



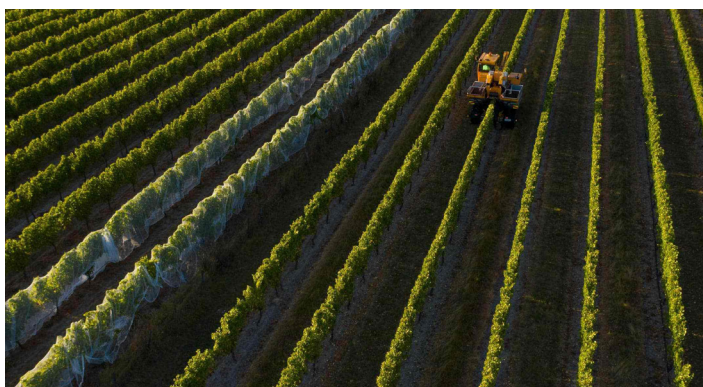
IRANZ

BRIEFING FOR INCOMING MINISTER 2020

FROM THE INDEPENDENT RESEARCH ASSOCIATION OF NEW ZEALAND (IRANZ) REPRESENTING NEW ZEALAND'S INDEPENDENT RESEARCH ORGANISATIONS (IROS).

KEY POINTS

- Independent Research Organisations (IROs) are a vital part of New Zealand's research, science and innovation (RSI) ecosystem and increase its diversity.
- IROs have a variety of community, philanthropic, and industry ownership models, they are not government owned. They provide important targeted research and expertise in specific economic, environmental, and social areas not adequately covered by CRIs and universities. IROs are frequently part of "the best teams" required for important research programmes.
- Strategic Investment in RSI capability and infrastructure should be available where appropriate to all research organisations. IROs have strategic capabilities that are unique in New Zealand, such as the fire testing facilities at BRANZ, the wind tunnel and road-testing capabilities at WSP Laboratories, and New Zealand's only licensed cell therapy manufacturing suite at the Malaghan Institute of Medical Research.
- The government's RSI strategies, policies, and investment portfolios should take into consideration impact across the entire research, science and innovation ecosystem, including IROs. This will be particularly important with initiatives and changes arising from Te Pae Kahurangi (CRI Review), and a new Research, Science and Innovation Strategy.
- The Endeavour Fund has highlighted valuable research opportunities for New Zealand that are being missed due to insufficient investment being available. A wide, rather than academic, assessment of "Research Excellence", alongside increased funding, will reduce the waste of high impact RSI opportunities.
- Health IROs are playing a vital role in New Zealand's fight against COVID-19. Malaghan Institute as a lead player in the Vaccine Alliance Aotearoa New Zealand, MRINZ with clinical trials and public health initiatives and by providing a regular report on the latest therapeutics for MBIE.
- IROs with good industry connections play a key role in increasing business expenditure on research and development (BERD).



strategic user-driven research and innovation

1. INDEPENDENT RESEARCH ORGANISATIONS

Independent Research Organisations are research organisations that have internal intellectual and material capability for carrying out research, science, technology, or related activities at all horizon levels with ownership and governance independent of Government. IROs are not CRIs or universities, they have a variety of ownership structures including industry, private, public, and community. Each IRO has been set up to address specific challenges in targeted areas of the economy, society, and/or environment.

PRIMARY PROCESSING, FOOD SAFETY, AND THE ENVIRONMENT - AHUWHENUA

1. Aqualinc Research Limited
2. Bragato Research Institute
3. Cawthron Institute
4. Land & Water Science Ltd
5. LASRA - The New Zealand Leather & Shoe Research Association
6. Lincoln Agritech Ltd
7. PlantTech Research Institute
8. Te Tira Whakamātaki

INFRASTRUCTURE AND THE ECONOMY - KETE ARONUI¹

9. BRANZ - Building Research Association of New Zealand
10. Verum Group
11. Xerra Earth Observation
12. HERA - Heavy Engineering Research Association
13. Mackie Research
14. Motu Economic and Public Policy Research
15. WSP Research
16. TiDA -Titanium Industry Development
17. New Zealand Institute for Minerals to Materials Research

HEALTH AND MEDICINE - HAUORA ME TE RONGOĀ

18. Malaghan Institute of Medical Research
19. MRINZ - Medical Research Institute of New Zealand

Further information on each IRO is given in the Appendix.

