

**Cabinet Economic Growth and Infrastructure Committee**

**Establishment of the Advanced Technology Institute**

**Proposal**

1. This paper recommends the establishment of the Advanced Technology Institute (ATI) to support firms in the manufacturing and services sectors to improve competitiveness and growth through science and technology-based innovation and its commercialisation.
2. This is a major initiative that will create an organisation that is very different to the current Industrial Research Limited (IRL). Specifically, the ATI will:
  - a. Operate in a highly business-friendly manner that is responsive to commercial imperatives and timeframes, based on a culture that is strongly industry-focused and results driven
  - b. Support firms at different stages of development, from start-ups to established R&D performers, to innovate in response to domestic and international market needs and opportunities
  - c. Offer a broad range of innovation support services, not just research and development (R&D) and technical services, including brokering access to specialised expertise and facilities
  - d. Be a highly networked organisation, linking up the significant but highly distributed capability that exists in universities, Crown research institutes (CRIs), polytechnics and other research organisations, and providing a route to international sources of expertise
  - e. Have a high proportion of engineers and technologists, as well as complementary capability in the areas of manufacturing processes, design, business engagement and networking
  - f. Be a gateway for manufacturing and services firms to access business R&D funding support, consistent with our objective of a one-stop shop for New Zealand businesses to access technology advice and support
  - g. Provide a vehicle for researchers and graduate students to do applied work and gain experience of industry, while also allowing academic stars to advance their careers
  - h. Develop its strategy in close consultation with firms and industry bodies and be nimble, flexible and evolve over time in response to market opportunities.

## Executive summary

3. New Zealand needs faster economic growth to lift our per capita income. The primary way to achieve that is to boost the competitiveness of New Zealand businesses so they have a platform from which they can be successful on the world stage. The government's business growth agenda is working to improve access to the key elements of successful businesses: capital, skilled workers, innovation and ideas, natural resources, export markets, and the supporting public infrastructure.
4. Increasing innovation in New Zealand's manufacturing and services sectors is an important means of increasing economic growth. New Zealand needs more firms developing, taking up and applying new technologies and we need businesses that are better at commercially exploiting those new technologies, taking full advantage of opportunities afforded in international markets.
5. Evidence that New Zealand is not doing as well as it could in this regard includes the low level of business expenditure on R&D; the narrow base of technologically advanced and innovative firms; the lack of visibility and relevance to business of public research organisations; the fragmentation of our existing capability to support the manufacturing and services sectors; the lack of mobility of staff between research institutions and business; and the scarcity of talent in the areas of design, science and engineering.
6. This proposed ATI is an institutional response to these issues. It is needed to provide specialised skills, facilities and infrastructure that are beyond the capacity of individual firms to build and maintain, to make better use of the existing capability that exists across universities, polytechnics and CRIs, and to facilitate more streamlined access to government support including business R&D funding.
7. The ATI will be a new type of organisation and will exist to assist firms in the manufacturing and services sectors to improve their competitiveness and growth through technological innovation and its commercialisation. It will operate in a highly business-friendly manner, offer a wide range of innovation support services (beyond R&D and technical services), and have a high proportion of engineers and technologies as well as capability in the areas of manufacturing processes, design and business engagement. The ATI will be a highly networked organisation, linking up expertise in existing research organisations with firms, organised around specific technology platforms and oriented towards solving business problems. It will provide a vehicle for researchers and graduate students to do applied work and gain experience of industry.
8. The ATI will add value to firms through the delivery of services, including testing and analysis, knowledge and technology transfer support, and R&D. In addition, it will improve connectivity and capability in the innovation system, for example by facilitating the development of industry-led R&D consortia, being a portal for firms to access R&D and technical expertise, equipment and facilities, and fostering mobility of staff between research institutions, the ATI and business. In support of these functions, it will need to develop strong relationships with universities and polytechnics, Crown research institutions, business and economic development agencies. Indeed, it is critical that the ATI sees a core part of its role as harnessing the capability that currently exists rather than duplicating it by building its own.
9. While the areas of scientific and technological capability required by the ATI have overlaps with IRL's current capability, the operating model and culture for the ATI will be very different. The ATI therefore needs to be established as a new entity, and a

Crown agent form is most appropriate given ATI's mix of functions. An Establishment Board will be set up to progress the detailed design and implementation of the ATI, including managing the process of transferring staff and assets from IRL into the ATI upon its establishment (with a target date of 1 December 2012). IRL will be prepared for transfer to the ATI during the transition period and will ultimately be disestablished.

## Background

10. New Zealand needs faster economic growth to lift our per capita income. The primary way to achieve that is to boost the competitiveness of New Zealand businesses so they have a platform from which they can be successful on the world stage. The government's business growth agenda is working to improve access to the key elements of successful businesses: capital, skilled workers, innovation and ideas, natural resources, export markets, and the supporting public infrastructure.
11. Our small domestic market and distance from global markets means that most export-oriented New Zealand companies have to become internationally active at a much earlier stage than companies in larger markets. Often they don't have the necessary expertise in design, production, distribution and marketing that their competitors have and that they need in order to successfully make that step. Market-led innovation is a particularly important ingredient for successful internationalisation, and this capability is generally more available to firms of at least medium scale. The result is that many very promising firms fail to fully exploit their commercial potential.
12. In early 2011, the Ministry of Science and Innovation commissioned an independent panel to advise the Government on ways to better facilitate the development and growth of firms in the High Value Manufacturing and Services (HVMS) sector. That Review identified a number of issues with the HVMS innovation system including:
  - a. Low business expenditure on R&D, especially a lack of very large R&D intensive firms
  - b. Narrow base of technologically aware and innovation-ready firms
  - c. Knowledge institutions lacking in visibility and business-friendly culture
  - d. Fragmentation of R&D capability across institutions and geographically
  - e. Poor connectivity between research institutions and industry, and to international ideas, technology and markets
  - f. Some specific barriers to accessing public research organisations related to the cost of R&D services and ownership of intellectual property
  - g. Lack of mobility of staff between research institutions and the business
  - h. Scarcity of talent in the areas of design, science, engineering and international business.
13. The government has taken a number of recent steps to address the issues identified in *Powering Innovation*. These include, for example, lifting New Zealand's investment in engineering tuition at tertiary institutions, and commencing a review of PBRF settings to assess whether they are creating artificial barriers to researchers moving easily between academic institutions and commercial companies.
14. A key recommendation of *Powering Innovation* was to transform IRL into a platform for industry growth that provides market-led, R&D and technology transfer services for firms operating out of centres in Auckland, Wellington and Christchurch.

15. In November 2011, the Prime Minister announced the Government's intention to transform IRL into an Advanced Technology Institute, to be a "high-tech HQ" for the New Zealand High Value Manufacturing and Services sectors. This paper seeks decisions to implement that initiative.

