

## Briefing: Report on the ATI from Knud Erik Hilding-Hamann (DTI)

<b>Date:</b>	11 May 2012	<b>MSI priority:</b>	Routine
<b>Security Classification:</b>	Commercial In Confidence	<b>Briefing no:</b>	B/12/181

### ACTION SOUGHT

	Action sought	Deadline
<b>Hon Steven Joyce</b> Minister of Science and Innovation	Note the attached report by Knud Erik Hilding-Hamann which shares lessons from the DTI experience relevant to the establishment of the ATI.	22 May

### CONTACT FOR TELEPHONE DISCUSSION (IF REQUIRED)

Name	Position	Telephone	1st contact
Peter Crabtree	Deputy Chief Executive, Systems Strategy and Policy		✓
Katherine Silvester	Systems Strategy and Policy		

### THE FOLLOWING DEPARTMENTS/AGENCIES HAVE SEEN THIS REPORT

<input type="checkbox"/> MED	<input type="checkbox"/> NZTE	<input type="checkbox"/> Treasury	<input type="checkbox"/> COMU	<input type="checkbox"/> DOL	<input type="checkbox"/> TEC	<input type="checkbox"/> MSD
<input type="checkbox"/> MFAT	<input type="checkbox"/> DOC	<input type="checkbox"/> MfE	<input type="checkbox"/> MoH	<input type="checkbox"/> TPK	<input type="checkbox"/> MoE	<input type="checkbox"/> Other

Please specify: \_\_\_\_\_

**Minister's Office to Complete:**

<input type="checkbox"/> Approved	<input type="checkbox"/> Declined
<input type="checkbox"/> Noted	<input type="checkbox"/> Needs change
<input type="checkbox"/> Seen	<input type="checkbox"/> Overtaken by Events
<input type="checkbox"/> See Minister's Notes	<input type="checkbox"/> Withdrawn

**Comments:**

## Recommendations

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*It is recommended that you:*

a.	<b>Note</b> the attached report by Knud Erik Hilding-Hamann which shares lessons from the DTI experience relevant to the establishment of the ATI.	
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**Dr Peter Crabtree**  
Deputy Chief Executive  
Systems Strategy and Policy

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Date

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**Hon Steven Joyce**  
Minister of Science and Innovation

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Date

## Purpose

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1. This paper prefaces the report received from Knud Erik Hilding-Hamann of the Danish Technological Institute (DTI), which is attached for your information. It highlights the key lessons we have taken into account in our advice on the establishment of the ATI.

## Background

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2. Knud Erik has now completed his consultancy report for MSI on 'The future Advanced Technology Institute and its role in growing the HVMS'. The report draws from his expertise from Denmark and the information he gathered during his visit to New Zealand in February. His report is attached.
3. His visit and the resultant report have been useful to us in a number of ways, as follows.
4. First, it has reinforced a number of our current views about the role of the ATI, for example:
  - the ATI should be able to support all HVMS firms with growth potential (not just focus on existing R&D capable firms)
  - it should have an emphasis on tailoring and transferring technologies and knowledge, with science and research playing a supporting role
  - it should provide or facilitate access to latest equipment and facilities
  - it must be one of the multiple "no wrong doors" into the innovation system
  - the ATI should be built from the 'patchwork' of existing capabilities and facilities in New Zealand.
5. Second, it has prompted us to consider roles for the ATI that would be relatively novel developments for our science and innovation system, for example:
  - the ATI could have a stronger international focus than we currently see in the system, forming cooperative relationships with overseas centres of expertise and enabling firms to access the best knowledge or technology worldwide
  - the ATI could have a leadership role in building connectivity across the science system. It could, for example, foster a range of science capability networks in particular areas (e.g. materials, automation) that would provide a simple front door for firms to access the specialised expertise they need
  - the opportunity for the ATI to coordinate innovation consortia, across science and industry, to address strategic challenges for New Zealand. These could include new opportunities from our natural resources (e.g. wool, wood, minerals), or innovative housing projects that could solve local problems and support high value export businesses.
6. Last, the report provides detailed information about how particular DTI funding instruments and incentives operate (p 14-21). While this will be useful in the implementation phase, it is also providing us with guidance at this policy development stage with respect to:

- the ways in which the outcomes and outputs from ATI core funding could be specified and measured through performance contracts (to a greater extent than is presently done with core funding to CRIs), for example:
  - i. be interlinked with the ATI's strategy
  - ii. use an input-to-outcome model: tight accountability for demonstrating the ATI's impact on industry performance, but discretion to determine how it delivers
  - iii. require the ATI to regularly re-evaluate and demonstrate the uniqueness and effectiveness of its activities vis-à-vis the rest of the innovation system.
- the benefits of having the ATI steer its own work programme, in cooperation with industry, to enable buy-in, rather than government seeking to specify this below an outcome level.

## **Communications**

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7. There are no communications implications of this report. While there are no particular sensitivities in the report, we do not intend to make the report available externally.

## **Annex**

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Annex 1: Final Report of the future Advanced Technology Institute and its role in growing the HVMS

## **Final Report on the future Advanced Technology Institute and its role in growing the HVMS**

Prepared for Ministry of Science & Innovation by Knud Erik Hilding-Hamann, DTI, Denmark

### **Executive Summary**

The purpose of this report is to share lessons from the Danish innovation system, approved Technical service institutes (GTS institutes) and the Danish Technological Institute experience in evolving a business-facing organisation to support innovation. The report provides input to MSI's thinking on the role and functions of an Advanced Technology Institute in a wider innovation system and how it interacts with its customers and partners.

An ATI should focus on all HVMS companies with an innovation and growth potential. The purpose of an ATI should be to tailor, transfer and disseminate technical know-how, new methods and knowledge to industry and society in order to support, create and increase business development in the HVMS sector.

An ATI should also play a role in creating and supporting a culture of "wanting to grow and succeed in international business development". Through training courses, master classes, benchmarking and innovation implementation services, an ATI will together with partners stimulate a growth culture among the current generation of business leaders and key employees.

Most of the expected revenue growth of HVMS companies will need to be achieved in international markets. An ATI will require strong cooperative linkages with the key knowledge and high-end R&D hubs around the world in order to support the companies in developing products and services that can compete globally.

In addition to the obvious technical skills and competences within the areas it will operate, an ATI will require the skills required to disseminate and diffuse the knowledge and technological applications widely to businesses eventually through commercial services. Performance contracts could be designed to develop these skills in conjunction with R&D development projects in relevant technological areas. This should be supplemented by short courses for ATI staff and a widely used coaching of employees by mentors.