1. Kete Aronui - basket of knowledge of aroha, peace and the arts and crafts which benefit the Earth and all living things - one of the three baskets of knowledge. This basket relates to knowledge acquired through careful observation of the environment. It is also the basket of ritual, of literature, philosophy and is sometimes regarded as the basket of the humanities. (from <https://maoridictionary.co.nz/>)

2. THE INDEPENDENT RESEARCH ASSOCIATION OF NEW ZEALAND

The Independent Research Association of New Zealand (IRANZ) represents the collective interests of these Independent Research Organisations in New Zealand.

IROs are a vital and unique part of the New Zealand Science ecosystem, IROs include the oldest (Cawthron) and newest (Te Tira Whakamātaki) research institutes in New Zealand.

While IROs are all different, they are each structured in a way that enables New Zealand to benefit from high-impact research across business, the economy, the environment, and the community. IROs consistently provide quality science outputs that provide high-impact results for their stakeholders and New Zealand.

ECONOMIC IMPACT

IRANZ members and our associates employ over 850 staff and have a combined turnover of \$160 million p.a., which includes \$30 million of research investment from Government and \$30 million of stakeholder investment.

PLACE IN THE RESEARCH SECTOR

IROs are a key part of a thriving independent research sector that is a major pillar of the New Zealand science system, and a key to New Zealand achieving the goal of increasing business expenditure on research and development.

Many, but not all, IROs started with government support, normally backed by an industry group. This includes BRANZ and HERA, who both administer industry research levies, as well as the recently established Regional Research Institutes.

Other IROs have been established completely independently of Government support by researchers who have identified specific needs for high impact research, these include the environmental IROs Motu, Aqualinc, Land & Water Science, and our newest IRO Te Tira Whakamātaki - dedicated to identifying where mātauranga Māori principles can be beneficially applied in tandem with a modern scientific approach for the protection of our native species and natural environment.

IROs often have excellent links to philanthropic funding, including Cawthron², the Malaghan³ Institute of Medical Research, the Medical Research Institute of New Zealand, and Motu Economic and Public Policy Research.

IROs play an important role in collaborative research programmes with universities and CRIs, where we provide important industry and sector linkages to the programme. Some 25% of the research undertaken at IROs is as subcontracts to CRIs or university programmes, with around 10% of the research led by IROs being contracted to other organisations.



2. Cawthron Institute was established in 1919 by the last will and testament of Nelson philanthropist Thomas Cawthron who had a vision – that science could contribute to the growth of a young New Zealand. Following his death in 1915, Cawthron bequeathed the equivalent of \$127 million* in today's New Zealand dollars - the largest single bequest in New Zealand at the time – to establish and maintain a technical school, institute and museum; the forerunners of today's Cawthron Institute.

3. Using funds from a trust established by the Wellington Medical Research Foundation and the Wellington Division of the Cancer Society, the Wellington Cancer and Medical Research Institute was opened on 26 July 1979, in rented premises in the Wellington School of Medicine. In 1986, the name of the Institute was changed to the Malaghan Institute of Medical Research in recognition of the generous support by Len and Ann Malaghan.

THE ROLE OF IRANZ

IRANZ represents the collective interests of its members by undertaking activities to create a positive operating environment for the Independent Research Organisations in New Zealand. These activities include:

- Providing a forum for IROs to discuss matters of common interest;
- Providing an IRO point-of-contact for Ministers, MBIE, and other governmental science investment agencies;
- Raising the profile of IRANZ and its members with the Government (and their advisors) and the research community (partners);
- Developing IRANZ policy positions on key issues, and advocating to Government on issues that are important and where there is a clear collective requirement;
- Sponsoring the Royal Society Speaker's Science Forum and other activities to promote science in the community; and
- Disseminating news and success stories from IROs that demonstrate the wide impact of our members' work by means of our quarterly email newsletter *Connections* and our website.

