

Staff costs have risen on average 5.4 percent per year in the period, increasing from 46 percent to 50 percent of total operating expenditure. This increase in staff costs has been driven by the increase in staff numbers from 305 to 330 FTEs.

Subcontracting costs have remained at a consistent proportion of MSI and commercial revenues and there has been a stable profile of suppliers (Table 16).

Assets costs, including depreciation and maintenance, have remained steady. This is discussed in further detail in Section 6.5.4.

Table 16: Subcontracting detail and top 10 subcontractors, 2007–11

Subcontractors	2007	2008	2009	2010	2011	Total
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6.4 Financial performance

6.4.1 Profitability

The financial performance of IRL over the past five years (Table 17) has been consistently below shareholders' expectations of an average return on equity of 8 percent per year.²⁴ The group has returned a cumulative loss of \$1.9 million over the past five years. The group's financial performance has, however, shown improvement in recent years, with IRL's net debt/cash position moving from net debt of around \$12 million in 2007 to a net cash position of around \$13 million in 2011 (refer Section 6.4.2 below).²⁵

²⁴ Shareholders' expectations of IRL have been regularly negotiated to below the 8 percent average required return.

²⁵ The financial performances of the parent and the group have been similar except for significant events in 2007 and 2010. These relate to the parent recognising a gain on the sale of HTS-100 Limited to the subsidiary Innovation Finance Limited (\$3 million) and the parent's impairment of its investment in HTS-100 Limited of \$3.1 million (see Annex 16 for further detail on the management accounts).

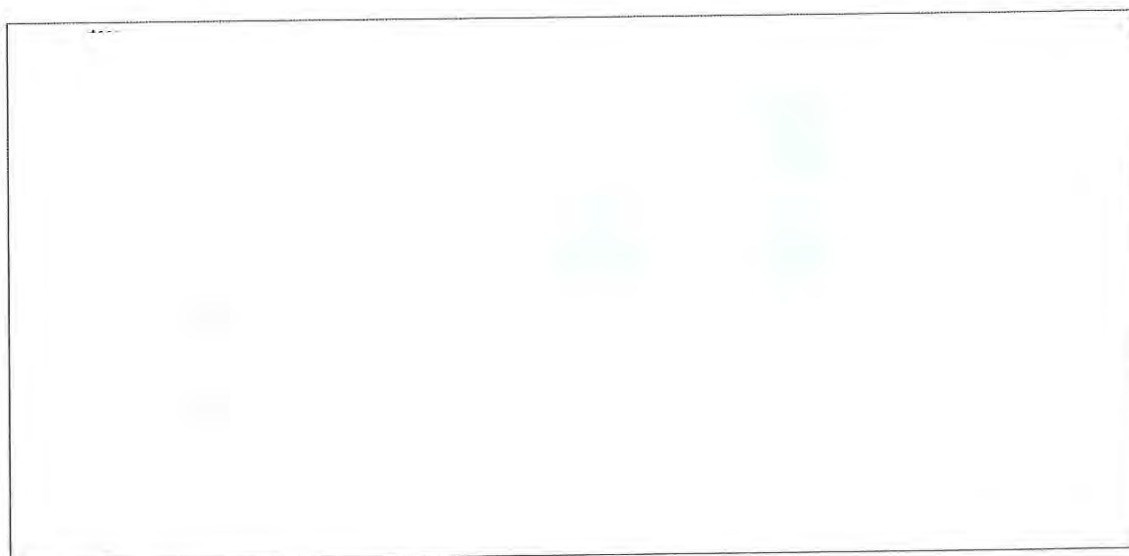
The 2011 results reported an EBIT of \$121,000, with net interest income and tax credits combining to produce a net profit after tax of \$2.3 million, a return on equity of 6.1 percent.

Table 17: Group financial performance, 2007–11 (per annual report)

(\$000s)	2007	2008	2009	2010	2011
Operating revenue	54,970	57,094	60,259	62,994	63,064
Operating profit	(1,966)	1,164	576	1,748	121
Net financial expense/(income)	987	621	(156)	(410)	(652)
Pre-tax profit/(loss)	(2,953)	543	732	2,158	773
Taxation	2,700	–	–	1,990	(1,538)
Post-tax profit/(loss)	(5,653)	543	731	168	2,311

6.4.2 Cash flows

Figure 18: Group cash flows, 2007–11

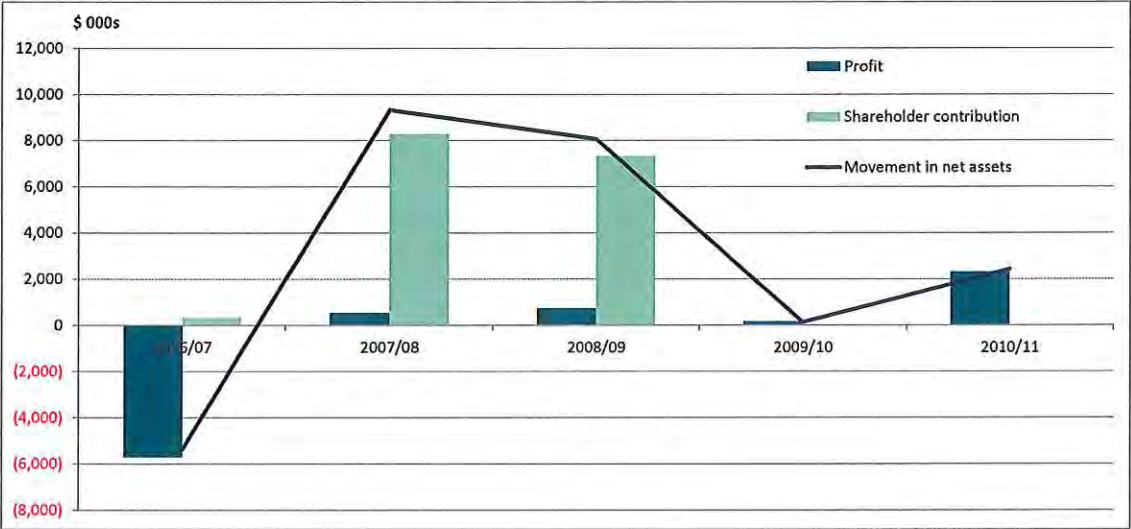


6.4.3 Changes in net assets

Figure 19 demonstrates the key drivers in the movement of the group's net assets (total assets less liabilities) over the period 2007–11. In 2007, there was a loss of \$5.6 million, while in 2008

and 2009 there were, as discussed in Section 6.4.4 below, large capital injections. No dividends were paid over the period.

Figure 19: Movement in group net assets, 2007–11



6.4.4 Capital injections

IRL required cash injections in the late 2000s to strengthen its balance sheet following several years of accumulated losses and restructuring. The company made a request to the Crown in 2008 for a \$15 million cash injection. It was agreed that there would be an \$8 million injection in 2008 and a conditional \$4.5 million injection in 2009. These capital injections were supplemented by \$2.3 million received from the Equity Investment Fund in 2009 and \$0.8 million of Ministry of Research, Science and Technology (MoRST) equity funding for MSL spread over 2008–09. There was also \$0.3 million of MoRST MSL capital funding in 2007. The combined equity injections over the period totalled \$15.9 million.

The 2008 and 2009 capital injections were subject to certain conditions on how the money should be spent. IRL maintained a separate cost centre to help manage this process. The results of which are displayed in Table 18.

Table 18: Capital injections – spend requirement, 2008 and 2009

	Requirement (\$)	2008–10 spend (\$)
Staff and resources to generate greater sector connectivity	3,000,000	1,047,390
Capex: Plant and equipment	800,000	855,746
Capex: Information technology	8,700,000	9,499,192
	12,500,000	11,402,329

As a result of the injections, IRL was able to invest in IT (electronic data processing) that supported the business and brought it back to what the Board believed would be a stronger footing with financial stability and sufficient capability to address the needs of the market.

The returns on this investment have not been quantified by IRL. IRL has made profits since the capital injection but there has been no step change in total customer numbers or revenues.

6.5 Financial position

6.5.1 Balance sheet overview

The financial position for the IRL group²⁷ is summarised in Table 19. The group reported net assets of \$39.2 million as at 30 June 2011. Cash holdings were almost \$13 million.²⁸ The financial position does not reflect any immediate liquidity or solvency risk due to the absence of any debt and the high level of cash.