An ATI must be able to provide industry access to the latest equipment and R&D facilities required to meet the R&D, prototyping, test and measurement needs of enterprises. In addition, it is recommended that an ATI will share a Customer Relationship Management and reporting system with other actors in the innovation system in order to coordinate activities.

An ATI strategy should be developed with industry representatives and public entities and address relevant global challenges. It should focus on partnerships and synergy creation and leverage on existing core strengths and opportunities within the HVMS sector by adding technological and knowledge capabilities to businesses. The strategy should be interlinked with the core funding and performance contracts agreements.

An ATI would need to offer a range of business engaging and industry outreach services including:

- Conferences and seminars
- Education and training courses
- Creativity and innovation services (for some segments operated as innovation agents)
- Product testing life cycle analysis and risk assessment
- Standards and certification services
- Production of high value components, production facilities and materials.
- Project and network management services

The Government funding of an ATI should cover the following types of activities:

- Development, acquisition and contextualization of knowledge and technology that enterprises are expected to demand either much earlier or to a greater extent than can be delivered via normal market development.
- Knowledge dissemination which cover activities, where knowledge is made accessible for a wider audience of New Zealand enterprises.
- Development of new services supply which covers development of competencies as well as customization of international knowledge, technology and business practices, so that it can be disseminated effectively and in a relevant form to firms in New Zealand.
- Standardisation work covering the development and publishing of standards as well as agreeing reciprocal approval mechanisms, measurement and technical references, test facilities and methods and terms of certification.

Section 6 of this report describes a range of instruments implemented in Denmark that could be implemented through an ATI alone or in cooperation with Research institutions and companies in New Zealand. Incentives for an ATI and its employees to perform and deliver commercial results should be built into the governance structure, the influence given to individual departments at an ATI and the remuneration schemes introduced at an ATI for managers and employees.

A complete implementation of an ATI which is sourcing more than half its revenue from commercial activities and is serving all the important parts of the HVMS sector will take at least five years to orchestrate.

The guiding principles for developing an ATI: It should be present where HVMS companies are concentrated; it should promote and support no wrong door for companies into the innovation system; quality and flexibility of services are vital and are linked to scale and volume which in turn builds excellence; focus on innovation partnerships and relationship building are vital success factors along with international anchorage of R&D activities and service development (see section 8 for guiding principles).

## 1. Background

The Ministry of S&I wants to increase the levels of innovation in firms in the New Zealand high-value manufacturing and services (HVMS) sector. A high-level review of the sector (Powering Innovation) found that creating an advanced technology institute (ATI) was one of the primary changes New Zealand should

make to increase HVMS firms' innovation. An ATI must be complemented by a suite of changes to the functioning of the innovation system around it. The review presented these recommendations at a relatively high level, and the next stage is to understand how to implement them in practice.

MSI is gathering information on the New Zealand HVMS sector, major research and development providers' capability and business, international best practice in innovation services for high-value manufacturing, and gaps in the domestic market (where demand for certain innovation services is exceeding supply). This will inform policy and investment decisions in 2012 for increasing HVMS firms' innovation.

As a representative of an organization that is providing such innovation services to manufacturing and services companies in Denmark, the author of the report was invited to New Zealand to meet with stakeholders (businesses, universities, IRL, Polytechnics, councils/economic development agencies, other research organisations and government agencies and people from the ministry of S&I), present the experiences in Denmark and discuss ways in which the Ministry of S&I and an ATI with partners could go about implementing the business facing services and improving the innovation uptake and competitiveness of manufacturing and services companies in New Zealand.

## 2. Purpose of the report

The purpose of this report is to:

- Share lessons from the Danish innovation system, the GTS and DTI experience in evolving a business-facing organisation to support HVMS innovation – key success factors, key features of customer base/ecosystem that made them work successfully in Denmark and how the thinking and approach has evolved over time
- Provide input and recommendations to MSI's thinking on the role and functions of an ATI, how it fits with the wider innovation system (including universities and Polytechnics), how it interacts with its customers, governance/funding/incentive arrangements and transition options.

## 3. The purpose of an Advanced Technology Institute (ATI) in New Zealand

The purpose of an Advanced Technology Institute will depend on whether its reason d'être should be to focus on the top 20% of companies (the companies with the highest innovation and growth potential) or indeed all companies with a growth and innovation potential in the HVMS sector. If the purpose is the first then the activities of an ATI will be more focused on high level research and less so on knowledge diffusion and dissemination services. If the purpose is the latter, then the focus should also include knowledge diffusion and dissemination services.

The advantages of focusing on the top 20% of companies are that:

- The Institute will be working with (presumably) motivated and capable enterprises
- The Customer Relationship Management effort is less demanding

- The Institute will be able to specialize on highly level R&D areas of relevance to the top 20%

The advantages of focusing on all companies with an innovation potential is that:

- The Institute will be able to spread its risk across, R&D, publically funded operator services as well as a wide range of commercial services
- The Institute will be able to support innovative enterprise driven initiatives independent of size and innovation capability at the outset (in other words both act as the R&D department of some enterprises as well as providing high level R&D & technical services to R&D departments in larger enterprises)

Based on analysis and discussions with representatives from both businesses and research organisations, **it is recommended that an ATI should focus on all HVMS companies with an innovation potential** and the purpose of the future ATI should be as follows:

- To tailor, transfer and disseminate technical know-how, new methods and knowledge to industry and society in order to support, create and increase business development in the HVMS sector.

Focusing on all HVMS enterprises with innovation and growth potential requires an ATI to gather substantial micro-level knowledge of subsectors, leading edge companies and networks (see section 3.4). Furthermore, as innovation and growth requires internationalization, an ATI will need to work closely with agencies supporting companies in their export endeavors (see section 3.2).

This should lead to a more competitive manufacturing and services sector in New Zealand. To fulfill this purpose the ATI will need to focus on:

- inspiring to innovation and development in firms
- initiating and supporting innovation networking and technological development at industry/business network level
- conducting industry directed and relevant research and development
- providing standardisation and certification services
- providing relevant knowledge dissemination, education and training services
- providing high value technical services and access to equipment not otherwise available at sufficient scale and quality in New Zealand

### ***3.1. An ATI should support the development of an Innovation “implementation” culture***

Although, New Zealand has many fantastic examples of innovative and entrepreneurial companies, there seems to be a cultural inertia creating barriers to innovation fulfillment and business growth (something most national economies outside the US struggle with to some degree – including Denmark).



This can and should be stimulated through the educational system – giving the younger generations (from primary school and up) the skills and the motivation to be successful at what they do, strive towards big global achievements and a critical attitude towards assessing the results of theirs and others efforts.

