

Please note: Parts of this report have been redacted prior to release because they contain commercially confidential information

Industrial Research Limited
– A Business Stocktake

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1 Executive summary

Industrial Research Limited's (IRL's) core purpose is to increase the contribution of the industrial manufacturing and associated sectors to the New Zealand economy by empowering industry to drive innovation in manufacturing and services.

IRL has a highly qualified workforce with some scientific capabilities of international standing. There are two groups – Carbohydrate Chemistry (CC) and High Temperature Superconductors (HTS) – with world-class scientific reputations and research outputs and the remaining groups contain nationally unique capabilities. IRL's research staff are split 63 percent applied science, 34 percent engineering and 3 percent other. The staff have networks with the science community in New Zealand and overseas.

IRL's business model largely reflects the environment it operates in, with the company's focus mainly on servicing the contract rounds run by the Ministry of Science and Innovation (MSI) and MSI's predecessor Crown funding agencies. IRL's reliance on MSI funding, at approximately 70 percent of its total funding, is the same as at the company's inception in 1992.¹

IRL's domestic commercial revenue, however, has trended down over the same period, both in nominal terms and as a share of total revenue, declining from 29 percent of total revenue in 1992 to 14 percent in 2011.²

IRL's domestic commercial revenues are often linked to co-payments associated with government funding, either directly or through research consortia. Consulting to private-sector clients is only a minor part of the business. Further, despite having filed a large number of patents, IRL generates little revenue from its intellectual property (IP).³ Over the past five years, net revenue from royalties and other IP (that is, net after the costs of protecting the IP) averaged \$0.9 million per annum, or around 1.5 percent of total revenue.

IRL has seeded a number of new businesses, such as *Measurement Standards Laboratory* and *General Cable Superconductors Limited*. Currently, IRL has two associate companies, HTS-110 Limited and General Cable Superconductors Limited, which were originally seeded by IRL as the result of work in the field of superconductivity.

Over five years to 30 June 2011, IRL's return on equity averaged 3.2 percent and it returned no dividends to the Crown.⁴ Rather, the Crown made capital injections of \$15.9 million.⁵ As a result of the equity injection and improved operating cash flows, IRL has turned its cash position around from a net debt position of around \$12 million in 2007 to a net cash position of \$13 million in 2011, despite difficult economic times domestically and globally.

¹ The Measurement Standards Laboratory is maintained as a specific contract from MSI to meet the requirements of the Measurement Standards Act 1992.

² All references to years in this report refer to the year ending 30 June unless otherwise stated.

³ IRL holds IP not only to derive revenue but also to give New Zealand industry freedom to operate.

⁴ IRL has resolved to pay a dividend of \$250,000 in 2011/12.

⁵ Refer to Section 6.4.4 for detail on the capital contributions from the Crown.

Due to its high proportion of long-term government contracts, the Stocktake Panel considers IRL has a low- to medium-risk revenue profile. While IRL has \$18 million of its contestable funding at risk over the next two years, the company nevertheless has 58 percent of its MSI revenue secure through to 2015. Of IRL's commercial customers, there is a material concentration of spend around only one entity, [redacted], at [redacted] percent of IRL's total commercial revenue.

IRL's contribution to the wider economy in terms of helping New Zealand industry grow is difficult to measure. One study reviewed six of IRL's projects and estimated benefit-cost ratios ranging from 1 to 16.1.⁶ The Carbohydrate Chemistry group has generated significant royalty revenue but much of it has been from international biopharmaceutical partnerships (for example, [redacted]) with variable royalty revenue from New Zealand sources ([redacted]). Other groups have contributed only minor royalties from their intellectual property. Most external expert reviews of IRL's individual science activities comment on poor stage-gating and commercialisation processes.

In recent years, the Board and senior management of IRL have increased the company's external focus. A largely new senior management team is in place and a number of improved processes and structures have been established, including a substantially new industry engagement team led by a manager with wide ranging industry experience.

Inevitably, it takes time to change an organisation's culture. Nevertheless, there are signs that the more outward-looking strategy is generating some success, with domestic commercial revenue⁷ increasing by 14 percent in the latest financial year, after falling in each of the previous three years. Most encouraging is the increase in revenue from New Zealand's private sector,⁸ with revenue growing by 75 percent in 2011, albeit from a historically low base.⁹ Initiatives such as IRL's research partnerships, "Scientist for a Day" and "What's Your Problem New Zealand" programme are increasing IRL's brand awareness and seeding potential relationships with the private sector.

IRL faces a number of challenges in contributing to the growth of New Zealand's high-value manufacturing and services sector (HVMS). The number of IRL's active customers has been declining steadily since 2006, although there has been some increase in average revenue per customer. IRL's engagement with the HVMS has considerable potential to expand. In 2011, only 10 of the TIN (Technology Investment Network) 50 were IRL clients.

⁶ Nimmo Bell, *Programme evaluation of IRL R&D projects: Methodology and case studies summary report*, October 2010. Separate reports are available for each of the six projects.

⁷ "Domestic commercial revenue" refers to all New Zealand-sourced revenue other than revenue from MSI, IP income and income from non-research and development sources such as rental income. Thus, domestic commercial revenue includes revenue from the private sector, other Crown Research Institutes and universities, related parties and non-MSI government agencies.

⁸ "Private-sector revenue" refers to revenue from New Zealand-based commercial entities (that is, it is domestic commercial revenue excluding revenue from Crown Research Institutes and universities, related parties and non-MSI government agencies). Note that, for the purposes of our analysis, revenue from state-owned enterprises is classified as private-sector revenue.

⁹ Private-sector revenue had declined in each of the previous three years, reaching a low of 5 percent of IRL's total revenue.

Looking ahead, the key challenges IRL faces include maintaining its levels of MSI contestable funding, better aligning its business lines with industry's needs, improving its commercialisation processes, better integrating its staff with private-sector needs (for example, by more secondments of staff to and from the private sector) and being prepared to withdraw earlier from projects that are not succeeding.

The extent of restructuring required for the new Advanced Technology Institute (ATI) will depend on the government's vision for the ATI. The flexibility of IRL's staff to respond to the new opportunities and environment is difficult to assess, however, the current mix of expertise provides a good base for an ATI and many of the science and engineering staff are readily transferable from existing research projects if necessary. Key factors in any transition will be organisational leadership and staff buy-in. IRL's physical assets are largely land and buildings (34 percent of total assets) and are generally multipurpose, although some buildings (for example, the GlycoSyn building) and most of IRL's plant and machinery is highly specific.

Regardless of the future organisational structure or form of IRL, there are some issues that should be addressed, including the level of deferred maintenance that has built up in recent years and resolving the future of the Gracefield site.

The Panel has prepared an analysis of IRL's strengths, weaknesses, opportunities and threats with respect to the creation of the new ATI in sections 8.10 and 8.11. Overall, there do not appear to be any show stoppers arising in relation to IRL that would undermine or block the establishment of the new ATI. Rather, the establishment of the ATI provides an exciting opportunity for the skills and talent at IRL to be better focused on and aligned with New Zealand's commercial and economic needs.

2 Introduction

2.1 Context

One of the goals within the government's Economic Growth Agenda is to boost economic growth by better facilitating the development and growth of the high value manufacturing and services sector (HVMS) through creating and transferring research and development (R&D).

To initiate steps in this direction, an independent review of the HVMS was conducted by Professor John Raine, Professor Mina Teicher and Philip O'Reilly. In 2011, their report, entitled *Powering Innovation*, was released. One of the pivotal recommendations of this report was to transform the main Crown Research Institute (CRI) with stewardship of the HVMS – Industrial Research Limited (IRL) – into an Advanced Technology Institute (ATI). The aim is that the ATI will function as a 'high tech HQ' for New Zealand and thereby lift innovation and the economic growth generated from this sector".

To help inform the policy process necessary to transform IRL into an ATI, a Panel consisting of Philip Barry (Chairman), Dr Tricia Harris and Andrew Simmonds were tasked to complete an independent business stocktake of IRL.

2.2 Objectives of the business stocktake

The objective of this business stocktake is to obtain a forward-looking assessment of the current state of IRL, both financial and non-financial. The stocktake is to provide insight into all levels across the full range of activities and services provided by IRL and to identify issues and opportunities that may impact on the establishment of ATI. The terms of reference for the stocktake are provided in Annex 2.

The scope of this business stocktake was defined as follows:

In scope:

- all aspects of IRL's current business, resources and capabilities, business systems and culture; and
- the external environment within which IRL operates, in particular, significant and strategically important collaborative arrangements/partnerships and customer relationships.

Out of scope:

- policy settings relating to IRL, including core funding settings, statement of core purpose, shareholder expectations; and
- advice on future strategic options or directions for the business and/or shareholders.

2.3 Approach taken

The independent Stocktake Panel had a number of information sources from which to draw upon, including:

- information provided by IRL;

- information provided by the Ministry of Science and Innovation (MSI);
- interviews were conducted with IRL management staff (tier one through to, in most cases, tier three); and
- interviews were conducted with external stakeholders (refer Annex 4).

MSI also provided secretarial support to the Stocktake Panel.

The Panel would like to record its appreciation for the positive and co-operative approach IRL adopted in working with the Panel. Invariably, the information requested by the Panel was provided in a timely and well-structured manner, where the information was available. IRL directors, management and staff adopted a positive approach in dealing with the Panel.

The Panel would also like to record its appreciation for the valuable secretarial support provided by MSI staff seconded to the Panel. Without their dedication and hard work we would never have been able to complete the project within a very tight timetable.

2.4 Disclaimer

At the time this report was prepared, the role, purpose and functions of the ATI were under development. The Panel was therefore neither able nor requested by MSI to comment on the goodness of fit of IRL's lines of business (LoBs), staff or assets with an ATI or on the capabilities of IRL's management to fill the requirements of an ATI.

3 Operating environment

CRI's are science research businesses owned by the Crown in New Zealand. They were formed under the Crown Research Institutes Act in 1992 from the existing government-owned research bodies, the largest of which was the Department of Scientific and Industrial Research. There are currently eight CRI's.¹⁰

The CRI's are, collectively, the largest dedicated providers of science research in New Zealand. They are also some of New Zealand's most significant commercial users of science and technology. In some fields, the CRI's undertake world-leading research.

