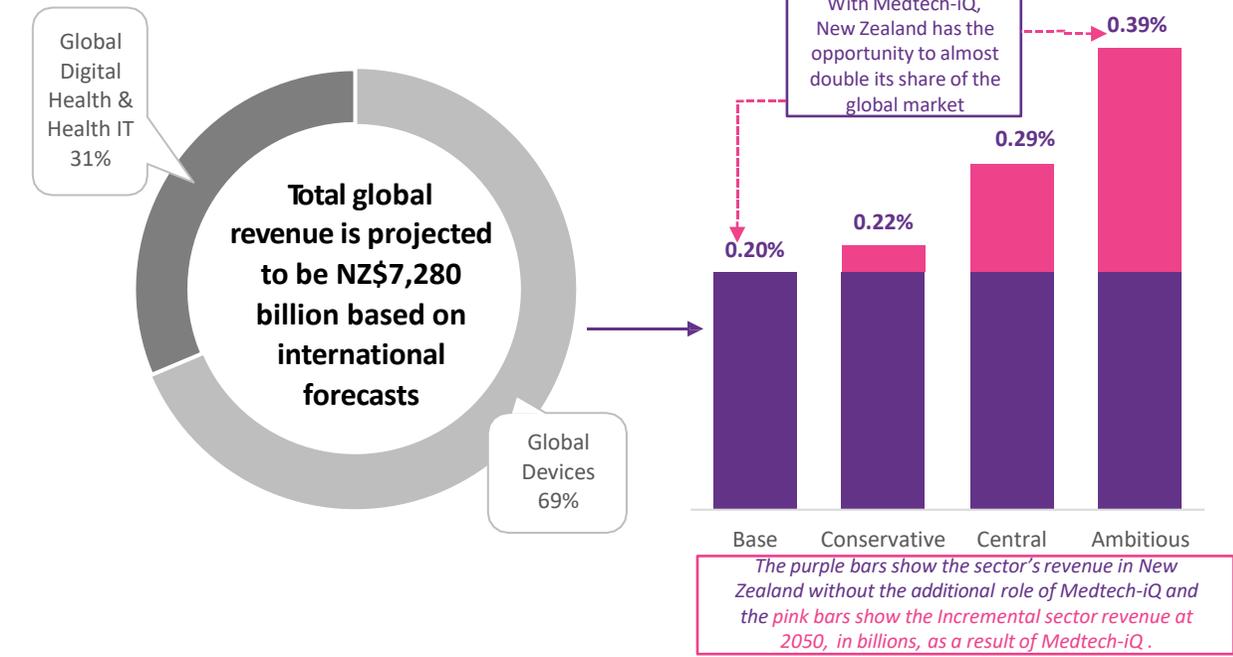
Global opportunity

Medtech-iQ supports New Zealand to increase our share of the Global medtech sector opportunity. Under the ambitious scenario, New Zealand has the opportunity to almost double its global share due to the role that Medtech-iQ would play, in turn building momentum to increase our global share further in subsequent years.

Global revenue, NZD Billions, 2021



Global revenue, NZD Billions, and New Zealand potential share by 2050



New Zealand's current share is 0.17% in Devices and 0.21% in Digital and Health IT. Combined (i.e including both Digital and Devices), New Zealand's share is 0.18%.

Applying the growth rates provided by international sources, the global market for Devices and Digital and Health IT is projected to be \$7,280 billion by 2050. Under the Base scenario, New Zealand's global share is projected to be 0.20%, but with the role of Medtech-iQ, this share could increase to 0.22% (Conservative scenario), 0.29% (Central scenario) and 0.39% (Ambitious scenario).

Source: Based on global market values and forecasts are based on BCC Research (Devices up to 2026 and CAGR is 5.6% and the CAGR for Digital Health and Health IT is 17.1% up to 2026 and CAGR; TIN2020, TIN2021, HealthTechActivator 2022.

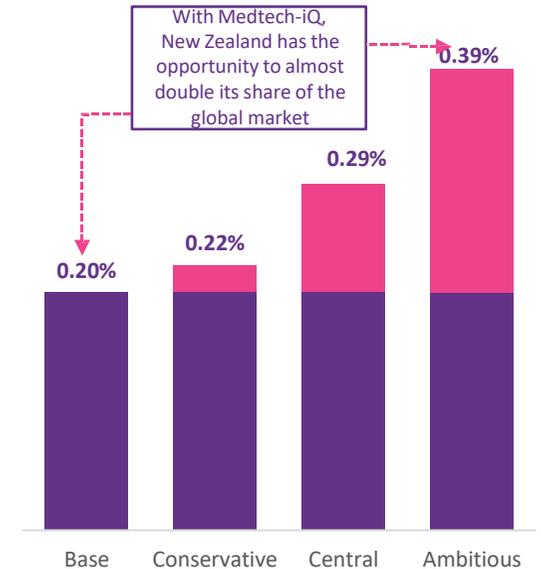
Diversification & Exports

If we take the learnings from small advanced economies (SAEs) globally (e.g. Sweden, Denmark, Ireland, Netherlands, Israel and Singapore), New Zealand has an incredible opportunity for “economic transformation” by shifting to more of a knowledge-based, high-skill economy.

Investment in building a ‘Medtech Innovation Ecosystem’ provides NZ with a promising diversification option. Medtech is export intensive, with firms potentially deriving most of their sales from exports. Medtech is diversified in terms of products and services, and in terms of geographical markets.



The purple bars show the sector's revenue in New Zealand without the additional role of Medtech-iQ and the pink bars show the Incremental sector revenue at 2050, in billions, as a result of Medtech-iQ.



Conclusion

Delivering our vision for Medtech-iQ



Conclusion

NZ has a broad-ranging MedTech landscape which has developed quickly over the last few years. There is now an opportunity to look at how a more coordinated cross-country collaboration can uplift and scale the translation of knowledge within the MedTech sector to enhance start-up success and grow the MedTech industry in NZ.

Looking at the successes of precincts internationally and building on the foundations of the CMDT, we know Medtech-iQ must grow to be the national medical technology and digital health innovation ecosystem that will create a platform to support, and propel community, academic, industry and entrepreneurial stakeholders onto the global stage. Medtech-iQ Aotearoa will enable greater connections and collaboration in the system, rather than competition across the MedTech innovation system.