### **Rationale for the Advanced Technology Institute**

16. There is a strong case for the creation of an organisation that supports firms in the manufacturing and services sectors to improve their competitiveness and growth through science and technology-based innovation and its commercialisation. This is because:
  - a. Some firms require specialised skills and infrastructure that goes well beyond the capacity of individual firms to invest in and maintain
  - b. There is a large existing capability and sunk investment in facilities and equipment across the innovation system, particularly in public research organisations, that can be better harnessed to support business innovation
  - c. The Government has the ability to help resolve coordination and information problems
  - d. The ATI can play an important role in streamlining access to government support, including business R&D funding
  - e. Evidence from overseas is that advanced technology institutes have been successful at helping companies go a step beyond what their own capabilities enable them to do, and in doing so, to build innovative capability that contributes to their growth and that of the broader economy.
17. The proposal for the Advanced Technology Institute is for an organisation that is very different to the current Industrial Research Limited (IRL). Specifically, the ATI will:
  - a. Operate in a highly business-friendly manner that is responsive to commercial imperatives and timeframes, based on a culture that is strongly industry-focused and results driven
  - b. Support firms at different stages of development, from start-ups to established R&D performers, to innovate in response to domestic and international market needs and opportunities
  - c. Offer a broad range of innovation support services, not just research and development (R&D) and technical services, including brokering access to specialised expertise and facilities
  - d. Be a highly networked organisation, linking up the significant but highly distributed capability that exists in universities, CRIs, polytechnics and other research organisations, and providing a route to international sources of expertise
  - e. Have a high proportion of engineers and technologists, as well as complementary capability in the areas of manufacturing processes, design, business engagement and networking
  - f. Be a gateway for manufacturing and services firms to access business R&D funding support, consistent with our objective of a one-stop shop for New Zealand businesses to access advice and support

- g. Provide a vehicle for researchers and graduate students to do applied work and gain experience of industry, while also allowing academic stars to advance their careers
  - h. Develop its strategy in close consultation with firms and industry bodies and be nimble, flexible and evolve over time in response to market opportunities.
18. The proposal differs somewhat from the original *Powering Innovation* recommendation, in that the ATI will be a highly networked organisation and is unlikely in the short term to have a dramatically larger staff than the current IRL. This is because there already is significant capacity (i.e., in areas of science, technology development, engineering & design) to support demand in the manufacturing and services sectors, albeit currently fragmented and uncoordinated. Further, given the diverse needs of the sector, it is not realistic for any single organisation to build and maintain capability in all the necessary areas of specialisation.
19. The ATI is expected to grow in size over time, in line with developing demand for its services by firms. A full development plan will be prepared to address the medium and longer term growth of the ATI.
20. The paper has been informed by a number of reports that provide a strong evidence base to support the proposal:
- a. Profile of the HVMS Sector – an analysis of the nature and key characteristics of the HVMS sub-sectors (e.g., their scale, location and performance)
  - b. Demand for technology and innovation services – firms’ views on the potential roles, functions and activities of ATI, including their demand for services
  - c. Current capability to support the HVMS sector – summarises existing capability (both people and facilities and equipment) in universities, CRIs, polytechnics and independent research organisations of relevance to the HVMS sector
  - d. Stocktake of Industrial Research Limited – an independent stocktake of IRL’s current business model and operations
  - e. International Best Practice Review – a comparative analysis of international technology institutes, including advice from a Danish expert.
21. Annexes 1 through 5 summarise the main findings from these reports. In brief:

*HVMS Sector Profile*

- a. The High Value Manufacturing and Services (HVMS) sector is important to New Zealand, producing approximately 29% (\$37.5 billion) of GDP. HVMS firms have high labour productivity, spend more on R&D and product development, are more likely to introduce ‘new to market’ products, and have higher export-intensity than non-HVMS firms.
- b. The sector is extremely diverse and fragmented, with few large firms or groupings of companies, making it a challenge to service the needs of all firms and sub-sectors. Most HVMS firms are located in the North Island, particularly Auckland, but there are also significant concentrations in Christchurch, Wellington and other centres.
- c. The most significant sub-sector is Food & Beverage Manufacturing but there are a number of sub-sectors with significant scale and/or the potential to grow to scale (e.g., ICT, electronics, and health technologies). New Zealand also has considerable potential to support the development of export-based HVMS firms

associated with our large primary sectors (e.g. in areas such as agri-technologies and advanced wood products).

#### *Demand for Technology and Innovation Services*

- d. This study confirmed that the key sources of ideas, knowledge and technology for business innovation are staff, customers and suppliers. Universities, polytechnics and CRIs are not currently central to firms' innovation processes and many firms lack awareness of these institutions' capabilities and services.
- e. Those firms that have engaged with public research organisations see them as science-based and research-focused and not easily accessible to business. The ATI, therefore, needs to operate in a very commercially-driven and business friendly way. It will also require different governance, accountability and funding structures to the existing CRI model if it is to have the right incentives to engage with and provide value-adding services to business.
- f. Firms envisage a role for the ATI that provides technical services, R&D, business capability and education services. Some of the specific services considered important include: measurement, testing and analysis services; prototyping facilities and pilot plant; R&D provision; access to specialised facilities; and equipment and access to business R&D funding.
- g. The study identified a very broad range of science and technology platforms that underpin innovation in the sector (e.g., manufacturing processes, industrial design, ICT (computer networks and software engineering), measurement, electronics, plastics & polymers, sensing & scanning). These widely varying needs make it difficult for any single organisation to maintain capability in all the areas of specialisation required to support service provision.
- h. Individual expertise and reputation are as important as organisational reputation in determining where firms go to access support. The quality of individual capability, motivation and drive will therefore be an important determinant of the ATI's success. Many of the best individuals are likely to want to straddle basic and more applied R&D, and may wish to continue to work in academic settings part time. It will therefore be important for policy settings to permit flexibility and encourage mobility between research organisations, the ATI and industry.

#### *Current capability to support the HVMS Sector*

- i. New Zealand has a significant capability in science, engineering, manufacturing processes and industrial design relevant to the HVMS sector.<sup>1</sup> This capability is distributed widely across New Zealand's knowledge institutions (e.g., IRL, universities, other CRIs, polytechnics and independent research organisations).
- j. Collaboration between research organisations has been increasing but the quality of industry engagement is variable and there are too few examples of industry-led collaborative R&D platforms and partnerships. Examples such as the Materials Accelerator, hosted at the University of Auckland, provide a good model for how to improve industry-science linkages in the future.
- k. Firms often seek highly specific expertise (ideally, matched with up-to-date industry knowledge and experience) rather than general capability. This means a

---

<sup>1</sup> Capability includes both the skilled people to carry out research, provide technical services or advice, and teach, as well as the physical equipment and facilities necessary to carry out these activities.

networked model, whereby the ATI primarily acts as a portal to expertise (both within New Zealand and overseas) is the best approach to providing the breadth and depth of capability required. Indeed, it is critically important that the ATI sees its role as harnessing and building the capability that currently exists across the system rather than unnecessarily duplicating that capability by building its own to the detriment of other actors in the system.

#### *Stocktake of Industrial Research Limited*

- I. The Stocktake identified a number of significant issues with IRL's current funding and business model:
  - a business model that is driven by the need to win government science contracts rather than by the need to engage with industry
  - low commercial customer base and revenue, with consequential high dependence on government revenue
  - a culture that is science-based and insufficiently outward looking, although this has been changing recently with positive initiatives such as "Scientist for a Day" and "What's Your Problem New Zealand?"
  - some specialisation in areas of science and technology that do not align well with New Zealand industry.
- m. The above features imply the ATI will need to operate very differently to IRL. It will require different governance, accountability and funding structures if it is to have the right incentives to engage with and provide value-adding services to industry. The above findings also clearly imply the need for a new entity rather than a more incremental approach to evolving IRL into the ATI.