A recent review of the CRI's¹¹ has resulted in substantial changes to their funding and research–user engagement processes.

CRI's receive operational funding from a variety of sources and through different mechanisms, some contestable, some not. The amounts and proportions of funding sourced from government and the private sector, and through different funding delivery mechanisms, differ considerably across the CRI's. The different patterns of funding reflect each CRI's particular customer base and the nature and range of services it offers.

In brief, the CRI's' revenue comes primarily from government funding through “Vote Science and Innovation”.¹² For IRL, in 2011/12, the relevant funds or “appropriations” from this Vote include:

- CRI Core Funding Output Expense: this appropriation is to create and maintain capability that is required for each CRI's core purpose and strategy;
- Research Area Output Expenses:¹³ this appropriation relates to the contestable funding rounds that MSI conducts. These rounds are open to CRI's such as IRL. There are six research areas that MSI will fund in the 2012 round: biological industries research; energy and minerals research; environmental research; hazards and infrastructure research; health and society research; and HVMS research. Given the nature of IRL's core purpose, the last mentioned research area – HVMS research – is an important source of funds for its activities; and
- National Measurement Standards Output Expense: this appropriation is limited to providing specified standards to satisfy the needs for traceable physical measurement in New Zealand and is the source of government funds for the Measurement Standards Laboratory (MSL).

¹⁰ The eight CRI's are: AgResearch Limited; IRL; the Institute of Environmental Science and Research Limited; the Institute of Geological and Nuclear Sciences Limited; Landcare Research New Zealand Limited; National Institute of Water and Atmospheric Research; the New Zealand Forest Research Institute Limited; and the New Zealand Institute for Plant and Food Research Limited.

¹¹ The CRI taskforce report is available from: <http://www.msi.govt.nz/update-me/archive/morst-archive/crown-research-institute-taskforce-archived/>.

¹² See <http://www.treasury.govt.nz/budget/2011/estimates> for further detail about this Vote.

¹³ Further detail about Research Area Output Expenses and their means of allocation can be found in the *New Zealand Gazette* Notice, page 5657: [http://www.dia.govt.nz/Pubforms.nsf/NZGZT/NZGazette193Dec11.pdf/\\$file/NZGazette193Dec11.pdf_](http://www.dia.govt.nz/Pubforms.nsf/NZGZT/NZGazette193Dec11.pdf/$file/NZGazette193Dec11.pdf_)

Section 6 provides further details on the funding arrangements for IRL.

Ownership responsibilities for the CRIs are shared between the Minister of Finance and the Minister of Science and Innovation. Each CRI is governed by a board of directors appointed by the shareholding Ministers.

The CRIs are collectively represented by an organisation called Science New Zealand.¹⁴

¹⁴ See <http://www.sciencenewzealand.org/> for further information about this organisation.

4 What Industrial Research Limited does

IRL's purpose, as outlined by the Cabinet in the Statement of Core Purpose (SCP) for IRL,¹⁵ is to "increase the contribution of the industrial manufacturing and associated sectors to the New Zealand economy by empowering industry to drive innovation in manufacturing and services".

To assist IRL in fulfilling this goal, the company has a 2011/12 budget of \$18.5 million per annum of core funding from the government.¹⁶ IRL budgeted \$24.6 million per annum of contestable funding and appropriation for MSL of \$6.5 million per annum. In addition, the IRL group¹⁷ is expected to generate \$11 million in domestic commercial revenue and \$9 million in international commercial revenue.

4.1 Science and technology platforms and research teams

IRL's SCP positions the key science and technology platforms of IRL as being:

- manufacturing, production and process engineering technologies;
- materials, energy and minerals technology;
- electronic and information engineering;
- measurement standards;
- industrial chemical and pharmaceutical manufacturing; and
- medical technologies.

IRL's Statement of Corporate Intent (SCI)¹⁸ states that the key disciplines underpinning its science and technology platforms are physics, chemistry, mathematics and engineering. Other disciplines underpinning the company's research activity include material sciences and some biology/biochemistry, though that expertise is generally partnered.

4.2 Outcomes Industrial Research Limited contributes to

IRL's SCP outlines the government's expectations with respect to the outcomes it wants IRL to achieve. These are:

IRL will fulfil its purpose through the provision of research and transfer of technology and knowledge in partnership with key stakeholders, including industry, government and Māori, to:

- increase economic growth by improving the performance and productivity of New Zealand's industrial manufacturing and services sector firms in developing market-led products

¹⁵ See <http://www.msi.govt.nz/assets/IRL-SCP.pdf>.

¹⁶ IRL was initially awarded \$13.5 million per annum of core funding but the level was renegotiated to \$18.5 million. Refer section 6.2.2.

¹⁷ The IRL group is IRL, its non-trading subsidiaries and its associated companies HTS-110 Limited and General Cable Superconductors Limited.

¹⁸ See the IRL website, http://www.irl.cri.nz/sites/all/files/IRL_SCI_vers9edit.pdf, for detail about the SCI.

- increase diversity in New Zealand's manufacturing base by transforming products, processes and services through the development of disruptive technologies and by acting as an intermediary of technology from domestic and international sources for industry
- increase human capital and research management expertise in the industrial manufacturing and associated sectors that will lead to a rise in business R&D investment and R&D performed by firms.

5 Organisational analysis

5.1 Governance and senior management

CRIs are Crown-owned companies that carry out scientific research for the benefit of New Zealand. As noted in Section 3 above, the CRIs have two shareholding Ministers who act to oversee the Crown's investment in the CRIs. The Minister of Science and Innovation and the Minister of Finance are the "responsible Ministers", as stated in the Crown Entities Act 2004 (Section 10).

The governance structure for all CRIs is the same: the shareholding Ministers appoint the directors of a CRI in accordance with section 89 of the Crown Entities Act 2004. One of the directors is appointed by the shareholding Ministers to be chairperson of the Board. The directors of a CRI are persons who, in the opinion of the shareholding Ministers, will bring (either individually or collectively) a wide range of skills to the Board of the CRI, including:

- (a) the skills necessary to ensure the sound management of the CRI, both financially and generally;
- (b) knowledge of, or experience in, the carrying out of, or the management of, research;
- (c) knowledge of, or experience in, the application, by the productive sector, of research and technology;
- (d) an understanding of, and the skills necessary to promote, the actual and potential linkages between the activities of the CRI and the activities of:
 - (i) the private sector; and
 - (ii) other persons or bodies that are able, or may be able, to utilise the research undertaken by the CRI or collaborate with the CRI in that research.

IRL is governed by six directors and the Chair, Michael Ludbrook. Table 1 lists the current Board members and their terms.

The IRL Board appoints the Chief Executive in accordance with the Companies Act 1993 and IRL's constitution. The Chief Executive is then responsible for the appointment of the rest of the Senior Management Team.

Table 1: Industrial Research Limited Board

Role	Name	Term
Chair	Michael Ludbrook	Jul 2011–Jun 2014
Deputy Chair	David Henry	Jul 2007–Jun 2013
Directors	Prof Jan Evans-Freeman	Jul 2010–Jun 2013
	Dr Richard Janes	Jun 2011–Jun 2013
	Maxine Simmons	Oct 2007–Jun 2013
	Mike Taitoko	Jul 2011–Jun 2014
	Dr Raymond Thomson	Jul 2009–Jun 2012

The membership of IRL's Senior Management Team is given in Table 2. An organisational figure for IRL is provided in Annex 5.

Table 2: Industrial Research Limited Senior Management Team

Role	Name
Chief Executive	Prof Shaun Coffey
Deputy Chief Executive	Drew Stein
General Managers ("cluster" or organisational-wide activity / responsibility given in brackets)	George McIrvine (Shared Services)
	Gavin Mitchell (Industry Engagement)
	Dr Roger Ridley (Strategy and Evaluation)
	Vikki Smithem; Industrial Biotechnologies
	"Industrial Biotechnologies" clusters three lines of business (LoBs): Carbohydrate Chemistry; GlycoSyn; Integrated Bioactive Technologies.
	Peter Stipkovits (People and Culture)
Dr Richard Templer, Advanced Manufacturing Technologies	
	"Advanced Manufacturing Technologies" clusters four LoBs: Intelligent Machines and Devices; Advanced Materials; Superconductivity and Energy; Medical Device Technology.
Chief Financial Officer	James Corrigan
Board Secretary / Executive Officer	Jeff Lycett
Director	Dr Tim Armstrong; Director, Measurement Standards Laboratory

5.2 Locations

5.2.1 Physical locations

IRL is located in three main centres in New Zealand. These locations and the number of staff engaged at each location (as at 30 June 2011) are:

- Auckland – 30 full-time employees (FTEs);
- Lower Hutt – 284 FTEs;
- Christchurch – 17 FTEs.

5.2.2 Value of assets in each location

All of IRL's significant assets (with a book value greater than \$100,000) are in Lower Hutt. The buildings in Auckland and Christchurch are leased.