3. STRATEGY FOR RESEARCH SCIENCE AND INNOVATION

As is pointed out in the draft Strategy for Research, Science and Innovation, New Zealand's research, science, and innovation system consists of a combination of people, institutions (including research organisations and businesses), and infrastructure. Independent Research Organisations are a vital and significant part of that system. IROs have been established to support areas in the system that are not adequately served by Universities and CRIs.

It is important that the Government's research investment portfolio recognises this, and the impact of science policies on IROs is assessed during their development. Although IROs are not Crown owned, many are community owned and are just as vital to the New Zealand research infrastructure. New RSI strategies, initiatives, and policies should take into consideration impact across the entire research, science, and innovation ecosystem including IROs. This will be particularly important with initiatives and changes arising from Te Pae Kahurangi (CRI Review), and a new Research, Science and Innovation Strategy.

4. ENDEAVOUR FUND

Contestable research is a fundamental part of the New Zealand research, science and technology environment, but over the years this investment has been eroded by new initiatives (e.g. Strategic Science Investment Fund and National Science Challenges). The renaming of contestable funding to the Endeavour Fund, the focus on impact as well as research excellence, and the broader strategic direction are all welcomed initiatives for contestable funding. The focus on impact is increasingly important, and the fund also needs to take a broad, rather than an academic, view of Research Excellence.

As the Endeavour Fund is eroded by mapping monies to Strategic Research and Science Challenges, competition for this investment has increased. This year the available funding through the Endeavour Fund has been further eroded by the COVID-19 crisis. The impact on IROs, particularly those that do not receive Strategic Funding, has been severe.

In the UK, an AIRTO report The impact of the innovation, research and technology sector in the UK economy, by Oxford Economics, assessed the total impact of the UK innovation, research, and technology sector at between £32Bn and £36Bn, equal to 2.3-2.6% of total UK GVA (gross value added), achieved with just 0.3% of government spending. This takes into account both the innovation, research, and technology sector's induced and catalytic effects on the economy. AIRTO (the Association for Innovation, Research and Technology Organisations) membership is roughly equivalent to the IROs, CRIs, and university science commercialisation groups, in New Zealand.

On the basis that a similar proportional impact would occur, New Zealand can only gain from increasing its investment in the Endeavour Fund for high-impact and excellent research. New Zealand must do this if it wants to achieve a high-performing economy, world-leading social well-being, protection for the environment, and an efficient 21st century infrastructure.

5. STRATEGIC SCIENCE INFRASTRUCTURES

The Strategic Science Investment Fund (SSIF) supports longer-term programmes of mission-led science and science infrastructure of enduring importance to New Zealand. Many IROs maintain such research and infrastructures, often without government support.