**An ATI should also play a role in creating and supporting a culture of “wanting to grow and succeed in international business development”. Particularly in relation to the current generation of business leaders and employees.** This should be addressed at several levels:

- Very practical short courses around creativity, innovation management and innovation fulfillment (ATI could play a role together with Polytechnics and University)
- Services aimed at prototype testing in international settings (global R&D cooperation) and technical and function dossier completion for approval and certification of products for entry into international markets (closely linked to NZTE services for international marketing and sales).
- Master classes around innovation in global value chains (promoting and creating learning experiences around the “unlikely” successes of SMEs in NZ by tapping into and significant harnessing global value chains – e.g. Formway Design working with Dupont, Knoll, etc.)
- Benchmarking services to be marketed through even the smallest of relevant sector organisations within the HVMS (benchmarking for instance innovation capacity, international value chain participation and achievements).

### ***3.2. An ATI should support the internationalization process of NZ HVMS companies***

Although many NZ companies have the potential to increase their revenue in the domestic market, much of the expected revenue growth of manufacturing and services companies will need to be achieved in international markets. Many NZ companies are struggling to keep a drift with the latest global knowledge, product and technology standards (state-of-the-art) in their areas of business and this is a significant barrier to international growth. The Crown Research Institutes and universities do collaborate internationally mainly on a project to project basis. However, it is not apparent that this takes place on the basis of a coherent strategy for internationalization of R&D and upgrading on product, process and technology standards for NZ firms.

Fulfilling the purpose as described in section x above, requires an ATI to have strong cooperative linkages with the key knowledge, R&D and high-end development hubs around the world.

**Therefore, it should be considered to allow and encourage CRIs and especially an ATI to boost international co-operations and likely establish a presence (being able to seek local R&D funds) in key knowledge hubs (e.g. Europe, Singapore, China, US).**

### ***3.3. Assessing the innovation potential of an ATI and the HVMS sectors***

An ATI can of course not spread its activities across all possible opportunities. Therefore, there is a need for an analysis and assessment of industry and services sector strengths and weaknesses up against the major challenges that New Zealand and the rest of the world are facing to identify the 10-15 key strategic

research themes that should help position New Zealand and its business communities as a key player during the period up to say 2020. Elements of this assessment could among others consider:

- The global challenges<sup>1</sup> (financial crisis, climate crisis, poverty crisis, food and water scarcity, security crisis, etc) and how these will affect New Zealand's near markets
- How NZ firms are positioned to meet these challenges and provide solutions for eliminating the problems they might be causing.
- Opportunities for exploiting natural and readily available resources in New Zealand (wool, wood, minerals, geothermal and other energy sources, capital funds, etc.)
- Unique opportunities for large scale innovative developments at Christchurch and through the merger of councils in Auckland. See for example the active house initiative in Denmark<sup>2</sup>.
- Creating internationally renowned demonstrators/living labs (DK- Island of Samsoe<sup>3</sup> – the island is self-sustainable on renewable energy after ten years intense work of citizens and businesses; industrial symbiosis with massive synergies and savings achieved – example from Kalundborg, Denmark<sup>4</sup>)
- Identifying common manufacturing challenges, productivity enablers and product standardisation and certification issues.
- Target joint innovation opportunities across companies and sectors – it is not just individual businesses that could benefit from product, service, market or process innovations. Often the strong opportunities are to be found along the value chain and in between companies, incl. by reconsidering business models. Identifying opportunities across businesses from different sectors will involve bringing companies together that are not used to working together (for example insurance companies, water and energy utilities, landscape architects and gardening, and engineering firms to explore new possibilities in relation to the challenges associated with torrential rain and flooding).

In Denmark, the national R&D led and sector specific innovation potentials are assessed through several initiatives at different levels.

At strategic level, the Government does not necessarily take an industry focus, but rather a problem oriented research agenda focus.

The current strategic research themes of DASTI were decided during the RESEARCH2015 process initiated in 2006 and implemented in 2009. Currently, a new process is initiated to identify the strategic research themes for 2020. You can read more about the process and contributions here:

<http://en.fi.dk/research/research2015-and-research2020/research2020>

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<sup>1</sup> <https://www.mm.dk/risk-opportunity-report-2009>

<sup>2</sup> <http://www.activehouse.info/>

<sup>3</sup> <http://energiakademiet.dk/en/vedvarende-energi-o/>

<sup>4</sup> <http://da.symbiosis.dk/media/7940/symbiosis%20paper%20presentation.pdf>

The Danish Council for Strategic Research publication provides five theme examples<sup>5</sup> that are directly linked to the Research 2015 process. Selected research themes must meet the following criteria:

- a high potential international impact
- a focus on significant societal challenges, and
- potential to contribute to national economic growth and welfare improvements

The SPIR initiative and the latest call for proposals into bio-based economy is another example of a research initiative that is addressing a societal challenge with potential for business growth<sup>6</sup>.

Similarly, other privately owned think tanks also contribute to the development of research agendas and networking globally. One example of this in Denmark is the Think Tank Monday Morning and the state driven research organisation REGLAB<sup>7</sup>. The Monday Morning think tank and publisher has produced foresight papers and publications concerning future scenarios in relation to Energy and renewable energy networks <https://www.mm.dk/less-energy-more-growth> <https://www.mm.dk/copenhagen-beyond-green> and <https://www.mm.dk/guide-to-sustainia-0> and in relation to Restructuring and reinventing the healthcare system: <https://www.mm.dk/reinventing-health-care>.

Sector specific initiatives are usually taken at the regional level, through innovation networks and specific GTS performance contracts and innovation consortia, but again will be closely linked to societal challenges. The Business development strategy of the Central Denmark Region is a good example of a regional sectoral focus<sup>8</sup>. The Central Denmark Region focuses on improving the competitiveness of enterprises operating in the environment and energy, foodstuff, health and welfare technology, ICT and tourism sectors.

### ***3.4. Understanding the high-tech manufacturing and services sector, its markets and value chains***

ATI and other relevant government institution should acquire quantitative and qualitative data to gain a better understanding of the challenges and opportunities of this sector, incl. exposure to international competition, possible linkages to global value chains, existing networks and active partnerships.

Focus should not just be on the top 100 or even top200. Innovation and growth can come from anywhere (e.g. Skype.com came out of a loft room in Denmark and became a billion dollar business).

In Denmark, at the GTS network level, we have researched and categorized companies into A, B and C categories according to “likely” exposure to international competition and internal innovation and R&D capabilities and mapped the joint customer base of 20.000 companies up against these categories to

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<sup>5</sup> <http://en.fi.dk/publications/2011/strategic-research-knowledge-growth-and-welfare-a-presentation-of-the-danish-council-for-strategic-research/engelsk-praesentation-til-web.pdf>

<sup>6</sup> <http://en.fi.dk/funding/calls/2012/spir-2012-strategic-platform-for-innovation-and-research/SPIR-EN-phase1-2012-call-final.pdf>

<sup>7</sup> <http://www.reglab.dk/english>

<sup>8</sup> <http://www.regionmidtjylland.dk/files/Regional%20udvikling/Vækstforum/Erhvervsudviklingsstrategi%202010-2020/Growth%20Forum's%20Business%20Development%20Strategy%202010-2020.pdf>

understand our coverage of sectors to identify areas for better coverage and growth and stimulation of innovation in our markets.