5.3 Key relationships

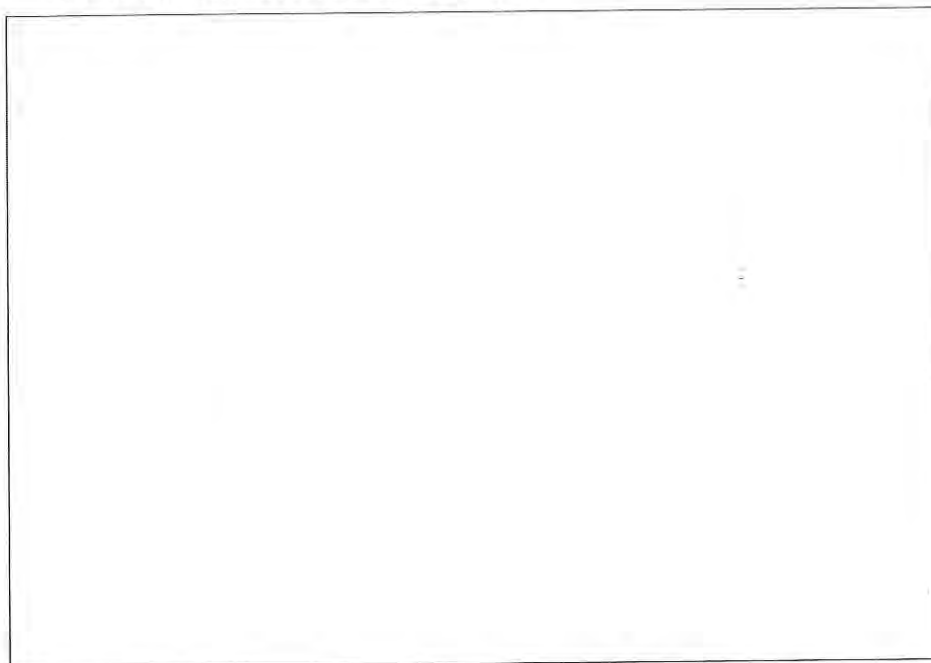
5.3.1 With customers

The key commercial customers of IRL include:

(refer Section 6.2.3 for further detail). In addition, over 200 smaller industry partners contract research with IRL (see Figure 1 below). The number of IRL's customers has been declining since 2007. International revenue has been volatile, while domestic commercial revenue has picked up in the past year after declining steadily over the preceding four years. In addition, there is some dependence on a small number of large commercial clients, especially those based internationally, and that their international commercial revenue has been volatile

over time and has been a source of risk in the past. Recent marketing initiatives, including the Co-investment Fund and Scientist for a Day programmes, may be starting to reverse the decline in IRL's customer base as is discussed in further detail in sections 6 and 8.

Figure 1: Number of customers and revenue, 2007–11



5.3.2 With others

IRL has a traditionally strong organisational relationship with Victoria University of Wellington, including a formal memorandum of understanding, joint appointments, post-graduate and summer student supervision. IRL is in discussion with several other New Zealand universities about the formation of joint graduate schools. Across IRL, individual teams have research collaboration relationships with most New Zealand universities. Internationally, all the research teams are well connected. The Carbohydrate Chemistry team has the deepest relationships, with a longstanding relationship with the Albert Einstein College of Medicine, New York, United States of America, and relationships also with the Agency for Science, Technology and Research (A*STAR) in Singapore, the Institute of Medical Biology, Singapore and the Industrial Technology Research Institute of Taiwan. IRL currently has 47 international research project collaborations.¹⁹

5.4 Lines of businesses and organisational-wide functionalities

As stated in its SCI, IRL currently employs about 340 FTEs, with the number of staff budgeted to grow by the end of 2011–12 to 360. Of these, 62 FTEs are in corporate, support and industry engagement, with a further 25 in site services and workshop roles.²⁰ See Annex 19 for a pan-CRI comparison of staff make up.

¹⁹ Refer to IRL's 2011 Annual Report for further detail. This is available from <http://www.irl.cri.nz/about-us/annual-reports/2011-annual-report>.

²⁰ For the purposes of this report, the business and corporate support services functions in IRL that are classified as Corporate and Research Office in IRL's management accounts are referred to as the "Corporate Group". This group includes units that are internally focused and externally focused (refer Annex 15).

IRL has seven operational LoBs. The LoBs are groupings of research capability focused on different areas of research and knowledge transfer. While IRL operates on a project basis, the company is structured for management purposes around the LoBs, with a separate manager responsible for each LoB (refer Annex 5), and the company presents its management accounts on the basis of the LoBs (refer Annex 6). Detailed analysis on each LoB is provided in Annexes 7 to 14 of this report.

The seven LoBs are split into two operational clusters, Advanced Manufacturing Technologies (AMT) and Industrial Biotechnologies led by general managers. The two clusters and the corresponding LoBs are:

1. **Advanced Manufacturing Technologies**

- Superconductivity and Energy (S&E) (Annex 7)
- Intelligent Machines and Devices (IMD) (Annex 8)
- Medical Device Technology (MDT) (Annex 9)
- Advanced Materials (AM) (Annex 10)

2. **Industrial Biotechnologies**

- Carbohydrate Chemistry (CC) (Annex 11)
- GlycoSyn (Annex 12)
- Integrated Bioactive Technologies (IBT) (Annex 13)

In addition, the MSL (Annex 14) is positioned as a stand-alone LoB.

An overview of each of these LoBs is given in Table 3.

Corporate Group: this provides both inward- (for example, industry engagement) and outward-facing services (for example, facilities management), is led by seven tier two managers, and includes:

- **Industry Engagement:**²¹ this group is responsible for IRL's engagement with industry. This team builds and manages relationships with potential and current clients. It represents all technologies available within IRL and engages with all organisations interested in business development opportunities and joint commercialisation. The group's key tasks include identifying and connecting industry needs with science capability; assisting IRL to align its science programmes with industry needs; identifying industry characteristics such as the companies operating in the sector, export markets and international competitors; identifying the unique value proposition of New Zealand industry against others; and assisting with the commercialisation of IRL IP;
- **Shared Services (includes facilities management and workshops):** this group is responsible for the managing areas such as the engineering workshop and tangible assets, for example, maintenance of buildings;

²¹ Within IRL, a commercialisation group has also been formed which reports to the deputy chief executive. This new group is led by Tim Balmer. The Pre-Seed Accelerator Fund sits within this team. The team works with IRL's Intellectual Property Manager and Legal Counsel, as well as the Industry Engagement Account Managers, in a team-based approach to commercialising IRL technologies and IP.

- People and Culture (Human Resources): this group is responsible for human resource management, including performance management and training;
- Finance (finance and information technology (IT)): this group is responsible for the management of IRL's finances as well as its IT systems; and
- Strategy and Evaluation: this group is responsible for overall group strategy and evaluation, communication and investment.

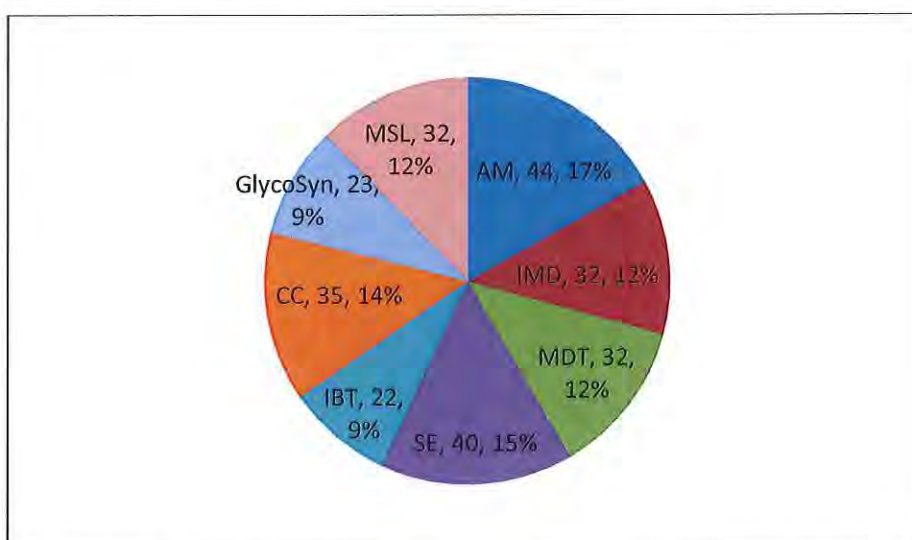
The proportion of staff in the corporate group is comparable to the other CRIs.

5.5 Workforce profile

5.5.1 Lines of business

The number of research staff in each of the LoBs (based on budgeted FTEs) is shown in Figure 2 below.

Figure 2: Research staff (full-time employee) by line of business, 2011



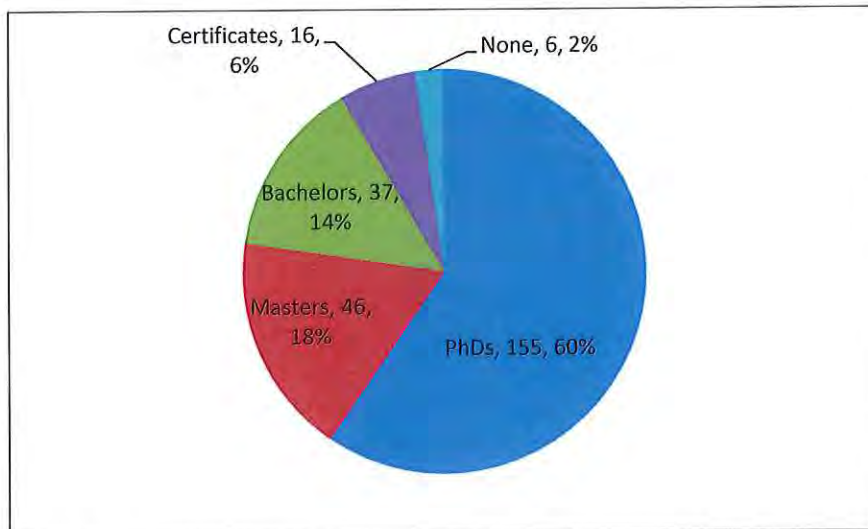
Note: MSL = Measurement Standards Laboratory; AM = Advanced Materials; IMD = Intelligent Machines and Devices; MDT = Medical Device Technology; SE = Superconductivity and Energy; IBT = Integrated Bioactive Technologies; CC = Carbohydrate Chemistry.

The research workforce also includes additional support from a varying number of doctorate students co-supervised by university staff and located in most of the LoBs as well as a strong summer studentship programme. A recent initiative is the appointment of two (intended to build to five) Industry Research and Outreach Fellowships who are appointed from other institutions for 50 percent of their time to work with industry to conduct research and technology transfer activities.

5.5.2 Qualifications

As is to be expected in a research-based organisation, IRL has a high proportion of staff with post-graduate qualifications (Figure 3). However, as Annex 19 shows, IRL retains a higher proportion of science staff (including engineers) than the average across the CRIs. Conversely, the proportion of technical support staff is lower in IRL than the CRI average.