- WSP Research is the only group in New Zealand undertaking international quality research and development into road materials⁴. At their Lower Hutt Laboratory their Wind Tunnels tests have been used to evaluate everything from buildings and cars to airplanes and spaceships.
- BRANZ fire testing laboratory offers a full range of fire resistance and reaction to fire tests for the building, construction, and marine industries.
- Cawthron's Aquaculture Park is the national centre of excellence for shellfish aquaculture research, development, and production. This world-class facility is home to seafood companies, education and training programmes, and New Zealand's largest mussel and oyster hatchery operations. The Seafood Safety Research Programme is led by the Cawthron Institute in partnership with CRIs, MPI, and industry.
- The Bragato Research Institute opened its research winery in February 2020 in Blenheim, enabling them to trial world-first technologies, conduct commercial trials, and undertake research winemaking at a scale and degree of experimental control not possible before in New Zealand.
- The Malaghan Institute of Medical Research contains New Zealand's only licensed cell therapy manufacturing suite. This unit is Medsafe approved to manufacture cutting edge cell and gene therapies to support clinical trials. The Institute is also home to a world-class cytometry and imaging facility and biomedical research unit with more than 100 biological disease models to support their immunology and immune therapy research activities.
- TiDA's initiatives in Selective Laser Melting (SLM) 3D printing have been key to directly 3D printing metal components in New Zealand, vital to the future of local manufacturing. Their latest robotic Wire Arc Additive Manufacturing (WAAM) developments offer potential for New Zealand to establish a leading role in the expanding global market for systems to 3D print large metal parts.
- HERA is undertaking world leading research on Industry 4.0 applications to fabrication in terms of real-time quality analysis during welding. It is also in the process of developing a Fabrication 4.0 research and training facility.
- Lincoln Agritech established a "New Uses for Crossbred Wool" pilot processing facility. This facility is the only one of its kind in New Zealand and transforms coarse wool into new physical formats, including powders, high surface area particles, and fibres, using wet spinning capability. This facility enables scale-up from lab-scale experiments to quantities that can be sent to customers for product evaluation and is being used by the wool industry as a proof-of-concept plant before investing in manufacturing capability of their own.

These nationally unique resources only exist because the IROs that maintain them are strong and financially viable. It is important to check that new policy initiatives will not undermine this viability.

The Strategic Science Investment Fund (SSIF) programmes are structured around science platforms. A science platform is a combination of people, facilities, information, and knowledge that provide a particular, ongoing science and innovation capability for New Zealand. While Cawthron, LASRA, the Malaghan Institute, and the Medical Research Institute receive SSIF investment, all IRANZ members are keen to be part of contributing to a larger-scale research infrastructure that supports enduring priorities and a high-performing science system. The SSIF platforms should be provider agnostic and focus on best teams' capabilities.

4. The team at WSP Research are the only group in New Zealand undertaking international quality research and development into road materials, surfacings, and road pavement behaviour. They have a dedicated research facility based in Lower Hutt, including a chemistry laboratory, rheology and mechanical testing equipment, and specialised road surfacing and pavement testing instrumentation. The latter includes the CAST machine which is unique in the Southern Hemisphere and was constructed by the team to study road surfacing behaviour under realistic traffic speeds and stresses in the laboratory. WSP Research works closely with Waka Kotahi NZ Transport Agency in the development of world leading innovations such as epoxy OGPA road surfacing, but also in undertaking the fundamental materials and engineering research needed to underpin the development of specifications needed for day-to-day maintenance and construction of the road network.

6. REGIONAL RESEARCH INSTITUTES

The new Regional Research Institutes (RRIs): Xerra (Alexandra), the Bragato Research Institute (Blenheim), PlantTech (Tauranga), and the New Zealand Institute for Minerals to Materials Research (Greymouth) are all IROs and contribute to the IRANZ community.

A report by NZIER, [*Impact of the Cawthron Institute: Economic contribution to Nelson and New Zealand*](#), showed that the Cawthron Institute has created a unique business model, adding value to the Tasman/Nelson region and national economies. It represents 25% of the Nelson business service sector's exports, contributes \$14m in added value to the local economy, and indirectly creates an additional 91 jobs. It has national and global reach, and its future successes could further boost New Zealand's GDP by \$200 million and create over 500 jobs.

A similar NZIER study commissioned by the [Bragato Research Institute](#) has shown that R&D has contributed to 20%-25% growth, worth over \$60 million a year, in the wine industry.

7. NATIONAL SCIENCE CHALLENGES

The eleven National Science Challenges provide an opportunity to align and focus New Zealand's research on large and complex issues by drawing scientists together from different institutions and across disciplines to achieve a common goal through collaboration.