An ATI and the other CRIs should engage with enterprises in the various sectors to get to know the sector and enterprises, their needs and prospects much better beyond the TIN report and in relation to the current customer bases. It should be possible to link commercial and non-commercial business customer base to the HVMS sector in total (or at least a top TIN 200 or in time TIN 500), and be measured on the interaction with and impact on these companies.

## 4. Skills, facilities and systems of an ATI

### *4.1. Important skills required by employees at Advanced Technology Institute*

An ATI will obviously need to employ people who possess technical skills and qualifications to international standards in the relevant technical areas to be covered by the ATI. Furthermore, the number of qualified personnel in each technical area must be of a sufficient critical mass to meet the needs in the industry.

Furthermore, an ATI will require the skills and qualifications required to disseminate and diffuse the knowledge and technological application developments widely to businesses preferably through commercial services.

*Hence, key skills and competences of industry facing staff are (most customer facing staff should be specialized in one to three of these areas):*

- Being able to understand day to day business challenges – process diagnostic and analysis skills
- Skills in developing and redeveloping business models (incl. service business models)
- Ability to convert and communicate application possibilities from theoretical knowledge/applied research (tech trans)
- Awareness of technology innovation strategies and the ability to communicate these to enterprises
- Ability to convert likely applications to actual business improvements and performance.
- Presentation, documentation and showcasing R&D results in convincing demonstrations
- Commoditization of R&D experience and results into technical services
- Ability to conduct R&D activity directly in cooperation with firms (Product and service development, testing and trials)

#### **4.2. How should these skills be developed?**

It is recommended that elements of core funding of an ATI is used to develop these skills were necessary. International experts and trainers could be used to cover areas that could not be covered by national experts, entrepreneurs and business developers. **Performance contracts could be designed to develop these skills in conjunction with R&D development projects in different technological areas. This should be supplemented by short courses and a widely used coaching of employees by mentors (even at a distance).** Mentors could be from other countries and mentoring could take place partly at a distance through web communication platforms.

#### **4.3. Facilities and systems required at an ATI**

An ATI must be able to provide industry access to the latest equipment and R&D facilities required to meet the R&D, prototyping, test and measurement tasks of enterprises.

In addition, it is recommended that an ATI will share a Customer Relationship Management system with other actors in the innovation system. In Denmark this has been implemented across growth houses and across GTS institutions in relation to the work of the innovation agents, but not across all actors, which is greatly missed and creates much duplication of effort. Hence, it is recommended to consider:

- Joint basic CRM system to manage interactions with businesses. Such a system could have several levels:
  - each institutions could view who had interaction with which companies and the subject of the interaction
  - each institution could in addition manage their own detailed interaction with each of these clients.
  - It would require “detailed rules of engagement”, but would greatly enhance the experience of companies, the coherence and sequencing of service provision.
- Common CRM and performance criteria across ATI units and partly shared with other stakeholders and CRIs
- Joint investment in laboratory and other R&D facilities across actors in the innovation system that can be used for both basic research as well as applied research and application development with business clients (e.g. for instance the latest scanners, additive manufacturing machines (3D printing equipment), high value and costly test and laboratory facilities.
- Lab and test facility database (updated by owners) to reduce overlap of facilities and exploiting extra capacity.
- Improvement and tailoring of the global experts network for better access to New Zealand & global networks of experts
- Online ordering systems for standard service modules (e.g. laboratory and test services) and customer evaluation and feedback scheme

- Project database (internal and external) to allow linkages between projects and enterprises.
- Digital do-it-yourself (self-help) tools/e-learning instruction for business clients

## 5. ATI roles, functions and Services

As mentioned earlier it will be necessary for an ATI to focus on enterprise relevant R&D and needs led technical services, including a range of entry-level technical services (commercial as well as part-funded). These entry-level services should help ATI develop relationships with a high number of potential customers in the HMVS sector. On the basis of partnerships with a wide range of business representative organisations (networks and local clusters, branch organisations, membership clubs, Maori communities, etc.) an ATI will tailor these services to the requirements of the companies.

R&D departments that demonstrate research and development activities with a close and substantial link and dependence to enterprises in New Zealand (opportunity for implementation/commercialization within 2-5 year/or by the end of the funding period) should be considered as a possible integral unit of a future ATI.

Investment in high tech equipment, laboratory facilities etc. will be vital to develop and maintain an innovation support capability within ATI, the other CRIs, Universities and Polytechnics that matches the needs for research as well as R&D needs in businesses. However, for small countries like New Zealand or Denmark, it is not affordable to create overlap of capability. A detailed overview of facilities, capacity levels and likely relevance of those facilities for prototyping, development and testing of business innovations must inform investment plans and ATI role definition as opposed to other institutions.

### 5.1. How to develop the strategic directions of an ATI?

The DTI uses several approaches and sources for determining sector and technology areas for capability development:

**The DTI obviously uses its Board of Trustees and Board of Representatives to provide insights from the market and the enterprises and to provide feedback and critique on strategies and plans.** The Institute directors will meet with the board at least four times per year and with the Board of Representatives once a year. Both the board of Trustees and the Board of Representatives are made up of industry and university representatives and other stakeholders.

DASTI has for the period 2011-2013 identified manufacturing and services industries broadly as the focal points for R&D investment – focusing on the need for increased productivity and increasing proportions of enterprises actually investing in innovation and R&D. The DTI initiatives are informed by these priorities and are designed to address the challenges within them.

The current process to identify the strategic research themes for 2020 will also inform the prioritization of relevant R&D and service development strategies at Danish Technological Institute as well as other GTS institutes. More information about the process and contributions can be found here:

<http://en.fi.dk/research/research2015-and-research2020/research2020>.

Furthermore, the EU, OECD, Danish and other ministries conduct studies on where technology developments are heading. Analyses work identifies future focal points of research programs and propose new activities. – the DTI will continuously map its own competences and possible capabilities up against these developments to identify its own future R&D and service development areas to match those areas where it can build on existing strengths.