6.5.2 Intangible assets

The knowledge and skill of IRL's staff is IRL's most significant asset. This asset is not recognised on the balance sheet as it does not meet the accounting rules for recognition. Formal IP, such as patents and royalties, are also not recognised as assets under IFRS financial reporting rules.

The published financial statements include some intangible assets, being purchased software licenses. For the purpose of this report, these assets have been classified as fixed assets.

6.5.3 Investments in associates

The carrying value of IRL's investment in associates is not large. The investment in General Cable Superconductors Limited (49 percent) is carried at zero value. The investment in HTS-110 Limited (36 percent) is carried at \$1.1 million in both the group and parent financial statements.

These investments are discussed further in annex 16.

Table 19: Industrial Research Limited balance sheet, 30 June 2011

Asset	30/06/2011	30/06/2011
	Group	Parent
Cash	12,993	12,993
Other current assets	6,149	6,149
Total current assets	19,142	19,142
Fixed assets	31,944	31,944
Investment in associate	1,095	1,117
Total non-current assets	33,039	33,061
Total assets	52,181	52,203
Non-interest bearing current liabilities	12,026	12,026
Total current liabilities	12,026	12,026
Non-interest bearing non-current liabilities	951	951
Total non-current liabilities	951	951
Total liabilities	12,977	12,977

²⁷ As noted in footnote 18 above, the IRL group is IRL, the non-trading subsidiaries and the associates HTS-110 and General Cable Superconductors Limited.

²⁸ These cash holdings are in place to fund the redevelopment of the Gracefield site.

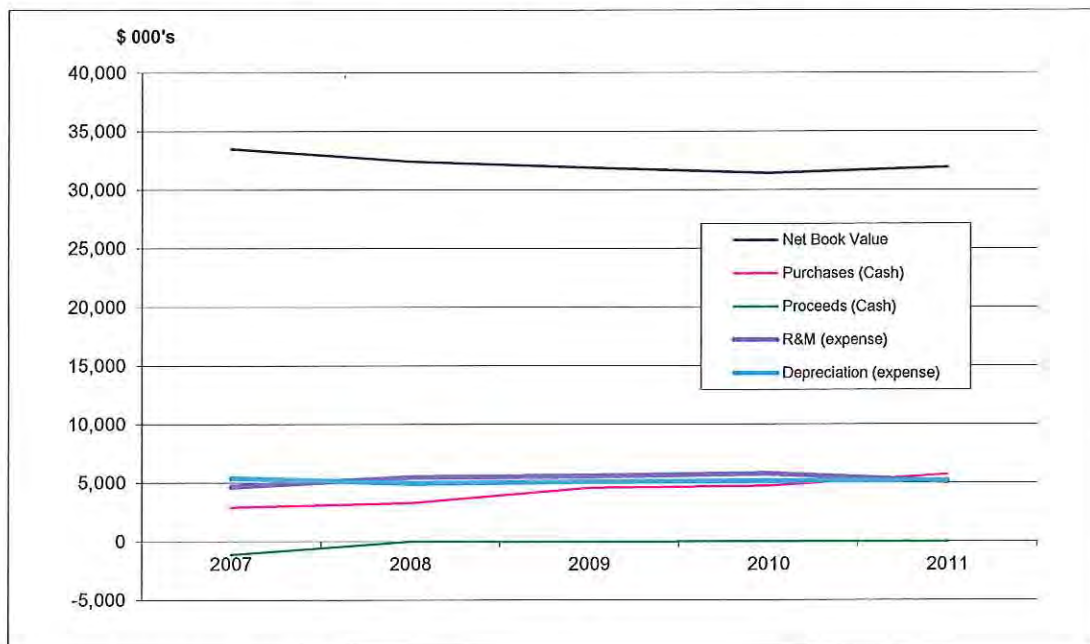
Asset	30/06/2011	30/06/2011
	Group	Parent
Share capital	40,170	40,170
Retained earnings	(1,047)	(1,025)
Other reserves	81	81
Total equity	39,204	39,226

6.5.4 Fixed assets

Fixed assets are the major class of IRL's reported assets, being 61 percent of the total group assets as at 30 June 2011.

The total book value of the group's fixed assets has declined by \$1.6 million over the past five years as purchases of fixed assets have been less than the depreciation expense in all years except 2011 (refer Figure 20).

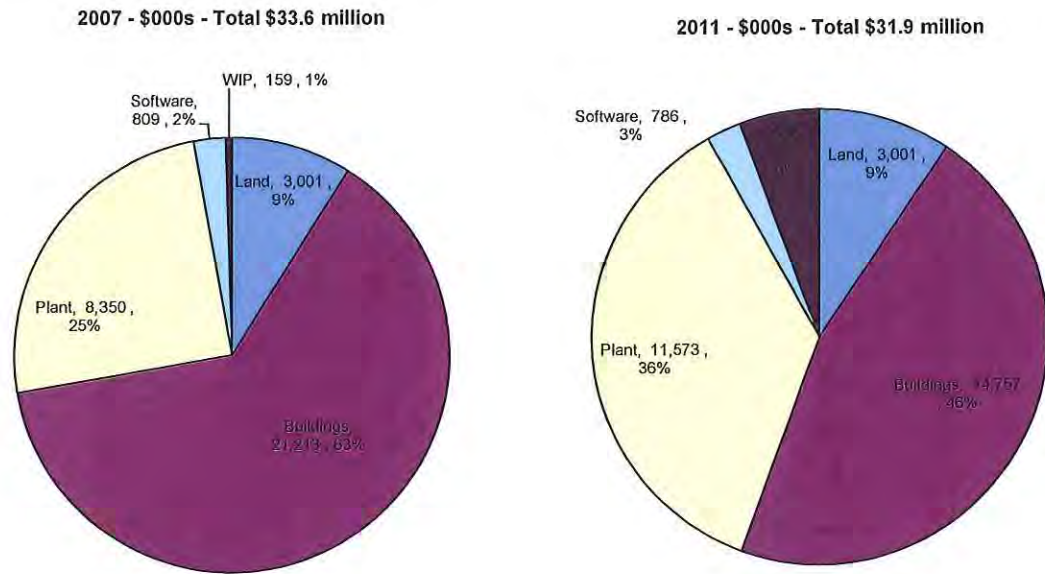
Figure 20: Industrial Research Limited group fixed asset book values and cash flows, 2007–11



Note: R&M = Repairs and maintenance.

The make-up of IRL's fixed asset portfolio has changed over the period as the net book value of plant has significantly increased and buildings have depreciated in excess of additions (refer Figure 21).

Figure 21: Group fixed asset breakdown, 2007 and 2011



Note: WIP = work in progress.

IRL's major items of plant and equipment by book value are listed in Table 20. Further detail on the plant and equipment held by each LoB is provided in the annexes.

Table 20: Detailed asset book values, 31 December 2011

Asset description	Age (Years)	Net book value (\$)
SPECTROMETER NMR Ultrashield 500mhz Bruker		
LASER PATTERN GENERATOR Compact Microtech LW405		
NMR 500 upgrade – Bruker Console and autosampler		
SuperEx Portable Supercritical extraction plant		
MASS SPECTROMETER Waters Q-TOF Premier Micromass		

Asset-based expense such as repairs and maintenance has been consistently around \$5 million per annum across the period. IRL has advised the Panel in interviews that maintenance of the Gracefield buildings has been deferred. While deferral of maintenance is reasonable given a significant upgrade of the Gracefield site is planned, a result of deferring maintenance expenditure is to increase operating cash flows and increase reported profits. The resulting unrecognised liability has been estimated informally by IRL staff to be

6.5.5 Off-balance sheet assets

IRL has tax losses of \$10.2 million as at 30 June 2011. No deferred tax asset has been recognised in relation to these losses.

6.6 Liabilities

6.6.1 Gearing

IRL has no material debt. As demonstrated in Figure 18, IRL's net debt has decreased from \$11.7 million at 30 June 2007 to a cash surplus of \$13.0 million at 30 June 2011.

6.6.2 Commitments and contingent liabilities

IRL has provided the following details of capital commitments (Table 21) as at 31 December 2011. The capital investment programme is discussed further in Section 6.7.2.