There is a unique opportunity for the MedTech industry to engage with communities and patients to co-create solutions to improve outcomes. Medtech-iQ becomes a space that allows for the necessary resource to enable research to rapidly translate into care solutions, with mutual benefit for business, the healthcare system and ultimately the patient.

The economic case presented in this report outlines the valuable contribution Medtech-iQ can bring to the NZ economy through increased GDP, increased employment opportunities and net new FTE jobs as well as opportunities to develop healthcare sector talent.

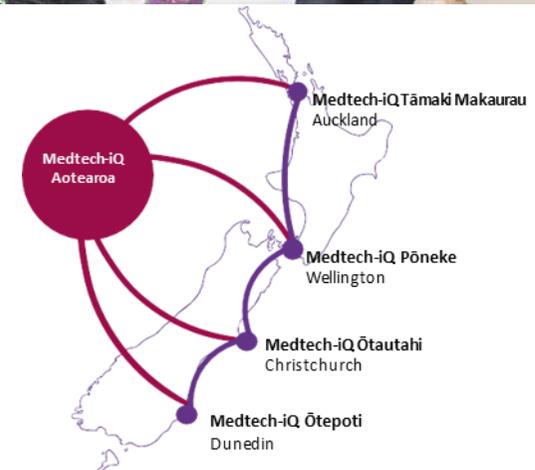
Medtech-iQ will lead the way in creating equitable, genuine partnerships through representative governance that enables innovation, collaboration and puts the health consumer at the centre.

Medtech-iQ Aotearoa establishes a national backbone, with linked regional hubs and connections into localities. It will act as a catalyst for growth of medical devices and digital health businesses by enabling access to resources, networks and infrastructure to translate ideas and research into implementation.

Medtech-iQ will bridge the gap between scientists, businesses, investors, clinicians and patients to solve NZ's biggest health challenges. From research to translation, commercialisation and implementation of breakthrough technologies, this platform will enable NZ's greatest minds to collaborate in delivering the best care solutions to our communities.

A special mention and thank you to the University of Auckland team for their input on this case and the workshops: Jim Metson, Peter Hunter, Diana Siew, Alexandra Thomas, Michael Steedman, Simon Neale, Fiona Chard, Erin Quirke and Ella Dixon.

The journey has already begun and it is now time to pick up the pace, to scale Medtech-iQ to reach its full potential.



Acknowledgements

We would like to thank the individuals who contributed to the stakeholder workshops and explored with us how to design the Medtech-iQ ecosystem for success.

Alex Thomas	University of Auckland	Ian Wright	University of Canterbury	Nigel Denny	Te Ākitai Waiohūa Iwi Authority
Andrew Clews	Callaghan Innovation	Jacqueline Passi	Pasifika Education Community	Penny Andrew	Waitematā DHB
Andy Shenk	UniServices	James Brown	Ngāi Tai ki Tāmaki Tribal Trust	Peter Hunter	University of Auckland
Ayla Fraser	University of Auckland Alumni	James Burley	University of Auckland Alumni	Peter Watson	Counties Manukau DHB
Caroline Quay	CaraMed	James Tee	Xeraya Capital	Phil Light	National Hauora Coalition
Chandra Selvadurai	Pharmaco	Jerome Phoenix	Auckland Council	Rachel Brown	National Hauora Coalition
Conor Sutherland	HeartLab	Jess Robertson	MBIE	Rachel Hopkins	Arvida Good Friends
Danette Olsen	Victoria University of Wellington	Jim Metson	University of Auckland	Rawiri Jansen	National Hauora Coalition
Dave Harper	Victoria University of Wellington	John Mamea-Wilson	Seki Group	Rebecca Warr	University of Canterbury
Daymon Nin	Whanau Tahī	Justin Kennedy-Good	Ara Manawa, ADHB	Reece Moors	Callaghan Innovation
Denise Taylor	Auckland University of Technology	Karen Wilson	Te Ākitai Waiohūa Iwi Authority	Robyn Whittaker	i3, WaitemataDHB
Diana Siew	University of Auckland	Kath McPherson	Auckland University of Technology	Ron Tennenbaum	The Clinician
Elia Chan	MYRIVR Technologies	Ken Chin	CaraMed	Ross Peat	RxOne
Erin Quirke	University of Auckland	Kevin Ross	Orion Health	Samantha Holdsworth	Matai
Faye Sumner	Medical Technologies Association of NZ	Lisa Tai	Pacific Business Trust	Sarv Taherian	Ara Manawa
Fiona Chard	University of Auckland	Mana Newton	Tauhara North No.2 Trust	Simon Fraser	Victoria University of Wellington
Garth Sutherland	The Insides Company	Marama Royal	Ngāti Whātua Ōrākei Trust	Simon Neale	University of Auckland
Geneva Harrison	Ngāti Tamaoho Trust	Margaret Wilsher	Auckland DHB	Steve Corbett	AUT Ventures Ltd
Geoff Chase	University of Canterbury	Marissa Brindley	Tātaki Auckland Unlimited	Tama Davis	Ngāti Whātua Ōrākei Trust
George Arnold	Southern Cross	Martin Gagon	Otago University	Tama Potaka	Ngāi Tai ki Tāmaki Tribal Trust
Georgina English	MBIE	Matekino Marshall	Ngāti Tamaoho Trust	Tamsin Bateman	NZTE
Greg Murison	UniServices	Merryn Tawhai	Auckland Bioengineering Institute	Terina Moke	Raukura Hauora o Tainui
Greg O'Grady	Alimetry	Michael Steedman	University of Auckland	Tevita Funaki	The Fono
Greg Shanahan	TIN/Veriphi	Mike Mitchener	Seki Health	Toni Laming	UniServices
Helen Lunt	VIA, Canterbury DHB	Mohan Nair	Emerge Inc	Tui Kaumoana	Uniservices
Ian Town	Ministry of Health	Paul Majurey	The Marutūahu Collective	Tureia Moxon	Te Kōhao Health
				Will Reedy	Spark Health

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Appendix



The NZ Investment Landscape

NZ's start-up ecosystem is thriving – with 2021 delivering a record high level of deal activity. deep-tech start-ups – *which includes pharmaceuticals, biotech, life science, health, technology hardware & equipment, aerospace, and industrials* – are the star of the show, accounting for 41% (\$106 million) of deal flow compared to 11% (\$17 million) in 2020. This also reflects the 63% increase in total funds invested from 2020 to 2021.^{1,2}



Venture Capital: Money provided to fund early-stage businesses (i.e. start-ups) with perceived long-term growth potential.