**In planning future R&D activities, the Institute and individual divisions will decide on strategic focal points for its service development activities based on its existing competences and capabilities coupled with the signals it is receiving from dialogues with industry.**

The DTI will hence propose R&D activities that are likely to lead to the development of technological services or competences which can be exploited later on as commercial services. **The Institute looks for best possible use of existing laboratory and technical capabilities and will invest in new facilities where it is convinced that there is a buy-in from industry.**

### ***5.2. Developing a Strategy for an ATI***

It is still premature to consider a strategy of an ATI, but the guiding principles for the process of developing a strategy could include the following elements:

- The strategy should address the relevant global challenges and position an ATI as an important partner to industry in developing attractive and sustainable solutions to solve these challenges.
- The strategy should leverage on existing core strengths and opportunities within the HVMS sector by adding technological and knowledge capabilities to these core competences.
- The strategy should be developed with industry representatives and also jointly with public entities as important procurement powers affecting innovation.
- The strategy should focus on partnerships and synergy creation to avoid overlap of efforts and instead the development of centres of excellence in technical and R&D services to industry (based on international benchmarks).
- The strategy should be linked to and direct/inform core funding and performance contracts agreements.

### ***5.3. The functions and services an ATI will provide in the innovation system***

The below lists the key business engaging and industry outreach functions of an ATI. A detailed description of services would depend on a comprehensive analysis of HVMS sectors needs and existing supplied by other actors in the market. Large scale commercial or publically funded R&D contract activities are likely to comprise several of the services in the table below.

<b>Services</b>	<b>Prioritization/timing</b>	<b>Function</b>	<b>Source of Revenue</b>
Conferences and seminars	Can be implemented more or less immediately and scaled	Relationship building with clients; dissemination of new emerging	Primarily commercial and potentially a good source

COMMERCIAL IN CONFIDENCE – NOT GOVERNMENT POLICY

	up/down according to demand	technological opportunities, technical standards, management approaches, etc.	of income! Should be operated as a separate unit and draw on expertise from other parts of ATI
Education and Training courses	Can be implemented more or less immediately and the course program should be developed according to demands and gaps in the market.	Developing technical capability in businesses by developing the skills of key people in areas such as: innovation implementation, management and quality systems, project management, new materials, measurement techniques and tools, etc. Creating opportunities for commercial contracts	Primarily commercial and potentially a very good source of income! Should be operated as a separate unit and draw on expertise from other parts of ATI.
Creativity and innovation services (for some segments operated as innovation agents)	Implementation depends on existing competences – some areas can be implemented straight away due to existing well developed competences; others should be developed over 1-3 years.	Facilitating creativity and innovation processes in businesses and across businesses for idea generation – could also be facilitated through workshops with several knowledge experts and different businesses participating.	Partly commercial where competences of staff exist and through performance contracts for development of competences where they do not exist! For certain segments it could continue as fully funded!
*Product, process and service development incl. prototyping and living labs	Implementation depends on existing competences – some areas can be implemented straight away due to existing well developed competences; others should be developed over 1-3 years.	Support new product, process and service development in HVMS sectors. Aimed at facilitating innovation implementation.	Partly commercial where competences of staff exist and through performance contracts for development of competences where they do not exist!
Standards and certification services	Will require competence development and in some instances approval by standards organisations – implemented over 1-3 years in areas where there are gaps in the market (important to assess value/impact vs. cost!	Helping businesses to prepare their products for foreign markets and meeting domestic and international standards (Consultancy in gathering technical dossier and actually preparing documentation)	Primarily commercial and potentially a good source of income! Building the competence supported via performance contract where this competence is relevant and non-existent in NZ!
*Product testing life cycle analysis and risk assessment	Implementation depends on existing competences – some areas can be implemented straight away; others should be developed over 1-3 years.	Supporting product development within the industry to meet higher performance standards. Supporting management decisions when considering several future product, technology and materials avenues!	Primarily commercial and potentially a good source of income! Building the competence supported via performance contract where this competence is relevant and non-existent in NZ!
*Production of high value components, production facilities and materials.	Implementation depends on existing competences – some areas can be implemented straight away; others should be developed over 2-5 years.	Providing industry with components, production facilities and materials that can strengthen the competitiveness of its products and services (e.g. prolonging the life of products, improving the experience of using a product, reducing price of products;	Performance contracts and other funding instruments can help develop the competence, however within 2-5 years it should show likely commercial revenue streams



		reducing or eliminating risks, etc.	
Project and network management services	Implementation could take place immediately; however, it would be worthwhile considering a national project and especially a network management course for relevant staff across all CRIs.	Ensuring that R&D projects go from initial idea to actual results. Creating value adding innovation networks across businesses and knowledge institutions. Benchmarking services around innovation performance and capability, sustainability and productivity performances.	Project management should be a commercial service or an integral part of running publically funded projects. Innovation network management should be partly commercial and partly publically funded – initially though funded by public funds.

\* will often require substantial financial investment in equipment, production facility and laboratory facilities (therefore requires an adequate market needs analysis to support decision making!

**5.4. Jurisdictional Tension between an ATI and other knowledge providers**

Jurisdictional Tensions between knowledge institutions and innovation service providers can be positive (keep various players on their toes) or negative (consume effort in territorial battles and duplication). Below good and bad lessons from Denmark about how to manage the territorial and functional tensions between the DTI and other innovation system players is presented. Furthermore examples are given of how the Danish system has harnessed these tensions for good (or at least to prevent them from having a negative effect).

The innovation system/DASTI in Denmark has learned that it is important to coordinate initiatives across ministries (each ministry and agency is responsible for different actors in the broader innovation system) and to involve all relevant stakeholders in the decision making around purpose, target audiences, possible overlap with existing commercial offerings and allocation of R&D funds to GTS and other knowledge institutions. The purpose of which is to avoid overlap of efforts and entry of knowledge institutions into business areas where commercial offerings are of sufficient quality and volume.

As a direct consequence, the current innovation strategy development process in Denmark involves a wide range of ministries and agencies and will most likely lead to greater coherence across initiatives.

In the past, there have been examples of overlap of efforts and lack of coordination. From time to time, private engineering companies and consultancies will as important players and being represented on the Danish Council for Technology and Innovation contest allocations to GTS or even universities as unfair competition and DASTI are asked to justify the allocation or change it. Furthermore, the Danish innovation system is constrained by EU rules setting stringent rules for publically supported business guidance and R&D activities so that they do not compete with commercial offerings.

DASTI and DEACA (<http://www.deaca.dk/>) have started coordinating efforts and governance of initiatives to bind the innovation system better together. DASTI has introduced even better control and documentation of actual business requirements for R&D support and investment. Although, it is not yet perfect these are steps in the right direction.

Possible competitors to the GTS and universities are represented on the Danish Council for Technology and Innovation and during the open and public hearing on the future performance contract proposals they can put forward arguments for not supporting planned projects or indeed change their focus for the coming three years (see section 6.2 for the process of planning future performance contracts in Denmark).

