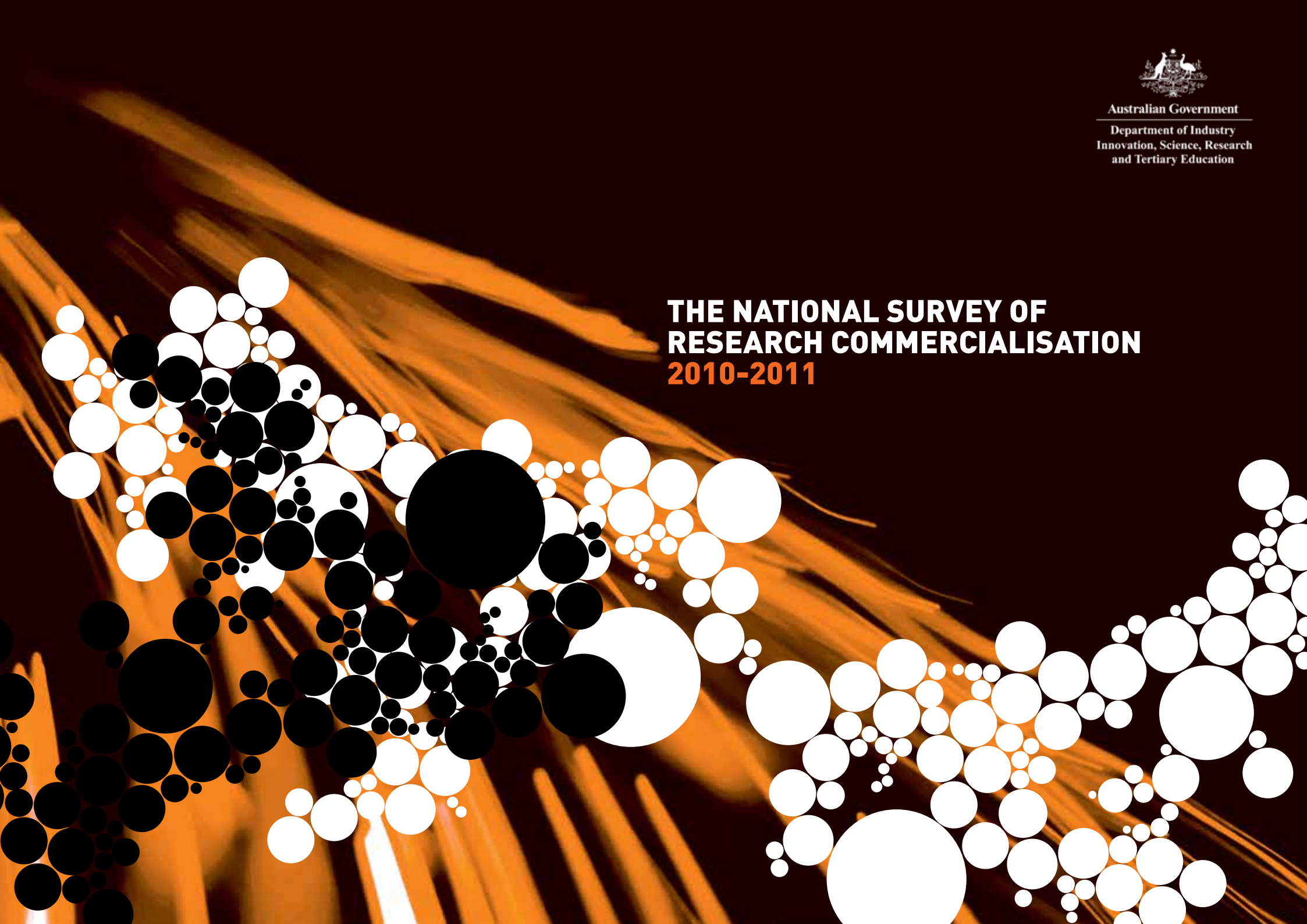

Australian Government

Department of Industry
Innovation, Science, Research
and Tertiary Education

THE NATIONAL SURVEY OF RESEARCH COMMERCIALISATION 2010-2011

THE NATIONAL SURVEY OF RESEARCH COMMERCIALISATION 2010-2011

Selected measures of commercialisation activity in Australia's Universities, Publicly Funded Research Agencies, Medical Research Institutes and Cooperative Research Centres

December 2012

DISCLAIMER

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FOREWORD

Australia's innovation system derives significant benefits from its universities, medical research institutes, publicly funded research agencies and the Cooperative Research Centres which, collectively, comprise our publicly funded research organisations (PFROs). PFROs exist to develop new knowledge, skills, materials and technologies and to then commercialise, or otherwise share or translate this new knowledge, skills, materials and technologies. They benefit the innovation system through their role in: generating financial returns from the commercialisation of research outcomes; the development of human capital; solving national and global challenges; promotion of research collaboration between the public and private sectors; developing innovative business models; and knowledge exchange between the research and industry sectors and the wider community.