01

The Numbers

2021 saw a boom in investments made both in NZ, and globally. Early Stage Investors in NZ invested \$257.5 million across 174 in 2021, which is a \$99.5 million increase from the year before. This represents a 63% growth in funding, 61% growth in number of deals made compared to 2020, and the median deal size for follow-on investment set a record \$1 million. Venture Capital funds provided 55% of total early stage funding, also reflecting an increased participation in NZ's start-up ecosystem, from 29% in 2020.

02

The Importance of Venture Capital participation in the MedTech ecosystem

As external, private start-up investors, venture capital (VC) firms play an influential role in the establishment and growth of young companies by offering financial investment and importantly beyond that, intangible assets based on their past experience, knowledge and global networks.³ This support can be invaluable in supporting start-ups to navigate the challenges of pricing, data, commercialisation strategy, and market trends.⁴ VCs play a vital role in the commercialisation phase of start-ups, with Harvard Business Review estimating that more than 80% of VC investments are used to build critical business infrastructure from manufacturing capabilities, marketing, and sales, to providing fixed assets and working capital to support the growing company.⁵ Other resources that VCs provide that increase the value of their portfolio companies include *brand* – VC backing 'signals' the quality of start-ups and can facilitate further investments, *industry and funding networks*, and *in-house expertise* for commercial deal making, strong governance, IP strategy and support, operational resources.⁶

Thus, finding the *right investor* for the *right start-up* is a key requirement in helping grow NZ's knowledge-based start-up economy. Particularly for MedTech and other deep-tech companies, where the investments are traditionally riskier due to complex regulatory and market approval requirements and processes, and complex, varying global healthcare systems, the right investor could play an instrumental role in accelerating and supporting the growth of start-ups.

03

NZ's Investment Ecosystem

There are several funds in Aotearoa that invest into medical and health technologies, ranging from early (pre-seed and seed) to later stage (Series A, B+). These include government established organisations such as NZ Growth Capital Partners (NZGCP) – of which invests at the Seed and Angel (Aspire) stage directly into early stage tech start-ups, and at the Series A and B stages (Elevate fund) by investing directly into VC firms to fill capital gaps for high-growth companies.

Appendix B: Themes from our engagement with local iwi and Māori groups on the vision for Medtech-iQ

Tauutuutu
Reciprocity

Manaakitanga
Showing Respect

Tino Rangatiratanga
Self Determination

Oranga tāngata
Community Wellbeing

Tohungatanga & Pūkenga
Skills and Expertise

KO TE AMORA NGI KI MUA, KO TE HĀPAI O KI MURI, KO TE TŪTURUTANGA MAHI PONO O TE MĀORI MANA MOTU HAKE

NĀKU TE ROUROU NĀU TE IWI

MĀ WHERO, MĀ PANGO, KA OTI TE MAHI



TE TIRITI

There's a variety of ways you can reflect Te Tiriti: **Partnership** – what does it mean to you? **Property** – Who owns the hubs? **Business Principles** – hardwire Te Tiriti into anything you do, at a basic wairua level? **Ethics and Tikanga** - You may have a rāhui or line in the sand where you will not deal with certain issues because the mana whenua don't allow for that?

Ultimately you need to pick 3 or 4 ways and do them really well.

Fundamental thing to get right is the governance. Let it reflect Te Tiriti through expressing a desire for Māori and the crown to be in equal partnership



INDIGENOUS DATA SOVEREIGNTY

Māori are overstudied and the recipient of so few benefits that come from those studies. Medtech-iQ needs to enable it so it can start providing Māori with data and information that can be turned to their benefit, which includes access to the IP that has been commercialised, in order to benefit their whanau.

There will be IP/privacy matters as it's inherent with the industry, but if we all focus on the outcomes of why, all of that stuff we can overcome it. **The scariest thing for Māori right now is giving up their data to externals, so we need that trust early**



MĀORI REPRESENTATION

Māori need to be the one to make a choice of how they can receive the benefits of the research that comes through it

Enable us to be a part of the board to make decisions, so our voice is heard consistently.

Give them a piece of the pie, in some form, early on to show your commitment to the partnership.



AUTHENTIC RELATIONSHIP

Typically it's a relationship where Māori are advisors, but the organisational governance will ultimately make the decisions. I think **Medtech-iQ could be a model in leading how true partnership could work.**

Scientists often want to extract information from communities, but don't reciprocate i.e. this is our findings, this is some of our network, this is how we can help you ... **It's as much about making deposits as it is making withdrawals.**

A strong focus on **building a relationship** with the partners as the kaupapa continues will gain our trust.



COMMERCIAL RELATIONSHIPS

When pakeha arrived, we capitalised off their commercial but never compromised who we were as a people – so that should be the guiding value – **commerciality that's driven from a cultural foundation**

Is there a quality **pathway for investment** into some of these businesses?

I do think there's a role in governance, but I'm more interested in the commercial governance and **bringing Māori commercial governance to the table**

Vā
The space between

Tautua
Service

Fepopupoulele'i'aki
Unity of Purpose

E FOFO E LE ALAMEA LE ALAMEA
THE SOLUTIONS FOR OUR ISSUES LIE WITHIN OUR COMMUNITIES



PROTECTION

Pacific Peoples have been burnt in the past by relationships... Other partners who don't have that trauma, they don't have those doubts, hence the importance of communicating protection for our people and building that trust

If communities don't trust an agency, you can pour in as much money as you want, but they're just going to disengage

We would want to make sure there's ample opportunity to review what data they collect and use... making sure that the collective benefit is equal, not hugely disproportional towards the people that own it versus the people whose data they have access to



PACIFIC PEOPLES REPRESENTATION

How they staff it will be important to how they run it – it's such an unfamiliar concept, without someone there that has a similar background, I'm not confident that they'll utilise the space

We need Pacific Peoples to be represented on all floors. Governance boards, middle management, working on the floor, we need representation everywhere.