## **6. Funding, instruments and incentives**

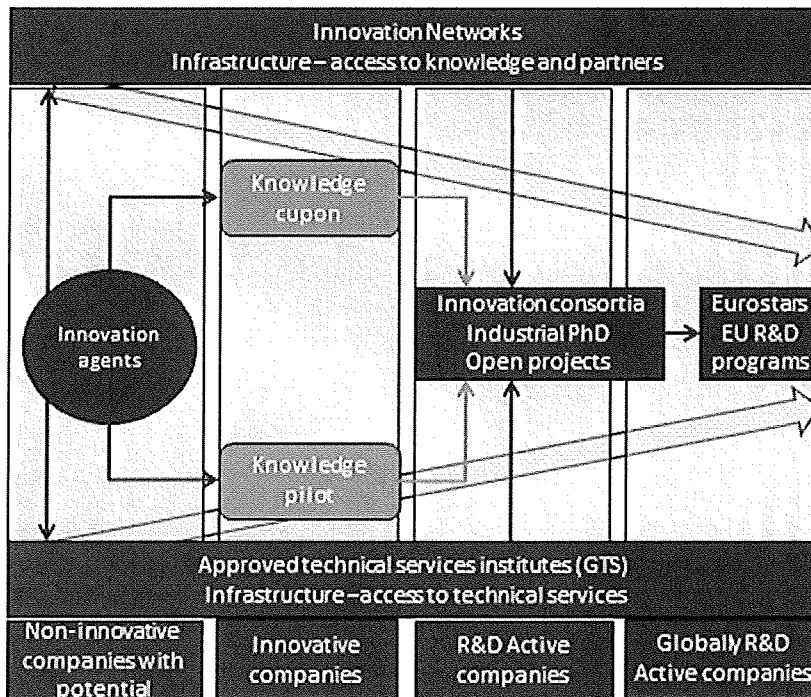
This section considers, on the basis of experiences from Denmark, how an ATI may be funded and which instruments and incentives should be implemented to ensure its optimal operation and impact.

As public budgets are strained, an ATI will over time need to build a substantial commercial operation as well as developing other sources of R&D income. Nevertheless, initially substantial Government funding is required to develop the capabilities of an ATI. The Government funding of an ATI should cover the following types of activities:

- Development, acquisition and contextualization of knowledge and technology that enterprises are expected to demand either much earlier or to a greater extent than can be delivered via normal market development. The activities should be directed towards dissemination and commercialization of such knowledge and technology in the interest of the business community.
- Knowledge dissemination which cover activities, where knowledge is made accessible for a wider audience of New Zealand enterprises. For instance, performance contract funds should not be used for international activities that do not support the development of companies and institutions in New Zealand.
- Development of new services supply which covers development of competencies as well as customization of international knowledge, technology and business practices, so that it can be disseminated effectively and in a relevant form to firms in New Zealand.
- Standardisation work covering the development and publishing of standards as well as agreeing reciprocal approval mechanisms, measurement and technical references, test facilities and methods and terms of certification.

### ***6.1. Funding Instruments and links between instruments***

The figure below shows how the most important instruments involving Danish GTS institutes incl. DTI are interlinked in order to support enterprises at different levels of innovation preparedness and capability.



The Performance contracts are aimed at developing services which are launched in the lower **Infrastructure** actor of the diagram and subsequently provides services to companies at all four stages of development (from non-innovative to globally R&D active). The innovation agents address primarily non-innovative

Companies and refer companies (among others instruments) to knowledge pilot program<sup>9</sup> and/or knowledge coupon/voucher scheme. Furthermore, the innovation agents may refer the companies to participation in one or more innovation networks (top network actor in the diagram). Innovation networks facilitate matchmaking and initiation of large and small scale innovation projects incl. innovation consortia, EU and international R&D project participations or development. Often however, such projects are also initiated by GTS institutes or even knowledge pilots in companies.

## 6.2. Core funding instrument – performance contracts

The MSI may consider the instrument “performance contracts” which is used by DASTI in Denmark to provide GTS with some a level of core funding representing 10-12% of GTS revenue. The performance contracts are characterised by the following design:

- *Earmarking of funding:* A Performance contract should specify what new knowledge and technological capability it will develop within the GTS involved and how (to what extend) this expands on the current knowledge and competence level at institute level. It should specify improvements to or new technological services that the performance contract will lead to and how these differ from what is already provided by other commercial providers in the market place. It should be specified how the results of the performance contract will be integrated in the

<sup>9</sup> <http://en.fi.dk/funding/funding-opportunities/knowledge-pilot/guidelines>

**COMMERCIAL IN CONFIDENCE – NOT GOVERNMENT POLICY**

commercial offerings of the institute following the performance contract. An estimate should be given for the timeframe required from start of knowledge and competence development to the first commercial invoice for developed technical service. The contract should specify which partners (international/domestic universities, businesses, trade organisations or other representatives) are involved in the project. Links to other R&D activities (before and during) should also be provided.

- *Examples of activities specified in Performance contracts:* International knowledge gathering, exchange and adjustment to Danish conditions; Needs analysis across relevant industry target groups; Developments of new technologies and knowledge covering several iterations; application and model development and testing in different industry/service settings; Assessment of process, results and impacts (several rounds); competence development and documentation of process and methodologies (building the technological service capability); dissemination of results at seminars and conferences; network development and involvement of industries. Establishment of permanent and operational knowledge centres covering specific technological fields.
- *Examples of key performance indicators/ annual milestones:* Documentation for international knowledge gathered and processed. Numbers of and contacts within industries involved in application development and testing; Number of seminars and conferences attended and arranged; Number of companies and other relevant target audiences reached through dissemination activities; papers submitted and presented.
- *Performance monitoring and evaluation:* Contracts run for three years and a report detailing achievements against milestones will be submitted each year. Change of key people working on the contract during any year is discussed and approved by DASTI. Each performance contract has an internal steering group with director level leadership. Each performance contract will meet and discuss achievements and challenges with an industry reference group at least once per year. DASTI will visit performance contract organisations and examine concrete results. GTS and their performance contracts are evaluated at half way stage and at the end including by external evaluators. Evaluations include discussing impacts of performance contracts for involved businesses the representatives of these businesses.

DASTI will already ahead of a call for performance contract proposals discuss key themes and R&D directions with all GTS institutes incl. DTI and may after submission of proposals demand mergers of some performance contracts, abandonment of others and alteration of focus or activities in specific performance contracts. Similarly the Council for Technology and Innovation may on the basis of the public hearing on performance contracts demand changes to performance contracts.