Figure 3: Research staff qualification profile, 2011



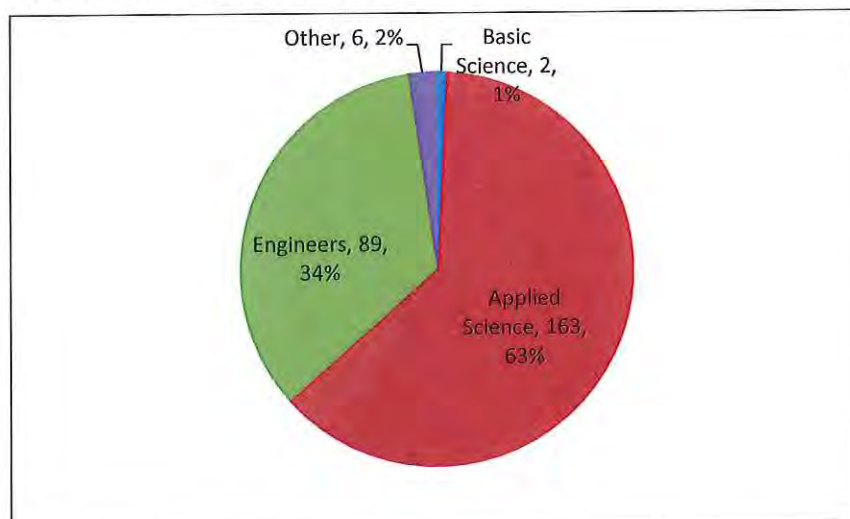
Note: PhDs = doctorate degrees.

5.5.3 Percentage in basic science/applied science/engineering/support

Since the release of the *Powering Innovation* Report,²² there has been an expectation that IRL will increase the proportion of engineering expertise relative to more fundamental or basic science expertise. The current expertise mix is as shown in Figure 4, suggesting that, without growth in numbers of FTEs, such an increase would have to be mainly at the expense of applied science staff.

Annex 19 shows that IRL has fewer women in both science and technical positions compared with other CRIs. This is not surprising as, historically, woman have not been attracted to graduate and post-graduate training in industry-facing sciences and engineering.

Figure 4: Research staff role profile, 2011



²² The *Powering Innovation* report is available from: <http://www.msi.govt.nz/about-us/consultations-and-reviews/high-value-manufacturing-review/>.

5.5.4 Salary profile

Annex 19 shows a comparison of costs per FTE across the different CRIs. Along with one other CRI, IRL has a high average salary per FTE relative to the other CRIs. Of IRL's staff, 73 earn over \$100,000 per annum (Table 4), reflecting in part the company's relatively highly qualified workforce and the relatively low proportion of technical support (see Annexes 7 to 14) in many of IRL's teams.

Table 4: Industrial Research Limited staff salary profile, 2011

	2011
\$570,000–\$579,999*	1
\$510,000–\$519,999	1
\$500,000–\$509,999	0
\$230,000–\$239,999	0
\$220,000–\$229,999	2
\$210,000–\$219,999	0
\$200,000–\$209,999	1
\$190,000–\$199,999	3
\$180,000–\$189,999	1
\$170,000–\$179,999	0
\$160,000–\$169,999	5
\$150,000–\$159,999	5
\$140,000–\$149,999	5
\$130,000–\$139,999	8
\$120,000–\$129,999	10
\$110,000–\$119,999	8
\$100,000–\$109,999	23

Note: * Includes redundancy payment

At the same time, however, there is a relatively normal distribution of salaries across staff earning below \$100,000 per annum (see Table 5) for both science and technical staff. Engineering staff remuneration is skewed slightly to the top of the scale, as is to be expected given the salaries professional engineers could expect in the private sector.

Table 5: Remuneration profile for staff earning less than \$100,000 per annum

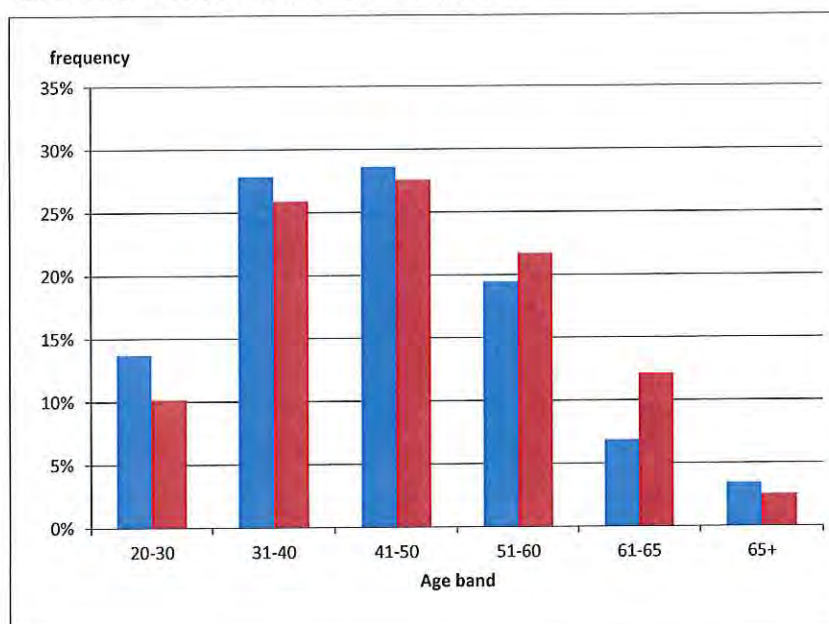
		0–50k	50–60k	60–70k	70–80k	80–90k	90–100k
Lower Hutt							
Applied science	Scientists						
	Technicians						
Engineering	Engineers						
	Technicians						
Administration	Management						
	Admin professionals						
	Skilled support						
	Unskilled support						

		0-50k	50-60k	60-70k	70-80k	80-90k	90-100k
Auckland							
Applied science	Scientists						
	Technicians						
Engineering	Engineers						
	Technicians						
Administration	Management						
	Admin professionals						
	Skilled Support						
	Unskilled Support						
Christchurch							
Applied science	Scientists						
	Technicians						
Engineering	Engineers						
	Technicians						
Administration	Management						
	Admin professionals						
	Skilled support						
	Unskilled support						

5.5.5 Age profile

Annex 19 shows that the IRL age profile (Figure 5 below) is generally younger in the science and engineering workforce than that of the other CRIs, while IRL's technical staff are generally older than the average across the CRIs. As outlined in the Annexes 7 to 14, and raised by the group leaders in roundtable discussion, there is some tendency towards a bi-modal age profile for many science teams, with early- and later-career scientists and engineers being predominant and a lower proportion of mid-career scientists and engineers. Such a profile is a risk for the organisation as the later-career scientists retire, leaving little mentoring for younger staff.

Figure 5: Science and technical staff profile by age, 2011



5.5.6 Staff retention

Table 6 shows the numbers of staff with tenures of less than 10 years with IRL.

There are a significant number and proportion of applied science (78 percent and 44 percent) and engineering (8 percent and 42 percent) staff based in Lower Hutt with tenures of less than five years with IRL. Given that overall headcount has not significantly changed over the past five years, this suggests that there has either been a deliberate campaign to refresh some teams or staff have been leaving of their own accord. As data on retention by team and age profile was not available in the timeframe of the stocktake, the Panel cannot take a position on whether the retention profile is of concern or benefit to the organisation.

Table 6: Staff tenure, 2011

		0-1YR	1-2YR	2-3YR	3-4YR	4-5YR	5-10YR
Lower Hutt							
Applied science	Scientists	24	13	14	12	15	34
	Technicians		3	1		1	6
Engineering	Engineers		2	2	2	2	4
	Technicians		2	1	1	1	
Administration	Management		5	4			6
	Admin professionals	4	7	4	10	9	13
	Skilled support	2	1				8
	Unskilled support						
Auckland							
Applied science	Scientists	1	1		1	2	
	Technicians						
Engineering	Engineers						4
	Technicians						
Administration	Management						
	Admin professionals	3	1	1	2	1	
	Skilled support						
	Unskilled support						
Christchurch							
Applied science	Scientists	2		1			3
	Technicians						
Engineering	Engineers		1			1	3
	Technicians				1		
Administration	Management						
	Admin professionals	1					
	Skilled support						1
	Unskilled support						

5.5.7 Remuneration policy, including remuneration at risk and IP sharing

IRL completed last year the implementation of its policy of eliminating at-risk remuneration provisions for IRL staff (with effect from 1 July 2011). The only IRL employee who is still in receipt of an at-risk remuneration element is the Chief Executive,

€

As a result, no IRL employees, except the Chief Executive, have available to them remuneration elements such as performance pay, profit-share and royalties. This is an internal policy decision made by IRL. Other CRIs maintain different policies, including profit share and royalty sharing with staff at either a group or individual level.

6 Financial analysis

This section of the report reviews IRL's financial position, including its sources of revenue, trends in expenditure and its major assets. The analysis relates to the IRL parent company and the management accounts provided by IRL unless otherwise noted, with corresponding financial analysis for each LoB and the corporate group provided in Annexes 7 to 14.

6.1 Overview

IRL has been performing poorly from a financial perspective for many years, with a cumulative loss of \$1.9 million over the past five years. The company's financial performance has, however, shown some improvement in recent years, with the company reporting a small operating profit in 2011. The company's net debt/cash position has turned around, reflecting the combined impact of the equity injections in 2008 and 2009 and improved operating cash flows (refer Section 6.4.1 and Section 6.4.2 for further detail).²³

Due to its high proportion of long-term government contracts, the Stocktake Panel considers IRL has a low-to-medium risk revenue profile. IRL's contestable funding from MSI is by no means risk-free, with \$10 million of IRL's contracts at risk in the current MSI funding round (MSI reports this to be a highly contested round) and \$8 million at risk next year. However, as is discussed further in Section 6.2.2 below, IRL has, overall, a relatively good security of revenue, with 58 percent of its 2011 MSI revenue contracted through to 2015. Of IRL's commercial customers, there is no material concentration of spend by any one entity. The biggest customer,

The balance sheet is strong but relatively small for a CRI.