The Building Better Homes, Towns and Cities National Science Challenge is being led by an IRANZ member, BRANZ, with Motu and WSP Research playing key roles. IRANZ members are also involved in several other National Science Challenges, including Cawthron Institute researchers playing an active part in Sustainable Seas, Land & Water, Biological Heritage, Science for Technological Innovation, and High Value Nutrition challenges, Lincoln Agritech is involved in the Deep South National Science Challenge, and Land & Water Science is part of the Our Land and Water challenge.

Climate Change and Big Data are subjects that could warrant new National Science Challenges. There are IROs well placed to take an active role in these areas.

8. HEALTH RESEARCH

The Malaghan Institute of Medical Research and the Medical Research Institute of New Zealand, IROs in the health sector, are dedicated to investigating the causes of important public health problems, including cancer and asthma, in New Zealand and internationally. They have led the way in New Zealand research for COVID-19 vaccines and treatments. They use their knowledge to support the prevention and treatment of a number of diseases and provide a base for specialist training in medical research. This research is normally supported by the Health Research Council. Research into new drugs or medical appliances that could be developed by New Zealand firms and provide economic and other health benefits could be supported by the Endeavour Fund.

9. BUSINESS AND ENTERPRISE RESEARCH AND DEVELOPMENT

The National Science Investment Strategy seeks to grow business and enterprise expenditure on research and development (BERD) to well above 1% of GDP. It sees this as driving a "thriving independent research sector that is a major pillar of the New Zealand science system". IRANZ members are excited to be part at this new growth area for New Zealand's research.

A number of IROs are built around Industry Levies: collective investment by business and enterprise in R&D and other collaborative activities. IRANZ sees IROs as being ideally placed to help increase BERD, whether they are structured as businesses or trusts, and whether or not they are supported by industry levies. It is important that policies are structure and funding neutral.

10. FURTHER INFORMATION

For further information about IRANZ or the IROs please feel free to contact the IRANZ Executive Officer, Dr Rob Whitney, on 027 292 1050 or information@iranzt.org.nz.



Independent Research Association of New Zealand • www.iranzt.org.nz

ABOUT IRANZ



IRANZ, an association of independent research organisations, was formed to promote communication both among member organisations and to wider interest groups on the valuable science and research being undertaken by our member organisations. We actively pursue common interests, especially issues that affect government-research funding and member access to funding. IRANZ was formalised as a non-profit incorporated society in 2009.

IRANZ provides a variety of valuable services to members, including a presence in Wellington and the opportunity to share common concerns with similar organisations across New Zealand. IRANZ has a Wellington-based Executive Officer who works with the IRANZ Executive to keep members abreast of new developments in Government and its agencies; and to educate policymakers about the contributions of independent research organisations to innovation and economic development in this country. As a representative organisation in the science sector, Government ministries and agencies often seek IRANZ engagement and feedback.

IRANZ member organisations make vital contributions to a broad range of scientific fields, and offer an important complement to university-based and Crown Research Institute research. Our members' organisational size and flexibility often provide an environment that is particularly conducive to innovation and end-user engagement.

For membership enquiries, please email: information@iranzt.org.nz

OUR MEMBERS

Health and medicine/ Hauora me te rongoā



The **Malaghan Institute of Medical Research** is New Zealand's world-leading independent biomedical research institute with a focus on breakthrough discoveries in immunology and immunotherapy. It is playing a key role in the Government's Covid 19 Vaccine Strategy. Based in Wellington, cutting-edge research and clinical trials are advancing our understanding of the immune system and its relation to human health. Malaghan is a registered charity, with more than 100 researchers and support staff working on research programmes in cancer, asthma and allergy, gut health, brain health, vaccine development, and infectious diseases.



The **Medical Research Institute of New Zealand** (MRINZ) is an independent medical research organisation. It is a charitable trust with over 50 staff located primarily in Wellington. MRINZ medical scientists are dedicated to investigating the causes of important public health problems, to use this knowledge to improve the prevention and treatment of diseases, and to provide a base for specialist training in medical research. MRINZ has research programmes in numerous fields including alternative and complementary medicine, asthma, cardiothoracic surgery, intensive care, medicinal cannabis, oxygen therapy, and stroke. Major advances have been made in all of these fields, with the research findings impacting on medical management and public health policy.