The approximate process of developing new performance contracts for 2013-2015 in Denmark is as follows:

<b>Activity</b>	<b>Timing</b>
Evaluation of performance contracts 2010-2012 and GTS institutes	All of 2011
Initial discussions between DASTI and GTS on directions and changes to formal requirements	December 2011 – March 2012
R&D agenda 2020 development	March – October 2012
GTS Strategy and performance contract development	January – April 2012
Public hearing on performance contracts	April – June 2012

Council of Technology and Innovation reviews performance contracts and strategies up against public hearing, Research agenda 2020 and DASTI recommendations	June-August 2012
Performance contract full proposals, negotiations and contract signature	August-December 2012
Start of performance contracts for three year period	January 2013

**6.3. Core funding - instrument aimed at supporting inventors (special performance contract)**

New Zealand inventors lack support in the validation and commercialisation of their ideas. Many of the discussion in New Zealand showed a need for improved support for inventors who otherwise end up putting away their idea in a drawer. The MSI may consider an inventor service similar to the one operated by the DTI on a performance contract<sup>10</sup>

Through the service, all inventors are offered basic counseling based on the web-based counseling tool "Inventor's 10 Steps" which has been developed specifically for the users of the service. In the event of particularly promising inventions, the inventor may be granted additional counseling. Each invention is assessed by an external board in order to evaluate the commercial potential. If granted additional counseling, the inventor gains access to 150 hours of counseling. Annually, the consultancy service provides advice to approx. 4500-6000 Danish inventors.

**6.4. Core funding - Innovation agent program aimed at supporting SMEs (special performance contract)**

An ATI in cooperation with other knowledge institution would benefit from running an innovation agent program aimed at stimulating SMEs to innovative and work with knowledge institutions. In Denmark this program has existed as a national program since July 2010 and today consists of 35 agents from all nine GTS institutes. The key design features of the innovation agent program are:

- The most important feature is that it binds together all the innovation system actors. The agents represent all nine GTS and the program must demonstrate substantial cooperation with all universities, innovation networks and business development agencies (regional and local) in order to ensure referrals of enterprises to the most appropriate innovation project partners.
- It takes time and substantial efforts to establish and maintain the skills, joint infrastructure (CRM and report registration system), network and knowledge platform (intranet for agents with referral partner examples, events, sources of funding, etc.) required to provide good quality innovation audits, project referrals and follow ups. This is however absolutely necessary to operate an efficient program!
- The critical process are 1) referral or selection of SMEs for referral (the better prepared and the more motivated the SME, the better the result and the innovation project); 2) the competence of

<sup>10</sup> <http://www.opfind.nu/english.aspx>

the innovation agent (vital to gain the trust and respect of the SME manager); 3) the quality of the referral and especially the follow-up is vital for a successful innovation project start.

The key learning points so far from operating the innovation agent program are:

- The innovation agent program is effective in stimulating a renewed focus on innovation within enterprises that prior to the visit were less or not active innovators.
- The innovation agent program is also effective in getting enterprises that were not used to working with knowledge institutions to start working with them on a more regular basis.
- As the innovation agent program addresses primarily innovation inactive or irregularly innovation active firms – there is a fair proportion (20-25%) of enterprises that it cannot stimulate given the resources allocated to an innovation audit and follow up (20 hours), but more importantly because they are not convinced that they need to, the timing is not right or they sense no competitive threat forcing them to invest in innovation.
- The innovation agent program is effective in creating opportunities for project partnerships across knowledge institutions with groups of companies.

#### ***6.5. Instrument - Knowledge coupon/voucher scheme aimed at supporting SMEs***

The Knowledge Voucher scheme has been introduced to inspire small and medium sized enterprises to utilize the opportunities and potential of making use of the knowledge from knowledge institutions. At the same time, the Innovation Voucher Scheme is expected to enhance the awareness at knowledge institutions of the need for knowledge and thus secure the quality and societal relevance of public research.

The scheme is open for projects within all scientific fields and the administrative structure and procedure of the scheme is designed to reduce bureaucratic burden as much as possible for the project participants. State co-funding is channeled directly from the Danish Agency of Science, Technology and Innovation to the research or technological partners of the projects, relieving the SME from the burden of invoicing its project partner.

An Innovation Voucher project is a research-business-partnership project designed along one of two different tracks:

A basic voucher for a research-based business development project with a state co-funding level of 40 percent, but a maximum of DKK 100,000 (approximately NZD 21,500). Main focus in the basic voucher is the successful transfer of knowledge from research to SME, in order to place the SME and its activities in a position ahead of its market.

An extended voucher with characteristics similar to a larger scale R&D collaboration project with a state co-funding level of 25 percent, but maximum DKK 500,000 (approximately NZD 107,500). Main focus of the

extended voucher is finding new solutions to current problems. It is a prerequisite for the extended voucher projects that the participating knowledge institution itself carries out research on the field in question.

The enterprise is the formal applicant and experiences an evaluation process for applications which is relatively fast - 30 days from end of month of applying.

There is one call every year with a first come first served basis and no fixed deadline, for optimal flexibility. This structure enables integration of academic research and practical business. The projects are effective network promoters between research institutions and the private sector. Two very different working environments are matched in the projects, making way for creating a personal network with a potential to spin off future collaboration. The applying SME must be a private sector SME located in Denmark whereas the knowledge institutions may very well be placed abroad. Applications are assessed by the secretariat of the Danish Council for Technology and Innovation.

#### **6.6. Instrument - Innovation network**

There are 22 nationwide innovation networks in Denmark and two so-called strategic platforms. An innovation network is a forum where companies and knowledge institutions share experience and develop new ideas within a specialist or technologically delimited field.

Each network has funds for innovation projects where companies and researchers work together to solve concrete challenges. The innovation networks also carry out idea development events and matchmaking activities, and they arrange theme meetings and other specialist events.

- *Most important design features of innovation networks and their consortia:* The networks gather all the key expert knowledge centres (universities, GTS and interest organisations) within a specific technology innovation field (e.g. Robots – covering robots for healthcare, agriculture and industrial use). These core partners are committed at proposal stage to gathering expressions of interest from as many relevant companies as possible and demonstrate the link between planned network activities and company needs and interests. See more in the cluster benchmark report forwarded separately!
- *Essentials of the standard innovation network funding agreement:* The agreement should specify purpose and target audiences, international knowledge networks and cooperation, development and dissemination activities and milestones, expected impact on targeted business community and society. For each dollar of funding the innovation network must secure at least a dollar of contribution in time or money from participating companies. This should be documented.
- *Are there a maximum number of successive four year terms for an Innovation network?* In the case of Denmark, we have already seen the death and merger of some networks and more are expected as some networks grow stronger and others are struggling to keep the business members happy. There is a maximum length for all networks, however it will vary from network to network. The end objective is for certain networks to be able to stand on their own feet without further public

funding (solely funded through membership fees and fees for services). Networks that have weak connections to industries will either be discontinued or merged with other networks to share overheads.