6.2 Sources of revenue

6.2.1 Revenue trends

IRL's biggest source of revenue is the government through MSI. As Figure 6 shows, IRL's Crown revenues have grown steadily since IRL's inception, increasing from \$27 million in 1992/93 to \$44 million in 2010/11. This growth in Crown funding, however, has largely tracked inflation. As Figure 7 shows, in inflation-adjusted terms, IRL's Crown revenues have been largely flat, increasing by 4.8 percent since 1992.

²³ As discussed in Section 6.5.4, IRL's reported profit and cash flows in recent years have also been boosted by deferred maintenance expenditure on the Gracefield site.

Until the introduction of core funding in 2011/12, IRL’s MSI funding was split between a contestable component (\$33 million in 2010/11), capability funding (\$6 million) and the funding of MSL (\$6 million). Core funding wrapped together certain contracts that were previously contested with the capability funding.

Figure 6: Revenues, 1993–2011

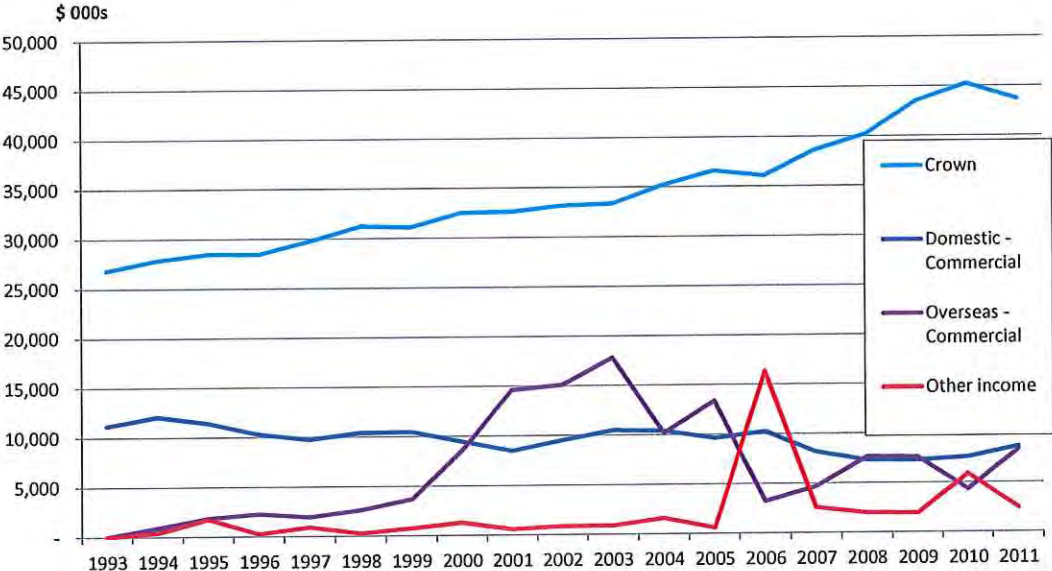
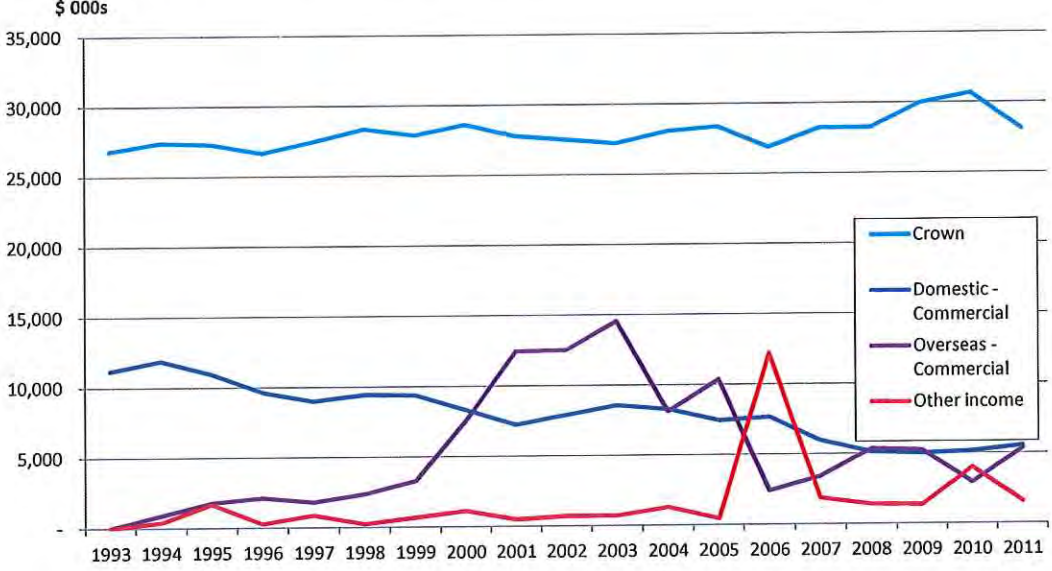


Figure 7: Inflation adjusted revenues, 1993–2011



Historically, the second biggest revenue category was domestic commercial revenue. Unlike Crown revenue, however, domestic commercial revenue has fallen steadily, both in nominal and real terms, between 1993 and 2011. In 1993, domestic commercial revenue was 29 percent of total revenue. In 2011, this had fallen to 14 percent. In real terms, domestic commercial revenues have fallen by 50 percent since 1992. Most recently, after three years of consecutive decline, domestic commercial revenues increased by 15 percent in 2011.

Overseas commercial revenue has been the most volatile revenue stream, peaking at \$18 million in 2003 as a result of the Biopharm project.

commercial revenues dropped sharply but have increased in recent years, and totalled \$8 million (13 percent of total revenue) in 2011.

Other revenue is made up of IP income (\$0.9 million in 2011), rent (\$0.9 million in 2011) and other income (\$0.9 million in 2011).

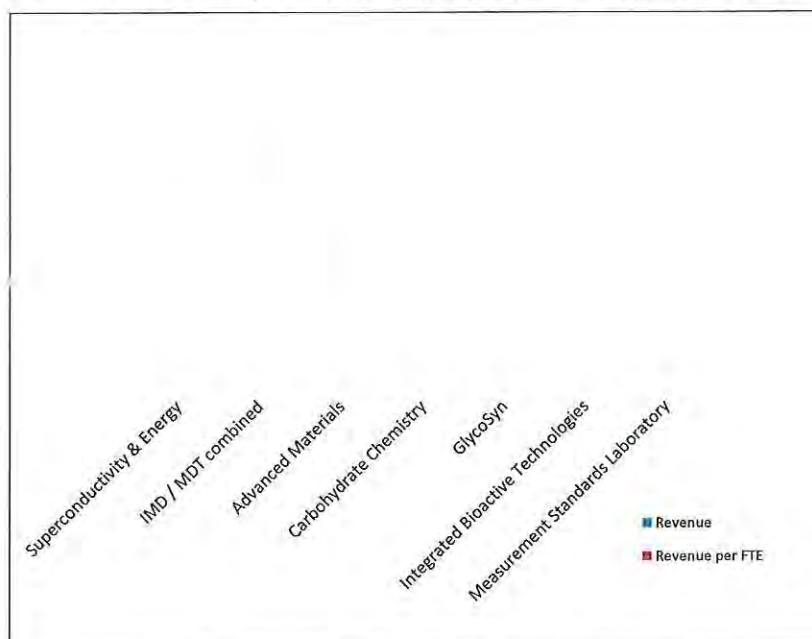
Table 7 displays the key movements in revenues that are discussed in detail in this section of the report.

Table 7: Revenue split overview, 2007–11

	2011		2010		Movement 2010-2011		2007		Movement 2007-2011	
	\$	% of total	\$	\$	%	\$	\$	%		
MSI										
MSI Contestable funding	31,818,844	51%	33,211,403	(1,392,559)	-4%	27,739,533	4,079,311	15%		
Marsden funding	707,727	1%	508,387	199,340	39%	611,404	96,322	16%		
Capability funding	5,389,530	9%	5,746,788	(357,258)	-6%	4,824,468	565,062	12%		
MSL funding	5,764,000	9%	5,763,556	444	0%	5,512,444	251,556	5%		
Total MSI	43,680,101	70%	45,230,133	(1,550,033)	-3%	38,687,850	4,992,250	13%		
Domestic Commercial										
Private Sector	5,354,920	9%	3,060,601	2,294,319	75%	5,713,424	(358,504)	-6%		
Other CRIs/Unis	1,587,190	3%	2,260,279	(673,089)	-30%	1,379,465	207,724	15%		
Related parties	678,723	1%	881,904	(203,181)	-23%	341,255	337,468	99%		
Non-MSI central govt	186,512	0%	282,235	(95,724)	-34%	336,416	(149,905)	-45%		
Other Crown entities	64,234	0%	357,196	(292,962)	-82%	83,017	(18,783)	-23%		
Total domestic commercial	7,871,578	13%	6,842,214	1,029,363	15%	7,853,577	18,001	0%		
International	8,265,158	13%	4,276,315	3,988,843	93%	4,466,352	3,798,806	85%		
Other revenue										
IP income	901,784	1%	4,913,512	(4,011,728)	-82%	1,490,447	(588,664)	-39%		
Other	1,815,789	3%	1,721,779	94,010	5%	1,091,139	724,651	66%		
Total other	2,717,573	4%	6,635,291	(3,917,718)	-59%	2,581,586	135,987	5%		
Total revenue	62,534,409		62,983,953	(449,544)	-1%	53,589,365	8,945,044	17%		