Primary Processing, Food Safety, and the Environment/ Ahuwhenua



Cawthron Institute is New Zealand's largest independent science organisation, offering a broad spectrum of services to help protect the environment and support sustainable development of primary industries.

Based in Nelson, Cawthron works with regional councils, government departments, major industries, private companies, and other research organisations throughout New Zealand and around the world. Cawthron is a diverse organisation employing more than 275 scientists, laboratory technicians, researchers and specialist staff.

Cawthron's scientists have expertise in aquaculture research, marine and freshwater resource management, food safety and quality, algal technologies, biosecurity, and analytical testing.



Lincoln Agritech is an independent, multidisciplinary R&D company owned by Lincoln University. Through research they create new science and engineering knowledge and technologies for their clients and stakeholders.

Lincoln Agritech's work is funded through a combination of government-funded science programmes, contract research, and consultancy - examples of their work can be found throughout New Zealand and internationally.

Lincoln Agritech has capability in: groundwater research to manage water quality and quantity; precision agriculture for sustainable primary production; new materials science; biotechnologies; smart sensor and measurement technologies utilising microwave sensing and machine vision; and IRRICAD™ - software for designing pressurised irrigation systems.



The Bragato Research Institute (BRI) provides cutting-edge science, research and development to benefit New Zealand's wine industry and its key stakeholders. Based in Marlborough, the Institute has a national focus, and global reach, providing world-leading research for commercial grape and wine production. Wine company ownership and involvement in research and development is a key driver for the new facility. The Institute will also improve integration between those involved in grape and wine research, and the commercial companies operating in the industry.



A Māori environmental not-for-profit with a research focus, **Te Tira Whakamātaki** ('the watchful ones') is the voice for Māori communities concerning environmental and conservation issues, and research and policy-making in the biological security sector. They aim to keep Māori informed about biosecurity issues, research and policy in New Zealand, and to include indigenous knowledge in biosecurity research and responses.



Aqualinc's core purpose is to equip New Zealand for world-class water management through scientific and policy research, technology development and deployment, and water management advisory services. Their research contribution to the body of knowledge required for managing the sustainable use of water is focused on groundwater (the quantity and quality of water stored and flowing between beneath the land-surface), irrigation, and strategic water management. Aqualinc is the leading independent provider of irrigation expertise across the policy-to-practice spectrum of the New Zealand water sector.



LASRA is the leading research and technology provider to the hide, skin, leather and footwear manufacturing sectors in New Zealand and Australia. They engage in research from the farm to the consumer and provide technical support to exporters. LASRA is the major provider of safety footwear testing services in Australasia.

LASRA is a registered Private Training Establishment operating courses in leather manufacturing technology.



PlantTech is a New Zealand-based research and development organisation specialising in addressing scientific challenges in New Zealand's horticulture industry with cutting-edge Artificial Intelligence (AI) technology solutions that produce competitive advantage. A collaborative partnership founded by horticultural-aligned companies from the Bay of Plenty who have strengths in plant-based innovation, the organisation's agile approach is based on the shared challenges of its members and the sector.



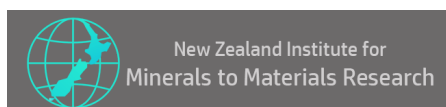
Land and Water Science is an innovative, research-based, environmental consultancy located in Invercargill, New Zealand. They have extensive experience in environmental science and resource management gained through research and consulting for and within regional councils, crown research institutes, and universities. They aim to provide high quality, cost-effective, user-focused scientific services in a range of environmental and earth science fields. Many projects have involved the use of high resolution spatial and temporal data which has provided an integrated view of environmental processes that range from regional to paddock scale.