#### *International Best Practice Review*

- n. Evidence from overseas shows that advanced technology institutes have been successful at helping companies go a step beyond what their own capabilities enable them to do, and in doing so, to build innovative capability that contributes to their growth and that of the broader economy.
- o. Overseas research also shows that better-performing firms actively source knowledge internationally as well as locally. It will therefore be important for the ATI to maintain strong connections with international research institutions and knowledge networks. New Zealand's offshore network will have an important role to play in ensuring firms and industries are well connected to global technology trends.
- p. A number of lessons from international models, in particular the Danish Technology Institute, have been incorporated into the proposal including the potential to adapt for use in New Zealand successful initiatives, such as the Danish Innovation Agents Scheme and Innovation Consortia programmes.

### **Purpose and Aims of the Advanced Technology Institute**

22. The main purpose of the ATI is to support firms in the manufacturing and services sectors improve their competitiveness and growth through science and technology-based innovation and its commercialisation. It will work to:
  - a. broaden the base of technologically aware and innovation-ready companies, in particular increasing the number of firms carrying out R&D

- b. stimulate existing business R&D performers to increase their expenditure on R&D
- c. build firms' innovation and commercialisation capability, including by putting firms in touch with the right expertise and facilities
- d. improve information about, and the accessibility of, the distributed science, engineering, design and technology development capability that exists across the public research and tertiary system
- e. improve the transfer of knowledge, know-how and technology to firms, by improving connectivity and information flows with knowledge institutions in New Zealand and overseas
- f. encourage greater mobility of staff between public research organisations, the ATI and the business sector.

23. The ATI will be attractive to businesses for a number of reasons:

- a. It will provide up-to-date technology intelligence relevant to their business, enabled through its participation in global technology networks
- b. It will directly support firms to innovate, by advising on R&D strategies, performing R&D, developing prototypes and supporting commercialisation
- c. It will provide access to the latest equipment and facilities, both in-house and through access agreements with domestic and international institutions
- d. It will offer firms direct access to business R&D funding support, in its role in administering grants-funding
- e. It will indirectly support firms to innovate by connecting them with world class sources of ideas and expertise and putting them in touch with other firms and researchers facing similar problems and opportunities
- f. It will increase the pool of talent available to firms, for example by assisting them to find and co-fund internships.

24. As important as the services it offers to business will be the way in which it delivers them. Specifically, it will operate in a business-friendly manner, providing services efficiently and in a timely manner. A key role of the ATI will be to negotiate access agreements to expertise and facilities with research institutions, thereby removing some of the barriers and costs that firms currently face in dealing directly with these institutions.

25. The success of the ATI will be measured by the contribution it makes to supporting manufacturing and services firms to innovate and increase productivity, whether through enabling increased exports, reducing the cost structure of industry (e.g., innovations that reduce energy consumption), or expanding the productive capacity of the economy (e.g., innovations that enable more economic resource extraction). While the ATI's financial performance will remain a key metric, the more important measures of performance relate to its wider contribution to the economy. Given the importance of getting the accountability and incentives on the ATI right, I propose that MBIE, in consultation with the Treasury and the ATI Establishment Board, report back to EGI by 30 September on an accountability and performance framework for the ATI.

## Roles and Functions

26. It is proposed that the ATI have two principal roles and related functions:
- a. An intermediary that will improve connectivity and capability in the innovation system by:
    - i. facilitating the development of industry-led R&D and innovation consortia
    - ii. leading the development of technology platforms that support industries or groupings of firms
    - iii. being a gateway for firms to access business R&D grants and related innovation and commercialisation support
    - iv. being a portal for firms to access relevant R&D and technical expertise, equipment and facilities, from New Zealand and overseas
    - v. actively fostering mobility of staff between universities, the ATI and businesses, for example by sponsoring joint appointments and secondments.
  - b. A service provider that will add value to firms through delivery of:
    - i. technology testing services (e.g., product analysis, process testing, calibration and certification and other related measurement services)
    - ii. knowledge and technology transfer services (e.g., participating in and leading innovation networks, brokering access to specialised expertise)
    - iii. business development services (e.g., technology management courses, IP management advice, technology foresight and sourcing)
    - iv. applied R&D either on a contract basis or collaboratively with business and other research organisations.
27. The ATI will need to put in place appropriate systems, policies and controls to manage the potential conflict of interest between its grants administration and service provision roles.
28. New Zealand's manufacturing and services firms operate in global markets and need to keep abreast of the latest knowledge and technology standards in order to maintain their competitiveness and growth. The ATI will need to have a credible international dimension to its operations, for example:
- a. Sourcing knowledge, expertise or technologies internationally, where this provides firms with a better match to their needs than what is available locally, or to support New Zealand firms with offshore offices
  - b. Engaging in international R&D activity to help ensure the ATI is at the forefront of technology developments in key areas and able to make that available to New Zealand firms
  - c. Contributing to decisions on international measurement standards and enabling New Zealand firms to meet their technical regulatory obligations
  - d. Collecting and interpreting market and technology intelligence of relevance to the manufacturing and services sector, complementing that provided through NZTE
  - e. Having international representation on its Board.

## Target Market and Technology Focus Areas

### *Industry Sectors & Associated Technical Capabilities*

29. The manufacturing and services sector is highly fragmented and made up of diverse industrial sectors and firms. As noted earlier, the most significant sub-sector is Food & Beverage manufacturing, but even this sub-sector is highly differentiated. There are a number of sub-sectors with scale and/or the potential to grow to scale (e.g., agri-tech, ICT, electronics, health technologies, pharmaceuticals, wood products). I expect firms in these sub-sectors to provide an initial focus for the ATI. Over time, the ATI will need to develop sector-based prioritisation through a strategic process involving engagement with firms, business and industry representative organisations and research organisations, iwi and other stakeholders.
30. A key question relates to what role the ATI should play in relation to New Zealand's primary sector-based industries, in particular food and beverage manufacturing. The relevant CRIs (i.e., Plant & Food, AgResearch and Scion) largely focus on pre-harvest science (e.g., relating to breeding, bio-protection and sustainable production), with less emphasis on off-farm manufacturing systems and further processing.
31. My view is that the ATI should have in its scope the manufacturing aspects of food and beverage (including further processing, automation, packaging etc.) and, potentially, wood products as this will complement the primary focus of the other CRIs on pre-harvest science.
32. The existing CRIs have limited engagement with F&B firms beyond the large players in the sector (e.g., Fonterra and Zespri). The alternative approach of extending the role of other CRIs further up the value chain would require significant changes in culture and capability, and risks diverting their current focus. The ATI will need to work closely with these other CRIs and its role will be one of leadership and facilitation rather than seeking to duplicate capability located elsewhere in the system.
33. The ATI's future role in food and beverage processing raises the question of its relationship with other publicly-funded initiatives in this area, in particular:
  - a. the NZ Food Innovation Network (NZFIN), set up to link key participants in the food innovation system (owned by three hub companies and Massey University)
  - b. The FoodBowl, a newly established open-access food development and commercialisation centre and member of the NZFIN network, located in Auckland (and owned by ATEED) but intended to be accessed by food companies nationwide.
34. There are clear overlaps/synergies between the functions of the networking company and the ATI, and I propose the functions of NZFIN transfer to the ATI upon its establishment. While ownership of facilities and equipment is not essential for the ATI to carry out its role, transferring The FoodBowl equipment and functions to the ATI would immediately enhance the ATI's ability to work closely with the food manufacturing sector. I therefore propose that MBIE, in consultation with the ATI Establishment Board and ATEED, consider how best to integrate The Foodbowl with the ATI and report back to me with its recommendation by 1 December 2012.
35. To underpin innovation in the manufacturing and services sectors, the ATI will require technical capabilities across the broad fields of engineering, science, design and technology development, plus complementary capabilities in the areas of manufacturing processes, business engagement and networking. I propose the ATI initially establish capability (in-house or distributed) across the following areas:

- a. *Measurement* - including analytical testing, standardisation, certification
- b. *Advanced manufacturing and materials* - including automation, materials, textiles, sensors and imaging, nanotechnology, health technologies, energy technologies, minerals processing, wood products, agri-technologies
- c. *Manufacturing and services processes/systems* - including process control, supply chain management, life cycle assessment, prototyping, user interface analysis, industrial product and service design
- d. *Digital technologies* - including electronics, communication networks, geospatial technology, signal processing, software, computer science, digital media
- e. *Applied chemistry and biotechnology* - including food and beverage processing and product development, bioactives, industrial products, fermentation, therapeutics synthesis and manufacturing.