PARTICIPATION

We certainly want to engage Pacific Peoples, but physically it's in a place where Pacific Peoples don't naturally go unless they need to go to hospital.

Why can't it be in local hubs, where our community already are? Otherwise we're going to have these Medtech people creating diabetes devices for us, but they haven't even been to Mangere and seen the temptations that are constantly surrounding our people.

What's common is for larger companies to seek university input in projects... give students the opportunity to play a role in the research and gain experience while progressing their degree



VALUE PROPOSITION

It will be a very foreign concept for us, you need to articulate the value it can bring to our communities before you see more Pacific Peoples partners want to join

The hub will help to attract angel investors into this space

First thing to address before getting to the next stage is the value proposition. Why would we want to consult with Pacific Peoples partners, if I can't clearly articulate the value add for them?



CULTURE OF COLLABORATION

It's encouraging to be invited at the beginning and not at the end, when there is limited funding or ability to make a meaningful impact on this

Use the hub to share ideas. Sometimes Pacific Peoples businesses tend to work in isolation, even in Ministries, they're all over the place even though we're fighting the same purpose on common ground.

If it's a culture of collaboration, and there is a seamless pathway for our people to be involved, they will be encouraged

International MedTech Innovation Precinct Spotlight

A key attribute of successful international case studies illustrates collaboration across universities, industry and government are critical.



RANDWICK HEALTH AND INNOVATION PRECINCT (RHIP), NSW, AUSTRALIA

- **Vision:** To be a transformative and collaborative place of excellence solving global challenges to enhance and nurture lifelong health.
- **Purpose:** In partnership, leverage Randwick's scale, diversity and expertise to influence and impact positive health outcomes.
- **Size:** By 2040, RHIP is estimated to contribute \$12.6B to Australia's GDP and \$500m is committed to redevelop the medical precinct connecting the University, Clinicians and Researchers on the one campus.
- **Employment:** By 2040, RHIP is estimated to contribute an additional 43,000 FTE jobs.



LIVERPOOL HEALTH, EDUCATION, RESEARCH AND INNOVATION PRECINCT, NSW, AUSTRALIA

- **Vision:** To reimagine how health, education, and research is undertaken individually and collaboratively to drive innovation in Liverpool.
- **Purpose:** By bringing together key stakeholders from across government, education, and business sectors together to collaborate the delivery of an aspirational vision focusing on the development of the area as a growth precinct.
- **Investment Size:** \$790 million investment by the NSW Government into the Health and Innovation Precinct.



International MedTech Innovation Precinct Spotlight

Australia



MTPConnect, VIC, AUSTRALIA

- **Vision:** Better health outcomes for consumers through products and services tailored to individual needs and through seamless digital connectivity and integration.
- **Purpose:** MTPConnect is forging stronger connections between research and industry to help maximise opportunities for Australians to not only make scientific and technological breakthroughs, but to see them developed through the proof-of-concept stage and successfully translated and commercialised.
- **Size:** \$182 million in sector support funds in 2021; overall economic impact was AUD \$3.8bn in 2021
- **Start-ups:** 145 and an additional 54 new start-ups by 2025

KEY INNOVATION HUBS

- MTPConnect WA Life Science Innovation Hub, based at the Harry Perkins Institute of Medical Research (Perth, WA). *This was co-founded through the WA Government's New Industries Fund and the University of Western Australia, to accelerate economic growth and create new jobs and industries.*
- MTPConnect Queensland Office, based at the Translational Research Institute (Brisbane, QLD). *The TRI is a 'bench to bedside' medical research institute, bringing together the University of Queensland Diamantina Institute, UQ School of Medicine, QUT's Institute of Health and Biomedical Innovation, the Princess Alexandra Hospital Centres for Health Research, and Mater Research.*



International MedTech Innovation Precinct Spotlight

Australia



ADELAIDE BIOMED CITY INNOVATION DISTRICT, SA, AUSTRALIA

- **Vision:** By 2030, ABMC will be a globally significant Health Innovation and Translation District, by bringing together capabilities in research, education, clinical care and industry to drive innovation and translation.
- **Purpose:** To deliver health and economic impact, locally and globally. Accelerating health innovation and translation, by acting as a gateway for industry-research collaboration and a catalyst for research commercialisation.
- **Size:** \$3.6 billion Healthcare Innovation and Translation precinct. In 2020, there were more than 2,000 medical researchers and 10,000 staff working within the precinct.
- **Other:** ABMC comprises leading-edge anchor institutes and companies, that cluster and connect with entrepreneurs, start-ups, SMEs, business incubators and accelerators. By offering mixed-use infrastructure, researchers, clinicians and students can work together with entrepreneurs and leading industry players. Furthermore, the district leverages its strong partnerships and collaborations to effectively deliver its goals.



Other Australia's Emerging Innovation Districts.



Adapted from SingtelOptus Pty Limited (2017)

International MedTech Innovation Precinct Spotlight

United Kingdom & Ireland

Oxford Road Corridor

OXFORDROAD CORRIDOR, MANCHESTER, UNITEDKINGDOM

- **Vision:** The Oxford Road Corridor is Manchester's innovation district with a unique concentration of knowledge, business and cultural assets to bring talented people together to learn, create, work, socialise, live and do business.
- **Purpose:** For the Health and Life Sciences, the Oxford Road Corridor is home to one of the largest clinical academic campuses in Europe, paving the way for businesses in the fields of science, health, and technology to co-locate and foster a culture of collaboration and innovation. Health Innovation Manchester located on the Corridor is an academic health science system which works alongside innovation assets and industry to drive innovation into the NHS at pace and scale.
- **Size:** The Oxford Road Corridor is home to 42,000 residents, 74,000 students, 8 800 businesses, and 79,000 employees. The 243 ha area accounts for 20% of Manchester's economic output.



THE NATIONAL UNIVERSITY OF IRELAND GALWAY, GALWAY, IRELAND

- **Vision:** Bringing break through innovations to market
- **Purpose:** The National University of Ireland in Galway (NUI Galway) is the lead institution for the national Centre for Research in Medical Devices (CÚRAM). One purpose is the creation of companies whose purpose is to turn research into societal impact is one of the core activities of the innovation office at NUI Galway.
- **Size:** Over 18,000 students.
- **Start-ups:** Last 5 years it had 14 spinout companies
- **Other:** NUI Galway is funded by Science Funding Ireland at about €50M pa and by the medical device industry. A great example of joint investment by the university, government and industry.