Table 21: Capital commitments, 31 December 2011

Category	Outstanding
Major CAPEX FY12	
Major CAPEX FY11	
Major CAPEX FY10	
Minor CAPEX FY12	
Minor CAPEX FY11	
CWIP	
Total	

IRL also has operating leases relating to sites in Auckland and Christchurch, as well as equipment leases. The commitment as at 31 December 2011 is displayed in Table 22. IRL advised the Panel that no additional material commitments have been made since 31 December 2011.

Table 22: Operating lease commitments, 31 December 2011

Commitments for non-cancellable operating leases and other operating commitments:	2011 (\$000s)
Not later than one year	
Later than one year and not later than five years	
Later than five years	

6.6.3 Off-balance sheet liabilities

IRL follows normal treasury practices to manage its exchange rate risk on income, operating expenses and capital expenses through the use of forward contracts.

As noted in Section 6.5.4 above, IRL has a potential deferred maintenance burden on its buildings at the Gracefield site in Lower Hutt.

6.7 Financial forecasts

6.7.1 Five-year business plan

IRL prepared a five-year business plan as part of the process of bidding for \$5 million of additional core funding in 2011. The business plan is summarised in Table 23, with the detail provided in Annex 17. The \$5 million additional funding was approved under the plan. IRL projects its commercial revenue growth to be higher than it would be without the additional Crown funding and its return on equity to increase to 6.7 percent in 2016.

Table 23: Five-year business plan

	2012 (\$m)	2016 (\$m)	Average % year on year growth
(
(
,			

6.7.2 Major capital spending plans

Table 24: Capital expenditure plan, 2012–14

Group	Y2012 expected spend	Capex items for FY2013 & FY2014
Advanced Materials		
Carbohydrate Chemistry		
Corporate and site		
GlycoSyn		
Integrated Bioactive Technologies		
Intelligent Machines and Devices		
KiwiStar Optics		
Medical Device Technology		
Measurement Standards Laboratory		
Superconductivity and Energy		
Grand total		

6.7.3 Progress against budget 2012

Table 25: Progress against 2012 budget as at 31 December 2011

\$000s	Actual 6 months to 31/12/2011	Budget 6 months to 31/12/2011	Difference
Crown revenue			
Domestic commercial			
Overseas commercial			
Intellectual property income			
Other			
Operating revenue			
Science project expenses			
Other expenses			
Net operating expenses			
Earnings before interest and tax			
Financial expense			
Surplus (loss) from operations			
Associate			
Pre-tax surplus (loss)			
Taxation			
Tax-paid surplus (loss)			

6.8 Financial systems

It is beyond the scope of this report to comment in detail on IRL's financial systems. However, the Panel notes that PricewaterhouseCoopers assessed IRL's internal control framework as part of its 2011 annual review.³⁰ PricewaterhouseCoopers rated the financial management control environment at IRL as very good and also assessed the financial information systems and controls as very good.

²⁹ The table has been extracted from IRL's Quarterly Report for shareholding Ministers for the period ended 31 December 2011 and MSI's internal workings. Further detailed analysis is included in Annex 18.

³⁰ Report to the Audit and Risk Committee for the year ended 30 June 2011.

7 Non-financial indicators

There are a number of tools to assess organisational science and technology productivity and performance against national (and international) benchmarks. These tools measure such indicators as the number and impact of publications and the number of patents filed. In 2010, IRL commissioned a review of the contribution that six projects made to the wider economy.

7.1 Number and impact of science outputs

The best measure of the number and impact of publications are derived from licensed searches of international publications in the fields of activity. The more detailed the level of search the less robust the data so, in terms of the business stocktake, searches were undertaken at the level of the key disciplines as in the SCI (see section 4.1). The search engines used were Scopus (2007–11) and Web of Science (2001 to 2010). The two search engines differ in the range of journals that they search, with Scopus having a much bigger number of journals and being less North American centric.

Table 26 summarises the average annual numbers of publications in the key fields and the average “citations per paper” (an accepted measure of international impact) against the average for the field for combined CRIs and combined New Zealand universities. It is important to note that impact comparisons cannot be made across fields of activity and that the citations from the Scopus database will be lower than those from the Web of Science as the more recent publications will have had fewer years to be cited by other authors.

In summary, in terms of the number and impact of publications, in all its areas of activity, IRL is a minor player compared with the universities. Given the specialised nature of much of IRL’s work, this conclusion is not surprising. IRL, however, dominates the published outputs from the CRIs in physics, material sciences and mathematics and is a significant contributor in engineering, chemistry and computer sciences. The Web of Science information shows a high impact of IRL’s publications in physics and material sciences. The Scopus data shows a good impact in engineering (and chemical engineering) and energy-related publications but a lower impact in other disciplines compared with the universities.

Table 27 shows Web of Science data available to the Panel for IRL compared with the Institute of Geological and Nuclear Sciences and National Institute of Water and Atmospheric Research as well as several New Zealand universities. In most cases, IRL has considerable impact with its work compared with the other CRIs and, given its scale of effort and specialisation, performs well compared with the universities.

Table 26: Benchmarking Industrial Research Limited publications against overall Crown research institute and New Zealand university performance

	Scopus results (2007 - 2011)		Web of Science results (2001- 2012) where available	
	Average number publications p.a.	Cites per paper (Impact)	Average number publications p.a.	Cites per paper (Impact)
Physics and Astronomy				
IRL	74	3.2	29	9.1
Combined NZ Universities	500	5.1	178	8.8
Combined CRIs	101	4.3	36	8.5
Materials Science				
IRL	49	3.4	9	8.3
Combined NZ Universities	332	4.3	76	6.2
Combined CRIs	74	3.2	21	5.4
Engineering				
IRL	39	2.6		
Combined NZ Universities	735	2.8		
Combined CRIs	87	2.9		
Chemistry				
IRL	34	4.4	27	6.2
Combined NZ Universities	407	6.5	281	9.8
Combined CRIs	83	5.4	39	6.4
Mathematics				
IRL	21	1.3	4	1.0
Combined NZ Universities	475	2.6	126	3.6
Combined CRIs	29	2.0	5	1.6
Biochem, Genetics, Mol. Bio.				
IRL	20	4.7	6	17.6
Combined NZ Universities	840	8.1	247	15.3
Combined CRIs	220	7.3	51	13.8
Chemical Engineering				
IRL	15	4.3		
Combined NZ Universities	169	5.8		
Combined CRIs	38	3.5		
Energy				
IRL	3	4.4		
Combined NZ Universities	105	3.6		
Combined CRIs	16	3.2		
Computer Science				
IRL	12	1.3		
Combined NZ Universities	734	2.0		
Combined CRIs	25	2.0		

Note: IRL = Industrial Research Limited; NZ = New Zealand; Mol. Bio. = molecular biology; CRI = Crown research institutes; P.A. = per annum.

Table 27: Benchmarking Industrial Research Limited publications against individual New Zealand institutions

	Web of Science results (2001–12) where available	
	Average number publications per annum	Cites per paper (impact)
Physics and astronomy		
Industrial Research Ltd	29	9.1
Institute of Geological & Nuclear Sciences Ltd	6	5.3
National Institute of Water & Atmospheric Research Ltd	2	11.3
University of Auckland	50	9.7
Victoria University of Wellington	42	9.5
University of Canterbury	36	9.4
University of Otago	23	8.8
Materials science		
Industrial Research Ltd	9	8.3
Institute of Geological & Nuclear Sciences Ltd	3	3.4
National Institute of Water & Atmospheric Research Ltd	0	
University of Auckland	32	5.5
Victoria University of Wellington	10	8.4
University of Canterbury	15	5.7
University of Otago	7	10.1
Chemistry		
Industrial Research Ltd	27	6.2
Institute of Geological & Nuclear Sciences Ltd	1	3.1
National Institute of Water & Atmospheric Research Ltd	2	11.8
University of Auckland	96	10.3
Victoria University of Wellington	25	12.4
University of Canterbury	64	11.7
University of Otago	54	10.0
Mathematics		
Industrial Research Ltd	4	1.0
Institute of Geological & Nuclear Sciences Ltd	0	
National Institute of Water & Atmospheric Research Ltd	0	
University of Auckland	50	4.3
Victoria University of Wellington	18	3.6
University of Canterbury	21	3.1
University of Otago	12	3.2