#### *Firm engagement*

- 36. To the extent that firms are currently engaging with public research organisations, it mostly involves mid-to-large sized companies and spin-outs. Smaller technology-based firms find it difficult to engage with public research organisations and, equally, research organisations are not well resourced to engage with a broad base of firms.
- 37. Internationally, advanced technology institutions receive the majority of their third party or commercial funding from the larger, more R&D capable firms. However, institutes such as the Danish Technology Institute have placed a significant emphasis on SMEs. Government funding support is required to enable such institutions to engage with a wider range of firms.
- 38. Initiatives such as the DTI's Innovation Agents scheme, Global Expert and Innovation Vouchers provide a way of achieving "quick wins" by solving immediate technology problems for SMEs, and may lead to deeper engagement by firms with public research institutions. I therefore propose the ATI provide a segmented range of services targeted at both the larger, more R&D capable firms as well as services designed to raise the technology awareness and build the R&D capability of smaller firms with growth potential.
- 39. The physical presence of the ATI is an important element in its operations. A key to good engagement particularly with smaller firms is accessibility, and the ATI will operate closer to its clients including from centres in Auckland, Wellington (Hutt Valley) and Christchurch. Part of fostering better linkages is likely to be providing or facilitating access to places where researchers and firms can physically interact, such as open laboratories. There is also potential for the ATI to play a key role in anchoring proposed technology parks in Auckland, Christchurch and the Hutt Valley, which will be explored as part of the work on innovation within the business growth agenda.

#### **Relationship with other agencies**

- 40. The ATI will be an important player in the innovation system but there are other public institutions that directly support innovation and its commercialisation. The ATI will need to develop strong relationships with universities and polytechnics, CRIs, business and industry representative organisations and economic development agencies especially NZTE, regional EDAs and MBIE. The ATI will also need to form close connections and partnerships with international knowledge institutions, in order to supplement domestic capability and ensure that firms are able to access the world's best expertise, facilities and equipment. These relationships are likely to include co-

appointments with staff holding senior posts in both public research organisations and firms.

41. There are a number of functions and activities performed by existing entities that, on the face of it, will make sense to transfer to or integrate with the ATI. *[Sentence withheld]*
42. MSI administers a range of business R&D funding programmes, including the TechNZ suite of funding schemes, the Global Expert Service and the Futureintech initiative. Delivery of these schemes is currently supported by around 15 MSI business investment managers who also provide a range of technical advice and assistance to firms based on their knowledge and experience of manufacturing and product design and development. Funding decisions are made by the statutory Innovation Board on the advice of business investment managers. The Global Expert service and the Futureintech initiative will fit well with the ATI and I propose that these functions, and associated funding, transfer to the ATI upon establishment
43. Some of the business R&D funding streams, and MSI's business investment manager capability, also fit with the roles and functions proposed for the ATI. I consider that the ability for the ATI to administer business R&D funding will be important for ensuring the relevance of the ATI to businesses and will support the seamless provision of business-facing services to firms. I therefore propose, in principle, that administration of certain TechNZ funding schemes be devolved to the ATI, and that relevant business investment management capability of MSI also transfer to the ATI, subject to further detailed advice and final decisions. Further advice will consider exactly which funding instruments should be devolved to the ATI, how to ensure integration between science and business funding, and the roles of MBIE and the statutory Innovation Board in administering business R&D funding.
44. New Zealand Trade and Enterprise (NZTE) provides a range of business development and technology related services to firms that complement those to be offered by the ATI. Firms wishing to grow their exports often face a number of issues and constraints relating to management capability, access to capital and knowledge of international markets. These capabilities need to be developed if firms are to successfully commercialise their technological innovation.
45. Given the number of points of intersection between the ATI and NZTE, I have considered the option of merging the proposed functions of the ATI with those of NZTE to form a single new integrated business development and technology services agency. Such an agency could provide a full range of business capability development support, including facilitating access to capital, business growth and market development and penetration strategies and support, in addition to the ATI functions. It would provide a "one stop shop" for business and enable sharing of back-office infrastructure and systems.
46. However, I consider there are good reasons for keeping the two agencies distinct and separate at this stage:
  - a. a single agency would have a very broad range of activities, and expanding the focus of NZTE risks diverting it from its current focus and delaying completion of its transformation
  - b. the service provision functions proposed for the ATI are not closely related to the current broader business development functions of NZTE

- c. a stand-alone ATI will be a focused, specialist institution with a clear purpose/brand and be highly visible, making it easier to quickly establish its presence
  - d. a stand-alone ATI is likely to be more attractive to top-level scientists and engineers, which the demand study has shown is critical to giving the ATI credibility.
47. On balance I propose the ATI be established as a separate, stand-alone agency. However, there will need to be strong alignment and coordination between the two, especially with respect to client engagement and grants decision-making. There are a number of options to achieve an integrated approach including:
- a. an integrated approach to client engagement (including potential for a shared "front door", or common business managers along the lines of the shared innovation agents system in Denmark)
  - b. common customer relationship management systems and practices to support this (NZTE will lead work on integrating the CRM systems given its significant investment in making its system fit-for-purpose)
  - c. an integrated grants management system (to reduce business transaction costs and enable a coherent approach)
  - d. mechanisms to ensure coordinated strategies across the two entities (which could be facilitated by common Board membership and close coordination at an executive management level).
48. In addition, NZTE has a number of offerings primarily directed towards firms in the manufacturing and services sectors that, on the face of it, fit with the ATI (i.e., Better by Design, Lean Business Programme, Manufacturing+ Programme). These initiatives should be considered for transfer to the ATI upon its establishment.
49. I propose that MBIE, in consultation with the ATI Establishment Board and NZTE, report back by 30 September 2012 on how it proposes the activities of ATI and NZTE be aligned and coordinated and whether to transfer the above NZTE programmes to the ATI.

## **Legal Form**

50. The following criteria have been used in considering potential organisational forms for the ATI, drawing on our broader policies regarding better government services and in particular our focus on business-facing agencies:
- a. Minimise organisation "clutter" and streamline interactions for business and between government agencies
  - b. Promote connection and responsiveness to business needs
  - c. Start to realise benefits from day one, with full benefits over time
  - d. Allow flexibility for continued evolution of structure and functions over time
  - e. Maximise efficient use of public infrastructure (including facilities, systems and networks)
  - f. Pragmatic and minimum cost approach to transition, including in particular minimal disruption of service delivery for current business clients.
51. Given the mix of commercial and non-commercial objectives of the ATI, the choice of organisational form narrows to one of a CRI, Crown entity company, or Crown agent.