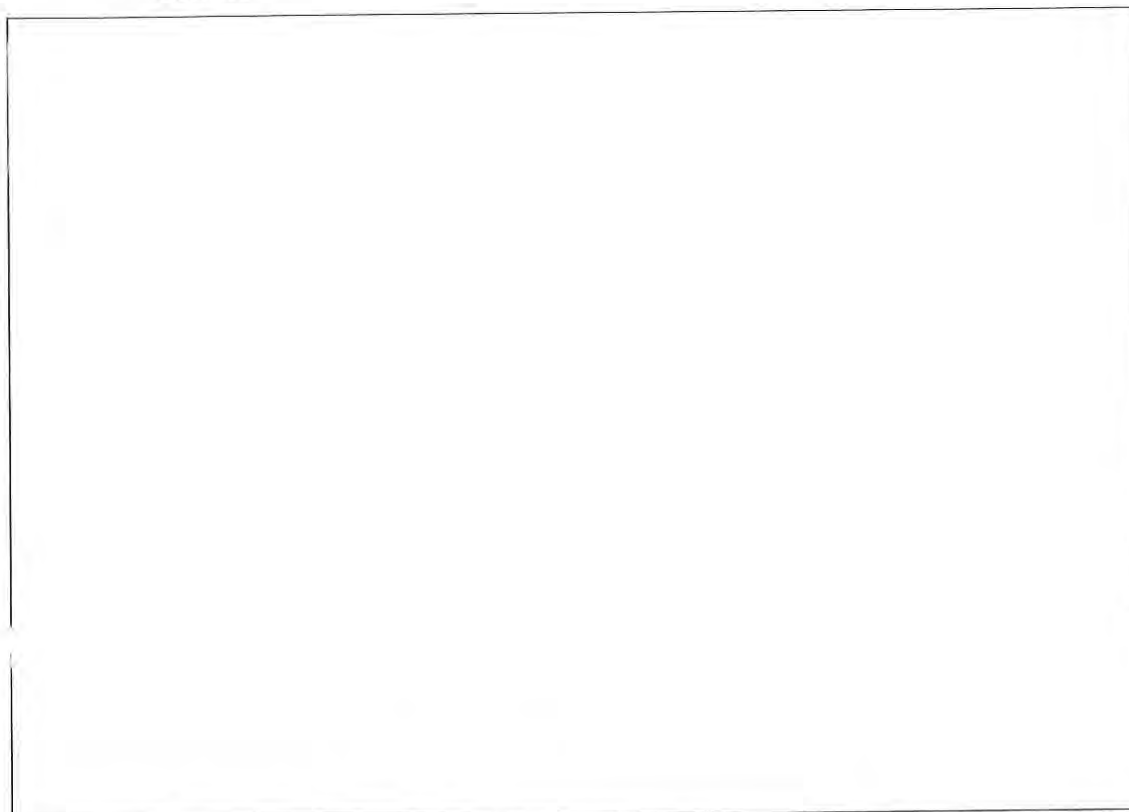
Note: MSI = Ministry of Science and Innovation; CRIs = Crown Research Institutes; IP = intellectual property.

Figure 8: Revenue and revenue per full-time employee (budget) split by line of business, 2011



Note: IMD = Intelligent Machines and Devices; MDT = Medical Device Technology; FTE = full-time employee.

Figure 9: Revenue and earnings before interest and tax per full-time employee, real terms 2007, 2007–11



Note: EBIT = earnings before interest and tax; FTE = full-time employee.

In total, revenue has increased between 1993 and 2011 from \$38 million to \$63 million. In inflation adjusted terms,

As Figure 8 and Figure 9 show, both the revenue and the number of total FTEs employed have increased over the past five years. In real terms, revenue per FTE has declined by 5 percent over the five-year period. Revenue per FTE has been consistent across the portfolio with the exception of S&E.

6.2.2 Ministry of Science and Innovation revenue

Table 8 lists the top 20 MSI contracts from 2007 to 2011.

Historically, IRL received approximately \$5 million of stable capability funding per year. This was superseded in 2011/12 with the introduction of core funding. IRL was initially awarded \$13.5 million per year of core funding (wrapping up \$7.7 million of contestable awards) but the level was renegotiated to \$18.5 million. Core funding is set to 30 June 2016 and does not have an annual inflation adjustment.

Table 8: Ministry of Science and Innovation revenue detail for the top 20 contracts, 2007–11

Contract name	Number	2007	2008	2009	2010	2011	Grand total
C08X0702	Communications Technologies	–	1,850,000	2,466,667	2,466,667	2,466,667	9,250,000
C08X0701	Glycotherapeutic	–	1,590,155	2,158,732	2,142,222	2,142,225	8,033,334
C08X0409	M5 Cross Objective	1,786,667	1,786,663	1,786,666	1,786,667	446,667	7,593,328
C08X0709	IBT: HVL	–	1,333,240	1,777,778	1,777,778	1,777,778	6,666,573
C08X0814	HTS Roebel Cable	–	–	1,333,333	1,777,778	1,777,778	4,888,889
C08X0812	3D Medical Ultrasonics	–	–	1,178,667	1,621,333	1,600,000	4,400,000
C08X0801	Advanced Skin Imaging	–	–	1,333,333	1,333,333	1,333,333	4,000,000
C08X0407	HTS	1,777,778	1,777,775	444,444	–	–	3,999,996
C08X0808	CarboNano	–	–	1,053,333	1,404,444	1,404,444	3,862,222
C08X0806	MDT: FFM	–	–	1,000,000	1,333,333	1,342,933	3,676,267
C08X0813	HTS	–	–	1,000,000	1,333,333	1,333,333	3,666,667
C08X0406	3D DENTAL ULTRASONICS	1,615,000	1,525,000	475,000	–	–	3,615,000
C08X0818	TRST Transformer	–	–	316,667	1,489,184	1,335,355	3,141,206
C08X0206	COGNITIVE RADIO	2,466,667	616,667	–	–	–	3,083,333
C08X0704	Integrated Optical Devices	–	600,000	800,000	800,000	800,000	3,000,000
C08X0402	Superconductivity Applications	1,333,333	1,333,333	333,333	–	–	3,000,000
C08X0302	Geopolymer Project Delivery	651,889	1,000,892	1,013,890	222,222	–	2,888,893
C08X0803	HCE 1	–	–	740,667	987,556	987,556	2,715,778
C08X0710	Cryogenic Refrigeration	–	500,000	666,667	666,667	666,667	2,500,000
C08X0807	Photonic Imaging	–	–	662,667	883,556	883,556	2,429,778
Other MSI funding including capability funding		29,056,517	26,291,649	22,967,149	23,204,061	23,381,809	124,901,186
Total MSI funding		38,687,850	40,205,374	43,508,991	45,230,133	43,680,101	211,312,449

Note: HTS = high temperature superconductors; MSI = Ministry of Science and Innovation; HVL = high value lipids; FFM = fast fluidic microanalysis; HCE = hydrogen and clean energy.

IRL has \$10 million of contestable contracts that are due to expire on 30 September 2012. The company is seeking to have these contracts renewed as part of the current funding round. MSI reports this to be a highly contested funding round. While IRL has a further \$8 million of contestable funding at risk in the 2013 MSI bidding round, the company has, overall, a relatively good security of revenue, with 58 percent of its 2011 MSI revenue contracted through to 2015 (table 9), a security of revenue that is driven by core funding.

Table 9: Ministry of Science and Innovation (MSI) contracted future revenue, 2011–15

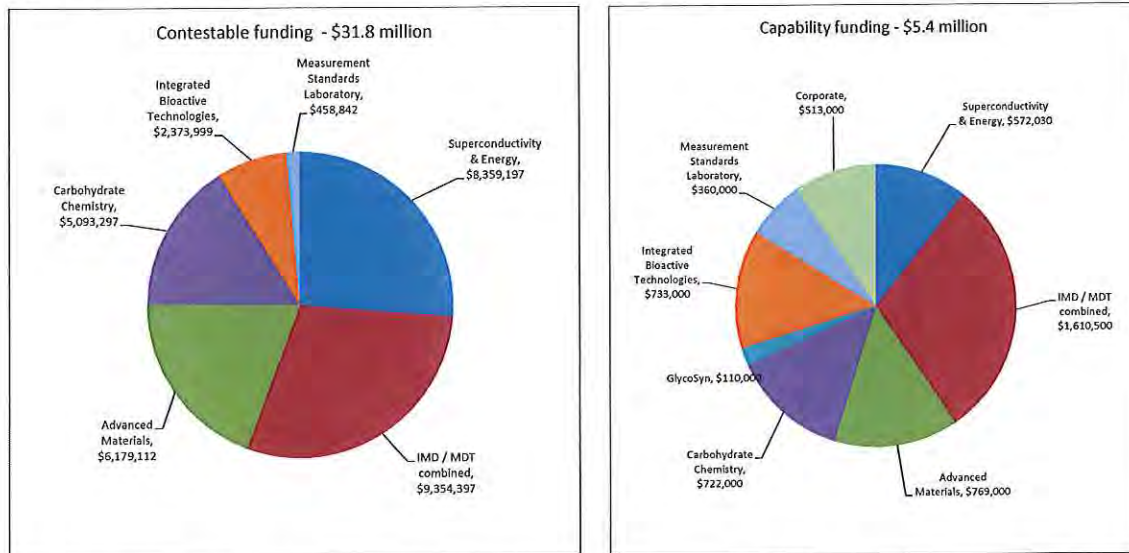
	2011 (actual)	2012*	2013 Contracted	2014 Contracted	2015 Contracted
MSI contracted future revenues (\$)	43,680,101	47,066,170	37,202,029	29,993,762	25,343,323

* 2012 revenue is split \$22.3 million for the six months to December 2011 (actual) and \$24.7 million for the six months to June 2012 (contracted).

In 2011, IRL received (Figure 10):

- \$31.8 million of contestable funding, with S&E being the biggest recipient;
- \$5.4 million of capability funding, with MDT being the biggest recipient;
- \$5.7 million of negotiated funding for MSL; and
- \$0.7 million of contestable funding from the Marsden Fund (ultimately derived from Vote Science and Innovation).