7.2 Production of protected intellectual property

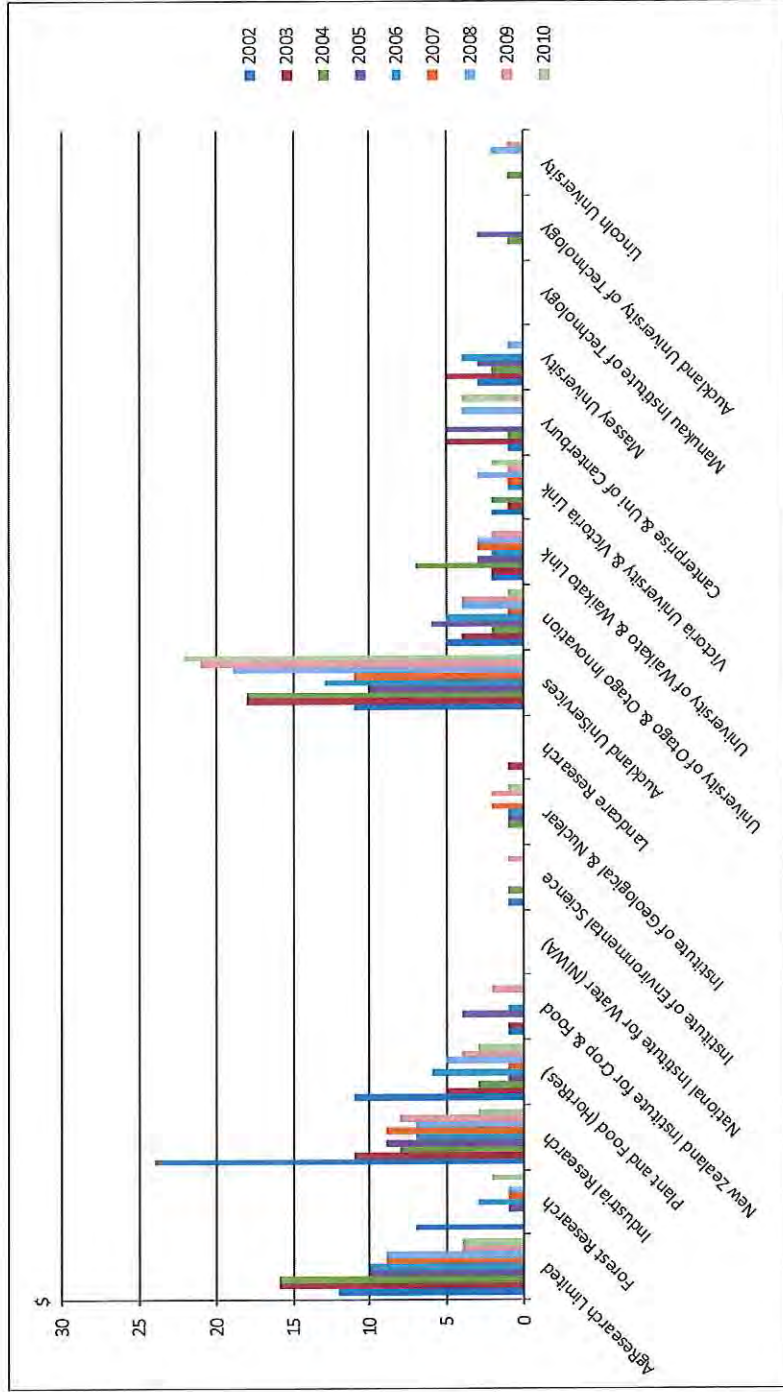
Benchmarking of IP productivity is notoriously error prone, however, a summary of IRL's Patent Cooperation Treaty (PCT) filings and New Zealand provisional patents compared with those from New Zealand universities and CRIs over the past 10 years is provided in Figure 22 and Figure 23. The tables show that, over the 10-year period, IRL accounted for one quarter of all the PCT filings and New Zealand provisional filings of the eight CRIs. Similarly, IRL's filings were around a quarter of all the New Zealand universities combined.

The only other CRI with significant patenting activity has been AgResearch, while the University of Auckland has dominated patenting activity by universities. On the basis of activity per FTE,

IRL is therefore performing strongly in terms of this benchmark compared with most other CRIs and universities. Commentary on the outputs of IRL's individual LoB outputs is provided in annexes 7 to 14. Annex 19 provides further patenting benchmarking data against the other CRIS; however, the data shown includes numbers of plant variety rights, where understandably AgResearch and Plant and Food Research have considerable activity, and does not discriminate full PCT activity from New Zealand only.

There is a clear downward trend by all institutions in the rate of filing of both PCTs and New Zealand provisional patents. Rather than a decline in productivity, it is likely that this is a reflection of a more sophisticated approach being taken to what IP is worth formally lodging and then protecting over time to extract value for the organisation or New Zealand industry generally. Alternative approaches, including retention as trade secret, have become more prevalent (and harder to quantify). IRL is no exception to this trend. IRL management argue that the patents they do file now are in order to provide New Zealand industry with freedom to operate in the future, where the industry itself may not yet be ready to take on the costs of filing and protecting the IP.

Figure 22: Benchmarking Industrial Research Limited Patent Cooperation Treaty (PCT) filings against New Zealand institutions, 2002–10



This data comes from the Delphion database. It is important to appreciate that it concerns publications during the relevant years, not patent filings.

PCT filings are those cases published during the indicated periods (A1-Publication of Int'l. application w/ ISR & A2-Publication of Int'l w/o ISR).

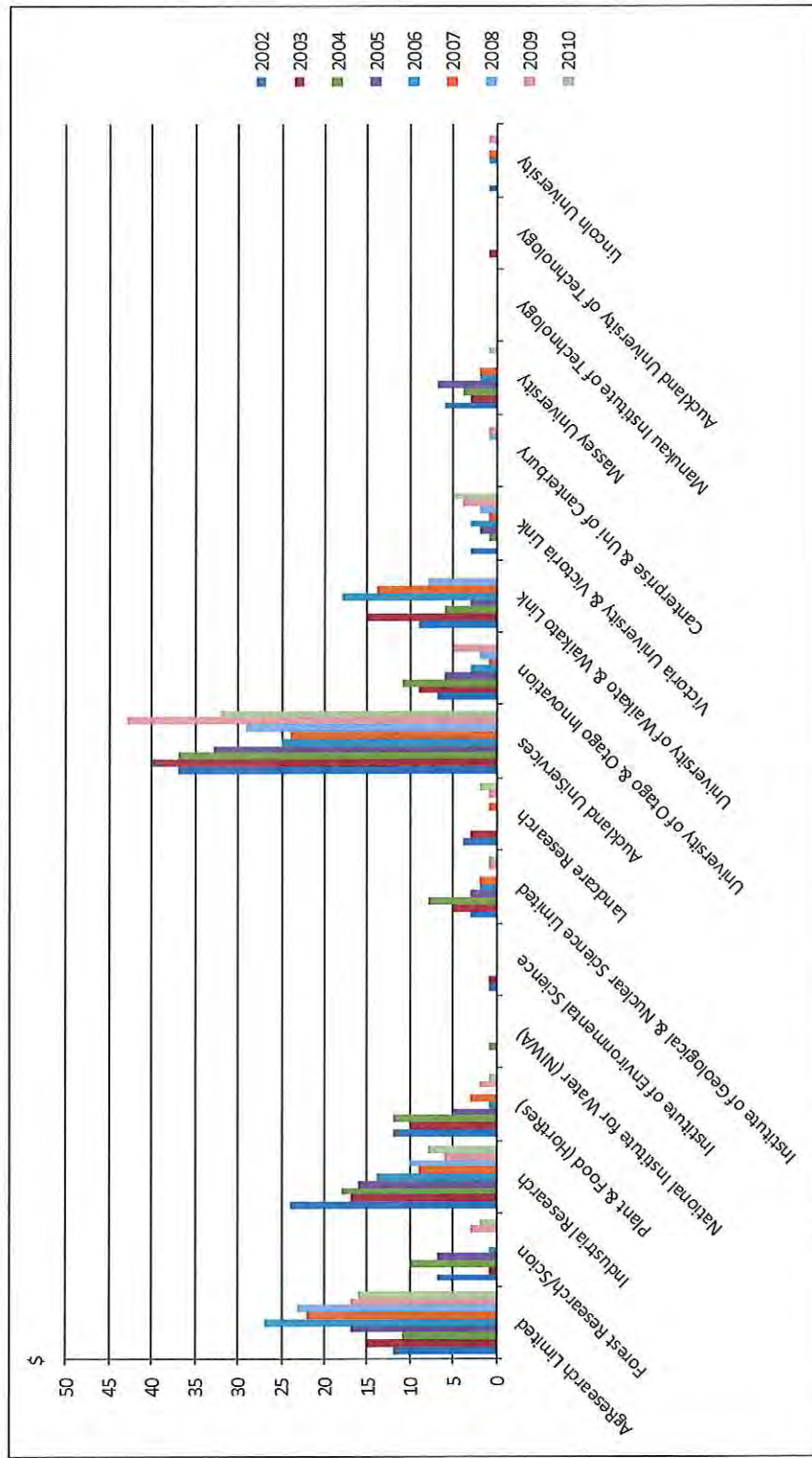
All data includes cases where the named company is sole applicant or joint applicant with a third party.