International MedTech Innovation Precinct Spotlight

Canada & The United States of America



MaRS INNOVATION DISTRICT, TORONTO, CANADA

- **Vision:** MaRS supports Canada's most promising start-ups — helping them grow, create jobs and solve society's greatest challenges.
- **Purpose:** MaRS brings together the innovation community to grow the economy and make an impact.
- **Size:** 250 ha Core is 31 ha; The innovation hub is home to 150 organisations.
- **Employment:** Employees 6,000 FTEs with 22,800 employed by MaRS supported companies; 62,864 students.
- **Start-ups:** 1400+



TEXAS MEDICAL CENTRE, TEXAS, UNITED STATES

- **Vision:** As the largest medical city in the world and at the forefront of advancing life sciences, TMC nurtures cross-institutional collaboration, creativity, and innovation to pioneer medical advancement and impact across the entire spectrum of patient care.
- **Size:** Home to the world's largest children's hospital (Texas Children's Hospital) and cancer hospital (MD Anderson Cancer Center), TMC has 1,345 total acres and is the 8th largest business district in the United States. TMC offers 9,200+ patient beds, performs 180,000+ annual surgeries and has over 8 million patient visits per year.
- **Other:** In 2019, TMC, Baylor College of Medicine, Texas A&M University–Health Science Center, The University of Texas Health Science Centre and the University of Texas M.D. Anderson Cancer Centre announced the plan for **TMC³**. This will be a 37 acre world-class life science campus to unite the best minds in medicine, science, academia, and commerce to rapidly drive new research breakthroughs.



International MedTech Innovation Precinct Spotlight

The United States of America



LONGWOOD MEDICAL AND ACADEMIC AREA (LMA), BOSTON, UNITED STATES

- **Purpose:** A thriving and dynamic community of medical, academic, research and cultural organizations that combine to create a powerful economic engine for the city and the state.
- **Size:** 213-acre site with a concentration of 21 medical and academic institutions (most strongly associated with Harvard University).
- **Employment:** Employees 68,000 FTEs with 27,000 students. The LMA has added more than 1,200 jobs per year over the last 10 years, and now accounts for 1 out of every 10 jobs in Boston.
- **Other:** LMA institutions invest \$2.9 million annually in school-based workforce, career and mentoring programs to support students interested in medical research. Boston attracts young biotech firms due to range of financing opportunities from venture capitalists and life sciences investment funds.



MEDTECH INNOVATOR, CALIFORNIA, UNITED STATES

- **Vision:** MedTech Innovator unites leading players in the MedTech innovation ecosystem and is the industry's non-profit global competition and accelerator for medical device, digital health and diagnostic companies.
- **Purpose:** To improve the lives of patients by accelerating the growth of companies that are transforming the healthcare system
- **Size:** The largest accelerator of medical devices in the world; USD \$4 billion follow-on funding and 421 portfolio companies with 90 products on the market- based in the US and Asia Pacific.
- **Start-ups:** 340; approx. 43 per annum



International MedTech Innovation Precinct Spotlight

The United States of America



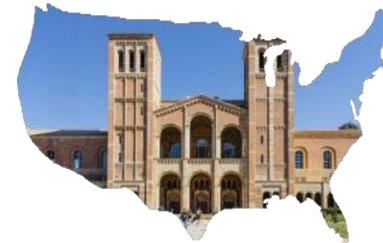
STANFORD UNIVERSITY, CALIFORNIA, UNITED STATES

- **Vision:** A purposeful university promotes excellence not as an end in itself, but as a means to promote its mission, which is to benefit society.
- **Purpose:** Stanford is a place of discovery, creativity and innovation.
- **Size:** 13,699 cumulative technologies, of which 575 over USD \$100k pa and 103 had over USD \$1 million pa and USD\$2.1 billion in cumulative licensing revenue.
- **Employment:** Employs 2,288 and 16,937 students.
- **Start-ups:** 415 start-ups over 50 years.



UCLA Biodesign, CALIFORNIA, UNITED STATES

- **Vision:** To train the next generation of healthcare transformers.
- **Purpose:** To pioneer healthcare innovation and transform medicine by uniting stakeholders across the healthcare ecosystem and through the development of novel technologies. UCLA Biodesign works with industry partners and the medical community to advance solutions that delivery improved valued and outcomes to patients worldwide.
- **Size:** UCLA Health is ranked as the No. 1 hospital in California with four main hospitals and a network of more than 200 primary care clinics throughout Southern California. Established in 2019, there have so far been 3 cohorts totalling 26 Discovery Fellows. Accelerator Fellows are staff and faculty advancing novel concepts in healthcare technology and since 2019, there have been two cohorts totalling 24 fellows.

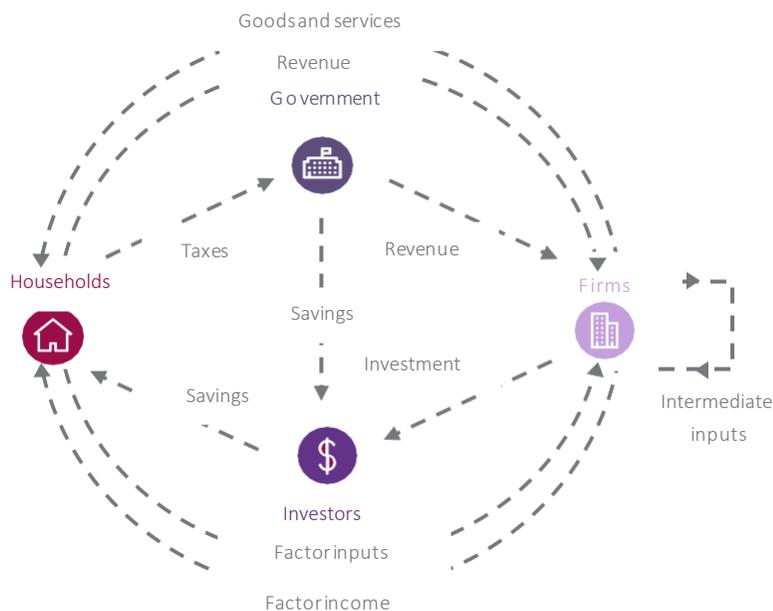


Appendix E: Overview of CGE modelling

Deloitte's in-house CGE model

The Deloitte Access Economics – Regional General Equilibrium Model (DAE-RGEM) is a large scale, dynamic, multi-region, multi-commodity computable general equilibrium model of the world economy with bottom up modelling of NZ regions. The model allows policy analysis in a single, robust, integrated economic framework. This model projects changes in macroeconomic aggregates such as GDP, employment, and wages. At the sectoral level, detailed results such as output, exports, imports and employment can also be produced.