52. On balance, a Crown agent best fits the broad roles and functions proposed for the ATI. Unlike the CRIs, its principal purpose is considerably broader than just carrying out research and science activities. The ATI will act as an agent of the Crown, particularly in relation to its intermediary roles and functions. The argument for a Crown agent is particularly strong given the ATI will have some responsibility for approving business R&D grants. A Crown agent form simplifies the process of ministerial and departmental oversight. While establishing a Crown agent requires legislation, this hurdle is appropriate given the important purpose and roles we envisage for the ATI.

### **Process for Establishment**

53. The following principles have guided thinking on the ATI establishment process:

- a. detailed decisions on organisational structure and initial business offerings should be made by those who will be accountable for delivering success
- b. the process itself should demonstrate as far as possible the operational principles and culture which will distinguish the new ATI – i.e. business-focused with a high level of stakeholder engagement
- c. minimal disruption to business as usual for existing business customers
- d. rapid establishment to provide certainty for key stakeholders and to manage transition risks including loss of key staff.

54. I propose an Establishment Board be set up to take the next steps in detailed organisational design and to develop the business case for the initial scope/scale of business offerings and associated funding model. This process will be similar to that followed for the Electricity Authority and Financial Markets Authority. Specifically:

- a. an Establishment Chair will be recruited with appropriate skills and experience.. Ideally the Chair would be the Chair Designate of the new entity for continuity of leadership and accountability reasons
- b. the remainder of the (small) Establishment Board will comprise individuals with a range of appropriate skills and experience, including in particular entity establishment and change management. Some of these members should also transition to the new ATI Board on establishment
- c. an Establishment Unit, led by an experienced Manager, will be set up to support the Establishment Board to operationalise ATI establishment. This will include supporting business case development, detailed organisational design, and transition planning for IRL (working closely with the existing IRL Board)
- d. a key task of the Establishment Board will be to recruit the Chief Executive Designate of the ATI as quickly as possible, who will take an active role in leading change and stakeholder engagement. This will provide additional certainty to affected staff and stakeholders and firmly establish leadership and a clear direction. It will also ensure that accountability for delivery post-transition sits with those responsible for establishment
- e. An interdepartmental Steering Group comprising the Establishment Chair and senior officials from MBIE, Treasury, DPMC and SSC will be established to maintain an overview of the broad programme of work to support the ATI's establishment, including the development of the accountability framework and the ATI funding model.

55. There are a number of implementation issues and risks that the ATI will need to pay close attention to during the establishment phase: creating a strong business-friendly culture and business development capability from day one; obtaining buy-in from key stakeholders in the innovation system (including existing commercial clients of IRL, other CRIs and tertiary education institutions); ensuring appropriate separation between the grants administration and service delivery parts of the ATI; securing key personnel; and developing a sustainable revenue model.

### **Implications for Industrial Research Limited**

56. The proposal to establish the ATI as a new entity requires a decision on the future of Industrial Research Limited (IRL). IRL currently employs around 340 staff across seven science groups and three main centres.<sup>2</sup> There is a reasonably good fit between the underlying scientific and technological capability that resides within IRL and the proposed areas of technical capability proposed for the ATI, although IRL's current capability does not fully meet the likely capability needs of the ATI (e.g., IRL has limited capability in digital technologies, manufacturing processes and systems, and industrial design etc). In addition, some areas of current capability probably fit better elsewhere in the system (e.g., IRL's capability in high temperature superconductivity technologies is highly specialised and not well aligned with New Zealand's industry base and, consequently, will probably be a better fit with a university or Centre of Research Excellence). The geographic location of staff is not well matched to the concentrations of industrial activity.

57. Change in the scope, scale and configuration of IRL's current activities is therefore required. The ATI's operational configuration will be the responsibility of the Board. I therefore propose the Establishment Board develop a transition plan, including which and when IRL assets and staff will progressively be transferred to the new entity. On ATI establishment, IRL will become a non-CRI subsidiary company of the ATI, including those assets, staff and liabilities which have not yet transferred to the parent. A key focus for this transition period will be minimising uncertainty for IRL staff and stakeholders, while providing the best foundation platform for the ATI to begin operations.

58. I propose the Establishment Board begin to implement the transition once the plan is agreed with the Minister of Science and Innovation. At the same time I propose the IRL Board be tasked with maintaining business as usual while supporting the ATI Establishment Board to achieve a smooth transfer of assets and staff over time

### **Publicity**

59. The Government's intention to establish an Advanced Technology Institute was first announced by the Prime Minister in November 2011. Since then, interest and speculation has been growing in the sector about the Government's intentions, not least from senior management and staff of Industrial Research Limited, other CRIs and tertiary education institutions.

---

<sup>2</sup> The seven groups are: Measurement Standards Laboratory (32 FTEs), Advanced Materials (35 FTEs), Intelligent Machines and Devices & Medical Device Technologies (64 FTEs), Superconductivity & Energy (40 FTEs), Integrated Bioactive Technologies (22 FTEs), Carbohydrate Chemistry (35 FTEs) and Glycosyn (23 FTEs). The majority of staff are located in Lower Hutt (284 FTEs), followed by Auckland (30 FTEs) and Christchurch (17 FTEs).

60. To provide certainty of direction, I intend to publicly announce the Government's decisions on this paper soon.
61. These announcements will be closely coordinated with the Ministry of Science and Innovation, Industrial Research Limited and New Zealand Trade and Enterprise.

### **Financial Implications**

62. Budget 2012 approved \$1.871 million in departmental operating expenditure for 2012/13 to provide for ATI set-up and establishment costs. In addition, \$166.1 million was appropriated over four years to support ATI implementation:

<b>ATI Appropriations</b> (\$ million)	<b>2012/13</b>	<b>2013/14</b>	<b>2014/15</b>	<b>2015/16 &amp; Out years</b>
Departmental Operating	1.871	-	-	-
Non Departmental Operating	10.000	20.000	30.000	30.000
Non Departmental Capital	11.900	20.000	20.600	23.600

63. The actual allocation and phasing of operating and capital expenditure in out-years is dependent on the development of a detailed financial model and associated business case for the ATI. It will also depend on what current contracts transfer from IRL to the ATI. I therefore propose that the release of non-departmental funding be approved by the Minister of Science and Innovation and Minister of Finance, subject to the approval of a business case proposed by the Establishment Board.

### **Legislative Implications**

64. Legislation is needed to implement the recommendations in this paper, specifically to establish the advanced technology institute as a new Crown agent.
65. I therefore seek your agreement to include an Advanced Technology Institute Bill in the 2012 legislation programme, with a priority 2 (must be passed in the year). I also seek your authorisation for the Minister of Science and Innovation, in consultation with the Prime Minister, the Minister of Finance and the Minister of State Services, to make decisions, consistent with the overall policy decisions in this paper, on any issues which arise during the drafting process.

### **Other implications**

66. This paper has no human rights, regulatory impact, business compliance cost, gender, or disability implications.

### **Consultation**

67. The following ministries and agencies have been consulted: Department of Labour, Ministry of Economic Development, Ministry of Education, Ministry of Primary Industries, State Services Commission, the Treasury, the Tertiary Education Commission and New Zealand Trade and Enterprise. The Department of Prime Minister and Cabinet and Parliamentary Counsel Office have been informed.