The National Survey of Research Commercialisation (NSRC) collects data on the commercialisation activities of PFROs and measures the extent to which public researchers have successfully translated their ideas into valuable technologies, services, business models and other intellectual property.

The 2010-2011 NSRC report shows that, over time, there have been steady increases in the number of invention disclosures and in the number of patents and plant breeder rights issued worldwide to Australian PFROs; an increase in the number of, and capital raising and institutional equity for start-up companies; increases in the value of research contracts and consultancies undertaken; and in direct sales recorded by PFROs. These increases demonstrate the continuing improvement of Australia's PFROs in developing and sharing the knowledge that they create.

This report features an analysis of Australia's PFROs Intellectual Property (IP) commercialisation activities, through citation and technology transfer rates. This analysis identified that one-third of the IP rights associated with PFROs involve commercial entities or have been transferred to a corporation; that successfully commercialised patents tend to be stronger rights; are protected in more countries, are more heavily referenced by third party patent applications and granted more frequently. The level of upfront investment in commercial patent rights is encouraging, suggesting that applicants have a higher confidence of an economic return or have expectations of a commercial technology transfer agreement.

Increasing the pace and scale of knowledge exchange between the publicly funded research sector, industry and the wider community is vital if Australia is to remain an innovative nation and deliver productivity increases.

Senator the Honourable Chris Evans
Minister for Tertiary Education, Skills, Science and Research

The Honourable Greg Combet, AM, MP
Minister for Industry and Innovation

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
AIMS	Australian Institute of Marine Science
ANSTO	Australian Nuclear Science and Technology Organisation
AUTM	Association of University Technology Managers (USA)
b	Billion
CCST	Coordination Committee on Science and Technology
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DIISRTE	Department of Industry, Innovation, Science, Research and Tertiary Education
DSTO	Defence Science and Technology Organisation
FTE	Full-time equivalents (staff)
GFC	Global Financial Crisis
HE-BCIS	Higher Education Business and Community Interaction Survey
HEFCE	Higher Education Funding Council of England
IP	Intellectual Property
IPO	Initial Public Offering
LOAs	Licences, Options and Assignments
m	Million
MDQ	Management Data Questionnaire
MTA	Material Data Transfer
MRI	Medical Research Institute
NICTA	National Information and Communications Technology Australia
NSRC	National Survey of Research Commercialisation
PCT	Patent Cooperation Treaty
PFRA	Publicly Funded Research Agency (ANSTO, AIMS, CSIRO, DSTO, NICTA)
PFROs	Publicly Funded Research Organisations
R&D	Research and Development
UK	United Kingdom
UNICO	The University Companies Association (UK)
US	United States of America

KEY FINDINGS

The National Survey of Research Commercialisation (NSRC) is a biennial survey that collects metrics on commercialisation activities of Australian publicly funded research organisations (PFROs).

The 2010 and 2011 data shows that Australian PFROs, like their international counterparts, have continued their commitment to commercialisation activities. PFROs have also continued the trend away from start-up company formation to Intellectual Property (IP) licensing, options and assignments (LOAs); research contracts and consultancies. Data for CRCs shows that the Services sector has again provided the bulk of commercialisation activity.

NSRC SURVEY FINDINGS

Seventy-two institutions responded to the NSRC 2010 and 2011. The key findings include the following data sets to provide a comprehensive outlook on commercialisation activity of Australian PFROs:

- NSRC data for 2010 and 2011 (See Table 1 and Chapter 2);
- NSRC time series data between 2000 and 2011 (See Table 2 and Chapter 2); and
- Intellectual Property analysis from Australia's PFROs and their related entities and start-up companies (See Chapter 5).

INTELLECTUAL PROPERTY ACTIVITY

INVENTION DISCLOSURES

- The time series data shows that the number of invention disclosures has steadily increased from 544 in 2000 to 1,489 in 2011, with a high of 1,503 in 2010 (See Table 2).

PATENT AND PLANT BREEDER RIGHTS: APPLICATIONS, ISSUES AND HOLDINGS

- The time series data shows that the number of patents and plant breeder rights issued worldwide to Australian PFROs has increased from 273 in 2001 to a high in 2010 of 1,021 (See Table 2).
- Total and new patent and plant breeder rights filings were lower in 2010 and 2011 than in 2009. However, the cumulative total was at a high in 2011 at 11,004, due to a reduction in culled and lapsed patents and increases in patent issuances (See Table 1).
- One-third of the IP rights associated with Australian PFROs involve commercial entities or have been transferred to a corporation (See Chapter 5).
- Successfully commercialised patents tend to be stronger rights. They are protected in more countries, more heavily referenced by 3rd party patent applications and granted more frequently (See Chapter 5).
- In terms of volume, the Australian research system appears to be primarily converting research into economic gain within the pharmaceuticals and biotechnology sectors (See Chapter 5).
- Patent assignees across all technical fields include PFROs in partnership with small and medium enterprises; start-up companies; multinational business; and with other PFROs (See Chapter 5).