The model is based upon a set of key underlying relationships between the various components of the model, each which represent a different group of agents in the economy. These relationship provide a system of interconnected markets with appropriate specifications of demand, supply and the market clearing conditions that determine the equilibrium prices and quantity produced, consumed and traded.



Key modelling assumptions

DAE-RGEM is based on a substantial body of accepted microeconomic theory. Key assumptions underpinning the model are:

- The model contains a 'regional consumer' that receives all income from factor payments (labour, capital, land and natural resources), taxes and net foreign income from borrowing (lending).
- Income is allocated across household consumption, government consumption and savings so as to maximise a Cobb-Douglas (C-D) utility function.
- Household consumption for composite goods is determined by minimising expenditure via a CDE (Constant Differences of Elasticities) expenditure function. For most regions, households can source consumption goods only from domestic and imported sources. In the NZ regions, households can also source goods from interregional. In all cases, the choice of commodities by source is determined by a CRESH (Constant Ratios of Elasticities Substitution, Homothetic) utility function.
- Government consumption for composite goods, and goods from different sources (domestic, imported and interregional), is determined by maximising utility via a C-D utility function.
- All savings generated in each region are used to purchase bonds whose price movements reflect movements in the price of creating capital.
- Producers supply goods by combining aggregate intermediate inputs and primary factors in fixed proportions (the Leontief assumption). Composite intermediate inputs are also combined in fixed proportions, whereas individual primary factors are combined using a CES production function.
- Producers are cost minimisers, and in doing so, choose between domestic, imported and interregional intermediate inputs via a CRESH production function.
- The supply of labour is positively influenced by movements in the real wage rate governed by an elasticity of supply.

Appendix E: Overview of data inputs to the CGE model

	Drive revenue growth for the MedTech sector	Attract R&D investment	Sector Talent Development
Quantified impact	<p>Medtech-iQ is expected to increase revenue in the MedTech Sector. This is will include a change in the number and majority of businesses in this sector. It is expected that Medtech-iQ will results in additional businesses, revenue, and output uplift as outlined below:</p> <ul style="list-style-type: none"> • Conservative: \$0.8B additional revenue or 11% uplift by 2040 • Central: \$2.3B additional revenue or 20% uplift by 2040 • Ambitious: \$2.3B additional revenue or 31% uplift by 2040 	<p>Medtech-iQ is expected to attract additional investment in research and development. This is estimated as 12.1% of revenue generated due to Medtech-iQ for the Conservative and Central Scenarios, and 22% for the Ambitious Scenario.</p> <p>The proportion of the sector to which research efficiency gains accrue varies across scenarios:</p> <ul style="list-style-type: none"> • Conservative: 25% • Central: 50% • Ambitious: 95% 	<p>The development of Medtech-iQ will attract more students to pursue a career in STEM. The following growth rates are assumed:</p> <ul style="list-style-type: none"> • Conservative: 2.5% growth • Central: 5% growth • Ambitious: 7.5% growth
Growth profile	<p>Since this analysis, models the growth phase of Medtech-iQ, it is expected that revenue will grow over the modelled horizon. While revenue follows a linear growth profile in the Conservative Scenario, an exponential growth trajectory is modelled in the Central and Ambitious cases.</p>	<p>Additional investment in R&D spend follows the same growth profile as revenue.</p>	<p>A linear growth profile is assumed across all scenarios.</p>
Time lags	<p>It is expected that there will be a time lag between investment into Medtech-iQ, and growth in the sector revenue. These vary across scenarios:</p> <ul style="list-style-type: none"> • Conservative: 10 years • Central: 8 years • Ambitious: 6 years 	<p>It is assumed that there is a 10 year time lag between investment in R&D and gains to employment.</p>	<ul style="list-style-type: none"> • It is expected that an increase in student enrolment is observed 2 years after the establishment of Medtech-iQ. • An additional 4 year lag is included to quantify the impact of additional student graduates in STEM to wage increases.

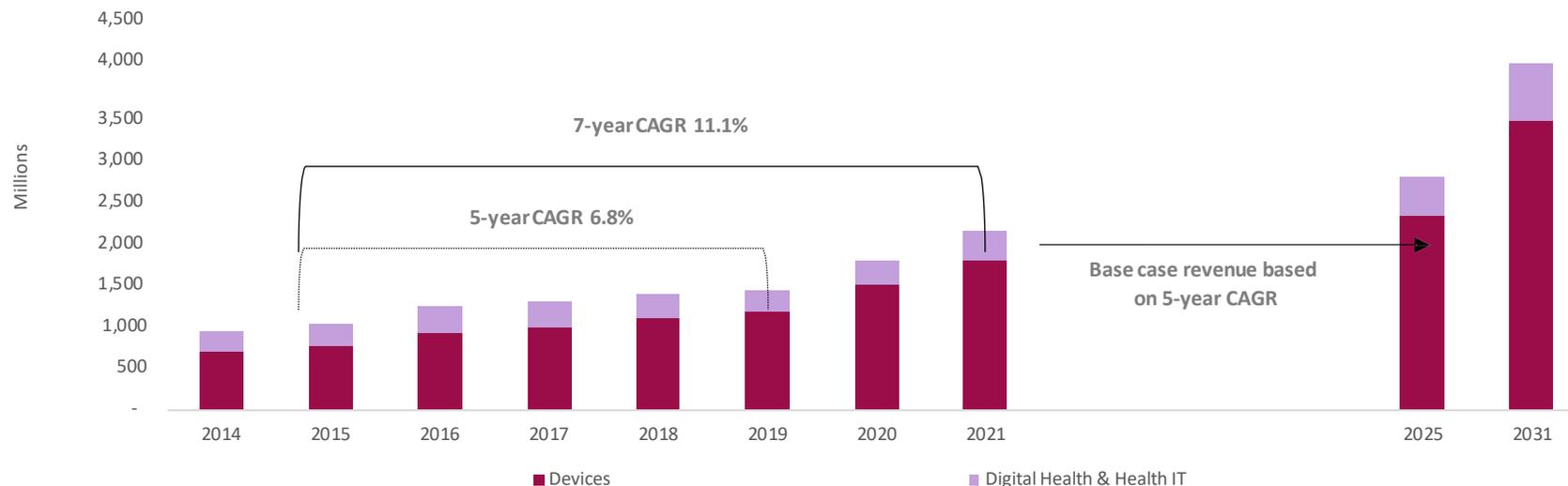
Appendix F: Detailed CGE modelling inputs – Revenue trajectory