BRANZ is a multi-faceted, science-led organisation that uses independent research, systems knowledge and its broad networks to identify practical solutions that improve New Zealand's building system performance. BRANZ undertakes and commissions research, funded by the Building Research Levy, that is both practical and drives positive change. This work helps improve industry practices around the performance of buildings and how we use them, through to informing policy and legislation. BRANZ also contributes practical improvements in the built environment through independent product testing, assurance and consultancy services.



TiDA is at the leading edge of titanium based products, powder metallurgy, and 3D Metal printing processes. Demand for titanium products has greatly increased over recent years, with consumer demand for laptops, mobile phones, and sporting goods. Additionally, the aerospace, medical, and automotive industries exploit titanium and 3D Metal printing in their most advanced products. TiDA provides titanium and manufacturing process research and technology to enable all industries to unlock these opportunities. TiDA's expertise extends to powder metallurgy with a range of metals and metal 3D printing based on small-scale powder and large scale wire-arc processes.



NZIMMR is seeking new and sustainable solutions for extracting resources and engineering technologies that shift minerals up the value chain. Founded in 2018, with MBIE funding, NZIMMR is a Regional Research Institute based in Greymouth. They nurture a synergy of stakeholders to build a future where extractive industries, the materials sector, academia, and members of the public participate and share.



WSP Research and Innovation Centre provides a broad range of high quality research, specialist consultancy and laboratory services to improve the design and performance of infrastructure for commercial and government clients. They have a proud history dating back more than 50 years to the New Zealand Ministry of Works when the company provided experimental research that informed the design and construction of major national infrastructure projects, such as hydroelectric power schemes and state highways. Today their researchers work in multi-disciplinary teams to address challenges as diverse as transportation safety, road performance, and the resilience of communities and businesses to major natural hazards.



Heavy Engineering Research Association (HERA) is an industry owned, membership based, non-profit research and industry development organisation dedicated to servicing the needs of metal-based industries in New Zealand. While the emphasis of its activities is on heavy engineering, HERA is also servicing wider metals industry interests such as in light-gauge steel, stainless steels and light alloys. Through its specialist staff, it provides a combination of research, training, advisory, industry development and promotional services making it the national centre for metals based product design, manufacturing technology and inspection and quality assurance.



Mackie Research specialises in human systems research and consultancy projects. They have specialist expertise in: **Transport:** Road safety systems, active transport, schools, user-friendly transport infrastructure and systems, truck driver requirements, health and transport; **Human systems and ergonomics:** Equipment evaluation, workplace systems, urban systems, sport & recreation, biomechanics, high performance sport, technology usability; and **Evaluations:** Formative, process and outcome evaluation of interventions, programmes and initiatives in the transport, sport & recreation and health sectors.



Motu Economic and Public Policy Research is a non-profit research institute that carries out high quality, long-term, socially beneficial research programmes. It aims to promote well-informed debate on public policy issues, placing special emphasis on issues relevant to New Zealand policy. Ongoing areas of research include environmental regulation, particularly around emissions trading and water quality, housing and homeownership, labour and population economics, infrastructure and economic geography, national savings, and the evaluation of national wellbeing and sustainability.



Verum Group, formerly CRL Energy, is an energy and environmental research and consulting company, with specialist knowledge in new energy technologies (hydrogen, biomass conversion, advanced coal conversion) energy modelling, geological assessments, and environmental impacts (causes and mitigation options). Verum Group offers research, consultancy, and testing in the areas of fossil fuel energy, particularly coal related, exploration and mining, fuel quality and use, and environmental monitoring.



Based in Alexandra, **Xerra Earth Observation Institute** is an independent Regional Research Institute. They conduct world-class research in the areas of Earth observation (EO) and remote sensing and develop new products and services that benefit regional industries and government. Xerra's projects are designed to tackle complex problems through the application of EO data, delivering valuable insights to decision-makers, based on sound science. New Zealand's space economy holds great potential, with value to be gained for government and industry from payloads being launched into orbit. Xerra is working closely with its peers, industry, and government to unlock the benefits from satellites passing overhead to monitor our land and sea in ways that have previously not been possible.