LICENCES, OPTIONS AND ASSIGNMENTS (LOAs)

- The number of Material Transfer Agreements (MTAs) entered into increased 11% from 928 in 2009 to 1,028 in 2011. The income from MTAs was at its highest in 2010 at $2.6m[1], with over $2.0m from CSIRO for a single MTA agreement (See Table 1).
- The number of LOAs yielding income increased 12% from 702 in 2009 to 789 in 2011 (See Table 1). However, the proportion of LOAs yielding income fell from 38% in 2009 to 27% in 2011 (See Table 12).
- Adjusted LOA[2] income has varied from year to year due to large LOA payments for a small number of successfully commercialised technologies (See Table 2).

START-UP COMPANY ACTIVITY

- The time series data shows that the number of new start-up companies formed each year by Australian PRFOs decreased by 75% from 61 in 2001, at its highest, to 15 in 2011 (See Table 2).
- The number of start-up companies operational with institutional equity increased from 69 in 2000 to 200 in 2007. Since 2008, the number has been steadily dropping to 163 in 2011 (See Table 2).
- Capital raising for research commercialisation activities[1] increased from $148m in 2009 to $165m in 2011. The university sector raised the highest amount of capital in 2010 and 2011, totalling $157m, followed by CSIRO at $112m and MRIs at $31m (See Table 1).

1 In constant 2011 prices and all money values are in AUD unless otherwise noted.
2 LOA income is adjusted by excluding the LOA income paid to other institutions

- The value of equity holdings[1] for the university sector has remained relatively consistent. The large increases from CSIRO in 2008 and 2009 were not repeated in 2010 and 2011, with CSIRO reporting only $29m in 2011. The MRIs recorded their lowest level of equity holding at just $1m in 2011 (See Table 1).

RESEARCH CONTRACTS AND CONSULTANCIES AND DIRECT SALES

- The total number of research contracts increased by 25% from 8,822 in 2009 to 10,995 in 2011. The total value of contracts also increased to a high of $1.19b in 2010 (See Table 15).
- The total number of research consultancies fell 18% from 5,575 in 2009 to 4,575 in 2011. However, the total value of consultancies increased 4% from $272m in 2009 to $284m in 2011 (See Table 15).
- The total number of direct sales was at its highest in 2010 at 15,626, with a value of $62m. This increase was mainly due to an increase in direct sales for other PFRAs and the university sector (See Table 15).

SKILLS DEVELOPMENT AND KNOWLEDGE EXCHANGE ACTIVITY

- In 2010 and 2011, 144 and 139 research postgraduates respectively were employed in start-up companies (See Table 1).

RESOURCES FOR RESEARCH COMMERCIALISATION

- Over the period 2000 to 2011, the total level of dedicated commercialisation staff has increased by 61%. The level grew rapidly from 191 Full-Time Equivalent (FTE) in 2000 to 296 FTE in 2003 and has remained relatively stable to 2011 (307 FTE) (See Table 2).
- Net commercialisation costs, including marketing, legal, staff and non-staff costs was $134m in 2011, up 11% from 2009 (See Table 17).

INTERNATIONAL COMPARISONS

Comparing the Australian PFROs with the United States (US), Canada, the United Kingdom (UK) and Europe, after adjusting for research expenditure (per $US100m) with US dollar purchasing power parity[3] (see Table 3 and Chapter 3) shows:

- The number of FTEs dedicated to commercialisation by Australian institutions was 11.0 FTEs per institution in 2011, which was higher than the US (10.9), Canada (9.1) and Europe (7.2) but lower than the UK (25.7)[4] (See Figure 16 and Table 3).
- Australian institutions underperformed compared to their international counterparts, the UK, Canada and the US, for invention disclosures per $US100m research expenditure in 2011. The number of invention disclosures per $US100m research expenditure in Australia was 28.8 in 2011, compared with the UK (43.7), Canada (41.6), the US (35.8) and Europe (28.4) (See Figure 17 and Table 3).
- The number of US patents issued to Australian institutions per $US100m research expenditure was 2.0 in 2011. In comparison over the same period, the number of US patents issued per $US100m research expenditure to Canada and Europe was 4.1 and 3.5, respectively. The US in 2011 and the UK in 2010 continued to display a higher rate in issued US patents per $US100m research expenditure than that of other countries at 7.7 and 7.8, respectively (see Figure 18 and Table 3).
- The number of LOAs executed per $US100m research expenditure by Australian institutions declined to 8.3 in 2011, compared with 13.2 in Canada, 10.6 in Europe and 9.9 in the US. The UK data shows a large number of LOAs executed in 2010 at 52.6 (see Figure 19 and Table 3).
- Australia's LOA income as a percentage of research expenditure fell to 1.5% in 2011. This was better than the rate in the UK (1.1% in 2010) and Canada (1.2% in 2011), but slightly lower than the rate in Europe (1.6% in 2011). The US has the highest ratio of LOA income to total research expenditure at 4.1% in 2011 compared with that of other countries (see Figure 20 and Table 3).
- Australian start-up companies formed per $US100m research expenditure have gradually declined from a peak of 2.2 in 2001 to 0.3 in 2011. The data in the UK and Canada showed a similar decline over the same period, but the number was much higher at 2.8 in the UK in 2010, 3.2 in Europe and at 1.6 in Canada in 2011. While the US has maintained a stable rate of start-up company formation per $US100m research expenditure at around 1.1 over the last decade (see Table 3 and Figure 21).