All data excludes cases filed in the names of inventors.

Data is presented by calendar years.

Note: Searching patent databases by applicant name is notoriously error-prone, but nonetheless reasonably indicative for this type of analysis.

Figure 23: Benchmarking Industrial Research Limited filing of New Zealand provisional patents against New Zealand institutions, 2002–10



This data comes from the Intellectual Property Office of New Zealand database.

Provisional filings are those filed in NZ only and recorded in the name of the relevant company (as sole or joint applicant).

Data is presented by calendar years.

Note: Searching patent databases by applicant name is notoriously error-prone, but nonetheless reasonably indicative for this type of analysis.

7.3 Economic outcomes

IRL's contribution to the wider economy in terms of helping New Zealand industry grow is difficult to measure. IRL commissioned Nimmo Bell in 2010 to review the contribution of six of IRL's projects to the wider economy.³¹ The evaluation methodology used was cost–benefit analysis of the direct economic impacts assessed at a national level. Nimmo Bell estimated benefit–cost ratios ranging from 1 to 16.1 for the six projects. The six projects assessed were:

- patch antenna;
- Hitman™;
- advanced ceramics;
- improved industrial radiation thermometry;
- glycotherapeutics; and
- widescan sonar.

³¹ 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.

8 Business model and culture

8.1 Level and quality of science and technology activity

Over the past five years there have been a number of internal and MSI-sponsored peer reviews that, together, encompass many of IRL's research programmes. Such reviews in general considered the basic/applied/developmental research continuum and often looked at opportunities and activity in commercialisation or other knowledge transfer of outputs.

In general, the reviews commented favourably on the quality of the research programmes against international benchmarks. Where independent reviews are available for individual research group activities these are commented on in Annexes 7 to 14.

The IRL Science Advisory Panel reported to the IRL Board on 21 December 2011 against the Board's Terms of Reference "to provide assurance that the science and engineering activities that IRL is undertaking are aligned with its SCP and SCI" and "provide advice as to the future science positioning of IRL."

In essence, the Science Advisory Panel found that, while there are good teams and good science within IRL, not all science teams could articulate their group, or IRL's, priorities and that the science activity is too thinly spread with poor processes to prioritise and focus.

The Capability Alignment Project currently under way in IRL might be expected to address this issue of focus and prioritisation of activity. However, the material given to the Stocktake Panel provided limited evidence that this would occur as the Capability Alignment Project currently stands because there is little evidence as yet of forward planning over a three- to five-year timeframe or cross-capability comparisons. However, IRL may be intending a further assessment of implications once the phase of information gathering is completed. Certainly, there are internal discussion papers at senior management level on how best to undertake such prioritisation to meet New Zealand industry needs.

8.2 Level of engagement with other New Zealand research institutions

As detailed in Annexes 7 to 14, the LoBs within IRL have a broad network of relationships with other New Zealand research institutions as evidenced by subcontracting out and subcontracting in of partnered research activity. In some cases, this is fee-for-service acquisition of expertise by either party but there are also long-standing research partnerships with complementary capabilities being applied to problem solving. In general, these partnerships are forged at the level of the LoB or key scientists rather than through institutional direction.

There are some conjoint appointments with universities, particularly with Victoria University of Wellington. The first Outreach Fellowship appointment was with Victoria University of Wellington (Dr Shaun Hendy) and that approach appears to be working well, with the further appointment of Professor Juliet Gerrard from the University of Canterbury and active engagement from both Fellows.

There was, however, some comment from the universities that other joint appointments of IRL staff into the universities were not working as effectively as had been hoped and further work from both parties to the appointments is needed to move them beyond tokenism.

8.3 Level of engagement with New Zealand industry and commercial customers

As summarised in Section 5.3.1 and detailed in Annexes 7 to 14, analysis of IRL's New Zealand commercial revenues suggests that all of the operational LoBs have increased their level of engagement with New Zealand industry and commercial customers in 2011 to some degree, albeit often off a very low base. The improvement, in group private-sector commercial revenues from \$3.0 million in 2010 to \$5.4 million in 2011 is encouraging.

The improvement in private-sector revenues has coincided with a comprehensive programme to increase IRL's engagement with New Zealand industry. To lead this effort, IRL has strengthened its industry engagement team with the appointment of an industry engagement manager to the Executive team and increased the size of the team by roughly 50 percent over the past two years. The team now has eight customer account managers and five sector managers. The role of the sector managers is to act as internal champions for industry in their sector areas, including preparing sector plans that are intended to drive IRL's science programme towards areas of industry need and opportunity.

Other notable features of IRL's efforts to increase industry engagement include:

- Board level focus: the industry engagement manager reports to the Board at monthly Board meetings, including providing metrics on industry engagement such as sales and contract pipelines. This focus is reflected in the Board papers of other Executive team members who report to the Board – with a strong emphasis in those papers on commercial revenues and relationships with industry;
- a similar level of focus on industry engagement across the whole of IRL's Executive team;
- consistent comment from all of the LoB team leaders that the Panel met: as to the need, and enthusiasm for their teams, to achieve greater levels of engagement with New Zealand industry. This was also reflected in many of the external interviews that the Panel conducted with IRL customers (and former customers) who positively commented on the uplift they had seen in industry engagement activity from IRL. Some team leaders have been particularly active in direct marketing to industry participants, including in Christchurch, in preparation for an anticipated increase in IRL's presence in that city;
- the implementation of successful industry marketing and outreach programmes, particularly the Co-Investment Fund approach that has brought new industry partners into partnered R&D, with evidence of progression into the Technology Transfer Voucher scheme or TechNZ projects. The What's Your Problem New Zealand competition has also provided leverage,

Paints), and smaller engagements with other participants in the programme. The Scientist for a Day initiative is yet to show further partnered research contracts, but IRL states that it is having active discussions with several companies for further work and has secured one contract;

- participation (and leadership) by IRL in the establishment of new industry-facing resources and hubs, such as the proposed Auckland Centre for MDT and a Polymer Alliance 2.0.

Nevertheless, there is still a lot of work to do. Despite the recent uplift, when judged on private-sector revenues, the engagement of most of IRL's LoBs with New Zealand industry is low. In the case of the S&E team, there is effectively no industry to engage with as the sector is nascent, and in the case of CC, GlycoSyn and parts of AM there are a limited number of companies nationally to work with. In other cases – IMD (especially Communications), IBT and MDT – there is specific and deep engagement with particular customers or sectors, but the engagement could be much broader across industry.

Assessment of the level of demand for IRL's output and/or services is outside the scope of this report, but it is nevertheless appropriate to note that IRL is aware that it faces considerable challenges in the process of increasing its industry engagement. These challenges include the often limited and/or fragmented nature of New Zealand industry sectors and the fact (as confirmed in some of the Panel's interviews with potential IRL customers) that some New Zealand companies are not receptive to the IRL overtures, for example, because they have their own in-house R&D capacity or they are happy to procure R&D services offshore.

8.4 Level of commercial uptake

Based on our analysis of IRL's commercial revenues over the past five years, on the whole, the level of commercial uptake of IRL's products, services and intellectual property by New Zealand companies has been somewhat underwhelming, with New Zealand private-sector revenue averaging \$4.3 million or 5 percent of IRL's total revenue base. As noted above, there has been a significant increase in New Zealand private-sector revenues in 2011 but from a low base.

The majority of IRL's commercial revenues are derived from international customers and licensees (the latter predominantly generated by CC and GlycoSyn). New Zealand public-sector entities (such as universities and other CRIs) also account for a significant part of IRL's commercial revenues.