- **Current size of the digital and devices within the overall sector:** the total size of the NZ Medical technology sector in 2021, including devices and digital only, was **\$2.1B**, of which \$1.8B is associated with the devices and \$0.3B associated with digital. This has been used to inform the size of the devices and digital sector, in the base case.
- **Historic growth of sector revenue:** the growth of the sector under the base case is informed by the 5-year calculated annual growth rate (CAGR), between 2015 and 2019 (**6.8%**). This growth rate was applied to project the revenue under the baseline scenario. This timeframe was selected as it excludes the effects of the COVID-19 pandemic, which significantly changed the revenue profile in 2020 and 2021. The 7-year CAGR, from 2015 to 2021 was 11.1%.

Current composition of the sector: was used to inform the revenue trajectory trends of the policy scenarios. According to the TIN2020 report, the current composition of the sector is:

- 163 early stage businesses (pre-revenue)
- 7 businesses between \$2m and \$10m (assumed \$6m each)
- 12 businesses between \$10m and \$100m (\$60m each)
- 2 businesses greater than \$100m (\$200m each)

NZ revenue growth by category



Note: Revenue for Devices and Digital for 2021 was derived from the total 2021 MedTech revenue and shares for each category in 2019; 2020 was taken as the average between 2019 and 2021.

Source: TIN2020, TIN2021, HealthTech Activator 2022 and verified with annual report of key Health Tech companies.

Appendix F: Detailed CGE modelling inputs – Revenue trajectory

Revenue trajectory across scenarios

Sector Revenue Trajectory

- Based on various workshops with the University of Auckland project team, informed by historical data on the effectiveness of Medtech-CoRE and relevant and similar international catalysts, we have assumed that the below additional number of companies will be borne based on the impacts of Medtech-iQ.
- The following revenue brackets are provisioned under the policy options for revenue profiles of companies :
 - Early stage businesses (pre-revenue).
 - Businesses between \$2m and \$10m.
 - Businesses between \$10m and \$100m.
 - Businesses between \$100m-\$500m.
 - Businesses greater than \$500m.

Linear / Exponential revenue curve

The shape of the revenue profile is expected to become increasingly steep as the policy scenario progresses from conservative to central to ambitious. It is also expected that there will be a delayed onset of the economic outputs from the Medtech-iQ facility, which will mean an exponential growth curve will be seen under the central and ambitious scenarios.

- Under the conservative policy scenario, a linear revenue profile is expected.
- Under the central policy scenario, a low profile exponential revenue curve is expected.
- Under the ambitious policy scenario, a high profile exponential revenue curve is expected.

Time lag between Medtech-iQ establishment and realisation of revenue impacts

- Under the conservative policy scenario, the revenue impacts will begin 10 years after the establishment of Medtech-iQ.
- Under the central policy scenario, the revenue impacts will begin 8 years after the establishment of Medtech-iQ.
- Under the ambitious policy scenario, the revenue impacts will begin 6 years after the establishment of Medtech-iQ.

Scenario	Total Early Stage	Impact of Medtech-iQ by 2040				Impact 2040 to 2050		
		\$2-\$10 Million	\$10-\$100 Million	\$100-\$500 Million	> \$500 Million	Additional revenue (\$ Billions)	Uplift to Base Case Scenario (percent)	Assumed growth rate (CARG)
Conservative (low)	158	40	10	No additional	No additional	\$0.8B	11%	6.8%
Central	190	48	12	2	No additional	\$1.45B	20%	9%
Ambitious (high)	237	59	15	3	1	\$2.33B	31%	11.1%

Assumptions: Early stages derived from New historical data around start-ups in MedTech for the Conservative Scenario; Central is assumed to be 20% of the Conservative Scenario and the Ambitious scenario is assumed to be 50% of the Conservative Scenario; \$2 to \$10 million is assumed to 25% of the total Early stage businesses; \$10-\$100 million is assumed to 25% of the \$2 to \$10 million revenue segment; \$100 to \$500 million is assumed to 1% of the Early Stage businesses and >\$500 million is only plausible in the Ambition Scenario.

Source: Deloitte based on agreement with University of Auckland informed by the sources on references on page 56 in this document

Appendix F: Detailed CGE modelling inputs – Revenue trajectory

Size of R&D investment in the Sector – Base Case Scenario

- A fixed percent of revenue has been used to determine the current size of research and development investment under the base case scenario. According to the TIN2020 report, R&D as a percentage of revenue was 12.1%, which equals \$262million in 2021.
- R&D investment is expected to grow to reflect the trend of revenue growth in the sector. Based on this, 12.1% of revenue has been taken as the fixed growth rate in R&D investment under the Base Case scenario. It was assumed that investment into R&D will increase at the same rate as revenue.