3 Purchasing Power Parities are taken from the OECD Main Science and Technology Indicators. Refer to http://stats.oecd.org/Index.aspx?datasetcode=SNA_TABLE4 and for information about purchasing price parities refer to http://www.oecd.org/about/0,2337,en_2649_34357_1_1_1_1_1,00.html

4 All figures for the UK are for 2010, the latest data available.

COOPERATIVE RESEARCH CENTRES (CRCs)

The CRC program is the primary government program for supporting medium to long term end user driven research collaborations to address clearly articulated, major challenges facing Australia, many of which are global challenges. Collaborations involve researchers, industries, communities and governments. The program was reviewed in 2008[5], with one of the major outcomes being a reinstatement of public good (social and environmental benefits) as a key objective of the program.

Data from the CRC program Management Data Questionnaire (MDQ) (see Chapter 4 for full details) shows:

RESOURCING FOR COMMERCIALISATION

- The Services sector accounts for the largest proportion of the total number of CRCs in 2011 (22 out of a total of 42, 52%), followed by the Agriculture, Forestry and Fishing industry (11 out of 42, 26%) (See Table 18).
- The total ratio of commercialisation expenditure as a proportion of research expenditure for all CRCs fell from 17% in 2008-09 to 14% in 2010-11 (see Table 19).

INTELLECTUAL PROPERTY PROTECTION ACTIVITY

- The total number of patents filed increased from 15 patents per $100m research expenditure in 2008-09 to 19 in 2010-11. The growth came from the Mining, the Manufacturing and Services industry sectors (see Table 4 and Figure 23).
- The total number of patents maintained per $100m research expenditure rose from 116 in 2008-09 to 256 in 2010-11, largely, as a result of strong growth in the Services sector (see Table 21 and Figure 24).
- Income derived from LOA activity per $100m research expenditure rose from $5.3m in 2008-09 to $5.8m in 2009-10 but dropped to $2.4m in 2010-11 (see Table 4 and Figure 25). The fall in income from LOAs in 2010-11 could be due to a downward correction adjustment for some CRCs from previous years, and from the changes in the MDQ questions for LOAs.

START-UP COMPANY ACTIVITY

- The number of new spin-off companies per $100m research expenditure increased from 0.5 in 2008-09 to 1.3 in 2009-10 but dropped to 0.4 in 2010-11 (see Table 4 and Figure 26 inset).
- Income from new spin-off company activity increased from $2,000 per $100m research expenditure in 2008-09 to $6,000 in 2010-11, following nil income per $100m research expenditure in 2009-10 (see Table 4 and Figure 27).
- Licensing of IP arising out of research appears a more common avenue for commercialisation compared with the formation of start-up companies. From 2005-06 to 2010-11, the number of LOAs soared by 204% (see Table 22), in contrast, the number of start-up companies formed fell by 82% (See Table 23).

RESEARCH CONTRACTS AND CONSULTANCY ACTIVITY

- The number of research contracts and consultancies per $100m research expenditure fell from 94 in 2008-09 to 77 in 2009-10 (See Table 4). This has been driven by a fall in the number of research contracts and consultancies in the sectors of Manufacturing and Agriculture, Forestry and Fishing (see Figure 28).
- The total income from research contracts and consultancies per $100m research expenditure declined from $8.8m in 2008-09 to $7.8m in 2009-10 (see Figure 29).

PROFESSIONAL DEVELOPMENT AND OTHER KNOWLEDGE EXCHANGE ACTIVITY[6]

- In 2009-10, the total number of training courses and conferences offered to end-users per $100m research expenditure were 55 and 72, respectively (see Table 4 and Figures 30 and 31).
- The income generated from conferences and courses per $100m research expenditure declined from $176,000 in 2008-09 to $144,000 in 2009-10 (see Table 4 and Figure 32).
- The number of publications for end-users per $100m research expenditure decreased by 22% between 2008-09 and 2010-11, and the number of confidential or unpublished reports for end-users per $100m research expenditure also fell by 23% between 2008-09 and 2009-10 (see Table 4 and Figures 33 and 34).
- Between 2009-10 and 2010-11, 627 postgraduates sourced from CRCs were employed in industry (see Table 26). Over the same period, the number of CRC postgraduates taking up employment in industry per $100m research expenditure was 119 (see Figure 35)

5 www.innovation.gov.au/innovationreview/Documents/CRCReviewReport.pdf

6 From 2010-11 onwards, questions in the CRC Program Management Data Questionnaire (MDQ) were changed, as a result, data on the number of training courses and conferences offered to end-users and income derived from these activities is no longer collected.