## Recommendations

68. I recommend that Cabinet:

- 1) **Note** that *Powering Innovation* recommended that Industrial Research Ltd should be transformed into a platform for industry growth that provides market-led, R&D and technology transfer services for firms operating out of centres in Auckland, Wellington and Christchurch.
- 2) **Note** that on 3 November 2011 the Prime Minister announced the Government's intention to transform IRL into an advanced technology institute (ATI).
- 3) **Note** that further detailed work has confirmed there is a strong case for the creation of the ATI, although the proposal has been further developed and refined from that proposed in *Powering Innovation*.
- 4) **Agree** to establish the ATI with the purpose of supporting firms in the manufacturing and services sectors to improve their competitiveness and growth through science & technology-based innovation and its commercialisation.
- 5) **Agree** that the ATI will:
  - a. Operate in a highly business-friendly manner that is responsive to commercial imperatives and timeframes, based on a culture that is strongly industry-focused and results driven
  - b. Support firms at different stages of development, from start-ups to established R&D performers, to innovate in response to domestic and international market needs and opportunities
  - c. Offer a broad range of innovation support services, not just research and development (R&D) and technical services, including brokering access to specialised expertise and facilities
  - d. Be a highly networked organisation, linking up the significant but highly distributed capability that exists in universities, Crown research institutes (CRIs), polytechnics and other research organisations, and providing a route to international sources of expertise
  - e. Have a high proportion of engineers and technologists, as well as complementary capability in the areas of manufacturing processes, design, business engagement and networking
  - f. Be a gateway for manufacturing and services firms to access business R&D funding support, consistent with our objective of a one-stop shop for New Zealand businesses to access technology advice and support
  - g. Provide a vehicle for researchers and graduate students to do applied work and gain experience of industry, while also allowing academic stars to advance their careers
  - h. Develop its strategy in close consultation with firms and industry bodies and be nimble, flexible and evolve over time in response to market opportunities.
- 6) **Agree** that the ATI will aim to:
  - a. broaden the base of technologically aware and innovation-ready companies
  - b. stimulate existing businesses to increase their expenditure on R&D
  - c. build firms' innovation and commercialisation capability, including by putting firms in touch with the right expertise and capability

- d. improve information about and access to the significant but distributed science, engineering, design and technology development capability that exists within public research organisations
  - e. improve the transfer of knowledge and technology in the innovation system by facilitating improved connectivity and networks between firms and knowledge institutions
  - f. encourage greater mobility of workers between knowledge institutions and business.
- 7) **Agree** that, while the ATI's financial performance will remain a key performance measure, the more important measures of performance relate to its contribution to the economy.
- 8) **Direct** MBIE, in consultation with the Treasury and the ATI Establishment Board, to report to EGI by 30 September on the detail of an accountability and performance framework for the ATI.
- 9) **Agree** that the ATI perform two principal roles and related functions:
- a. An intermediary that will improve connectivity and capability in the innovation system by:
    - i. facilitating the development of industry-led R&D and innovation consortia
    - ii. leading the development of technology platforms that support industries or groupings of firms
    - iii. being a gateway for firms to access business R&D grants and related innovation and commercialisation support
    - iv. being a portal for firms to access relevant expertise, equipment and facilities, from New Zealand and overseas
    - v. actively fostering mobility of staff between universities, the ATI and businesses, for example by sponsoring joint appointments and secondments.
  - b. A service provider that will add value to firms through delivery of:
    - i. technology testing services (e.g., product analysis, process testing, calibration and certification and other related measurement services)
    - ii. knowledge and technology transfer services (e.g., participating in and leading innovation networks, brokering access to specialised expertise)
    - iii. business development services (e.g., technology management courses, IP management advice, technology foresight and sourcing)
    - iv. applied R&D services, either on a contract basis or collaboratively with business and other research organisations.

*Industry Sectors & Associated Technical Capabilities*

- 10) **Agree** that the ATI will to a large extent operate in responsive mode, providing services that address the needs or requests of manufacturing and services firms.
- 11) **Agree** that, over time, the ATI will need to develop sector-based prioritisation through a strategic process involving engagement with firms, business and industry representative bodies, research organisations, iwi and other stakeholders.

- 12) **Agree** that the following sectors, which have scale or the potential to grow in value or scale, provide an initial focus for the ATI:
  - a. Food & Beverage manufacturing
  - b. Agri-technologies
  - c. Information and Communication technologies
  - d. Electronics and electrical equipment
  - e. Health technologies
  - f. Therapeutics manufacturing
  - g. High value wood products.
- 13) **Agree** that to support technological innovation in the manufacturing and services sectors, the ATI initially establish networks of capability in the following areas:
  - a. Measurement - including analytical testing, standardisation, certification
  - b. Advanced manufacturing and materials - including automation, materials, textiles, sensors and imaging, nanotechnology, health technologies, energy technologies, minerals processing, wood products, agri-technologies
  - c. Manufacturing and services processes/systems - including process control, supply chain management, life cycle assessment, prototyping, user interface analysis, industrial product and service design
  - d. Digital technologies - including electronics, communication networks, geospatial technology, signal processing, software, computer science, digital media
  - e. Applied chemistry and biotechnology - including food and beverage processing and product development, bioactives, industrial products, fermentation, therapeutics synthesis and manufacturing.

*Business engagement*

- 14) **Agree** that the ATI provide a segmented range of services targeted at both larger, more R&D capable firms as well as services designed to raise technology awareness and build the R&D and innovation capability of smaller firms with growth potential.

*Relationship to other agencies and transfer of functions to ATI*

- 15) **Agree** that a function of the ATI is to maintain strong relationships with the key players in the innovation system, in particular universities and polytechnics, other Crown research institutes, NZTE, regional EDAs and MBIE.
- 16) **Agree** that the Global Expert Services and the Futureintech initiative, and associated funding, transfer from MBIE (currently with MSI) to the ATI upon its establishment.
- 17) **Agree** in principle that the administration of certain business R&D grants schemes, along with MSI's current business investment managers whose primary role is to administer these funding schemes, transfer from MBIE to the ATI upon its establishment.
- 18) **Direct** officials from MBIE, in consultation with the Treasury, to report back to EGI by 30 September 2012 with final advice and recommendations to give effect to recommendation 17.

- 19) **Agree** that the report back in recommendation 18 is to include consideration of: which funding instruments should be devolved to the ATI; how to ensure integration between science and business funding; the appropriate roles for MBIE and the statutory innovation board in the grants administration system; and how to ensure a level playing field vis-à-vis other research providers.
- 20) **Direct** officials from MBIE, in consultation with the ATI Establishment Board and NZTE, to report back to EGI by 30 September 2012 on how it proposes the activities of ATI and NZTE be aligned and coordinated and which, if any, NZTE initiatives or programmes should be transferred to the ATI.
- 21) **Agree** to transfer the functions of the New Zealand Food Innovation Network Company to the ATI upon its establishment.
- 22) **Direct** officials from MBIE, in consultation with the ATI Establishment Board and ATEED, to consider how best to integrate the FoodBowl with the ATI and report back to the Minister of Science and Innovation with its recommendation by 1 December 2012.

### **Organisational Form**

- 23) **Agree** that, given the mix of commercial and non-commercial objectives of the ATI, the choice of organisational forms is between a Crown agent, Crown research institute or Crown entity company.
- 24) **Agree** that, on balance, a Crown agent represents the best fit with the proposed mix of roles and functions proposed for the ATI, especially given its role in administering business R&D grants.
- 25) **Agree** that the ATI be established as a new Crown agent, with a target date for establishment of 1 December 2012.