LoBs that have performed better in terms of a consistent New Zealand commercial uptake have been:

- S&E, through contracts with IRL's associate companies HTS-110 Limited and General Cable Superconductors Limited;
- IMD, through its contracts with ...
- AM, through its work
- IBT with its contracts with

8.5 Intellectual property generation, management and commercialisation processes

As noted in Section 8.1 over the past five years there have been a number of internal and MSI-sponsored reviews. There is a consistent theme throughout these reviews around the risks in IP generation resulting from poor stage-gating, not focusing on the core research target, lack of well-developed business development plans and/or lack of a clear value proposition. From the material provided, it is not clear what progress IRL has been making in implementing the Industry Engagement Performance Review (December 2010), which highlighted such points and suggested a pathway forward for IP generation activities.

IRL appears to be managing its patenting activity in an efficient manner. IRL's IP manager conducts periodic reviews to determine whether there are likely to be commercial opportunities for the non-licensed patent families in IRL's portfolio, and IRL will discard patents that are judged to have no further commercial potential. It is, however, difficult to judge whether there is a problem of leakage of valuable IP due to a failure to identify and project promising IP at an appropriate stage. For several years, commercialisation activity was devolved to individual LoBs, leading to somewhat haphazard commercialisation processes. More recently, commercialisation activity has been centralised under the leadership of a new commercialisation manager. This has led to a more structured approach to the identification and management of commercialisation opportunities, through, for example, the development of an "Intellectual Property and Commercialisation Policy" and formalised "IP Process Pathway" that cover all aspects of IRL's activities in this area. These initiatives should yield better and more consistent outcomes.

The commercialisation manager's role includes seeking out New Zealand partners for the commercialisation of IRL IP, whether through licensing or the establishment of new ventures. If a New Zealand partner cannot be found, overseas partners may then be sought.

8.6 Interdependencies and synergies between the lines of business

In most cases, the operational LoBs stand relatively independently from each other although there are clear interdependencies between CC and GlycoSyn and also between MDT and aspects of IMD.

Several of the external stakeholders interviewed commented that one of the strengths of IRL is the multi-disciplinary approach it can take to problem solving and the way in which contacts in one LoB will bring staff into project discussions from other LoBs if different capabilities are needed to successfully deliver an outcome.

8.7 Flexibility and specificity of assets and skills

Much of the scientific equipment, IT and communication infrastructure is similar to that found in any laboratory-based research organisation. There are, however, specific assets that are either not available elsewhere in New Zealand (for example, the super critical extraction facilities, part of the HTS engineering facilities, aspects of MSL's instrumentation and GlycoSyn's GMP plant) or that are more extensive than in other research organisations (for example, the microfabrication facility).

Although most are currently involved in targeted research activities, the IRL scientists and engineers and their support staff in general have skill sets that would readily transfer to other research programmes either underpinning or delivering applied research projects supporting the HVMS.

8.8 Organisational culture

The culture of IRL is that of an organisation in change. IRL was formed as a CRI in 1992 with clear expectations from its owners that it should act as a company under the Companies Act 1993. As with all CRIs, the operational staff (and many management) were redeployed from a government department (Department of Scientific and Industrial Research – DSIR), which had a culture of "government service" and "New Zealand good". The transition over the past 20 years has been a

long one, with several shifts in ownership priorities along the way. However, some priority was given to return on equity for much of the period alongside an emphasis on transformation of the New Zealand economy through delivery of new enterprises and industries. IRL, along with the other CRIs, attempted to deliver on these ownership expectations while ensuring that it retained quality underpinning science platforms to the extent possible.

Over the period, management has focused on the financial sustainability of the organisation while science and engineering staff positioned their activity around the investment signals provided by the then Foundation for Research, Science and Technology. These signals included, for an extended period, a strong focus on spin-outs and commercialisation of IP globally.

The recent CRI reforms and associated changes in government policy have started a process whereby IRL is being asked to engage more broadly and deeply with New Zealand industry. The desire to “serve New Zealand” is still embedded in the organisation’s culture, but, because of its history, the associated mix of capabilities and its large reliance on government funding, it is taking time to shift from a science or technology-push culture to one of supporting industry needs (both current and future). This rebalancing of the organisation’s culture is well under way and, as noted in other sections of this report, IRL management and staff seem committed to making this change. The relatively large proportion of staff with less than five years’ tenure alongside a refreshed management team should help accelerate this change.

8.9 Management capabilities

As noted in various parts of this report, IRL’s Board and management team have made progress in implementing positive changes in IRL, particularly in encouraging a more outward orientation for the business. It is Panel’s assessment, overall, that there is significant scope for the company to increase further its engagement with the business community so as to enhance IRL’s contributions to the growth and development of the HVMS in New Zealand.

As noted in section 2.4 above, at the time this report was prepared, the role, purpose and functions of the ATI were under development. The Business Stocktake Panel was therefore not able nor requested to comment on the capabilities of IRL’s management to fill the requirements of an ATI or to manage the change process involved in establishing an ATI.

8.10 Overall strengths and weaknesses

8.10.1 Overall strengths

The Stocktake Panel identified the following as important strengths of IRL:

- the robustness of IRL’s science and engineering outputs. This is highly valued by IRL’s customers and reflected in a strong “brand” image amongst IRL’s existing customer base;
- the science quality of several of IRL’s teams;
- the breadth of IRL’s capability, enabling a multi-disciplinary approach to IRL’s work and solving industry’s problems;
- IRL’s strong relationships with key New Zealand university departments and faculties;
- IRL’s commitment to change and improvement:

- IRL’s Board, senior management and the operational staff appear determined to improve IRL’s performance, particularly IRL’s commercial performance and its level of engagement with industry;
- this is supported by programmes and management changes that can be expected to deliver improvements over time;
- existing marketing initiatives provide a good base to keep engaging with new industry partners and leverage those already engaged;
- IRL’s Board and senior management are pursuing new relationships and structures in the research, science and technology sector that have the potential to deliver a step change in the delivery of services and IP to, and engagement with, New Zealand industry sectors; and
- specific LoBs that have the potential to really pull industry forward (as opposed to supporting organic growth) based on their current initiatives and new internal alignments are:
 - CC and GlycoSyn, particularly if the team successful diversifies its New Zealand focus beyond pharmaceuticals into animal health and added-value food-related activities and builds on the new initiatives with Christchurch industry; and
 - the mix of teams within IBT in relation to the functional food and over the counter therapeutic sectors.

8.10.2 Overall weaknesses

The following were identified by the Stocktake Panel as material weaknesses of IRL:

- a material proportion of IRL’s annual revenues are at risk in MSI’s competitive bidding processes over both this year and next year;
- IRL has a commendable reputation in some areas of activity built on the achievements of several scientists of international repute. However, some of these scientists have already retired and, of those left, many may leave the organisation over the next few years as a high proportion of the “significant players” or thought leaders are reaching the end of their careers. There is a large gap in many teams between these senior staff and the early-mid career staff who form the rest of the teams. Building the future leadership and mentoring new recruits will become increasingly important;
- too many of IRL’s projects lack capable and/or committed industry partners. There is an over-emphasis on science-push rather than industry-pull in IRL’s current portfolio of projects;
- IRL’s highest performing teams in science terms are not aligned with strong New Zealand industry partners and are facing nascent or narrow domestic industry sectors. This contrasts with several of IRL’s poorer performing teams in science terms, which are aligned with strong industry partners and face broader industry sectors;
- the work of some of IRL’s teams overlaps with work by other New Zealand science research and technology institutions, and in some cases private-sector organisations;
- stage-gating of research projects, particularly in making the value proposition to industry, is still weak at IRL;
- IRL’s commercial and commercialisation expertise is thinly spread within the organisation, although a programme is under way to improve the organisation’s capabilities in these areas; and
- IRL’s Gracefield site is very tired.

8.11 Opportunities and risks that may impact on the Advanced Technology Institute establishment

8.11.1 Opportunities

The main opportunities that the Stocktake Panel identified that may impact on the ATI establishment are:

- IRL has a number of practically oriented teams that are well suited to an applied science and engineering-focused ATI;
- several of IRL's teams are working with New Zealand industry sectors that have the potential for significant growth. Establishment of an ATI could provide an opportunity to increase the contribution IRL makes to those sectors and to better align other IRL teams and research projects with New Zealand industry; and
- the increased flexibility CRIs now have with core funding will improve the potential for an ATI (assuming it also has core funding) to be a responsive strategic partner with New Zealand industry.