Table 1: Summary of selected NSRC survey metrics for 2009, 2010 and 2011[7]

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Resourcing for commercialisation																
Total FTE	No.	153	135	143	45	50	48	460	448	448	48	39	42	706	672	681
Total staff costs	$'000	23,351	21,183	20,999	8,635	6,485	6,154	54,077	57,328	57,517	8,158	6,446	6,648	94,221	91,442	91,317
Intellectual property activity																
Invention disclosures received	No.	96	105	117	41	26	36	1,199	1,328	1,295	162	177	257	1,498	1,636	1,705
Patent and plant breeder rights Filed total	No.	262	279	274	119	92	86	1,253	1,134	1,167	304	215	231	1,938	1,720	1,758
Patent and plant breeder rights Issued																
- In Australia	No.	22	20	27	3	9	17	103	143	117	24	9	10	152	181	171
- In the US	No.	17	30	23	3	4	6	53	71	73	14	5	11	87	110	113
- Elsewhere	No.	135	158	178	9	15	3	444	548	422	39	34	60	627	755	663
Total	**No.**	**174**	**208**	**228**	**15**	**28**	**26**	**600**	**762**	**613**	**77**	**48**	**81**	**866**	**1,046**	**948**
Patent and plant breeder rights Holdings																
- Patents pending	No.	2,151	1,841	1,845	412	300	327	3,065	2,740	3,205	667	908	956	6,295	5,789	6,333
- Patents issued (cumulative)	No.	1,568	1,619	1,707	177	94	196	1,860	1,740	1,914	522	793	855	4,127	4,246	4,672
Total held	**No.**	**3,719**	**3,460**	**3,552**	**589**	**394**	**523**	**4,925**	**4,480**	**5,119**	**1,189**	**1,701**	**1,811**	**10,422**	**10,035**	**11,004**
Patent and plant breeder rights Culled or lapsed	No.	752	166	264	17	28	0	818	522	335	189	129	126	1,776	845	725
Licensing activity																
Material Transfer Agreements	No.	87	132	157	2	1	6	342	408	280	497	538	585	928	1,079	1,028
Income from MTAs	$'000	178	2,148	102	0	0	0	124	19	55	21	455	345	323	2,623	503
LOAs executed	No.	102	106	108	21	13	20	266	345	305	119	52	69	508	516	502
LOAs active	No.	470	470	488	122	120	136	936	1,711	1,924	310	295	325	1,838	2,596	2,873

7 Note that all dollar values in this table are presented in constant 2011 prices (Tabled data in Chapter 2 is in nominal terms)

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
LOAs yielding income	No.	248	286	263	14	12	13	318	444	445	122	60	68	702	802	789
Adjusted gross LOA income	$'000	255,866	92,981	36,674	564	487	600	58,091	52,376	54,081	22,572	15,945	29,546	337,092	161,789	120,901
Start-up company activity																
Start-up companies created	No.	0	0	0	2	1	2	24	15	14	1	1	1	27	17	17
Capital raising - total	$'000	62,658	39,315	72,800	0	0	3,000	78,805	92,730	63,908	6,462	5,620	24,900	147,926	137,665	164,608
Operational start-up companies which are dependent on licensing/assignment of technologies	No.	18	16	7	6	7	6	168	164	172	24	14	14	216	201	199
Start-up companies in which institutions have an equity holding	No.	18	16	5	6	5	5	152	144	156	20	15	13	196	180	179
Value of equity holdings	$'000	87,559	36,784	28,906	763	1,548	1,557	119,697	115,507	108,417	42,744	2,109	929	250,764	155,947	139,809
Research contracts and consultancy activity																
Contracts and consultancy agreements entered into	No.	2,258	2,202	2,210	1,460	910	812	10,171	11,911	11,990	508	564	558	14,397	15,587	15,570
Total gross agreed value	$'000	361,042	334,890	343,696	29,143	53,318	38,274	847,010	1,095,872	978,904	73,709	56,421	57,175	1,310,903	1,540,501	1,418,048
Skills development and transfer activity																
Research postgraduates employed in start-up companies	No.	37	37	38	3	0	1	59	78	65	12	29	35	111	144	139

Table 2: Summary of NSRC Metrics for surveys 2000-11[8]