The following relationship to R&D was adopted for modelling purposes:

Dimension	Input assumption	Commentary	Source
Additional R&D dollars attracted/invested by Medtech-iQ	<ul style="list-style-type: none"> • Conservative: 12.1% based on the uplifted revenue curve for this scenario • Central: 12.1% based on the uplifted revenue curve for this scenario • Ambitious: 22% 	<ul style="list-style-type: none"> • The Ambitious Scenario will incur an additional 10% growth in R&D relative to the Conservative and Central scenarios- i.e. 22% (12% + 10%) of revenue in the ambitious policy scenario to represent this accelerated R&D investment. 	MedTech Core, TIN2020 and MBIE; According to MBIE's target set for NZ, business expenditure on R&D can be expected to increase from \$2.2B in 2019 to \$5B in 2027. This equates to ~10%pa growth in R&D investment.
Increase in effectiveness of R&D dollars due to Medtech-iQ	<ul style="list-style-type: none"> • Conservative: no increased effectiveness in R&D spend as the project will not reach the size where efficiency gains can be recognised • Central: Deloitte Access Economics previously estimated that every \$1 R&D spent by Universities will result in a \$5.1 output • Ambitious: International studies shows a return of \$7.5 for every \$1 of R&D spent 	There will also be an increase in the effectiveness of R&D dollars due to Medtech-iQ. These agglomeration effects have been informed by local and international studies.	<p>Deloitte centre for health solutions report, DAE Universities NZ report.</p> <p>Australian Innovation System Report (2014 and 2022), Australian Department of Industry.</p> <p>Randwick Health and Innovation Precinct (RHIP): Economic Analysis (September, 2021) SGS.</p>
The portion of the sector where these gains accrue to	<ul style="list-style-type: none"> • Conservative: 25% • Central: 50% • Ambitious: 90% 	The agglomeration effects are not expected to accrue to the entire sector. Broad level estimates on the percentage of the sector affected have been made based on the structure of the sector.	As per agreement with the University of Auckland and the TIN2020 report.

Assumptions: Early stages derived from New historical data around start-ups in MedTech for the Conservative Scenario; Central is assumed to be 20% of the Conservative Scenario and the Ambitious scenario is assumed to be 50% of the Conservative Scenario; \$2 to \$10 million is assumed to be 25% of the total Early stage businesses; \$10-\$100 million is assumed to be 25% of the \$2 to \$10 million revenue segment; \$100 to \$500 million is assumed to be 1% of the Early Stage businesses and >\$500 million is only plausible in the Ambitious Scenario.

Source: Deloitte based on agreement with University of Auckland informed by the sources on references on page 54 in this document

Appendix G: Additional considerations in a CGE framework

Additional considerations:

As with any economic tool, the robustness of modelled results are a function of the model's underlying assumptions, the approach and the supporting data. This section discusses some of the impacts not modelled within the CGE framework.

Investment is likely required to deliver the Medtech-iQ program, whether through digital or physical infrastructure. Such investment would positively impact the NZ economy by adding additional capital to the local economy. Availability of data has limited the ability to model capital outlays associated with Medtech-iQ. The source of funding has also not been considered due to data limitations.

The Medtech-iQ program is modelled to **improve the delivery of healthcare services in NZ**. Here such improvements are modelled as delivering additional labour force benefits. This impact, while significant is likely to form only a subset of the possible outcomes from improved health impacts of Medtech-iQ. For example health gains to society are likely to see:

- avoided costs to households in terms of health related expenditure, and
- similar savings to government from administering healthcare programmes.

These financial impacts of improved healthcare are not included in the analysis in part because the literature in the early stages of considering these issues and due to some limitations in the CGE framework.

The provision of healthcare services has important distributional impacts by affecting various segments of the population depending on age, education and even occupation. Such distributional impacts have not been considered in this analysis due to data limitations particularly with respect to the final outcomes of the beneficiaries of improved health services.

All economic modelling depends on the approach and underlying assumptions. For this analysis of Medtech-iQ, **health improvements from additional investment into medical research and development due to Medtech-iQ are translated into higher labour force productivity.**

While there is an established link between improved labour force productivity as a result of health and wellbeing gains, owing to investment in medical research, few studies quantify this relationship. One such study conducted in Australia found that historical investment of AU\$6.625 million into medical research into HIV, mental health, and HPV, resulted in a workforce that is 1,816 FTEs larger in 2018.

Owing to literature constraints, Deloitte Access Economics utilised findings on the impact of investment in medical research on improvements to quality adjusted life years (QALYs). The QALY results were translated into additional fulltime equivalent jobs (FTE) based on assumptions such as the proportion of hours spent working in 1 year, the duration of a working life, and NZ's working age population. Since these findings rely on literature from a variety of geographies, investment and QALY data was rebased to \$NZ and NZ's population respectively. This data was used to calculate FTEs added to the workforce, per million dollars invested in medical research.

The analysis found that 0.027 FTEs were added to the workforce per million dollars of investment in medical research development. There is a time lag of 10 years between investment in medical research and gains to employment. This estimate was used to quantify the impact of additional investment attracted by Medtech-iQ on labour productivity in NZ.

Appendix G: Additional considerations in a CGE framework

A summary of the input data, key assumptions, and outputs used to parameterise the impact of additional investment in medical research on labour supply is outlined below.

Input data

Research paper	Duration of medical investment (years)	Cumulative expenditure on R+D (NZ\$m)	Quality adjusted life years (QALYs) gained (years)*	Workforce gained (FTEs)
Glover et al, 'Estimating the return to UK publicly funded cancer-related research in terms of the net value of improved health outcomes' (2014).	39	\$36,600	448,034	
Johnston et al, 'Effect of a US National Institutes of Health programme of clinical trials on public health and costs' (2006).	30	\$749	7,266	
Glover et al, 'Estimating the return to United Kingdom publicly funded musculoskeletal disease research in terms of net value of improved health outcomes' (2018).	39	\$8,611	66,142	
PwC, Economic and social footprint of the pharmaceutical industry in Europe (June 2019).	10	\$1,026	8,778	
KPMG, Economic impact of medical research institutes (Association of Medical research institutes in Australia, August 2018)	27	\$ 7,792		287.92

Outputs and key assumptions

Key assumptions used to manipulate QALYs to FTEs

- A. Total number of hours in 1 year = 8,760
- B. Total hours worked per worker (NZ) in 2020 = 1,739
- C. Percentage of each year spent working = B/A = 19.85%
- D. Duration of working life = 49 years
- E. NZ Working population as a proportion of total population = 80%

$$\text{Additional FTEs} = (\text{QALYs gained} * C * E) / D$$

Sources:

Total hours worked, OECD data (2021)

NZ working age population (September 2021)

Research paper	FTE/million \$ invested
Glover et al (2014)	0.032
Johnston et al (2006).	0.025
Glover et al (2018).	0.020
PwC (2019).	0.022
KPMG (2018)	0.037

Medtech-iQ: creating tomorrow, today



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