8.11.2 Risks

The main risks that the Stocktake Panel identified that may impact on the ATI establishment are:

- the pool of highly skilled scientists and engineers available and suitable for work in New Zealand firms is relatively small. Any increase in recruitment by IRL or an ATI from this talent pool is likely to put pressure on firms that would otherwise employ these staff and could draw talent out of firms (as well as from other research organisations) with negative effects. Some firms expressed their concern about this risk during discussion with the Stocktake Panel;
- there is a risk that an ATI could crowd out existing consultancy firms, for example, engineering consulting firms, that currently service the private sector. This risk may be mitigated to the extent that the ATI focuses on national capability rather than just its own in isolation;
- New Zealand's HVMS, whilst encompassing many firms, is relatively shallow. It seems unlikely that the sector would absorb a rapid scale up in the level of services offered by an ATI. Growth would, therefore, need to be carefully managed and aligned to industry needs;
- a large increase in Crown funding for IRL or the ATI could have the opposite effect of that intended by shifting the organisation's attention away from the HVMS and back to the Crown as the principal source of revenue. Any increases in Crown funding should, in the Panel's view, be conditional on additional private-sector revenue; and
- this is the fifth or sixth year of uncertainty for IRL management and staff with reviews, injections of funding (2007 equity injection; 2012 core funding injection) and mixed signals as to when and where to progress. There is a risk that those science staff who have the reputational strength to do so will walk rather than endure further change.

9 Obstacles to and opportunities for change

9.1 Legal

9.1.1 Introduction

As part of the review, the Panel undertook a high-level review of information provided to it by IRL concerning core legal aspects of the business, including properties, IP, environmental, material contracts³² employees, risk management, insurance, litigation and other impediments to change.

9.1.2 The Panel's view

The Panel has not identified any "show stopper" to change from a legal perspective. As a general comment, and from the information provided to the Panel, IRL manages its legal affairs prudently, including by having in place a range of policies, processes, and checks and balances to ensure legislative compliance and to protect the interests of IRL. IRL has standard terms and conditions that it endeavours to use in its dealings with third parties. These terms and conditions are favourable to IRL but, of course, the success of contracts and transactions is often reliant on, not just the legal terms, but the commercial management of that relationship (which is not discussed in this section).

As would be expected where there is change in any business, there is a range of legal matters that need to be addressed as part of any change process but the issues identified should be capable of resolution and/or management. These issues include the following.³³

- Land: Land owned by IRL at the Gracefield site is subject to a caveat registered by the Crown. This caveat was lodged under section 31 of the Crown Research Institutes Act 1992 and relates to protecting the Public Works Act 1981 "offer back" rights of persons (or their successors) from whom the land was originally acquired. To the extent that change occurs and the land is no longer required for a public work (for example, if some of the land is to be sold privately), the offer back provisions in the Public Works Act 1981 would need to be followed. IRL has advised that it is still establishing whether there will be any "offer back" issues as most of the former owners were either companies (which have since gone into liquidation) or are deceased individuals. IRL has also advised that it has obtained legal advice that there are no Treaty of Waitangi claim issues in respect of the Port Nicholson settlement.
- Contractual commitments: As would be expected with the nature of IRL's business, IRL has a range of short- to long-term contractual commitments in respect of its business, including providing research and development services and licensing of technology. Many of these contracts are incapable of transfer without the other party's consent although there are well-established mechanisms for addressing this if change occurs. Careful consideration will be required of how some of the contractual commitments are addressed depending on what change occurs (which, as an alternative to transfer to an

³² All contracts with a value of at least \$500,000 that bind IRL to long-term commitments and that are strategically important or could be considered high risk or highly unusual were requested.

³³ The list includes matters that MSI has requested comment upon.

ATI, could include negotiating alternative arrangements for the performance of the contract or negotiated termination). By way of example:

- Staff: To the extent that change encompasses redundancies, the standard individual and collective employment agreements include relatively generous provisions as follows:
 - first year of service: six weeks' pay;
 - second year of service: additional two weeks' pay;
 - third year of service to 20 years: additional three weeks' pay for each additional year of service; and
 - 20 years of service onwards: no further provision is made.
- Both the individual and collective employment agreements address the sale, transfer, lease or other disposal of all or part of the business of IRL. Where the potential new employer offers employment on the same (in the case of the collective agreement) or substantially the same (in the case of the individual agreement) terms and conditions, the employee is not entitled to redundancy compensation. Both agreements include a process to be followed in respect of employees in the event of sale, transfer, lease or other disposal.
- As noted above, IRL has tax losses of \$10.2 million as at 30 June 2011. These tax losses may be lost if IRL ceases to operate in its current form, however, this is a nil net cost to the government.

The Panel notes (as information was specifically requested on this) that it has not identified any other material issue that could be an impediment to change. In particular, IRL has advised that it has not been subject to any litigation or claims over the past three years, nor are any threatened or pending.

Annexes

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1 Glossary

Abbreviation or term	Explanation
AM	Advanced Materials
ATI	Advanced Technology Institute
CC	Carbohydrate Chemistry
CoRE	Centre of Research Excellence
CRI	Crown research institute
EBIT	earnings before interest and tax
FTE	full-time employee
GNS	Institute of Geological and Nuclear Sciences Limited
HTS	high temperature superconductors
HVMS	high value manufacturing and services
IBT	Integrated Bioactive Technologies
IP	intellectual property
IRL	Industrial Research Limited
IMD	Intelligent Machines and Devices
LoB	line of business
MDT	Medical Device Technology
MoRST	Ministry of Research, Science and Technology
MSI	Ministry of Science and Innovation
MSL	Measurement Standards Laboratory
NIWA	National Institute of Water and Atmospheric Research Limited
NPAT	net profit after tax
PCT	Patent Cooperation Treaty
PPL	Power Projects Limited
R&D	research and development
real	inflation-adjusted
S&E	Superconductivity and Energy
SCI	Statement of Corporate Intent
SCP	Statement of Core Purpose

2 Terms of Reference/Statement of Work

SCOPE OF WORK: INDEPENDENT IRL STOCKTAKE

1. **Start date:**
1 February 2012
2. **End date:**
16 March 2012
3. **Services:**

The Supplier(s) must undertake and deliver the services as described below.

Description of services

Context

The high-value manufacturing and services (HVMS) sectors have significant growth potential but they need support and expertise of technology-focused research and development, and assistance with commercialising technological innovation, if they are to significantly increase exports and productivity. To better support innovation in the HVMS sectors, the government has announced its intention to transform Industrial Research Limited (IRL) into an advanced technological institute, which will function as the 'high tech HQ' for New Zealand. This institutional response will be part of a broader suite of changes designed to lift innovation in the HVMS innovation ecosystem.

Given the scale and scope of the likely institutional changes, the government wishes to commission an independent stocktake of IRL's current business, similar to the due diligence that would be undertaken by any business owner contemplating a major investment that is likely to involve significant change. The stocktake will assess the relative strengths of IRL's range of science and technology capabilities and platforms and business innovation services, and the sustainability and robustness of different business units, to enable a comprehensive and objective assessment of the risks and opportunities associated with the proposal. The stocktake will also consider any material risks or issues that may impact on institutional reform.

This work will be one of a number of "building blocks" that will inform future policy decisions around the establishment of the ATI and related supporting initiatives.

Aims/objectives

The Stocktake is principally a forward-looking assessment of the current state of IRL, both financial and non-financial, to inform advice to the government on the establishment of an ATI.

It will provide insight into IRL at all levels across the full range of activities and services provided by IRL.

It will identify issues and opportunities that may impact on the establishment of ATI.

Scope of work

In scope:

- all aspects of IRL's current business, resources and capabilities, business systems and culture;
- 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
- advice on future strategic options or directions for the business and/or shareholders.