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Resourcing for commercialisation													
Dedicated commercialisation staff	FTE	191	231	281	296	282	295	299	289	309	309	305	307
Intellectual property activity													
Invention disclosures	No.	544	716	707	810	956	926	1,081	1,196	1,300	1,409	1,503	1,489
New Australian and US patent and plant breeder rights applications filed	No.	587	470	503	539	587	518	546	527	650	641	673	664
Patent and plant breeder rights issued worldwide	No.	524	273	315	805	814	540	582	508	844	841	1,021	914
Licensing activity													
LOAs executed	No.	414	383	445	433	381	453	515	549	472	491	505	481
LOAs yielding income	No.	489	605	629	629	666	656	708	746	630	692	779	766
Adjusted gross income from LOAs in constant 2011 prices	$'000	146,300	99,549	98,470	89,588	79,260	79,303	135,630	251,088	100,960	320,240	151,488	94,880
Start-up company activity													
Start-up companies formed during the year	No.	47	61	58	50	29	38	41	33	14	19	16	15
Start-up companies operational at year end dependent on assignment of technology	No.	86	109	119	228	251	220	237	242	196	195	180	180
Start-up companies operational at year end with institutional equity stakes	No.	69	79	96	182	203	169	192	200	176	175	165	163
Value of equity holdings in constant 2011 prices	$'000	179,966	181,630	155,523	209,688	246,742	196,543	217,072	218,497	190,698	237,533	148,027	133,054

8 The data represented in Table 2 is drawn from the current time series cohort of 59 organisations.

Table 3: Summary of selected commercialisation metrics for Australia, US, Canada, UK and Europe 2000-11[9, 10]

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Resourcing for Commercialisation Commercialisation FTE per Institution (No.)												
Australia	4.5	5.6	6.8	7.6	7.4	7.5	7.7	7.9	10.5	11.2	10.8	11.0
Canada	6.6	6.8	7.1	7.3	8.3	7.8	7.9	9.1	9.9	9.5	8.9	9.1
Europe (excl. UK)	-	-	-	-	-	7.3	6.7	8.2	9.7	-	8.0	7.2
United Kingdom	9.8	11.2	13.5	16.5	14.1	17.1	21.6	24.0	25.0	25.1	25.7	-
United States	6.6	7.4	7.7	7.8	8.3	8.9	9.6	9.9	11.0	11.6	11.8	10.9
Intellectual Property Activity Invention Disclosures per USD100m Research Expenditure (No.)												
Australia	20.0	25.3	24.2	22.7	26.5	26.8	26.3	25.5	25.3	25.6	28.3	28.8
Canada	57.1	40.8	44.8	44.1	39.5	41.1	39.3	43.6	40.7	39.4	34.7	41.6
Europe (excl. UK)	-	-	-	-	29.2	28.6	28.7	27.8	27.7	-	31.7	28.4
United Kingdom	46.5	48.7	49.8	53.4	49.2	53.1	52.1	48.1	41.8	40.8	43.7	-
United States	46.6	42.1	41.2	40.3	40.8	41.1	41.6	40.6	38.7	37.6	35.0	35.8
United States Patents Issued per USD100m Research Expenditure (No.)												
Australia	4.2	2.3	1.9	3.7	5.3	2.3	2.6	1.7	1.4	1.5	2.0	2.0
Canada	8.8	7.1	6.6	6.2	4.5	4.1	3.1	3.9	2.7	2.5	2.9	4.1
Europe (excl. UK)	-	-	-	-	-	-	1.2	1.5	4.3	-	1.7	3.5
United Kingdom	5.4	3.9	6.9	8.2	11.6	8.9	9.0	7.8	7.1	8.6	7.8	-
United States	13.9	11.9	10.0	10.2	8.9	7.7	7.2	7.4	6.3	6.3	7.6	7.7
Licensing Activity LOAs Executed per USD100m Research Expenditure (No.)												
Australia	15.2	13.3	14.3	12.1	10.6	11.6	12.5	11.8	9.2	9.0	8.5	8.3
Canada	18.7	14.6	13.8	15.4	16.5	16.4	11.9	16.0	14.1	14.2	10.8	13.2
Europe (excl. UK)	-	-	-	-	14.0	15.8	12.8	9.0	9.1	-	9.5	10.6
United Kingdom	16.3	12.1	13.9	38.0	34.1	41.5	45.7	42.4	48.9	50.2	52.6	-
United States	15.7	12.4	12.3	11.7	11.6	11.7	10.9	10.5	9.9	9.9	9.1	9.9

9 Source: AUTM US and Canadian Licensing Activity Survey, UK Higher Education – Business and Community Interaction Survey (HE-BCI), European ASTP and Knowledge Transfer Study 2010-2012 . For further information see the Methodology Chapter and the references.

10 Commercialisation FTE per institution is a total number of FTEs including both licensing FTEs and other FTEs for all countries. The statistics in this table may differ from the one published in the previous NSRC reports. This is due to the use of the latest US$ Purchasing Power Parity (PPP) and the source data (AUTM, HE-BCI and ASTP etc.), that, some of the data and PPP, have been revised.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Ratio of LOA Income to Total Research Expenditure (%)												
Australia	2.8	2.0	1.9	1.6	1.3	1.4	2.2	3.5	1.5	4.1	2.0	1.5
Canada	1.8	2.3	1.6	1.6	1.4	1.2	1.4	1.2	1.0	1.0	1.0	1.2
Europe (excl. UK)	-	-	-	-	3.2	3.2	0.4	1.0	1.3	-	1.2	1.6
United Kingdom	0.6	1.1	1.1	1.1	1.5	1.4	1.3	1.4	2.1	1.3	1.1	-
United States	4.8	3.7	3.7	3.7	3.6	5.0	4.8	4.9	6.6	4.3	4.1	4.1
Start-up Company Activity Start-up Companies Formed per USD100m Research Expenditure (No.)												
Australia	1.7	2.2	1.9	1.4	0.9	1.0	0.9	0.8	0.3	0.5	0.3	0.3
Canada	3.8	3.0	1.9	2.0	1.4	1.0	0.8	1.1	0.9	1.0	1.0	1.6
Europe (excl. UK)	-	-	-	-	1.5	1.8	3.1	2.3	1.9	-	3.9	3.2
United Kingdom	5.3	4.2	3.6	2.9	2.4	2.9	3.1	2.9	2.1	2.6	2.8	-
United States	1.5	1.4	1.1	1.0	1.1	1.2	1.2	1.1	1.1	1.1	1.1	1.1