### **Implementation Process**

- 26) **Authorise** the Minister of Science and Innovation, in consultation with the Minister of Finance and the Minister of State Services, to appoint a small Establishment Board to take the next steps in ATI organisational design and implementation.
- 27) **Agree** that the ATI Establishment Board will develop and implement a transition pathway for IRL to become part of the ATI.
- 28) **Agree** that the Minister of Finance and I refocus the IRL Board on preparing the company for transition to the ATI, working closely with the ATI Establishment Board to ensure a smooth transfer of assets and staff to the new entity.

### **Publicity**

- 29) **Invite** the Minister of Science and Innovation to announce these decisions as soon as possible.

### **Financial Implications**

- 30) **Note** that Budget 2012 approved \$1.871 million in departmental operating expenditure for ATI establishment in 2012/13, and that this will fund the activities of the establishment board and establishment unit.
- 31) **Note** that Budget 2012 also approved \$166.1 million in non-departmental funding over four years to support ATI implementation but the final allocation and phasing of operating and capital expenditure is dependent on the development of a detailed business case and revenue model.

- 32) **Agree** that the release of non-departmental funding be approved by the Minister of Science and Innovation and Minister of Finance, subject to an acceptable business case and revenue model being proposed by the Establishment Board.

### **Legislation**

- 33) **Agree** to the inclusion of an Advanced Technology Institute Bill in the 2012 legislation programme, with a priority 2 (Must be passed in the year).
- 34) **Invite** the Minister of Science and Innovation to issue drafting instructions to Parliamentary Counsel to implement the recommendations in this paper.
- 35) **Authorise** the Minister of Science and Innovation, in consultation with the Prime Minister, the Minister of Finance, and the Minister of State Services to make decisions consistent with the overall policy decisions in this paper on any issues which arise during the drafting process.
- 36) **Note** that the Bill should be passed no later than 30 November 2012 to achieve the desired ATI start date of 1 December 2012.

Hon Steven Joyce  
Minister of Science and Innovation

Date: \_\_ / \_\_ / 2012

## Annex 1: Key Findings of HVMS Sector Profile

An analysis of available data and research on the New Zealand HVMS sector<sup>3</sup> was commissioned from MartinJenkins. It involved analysis of data from several Statistics New Zealand sources as well as industry reviews and secondary analyses carried out by other agencies.

Key findings of the profile study are:

- The HVMS sector is important to New Zealand, producing approximately 29% (\$37.5 billion) of New Zealand's total value added and employing around 16% of workers. HVMS firms have higher labour productivity, spend more on R&D and product development, are more likely to have introduced "new to market" products and have higher export intensity than non-HVMS firms. Some firms in the sector are "high-value" as they produce specialised knowledge-intensive products and services that command premiums in markets. Others have scale and the potential to add further value to their products and services through technological innovation.
- Food & Beverage Manufacturing is the largest HVMS sub-sector by value added and employment, contributing 50% of our total manufacturing export value, and a third of the product classes with revealed comparative advantage.<sup>4</sup> Wood & Paper and Metal Materials are also significant exporters. There is considerable potential to support the development of export-based technology firms that emerge through their association with our large primary sectors, including in areas such as agri-tech or advanced wood products.
- There are a number of other sub-sectors with significant scale and/or the potential to grow to scale: Mining; Heavy & Civil Engineering; Engineering, Surveying & Mapping; and ICT Services, Design & Publishing have all grown by 60% or more in the last five years, and each produces more than \$1 billion in value added per year.
- The sector is very diverse and fragmented, with few large firms or groupings of companies. They are also geographically dispersed. While most HVMS employment is concentrated in the North Island, in particular Auckland, there are significant differences in employment distribution between sub-sectors. Wellington has a high proportion of HVMS Services employment, and Canterbury has a high proportion of HVMS Manufacturing employment.
- HVMS firms' science and technology needs are also disparate. HVMS firms are more likely in general to spend on R&D and innovation, and this increases with firm size. HVMS firms with 100+ employees spent almost four times as much on innovation and were four times more likely to undertake R&D as the same size non-HVMS firms. Sub-sectors with the greatest number of firms undertaking R&D were Food & Beverage Manufacturing; Scientific Research & Testing; and ICT Services, Design & Publishing (which contributes almost 20% of total HVMS spend on R&D). Sub-sectors with the highest average R&D spend were manufacturers of Scientific Instruments; Electrical Equipment & Appliances; and Electronic Equipment (ICT). These subsectors could therefore be important clients of the ATI.

---

<sup>3</sup> The HVMS sector was broadly defined for the study, to avoid unduly ruling out sub-sectors which could be within scope for the ATI. The sector profile includes Manufacturing (Food & Beverage; Textiles, Clothing & Footwear; Wood & Paper; Materials; Chemicals & Pharmaceuticals; Electrical Equipment & Appliances; Electronic Equipment and Other Machinery & Equipment; Scientific Instruments); Services (ICT, Digital & Creative; Telecommunications; Engineering; Scientific Research & Testing); and Energy & Mining.

<sup>4</sup> i.e. a product where New Zealand's share of world exports is greater than New Zealand's total share of world exports.

## Annex 2: Key Findings of Demand-Side Study

A study of HVMS firms' demand for R&D and innovation support services was conducted by Deloitte. It involved interviews with 44 firms and survey responses from 344 firms which provided information on: why and how HVMS firms innovate; their experience with public research organisations (PROs); their barriers to innovation; the implications this has for the role of the ATI.

Key findings of the study are:

- Innovation is critical to HVMS firms. It is predominately market-led and typically driven by the need to remain competitive with other businesses in their market/s and continually improve existing product or services. Only a small proportion of firms innovate predominantly through a technology-push mechanism.
- When looking for innovation expertise, firms first draw on internal resources before looking externally for support. Externally, they tend to look to support from known providers of specialist services such as suppliers, customers or their wider networks. PROs (both CRIs and universities) are not typically an important source of external support.
- Firms engage with PROs on selected projects where the capability is considered relevant and deep. IRL and the Universities of Auckland, Canterbury and Massey are the PROs most routinely accessed by HVMS firms. Firms were also found to routinely access international capability to support their innovation.
- A number of barriers to innovation were identified in the study, the most important being the high cost of innovation and limited access to funds. Other barriers included lack of in-house knowledge, management resources and equipment.
- Firms saw a role for the ATI in the provision of technology services, R&D, business capability and education services. They also indicated they wanted the ATI to be market-oriented, and needed a "one stop shop" for access to R & D grants, smart capital, capability and new thinking, and support for the aggregation of demand for specialist equipment not currently available in New Zealand.
- There were some concerns that the ATI could duplicate and displace existing services available in the private sector, be too generalist in nature and increase business confusion about where government support could be obtained.

## Annex 3: Key Findings of Supply-Side Study

MSI carried out a study of the technical capability in New Zealand universities, CRIs and other knowledge institutions relevant to HVMS firms. This involved desk research, plus a series of meetings and/or site visits to all universities and CRIs, WeITec and Manukau Institute of Technology, BRANZ, HERA, Cawthron, and the Defence Technology Agency.

Capability considered relevant to HVMS firms covered a broad scope of areas including measurement, advanced manufacturing, materials, digital technologies, manufacturing processes, industrial chemistry and biochemistry. The study identified the nature and location of relevant capability across the system but did not assess capacity or performance. It also gathered information on existing linkages with firms and industry.