Deliverables

The output required from the Supplier(s) for this project is a report to the Ministry of Science and Innovation (MSI) that provides an independent assessment of the current state of IRL, which will identify strengths and weaknesses of IRL's current business and the opportunities and risks that may impact on the establishment of ATI. Areas to be covered include:

Financial analysis

- For the different business units (e.g., science groups) and service offerings: revenue, expenses, profitability and cash flow (and drivers of these), infrastructure and staffing profile and issues, critical operational dependencies (including key staff and equipment, or resource bottlenecks), perceived competitive advantages and key competitors, risk profile of funding sources, flexibility of operations to respond to demand.
- IRL's financial structure, the manner in which the balance sheet is being leveraged, analysis of exposure to financial risk, and rate of return.
- Analysis of the cost and revenue streams used for different IRL research programmes, including their financial and operational impact.
- Intellectual property (IP) generation and management processes and current financial value of IP/intangible assets and associated revenue flows.
- General infrastructure/physical assets, including buildings and land, significant items of equipment and any specific issues which could impact on transformation of IRL.

Organisational analysis

- Scientific research and technological development capabilities, including major technology platforms, research teams and dedicated infrastructure, including laboratories and testing facilities.
- Other business innovation and related services, especially commercialisation-related activities and supporting staff.
- Customer relationships, especially the breadth and depth of relationships with businesses in the HVMS sector.

- Relationships and linkages with universities, other research organisations and research and technology networks in New Zealand and overseas, and the value of these.
- Management and organisational capabilities and culture.
- Progress in implementing the 2007 business case proposals to strengthen physical infrastructure and build business development and commercialisation capability (the business case was used to support a shareholder capital injection of \$12.5 million, approved in December 2007).

Legal analysis

- Review of material contracts (including employment agreements) and property titles, to identify any material encumbrances, liens or other issues that may impact on institutional reform.
- Review of any issues associated with asset ownership, whether tangible or intangible, that may impact on institutional reform, including land ownership and related Treaty of Waitangi considerations.
- Identification of any other material issues, such as legal actions taken by or against IRL, that could impact on the institutional reform.

Specific tasks the Supplier(s) is expected to complete include:

- Review relevant documents held by MSI and COMU, such as recent assessments, business cases, accountability documents and quarterly and annual reports.
- Provide detailed analysis of IRL documentation including financial records, business and financial plans and management reports, Board papers, and legal documents etc.
- Interviews with members of the Board, senior executives and other key management and staff at IRL, across all significant business units.
- Interviews with key customers and stakeholders.

Timetable

1 February 2012	Project commencement
2 March	Draft report due
16 March	Final report due – project end

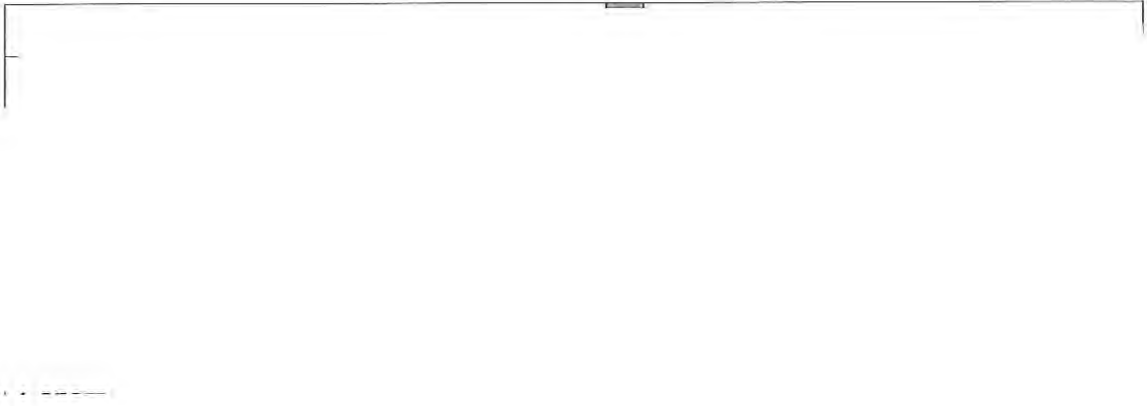
The Supplier(s) will:

- provide a draft report to MSI by 2 March 2012;
- meet with MSI and members of MSI’s ATI Project Reference Group to discuss feedback on the draft in the week beginning 5 March 2012;
- complete the final report, incorporating any feedback provided by MSI and IRL (and any related parties), by 16 March 2012.

3 Industrial Research Limited Business Stocktake Panel

Philip Barry Chairman	Taylor Duignan Barry Ltd
Dr Tricia Harris	Independent Consultant
Andrew Simmonds	SiMart Ltd

4 Stakeholder consultation

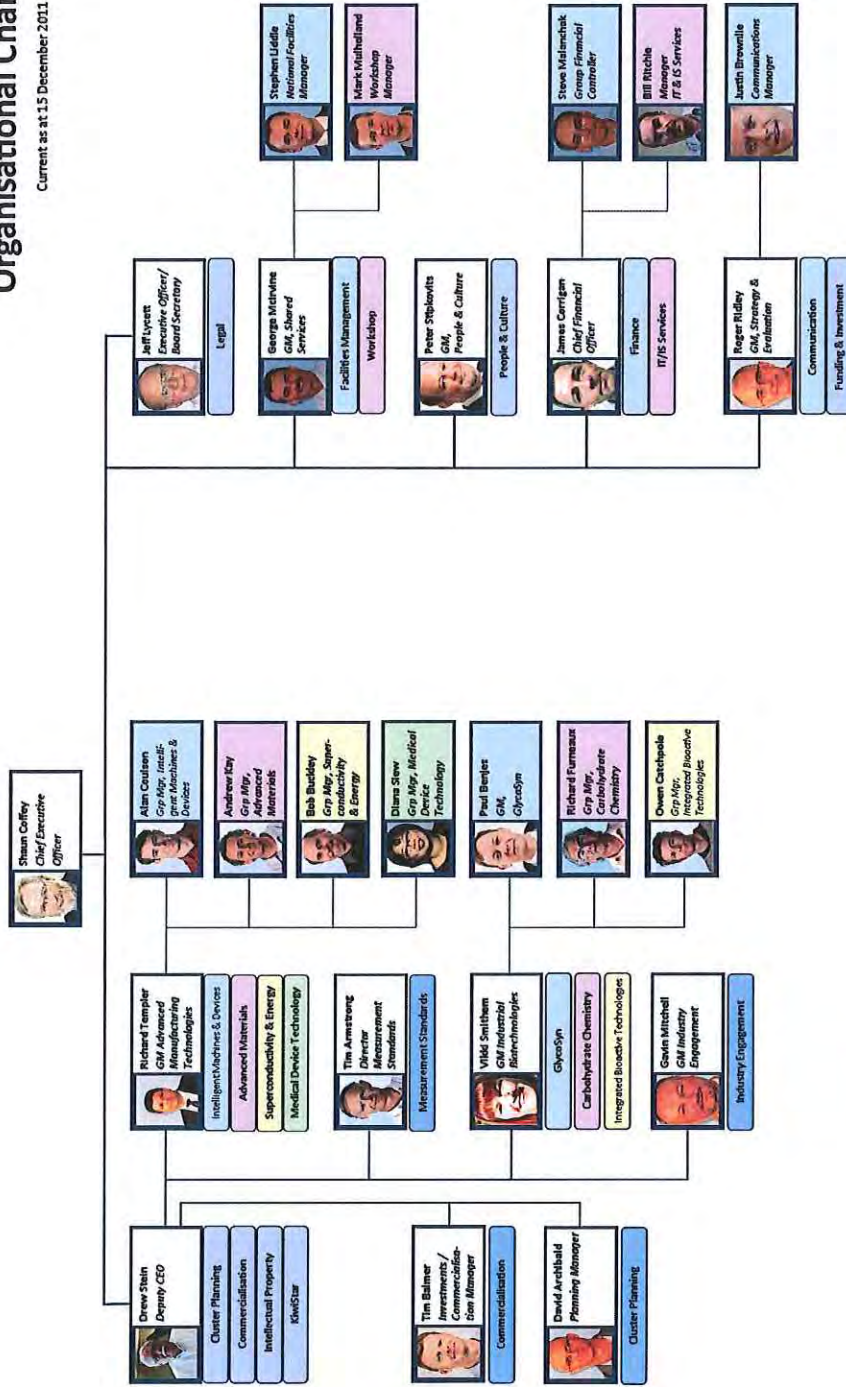


The comments expressed by the individuals consulted did not necessarily represent the views of their organisation.

5 Industrial Research Limited organisational chart

Organisational Chart

Current as at 15 December 2011



INDUSTRIALRESEARCH
LIMITED
Te Tauīhu Pōtaiao