Table 4: Summary of selected Cooperative Research Centre (CRC) commercialisation metrics for 2005-06 to 2010-11[11]

		2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
CRCs responding	No.	66	53	56	46	50	42
Research expenditure	$'000	862,952	799,369	720,787	577,965	554,372	503,502
Resourcing for commercialisation per $100m research expenditure							
Commercialisation expenditure per $100m research expenditure	$'000	12,238	12,233	14,018	17,334	17,885	13,830
Intellectual property protection activity per $100m research expenditure							
Patents filed In Australia	No.	9	10	12	9	8	9
Patents filed overseas	No.	7	7	7	6	7	10
Patents filed total	No.	15	17	19	15	14	19
Patents maintained in Australia	No.	29	27	28	31	39	41
Patents maintained overseas	No.	73	59	65	85	104	216
Patents maintained total	No.	102	86	92	116	143	256
Licensing activity per $100m research expenditure							
LOAs contracted	No.	9	17	14	38	29	45
Income from LOAs	$'000	2,705	2,490	3,306	5,281	5,840	2,449
Start-up company activity per $100m research expenditure							
Start-up companies formed	No.	1.3	0.8	0.3	0.5	1.3	0.4
Income from new start-up companies – total	$'000	118	105	0	2	0	6
Research contracts and consultancy activity per $100m research expenditure							
Contracts and consultancy agreements entered into	No.	62	75	83	94	77	-
Contracts and consultancy income	$'000	7,951	8,152	7,832	8,824	7,845	-
Training, development and knowledge exchange activity per $100m research expenditure							
Professional training courses offered to end-users	No.	41	27	40	46	55	-
Conferences provided for end-users	No.	63	55	78	126	72	-
Income from courses and conferences	$'000	259	187	208	176	144	-
CRC postgraduates taking up employment in industry	No.	39	41	44	35	55	64
Publications for end-users	No.	290	187	321	342	268	267
Confidential and unpublished reports for end-users	No.	98	111	138	184	142	-

11 Note that all dollar values have been adjusted to 2011 prices

1. INTRODUCTION

The successful commercialisation of publicly funded research contributes to innovation in Australian organisations and places Australia as a globally competitive economy. The commercialisation process also encourages collaboration, knowledge exchange and problem solving and capacity building capabilities for research organisations and industry.

There are many mechanisms and measurable metrics for the commercialisation of intellectual property including start-up company formation, licensing, options and assignments, contracts and consultancies and direct sales.

The National Survey of Research Commercialisation (NSRC) collects these metrics, and also collects data on patenting activity, commercialisation staffing and costs, training offered to researchers and research students and institutional employment in start-up companies.

These metrics provide an insight into long term trends of commercialisation activity in Australia's publicly funded research organisations (PFROs). The information is used to inform and shape policy relating to commercialisation of Australian research.

For the survey years 2010 and 2011 the following PFROs were approached to take part in the survey:

- Five Australian publicly funded research agencies (PFRAs)
  - Australian Institute of Marine Science (AIMS)
  - Australian Nuclear Science and Technology Organisations (ANSTO)
  - Commonwealth Scientific and Industrial Research Organisations (CSIRO)
  - Defence Science and Technology Organisation (DSTO); and
  - NICTA, Australia's Information and Communications Technology Research Centre of Excellence
- All 39 Australian universities; and
- 31 medical research institutes (MRIs) that have previously responded to the survey.

Responding to the NSRC is voluntary and for the 2010 and 2011 survey years 72 institutions (96%) provided a response.

The NSRC questionnaire was originally based on the United States Association of University Technology Mangers (AUTM) licensing survey. It has since been modified to include recommendations from advisory groups and key stakeholders. Chapter 6 provides further information on the methodology.

The NSRC also uses third party data to reduce respondent burden and enhance data comparability wherever possible, including data for the Cooperative Research Centres (CRCs) provided from the CRC Management Data Questionnaire (MDQ).

This NSRC report compares the current data collected for years 2010 and 2011 data to the previous survey year of 2009, time series data from 2000 to 2011, international benchmarking against the United States of America (US), the United Kingdom (UK), Canada and Europe, as well as information on the commercialisation activities of CRCs.