#### **6.7. Instrument - Innovation consortia**

Innovation consortia (Consortia of businesses, universities and GTSs) aimed at specific technology innovation Innovation consortia bringing GTS, Universities (COREs)/Polytechnics and business together in 2-4 year innovation projects. It is a Danish model R&D instrument with proven results.

For all of the above instruments international links and cooperation are required in order to ensure state-of-the-art and transfer of good practices from other parts of the global R&D community.

#### **6.8. How to build incentives into the innovation system?**

It is important to configure innovation organisations at their outset so that they are motivated to perform well and deliver the expected results. In this section, the constitutional setting and management systems are discussed based on the experiences from the DTI in Denmark.

The DTI as a self-owned (not for profit) institute has both a board of Trustees and a board of representatives – these add legitimacy to our activities, play a vital role in keeping us on our toes and as stakeholders providing us with feedback on our direction, strategy and initiatives. Furthermore, the funding, purpose and parameters of the contracts we can bid into are mostly subject to competition among the GTS (all nine compete for the same pot of funding and often also against universities and other research organisations).

Board of trustees <http://www.dti.dk/23890,4>

Board of Representatives <http://www.dti.dk/23890,5>

Similarly, innovation networks are committed to involve stakeholders in the legitimisation of their activities through advisory boards and steering groups with representatives from industry (supply and customer level – plus participating knowledge institutions). The funding of innovation networks commits the consortium partners to secure industry co-funding in the form money or time spent on network activities and projects. See the funding of the Robocluster here: <http://en.robocluster.dk/about-en/financing.aspx> In other words, the part only funding of the network is an incentive to secure industry involvement and participation also.

*Key incentives for managers, researchers and consultants at an ATI:*

- Managers, researchers and consultants should have the opportunity to propose and design the R&D projects in dialogue with industry representatives (giving them influence on their future work). In other words, MSI should not steer activities of an ATI too directly. Motivation comes from having influence on the work ahead and being able to match personal goals with institute and societal goals!



- Approval of R&D projects should be given when sufficient industry endorsements/commitments are demonstrated (providing an incentive to involve and discuss ideas with industry representatives) and the project proposal showing a likely potential of meeting societal needs and challenges!
- Internal reward/remuneration structures at the institute should partly be linked to milestones in terms of commercial sales of existing services, R&D project results and subsequent commercialization (incentive achieve milestones). Some of these milestones may also cover dissemination targets (number of companies engaged and project initiations).

## 7. Measurement - Impact of research and development and data gathering

What should success look like in terms of KPIs for an ATI? How soon should funding of an ATI be reviewed? Should the funding ratio change over time given of success (or partial success, or failure)?

Based on the experiences of the DTI in measuring the performance of its centers, its performance and other contracts and its experiences of situations where it has had to 'divest' itself of a capability (stop supporting it) possible approaches are provided for measuring an ATI in New Zealand.

Performance measurement requires registration of customer data and experiences. Hence, the need to put in place CRM and reporting systems in order for an ATI to track results and impacts (see section 4.3 on facilities and systems above).

Performance of DTI centers is measured in terms of:

- Growth and margin
- customer satisfaction (each commercial customer is asked to complete a short questionnaire and all negative responses require a follow up and an explanation as to what went wrong). Up until now, the DTI scores an average of 90-93% satisfied out of a possible 100%
- Contributions to specific R&D projects and the ability to turn R&D results into commercial services.
- Net revenue generation according to three categories: performance contracts, R&D projects and commercial revenue (targets are set for each type and performance is measured against these targets).
- Every two years, an employee satisfaction survey is conducted which measures employee satisfaction with managers, directors and own performance in relation to a range of dimensions from business development and direction to feedback loops and work environment.
- If a center continuously fails on more than one of the above criteria or political decisions take away complete public funded operations, the Institute will consider discontinuation/divestment or downsizing/restructuring the center as it has happened on several occasions over the last 15 years. However, at the same time, the Institute has invested in new areas where it has experienced growth opportunities.

Evaluation and measurement of performance contracts has been covered in the above section on the instrument description of performance contracts. Performance contracts that are not performing in line

with milestones could be discontinued after the first or second annual report submission. Such a decision will depend on the evidence and explanation provided by an ATI. If it is impossible to revitalize activities of one contract, a discontinuation of this contract may lead to the strengthening (expansion) of another contract.

### ***7.1. Longitudinal data is important for measuring the long term impact of publicly funded R&D***

Project evaluations and contract reporting will provide data on immediate results and impacts, but will not provide data on the long term impact of publicly funded R&D activities. It is important therefore that funding agencies invest in infrastructure, systems and surveys that will measure the impact of these R&D funding schemes on business value added, innovation performance and competitiveness (growth, employment and exports).

## **8. Guiding principles for the short to medium term developments**

**A complete implementation of an ATI which is sourcing more than half its revenue from commercial activities and is serving all the important parts of the HVMS sector will take at least five years to orchestrate.** The guiding principles for establishing an ATI should be as follows:

- NO wrong door into the innovation system – an ATI should embrace the innovation system and support the coordination between its relevant parts. Companies entering with the ATI should be referred to a university expert, where this is the most appropriate expert in the area in question and vice versa.
- Geography matters - close proximity to market and business networks is required (certainly for outreaching activities). Therefore an ATI will need to be present with services that are in demand at the local level where possible – personal relationships and regular contact and speed of delivery is vital for success!
- An ATI will most likely be built and expanded on the basis of a patchwork of existing publically funded business-to-business product development and testing facilities, capabilities and competences in New Zealand -
- Scale and volume matters – a technical competence will only then be world class when it is continuously challenged and performed a sufficient number of times per annum (often in different settings and/or sectors). This means that for some areas where scale of possible demand in NZ is insufficient) it may well be better to coexist/invest with Australian or other national research institutes. Other forms of cooperation may also be possible (e.g. franchising facilities and competences).
- Quality and dynamic response of test, lab and human resources are key factors of success. It may be relevant to digitalise some or parts of the high volume ATI processes. Hence, linking

remuneration to customer satisfaction (as in the online customer feedback and evaluation scheme – see section 4.3 above).

- Industry relationship and innovation partnership building is central to future success of an ATI. Mobilising the networking of businesses and industries is both a bottom up and a top down process. Funding agencies can help by pre-funding innovation network – building in parallel with establishing an ATI.
- The international anchorage of an ATI is vital for access the latest knowledge, technologies, standards and even funding. An ATI should eventually be present in key international markets giving it direct access to local R&D communities and allowing it to substantially part take in international R&D projects.