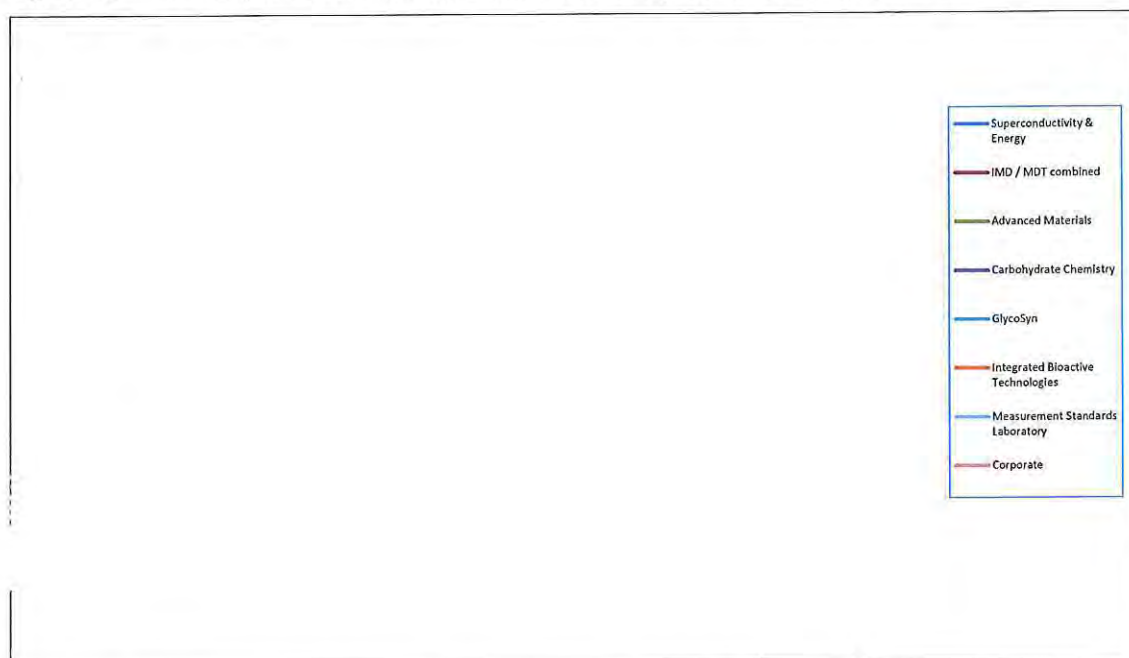
Figure 10: Ministry of Science and Innovation revenue split by line of business, 2011^a



^a The \$513,000 of capability funding to Corporate is for Outreach Fellowships. IMD = Intelligent Machines and Devices; MDT = Medical Device Technology.

Across the company over the past five years, S&E's revenue has grown the fastest, while IBT's has grown steadily, AM's has fluctuated the most and IMD/MDT's has declined (Figure 11).

Figure 11: Ministry of Science and Innovation revenue by line of business, 2007–11



Note: IMD = Intelligent Machines and Devices; MDT = Medical Device Technology.

6.2.3 Domestic commercial revenue

IRL's domestic commercial revenue decreased consistently from 2007 to 2010 (from \$7.8 million in 2007 to \$6.8 million in 2010) before increasing back to \$7.8 million in 2011 (Table 10).

Table 10: Domestic commercial revenue detail for top 10 customers, 2007–11

Customer	2007	2008	2009	2010	2011	Total

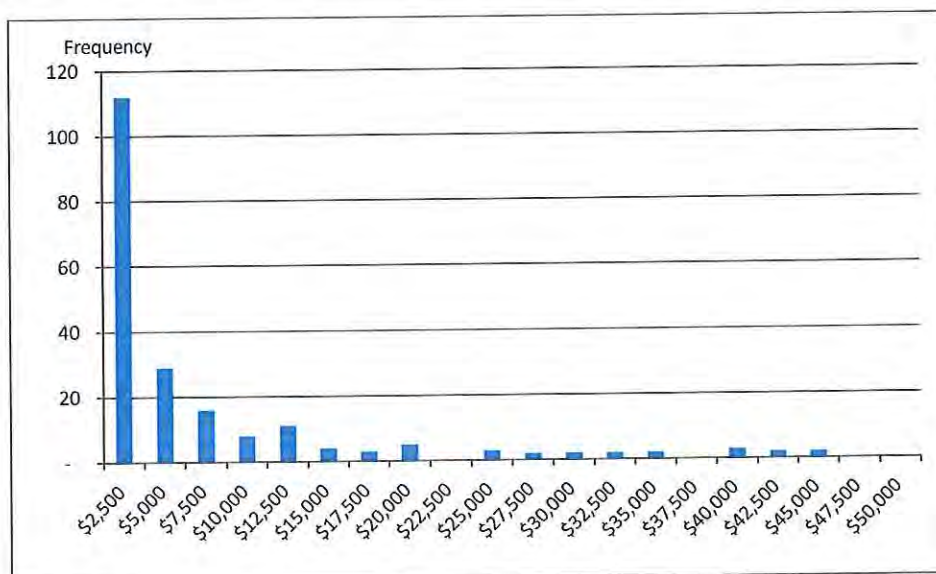
IRL's domestic commercial customer base is split between a large number of small customers spending small amounts and a few big spenders. The company's customer profile has changed somewhat in the past five years as the total number of domestic commercial customers dropped each year from 297 to 235 (refer Table 11). At the same time, median revenue increased from \$2,100 to \$3,100 – suggesting that the loss in customers has been mainly amongst smaller customers. Table 10 displays IRL's top 10 commercial customers. The proportion of commercial revenue that came from the top five customers has increased consistently over the period (29 percent; 28 percent; 34 percent; 41 percent; 41 percent). Total domestic commercial revenue, however, has not increased over the period.

Table 11: Additional detail for domestic commercial revenue, 2007–11

Domestic commercial customers	2007	2008	2009	2010	2011
Total number of customers	297	278	259	245	235
Median revenue (\$)	2,100	1,698	2,500	2,706	3,100
Customers: Upper North Island	49%	50%	45%	43%	46%
Customers: Lower North Island	35%	31%	36%	38%	35%
Customers: South Island	15%	19%	19%	19%	20%

All of IRL's significant customers (greater than \$50,000 in any year) are listed by LoB in the corresponding annexes. Figure 12 provides the distribution profile of the smaller customers (that is, customers with a spend of less than \$50,000) for 2011.

Figure 12: Domestic commercial revenue – small customer distribution by spend, 2011



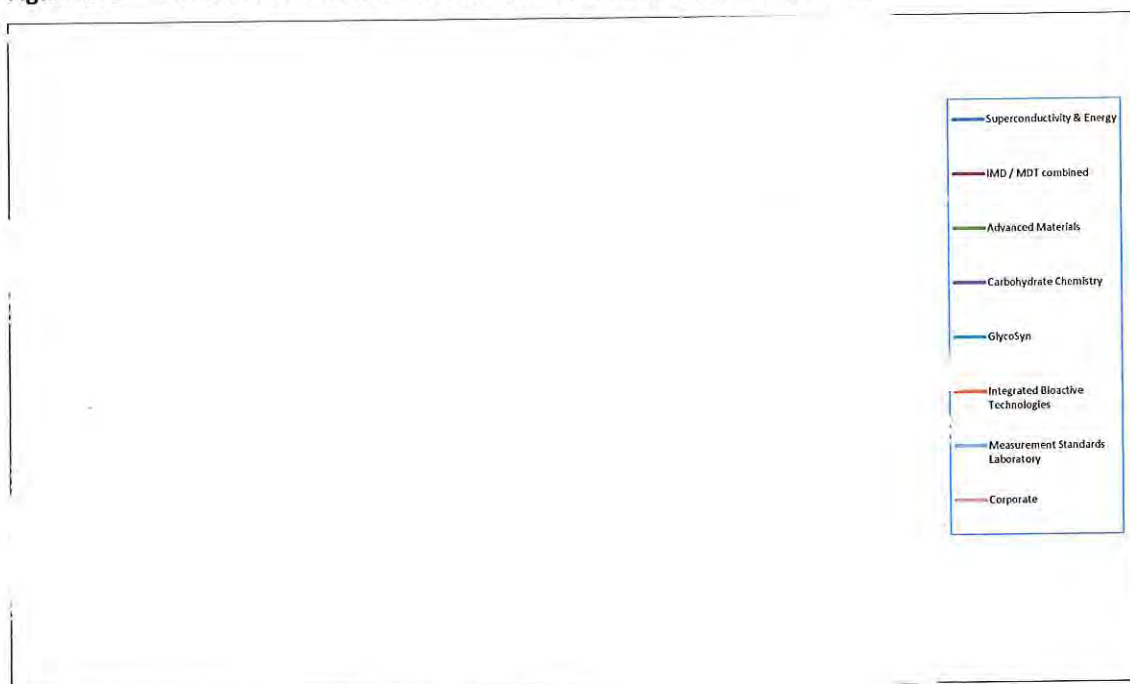
Note: There were 28 customers with a spend greater than \$50,000 in 2011.

The geographic distribution of IRL’s customers has remained relatively steady over the period. In 2011, 46 percent of IRL’s domestic customers were centred in the upper North Island, 35 percent in the lower North Island and 20 percent in the South Island (Table 11).

The nature of IRL’s domestic commercial revenue base, which is dominated by the spending patterns of larger customers, means that there is some volatility amongst the LoBs despite a smoother trend in total domestic commercial revenue. Over the five-year period (Figure 13),

These are commented on in detail in the annexes.

Figure 13: Domestic commercial revenue split by lines of business, 2007–11



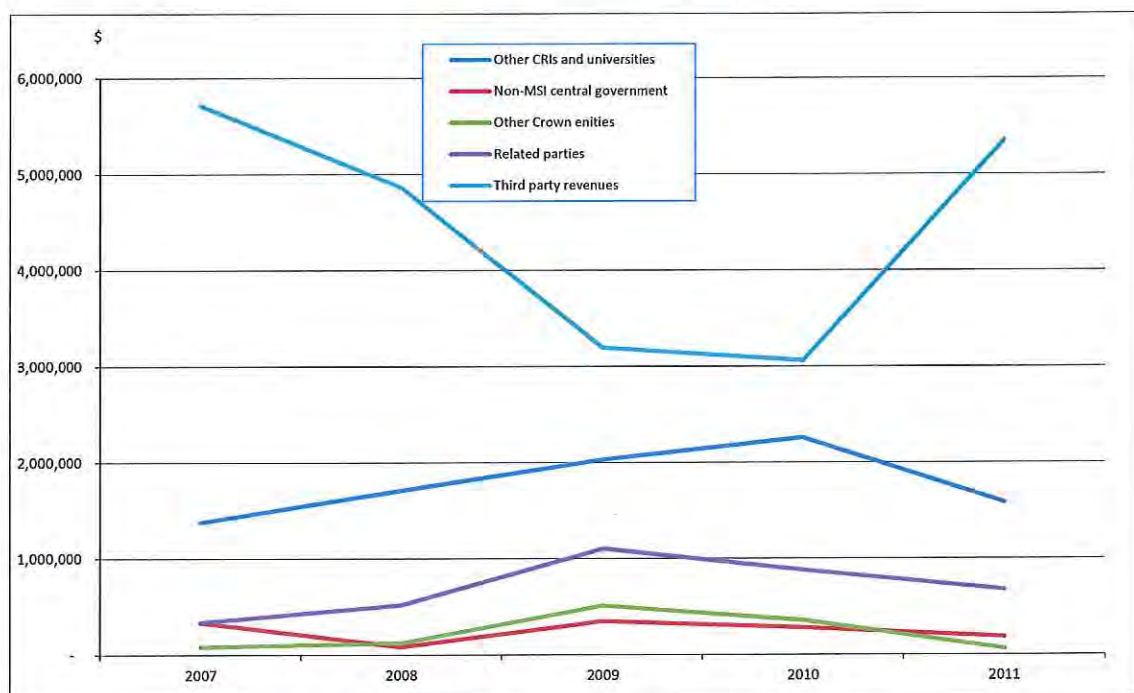
Note: IMD = Intelligent Machines and Devices; MDT = Medical Device Technology.