Key findings of this study are:

- HVMS-relevant capability is widespread across New Zealand knowledge institutions. IRL and the University of Auckland (UA) have significant capacity, each supported through around \$25 million per annum MSI contestable investments. But relevant capability also exists in all other institutions. The attached map shows the broad groupings of capability identified across the country.<sup>5</sup>
- The wide distribution of capability is not surprising. Capability has been developed over the years for a range of purposes: in universities and polytechnics to support tertiary teaching at their local campuses, in CRIs to support their sector's needs, and in research associations to support local and national industry needs.
- The expertise and services currently available to firms is wide-ranging including research, science and regulatory advice, technical services (e.g. testing and analysis), access to facilities, and student support for industry projects. Much of the capability is intended to support teaching or public good research, but throughout the system there are examples of units set up to provide services to firms. These include longstanding service units within CRIs, such as the Measurement Standards Laboratory at IRL, and more recent initiatives such as the University of Auckland's Materials Accelerator.
- Science-science linkages appear to have increased over the past few years, with a number of recent examples of greater collaboration and staff working across institutions. Discussions indicated there was potential for the ATI to further build connectivity in the science system, particularly that which needs to occur between science institutions outside or prior to research investments.
- Most links between universities and firms are driven by teaching needs. Engagement is also integral to applied research activity and also occurs through consultancy services. The University of Auckland has a strong commercial approach to industry consultancy and partnerships. In other universities, engagement with industry is less formalised.
- The primary-industry focused CRIs (Plant and Food Research, AgResearch and Scion) have extensive relationships with large industry groups, such as Zespri and DairyNZ, and larger companies, such as Fonterra and Carter Holt Harvey. They also have links with international firms. Their interaction with smaller New Zealand firms is more limited and tends to involve the CRIs in a capability-building role.

---

<sup>5</sup> Capability includes both the skilled people to carry out research or technical services, provide advice or teach, as well as physical equipment and facilities.



## Annex 4: Stocktake of Industrial Research Limited

An independent panel was commissioned to undertake a detailed stocktake of IRL's current business model and operations, similar to a due diligence which would be undertaken by any business owner contemplating a major investment. The panel drew on a wide range of information provided by IRL and MSI (including management information, Board reports, previous reviews and strategic documents, current contracts) and interviewed IRL Board members, senior managers and staff as well as a small number of external stakeholders.

The panel found no "show stoppers" to change. Key findings of the Stocktake are:

- IRL employs around 340 FTEs - the majority (284) in Lower Hutt, followed by Auckland (30) and Christchurch (17). The composition of IRL's research staff is: 63% Applied Science; 34% Engineering; and 3% other. Compared to other CRIs, IRL has more scientists, fewer technicians and a similar number of central support staff.
- Around 70% of IRL's annual revenue of \$62.5 million comes directly from the government; 18% from CRI core funding and an appropriation to fulfil the Government's requirements under the Measurement Standards Act 1992, and 51% through MSI contestable science funding (this is at risk in MSI's bidding processes over both this year and next).
- In 2011, 9% of IRL's revenue came from domestic commercial customers, and a further 13% from offshore clients<sup>6</sup>. Domestic commercial revenue has fallen by 50% in real terms since 1993, reflecting a trend of steadily declining active customer numbers since 2006. Both on and offshore, a small number of clients account for the major share of commercial revenue - in 2011 the top 10 customers accounted for 41% of total domestic commercial revenue, and two clients accounted for 71% of the international total.
- Overall IRL's financial performance has been poor, with a cumulative loss of \$1.9 million over the last 5 years. Return on equity has averaged 3.2% over that period and it has paid no dividends to the Crown.\*\* The net debt/cash position is however healthy, as a result of \$15.9 million in Crown capital injections and recently improved operating cash flows.
- IRL has some scientific capabilities of international standing, built on the achievements of several scientists of international repute. However several key people have recently retired or are nearing the end of their careers. Moreover the highest performing teams in science terms are not aligned with strong NZ industry partners, and are facing nascent or narrow domestic industry sectors. Despite a relatively high level of patenting, commercial uptake of IRL's products, services and IP by NZ firms has been limited. Two companies spun-out of IRL's work in superconductivity have not generated large returns.
- IRL's business model largely reflects its operating environment, where its focus has largely been on servicing contestable funding rounds run by MSI. Activity has been positioned around investment signals which for an extended period drove a focus on spin-outs and commercialisation of internally generated IP, and a significant investment in areas of emerging technology with little strong connection to New Zealand industry.
- IRL has recently adopted a more outward-facing strategy which is generating some success, including an against-trend increase in domestic commercial revenue last year. All lines of business have increased their level of engagement to some degree. However commercial and commercialisation experience is thinly spread and there remains an over-emphasis on science-push rather than industry-pull in the current project portfolio.

---

<sup>6</sup> The remainder is from IP and other income (4%), other CRIs and universities (3%), related parties (1%) and non-MSI central government and crown entities.

\*\* Clarification added for public release of paper: this sentence refers to the five years to 30 June 2011 (the period covered by the Stocktake). As per p.9 of the Stocktake, the IRL Board resolved to pay a dividend of \$250,000 in 2011/12, which has since been paid.

## Annex 5: International Best Practice Review

MSI carried out a review of institutional approaches used by a selection of other countries to support their high-tech manufacturing and services sectors, including Denmark, Sweden, Finland, the UK, Taiwan, Korea, Singapore and Australia (Queensland). In addition a report was commissioned from a senior manager in the Danish Technology Institute (DTI) to explore lessons from the DTI experience which may be relevant to the establishment of the ATI.

Key findings of the review are:

- Agencies designed to support innovation in advanced technology sectors, including high value manufacturing and services, exist in most developed countries. In most cases, applied R&D is the predominant function, but this is often supported by a range of technical and business services, and sometimes also explicit roles in coordination and capability building for industry.
- Overseas evidence shows advanced technology institutes have been successful at helping companies extend beyond their own capabilities, contributing to their own growth and that of the broader economy. Better performing firms actively source knowledge internationally as well as domestically.
- Common themes across country models include:
  - There is variation in both functions and emphasis across countries, reflecting economic structure and the origins of the organisation itself. There is no “one best model”.
  - Most countries have taken an integrated approach, configuring their institutes to carry out not only R&D and technical services but other functions in the wider innovation value chain, including developing skills, facilitating partnerships between science and industry, and in some cases also commercialisation support. While most are multi-functional, in no country is the full network of support located in a single institute.
  - Institute functions are underpinned by a range of capabilities and capital, often used strategically by the institutes to meet broader national aims as well as immediate (research) outputs.
  - Strong government commitment to advanced technology typically includes a clearly articulated vision or strategy for growth through advanced science and innovation, and commitment at the highest political level. Such commitment is accompanied by targeted funding support, although the pattern and nature of this varies.
  - In most countries there is a business and wider societal culture committed to wealth generation through technological change, and willing to take direction from government; this is most apparent in the consensus-driven cultures of Scandinavia and in the Asian countries.
- Specific gaps/issues in the NZ HVMS innovation system identified in the review and DTI report include:
  - there is a need for a stronger international focus than there is currently in the system, linking firms to the best knowledge or technology worldwide
  - there is a need for leadership in building connectivity across the science system, fostering a range of science capability networks and providing a front door for firms to access the specialised expertise they need
  - there is an opportunity to coordinate innovation consortia, across science and industry, to address strategic challenges for New Zealand.

*[Annex withheld]*