The classification of domestic commercial customers, whilst correct for IRL, needs additional consideration from a whole of government perspective since the category includes significant outsourced revenue from other CRIs and the universities. Domestic commercial revenue (Figure 14) over the period included \$9 million (24 percent) of work outsourced by universities and other CRIs. A further 6 percent of domestic commercial revenues were sourced from central government and other Crown entities (excluding state-owned enterprises).

Revenue from the private sector (\$5.3 million in 2011) accounted for around 67 percent of IRL’s domestic commercial revenue in 2011 and 60 percent on average over the five-year period. Over the five-year period, private-sector revenues were 7.5 percent of IRL’s total revenue. Some of this private-sector revenue will have been matched by MSI revenue (co-investment) or may have received funding directly from the Crown.

After falling significantly between 2007 and 2010, private-sector revenue increased sharply in 2011 (by 78 percent), returning to near 2007 levels in nominal terms. In inflation adjusted terms, private-sector revenue is down by around 17 percent over the five-year period. The strong increase in private-sector revenue in 2011 has been driven by IRL’s strong relationships with several large businesses: research partnership:), MSI co-funding and through the recent marketing initiatives such as IRL’s Co-Investment Fund. IRL’s engagement with New Zealand industry is discussed further in Section 8.2 and Section 8.3 below.

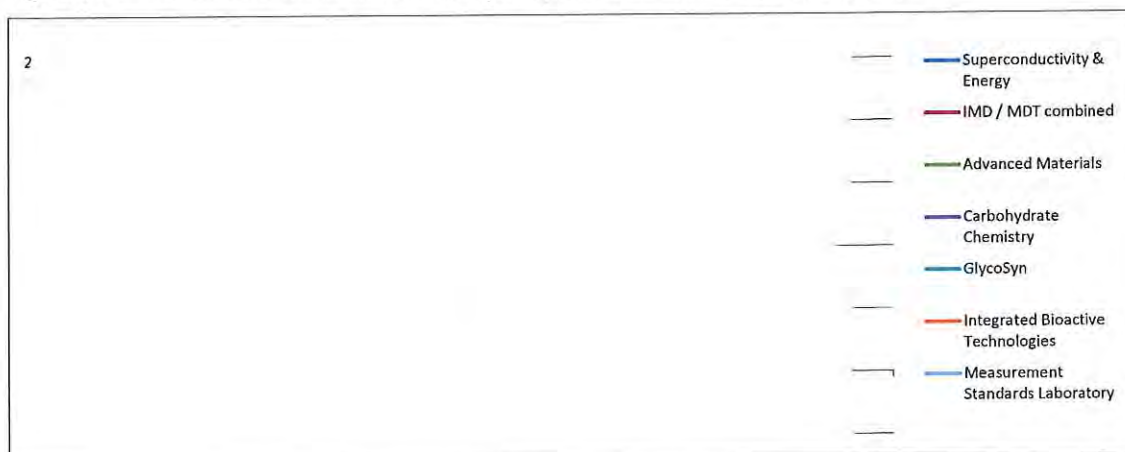
Figure 14: Domestic commercial revenue split by source, 2007–11



Note: CRIs = Crown Research Institutes; MSI = Ministry of Science and Innovation.

The growth in private-sector revenues in 2011 has occurred across all the LoBs except MSL. The contribution to IRL’s overall revenue growth was strongest from the IMD/MDT group (Figure 15), although this group’s private-sector revenue had declined the most from 2007 to 2009.

Figure 15: Private commercial revenue split by research lines of business, 2007–11



Note: IMD = Intelligent Machines and Devices; MDT = Medical Device Technology.

Annexes 7 to 14 discuss the trends in private-sector revenue for the individual LoBs in further detail. Table 12 highlights the most significant contributors to private-sector revenues.

Table 12: Private commercial revenue top 20 customers, 2007–11

Customer	2007	2008	2009	2010	2011	Total	% of Total

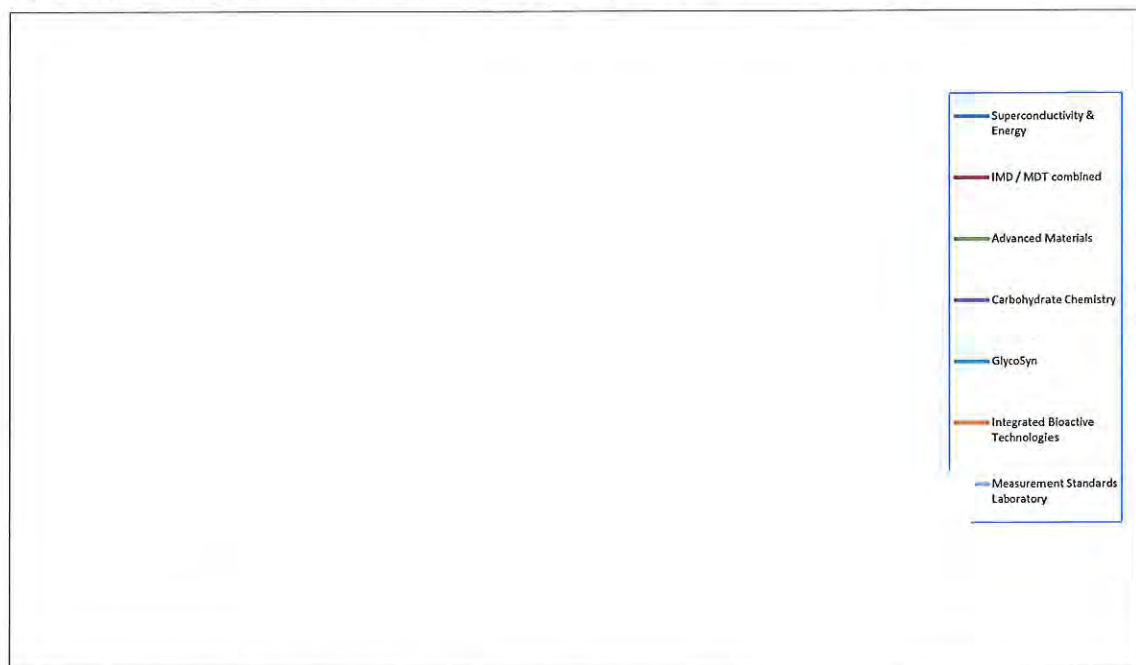
6.2.4 International commercial revenue

IRL's international commercial revenue (Table 13) has been a volatile revenue stream, peaking at \$8.2 million in 2011. Recent growth has been generated by

Table 13: International revenue detail top 10 customers, 2007–11

Customer	2007	2008	2009	2010	2011	Grand total
International revenue	4,466,352	7,619,166	6,356,199	4,276,315	8,265,158	30,983,189

Figure 16: International commercial revenue split by lines of business, 2007–11



Note: IMD = Intelligent Machines and Devices; MDT = Medical Device Technology.

6.2.5 Other revenue

By its nature 'other' revenue is lumpy but there are some underlying trends. Rental income from Lower Hutt, Auckland and Christchurch increased from \$489,000 to average \$968,000 from 2009–11.

Table 14: Other revenues, 2007–11

Year	2007	2008	2009	2010	2011
Intellectual property income	1,490,447	375,754	798,787	4,913,512	901,784
Other	1,091,139	1,574,146	2,439,737	1,721,779	1,815,789
Other revenue	2,581,586	1,949,901	3,238,524	6,635,291	2,717,573

IP revenue (Table 14) has been volatile and has typically been a relatively small component of IRL's total revenue, averaging 3 percent of total revenue over the past five years.

In net terms (that is, after accounting for the costs of managing and protecting IP revenue, refer Table 15), IP net revenue has averaged \$0.9 million per annum.

Table 15: Intellectual property (IP) costs and revenues, 2007–11

Year	2007	2008	2009	2010	2011
IP revenue	1,495,000	378,000	804,000	4,914,000	902,000
IP costs	903,000	587,000	1,179,000	680,000	575,000

IP revenue is managed in the corporate cost centre. However, IP is generated throughout the business,

6.2.6 Revenue classification policies

IRL has adopted the following accounting policies for revenue classification:

- if monies are received directly from MSI (contestable funds, co-funding), revenues are classified as MSI revenue;
- if monies are received from a third party (pure commercial work, subcontracting and Tech Transfer Vouchers) then revenues are classified as domestic commercial revenue; and
- IRL internal funding (IRL's Co-investment Fund and What's Your Problem New Zealand?) is recognised as intra-company revenue and as an expense in the Corporate cost centre) – this internal funding consolidates to nil in the financial statements.

6.3 Expenditure

IRL's costs have increased steadily but not spectacularly over the past five years. Total operating costs have increased by 3.2 percent per annum on average (Figure 17). The most significant costs relate to staffing, asset depreciation and maintenance, and subcontractors and services.

Figure 17: Operating expenses, 2007-11