For the first time, a chapter on intellectual property activity has been included to develop a greater understanding of Australian PFROs commercialisation activities.

2. SURVEY RESULTS

The results presented **in blue** below are for all institutions responding to the NSRC for 2010 and 2011. Time series data are presented **in green** and includes a subset of institutions that have consistently responded to the questions used in the time series analysis.[12] Notes on the survey methodology can be found in Chapter 6.

INTELLECTUAL PROPERTY ACTIVITY

INVENTION DISCLOSURES

An invention disclosure occurs when a device, material, or method that is novel and useful is made known to the area responsible for technology transfer within an institution. This is usually the first step in enabling the evaluation of commercial potential before deciding to secure intellectual property (IP) rights.

Procedures for recording invention disclosures vary from institution to institution. A disclosure might either be recorded early in the evaluation process or not recorded until sufficient investigation is undertaken to confirm that the technology is novel and has commercial potential.

KEY POINTS

DATA FOR 2010 AND 2011

- The total number of invention disclosures has increased by 14% from 1,498 in 2009 to 1,705 in 2011 (see Table 5).

TIME SERIES DATA FOR 2000-11

- The time series data shows a steady increase in invention disclosures across all institution types. Overall, the number of disclosures has risen from 544 in 2000 to 1,489 in 2011, with a high of 1,503 in 2010 (See Figure 1).

Figure 1: Number of invention disclosures by sector 2000-11

12 Consequently the two data sets cannot be directly compared as the time series will always be smaller than the full data set.

Table 5: Invention disclosures in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	36	39	39	30	28	28	71	72	72
Invention disclosures received	No.	96	105	117	41	26	36	1,199	1,328	1,295	162	177	257	1,498	1,636	1,705

PATENT AND PLANT BREEDER RIGHTS: APPLICATIONS, ISSUES AND HOLDINGS

A patent is a right granted for any device, substance, method or process which is new, inventive and useful. Plant breeder's rights are exclusive commercial rights to a registered variety of plant to reproduce and stock the plant material for sale, import and export.

Patents and plant breeder rights establish legally enforceable protection of rights over IP associated with inventions. They provide surety and security of ownership as a basis for any investment in commercialising inventions. The number of patent and plant breeder rights applications and the number issued indicate the level of production of new knowledge that has the potential for commercial application.

A standard national phase patent gives protection and control over an invention for up to 20 years. Before embarking on a national phase patent application in Australia or elsewhere, many institutions take out provisional patents, and/or seek protection through the Patent Cooperation Treaty (PCT) arrangements.[13]

An innovation patent is an Australian mechanism specifically designed to protect inventions for a period of up to eight years. Introduced in 2001 to stimulate innovation among small to medium businesses and local industry, the innovation patent is a relatively fast way to obtain protection for a new device, substance, method or process that may have a shorter commercial life than the standard 20-year patent. The Government has requested that the Advisory Council on Intellectual Property (ACIP) and IP Australia undertake further consideration of the innovation patents system, in response to decisions by the Federal Court of Australia and submissions received from the ACIP review on the utility of innovation patents.

KEY POINTS

DATA FOR 2010 AND 2011

- In 2010 and 2011, 30% and 25% of responding institutions respectively reported no patent applications filed (see Table 6).
- A small number of institutions account for the majority of patent activities, with seven institutions accounting for 57% of IP filings in 2011.[14]
- CSIRO is still the institution with the highest number of total IP filings, which increased 55%, from 102 in 2009 to 158 in 2011. This is mainly due to the inclusion of PCT, Divisionals and Trademark filings (See Table 6).
- In 2011, the university sector had the highest level (67%) of new patent and plant breeder rights applications filed (See Table 7).
- In 2011, 53% of total IP protection applications were filed outside of Australia. With MRIs having the highest percentage of overseas filings at 70% (See Table 8).
- The total stock of patent and plant breeder rights increased 6% from 10,422 in 2009 to 11,004 in 2011 (See Table 10).
- The number of patent and plant breeder rights that were culled or lapsed fell 59%, from 1,776 in 2009 to 725 in 2011 (See Table 10).
- In 2010 and 2011, CSIRO reported the highest number of patent family filings, issuances and holdings by a single institution, while the universities have the largest number by sector (See Tables 8, 9 and 10 and Figure 2).

13 The Patent Cooperation Treaty is an international treaty, administered by the World Intellectual Property Organization, between more than 125 countries. The PCT makes it possible to seek patent protection for an invention simultaneously in each of a large number of countries by filing a single international patent application instead of filing separate national or regional patent applications.

14 Based on unit based data from the NSRC database

Table 6: New Intellectual Property protection applications filed in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	37	38	39	30	28	28	72	71	72
Institutions filing no applications	No.	0	0	0	1	1	1	7	11	8	12	9	9	20	21	18
Provisional Patents	No.	96	103	70	31	28	28	249	296	327	57	48	44	433	475	470
PCT Patents	No.	0	2	44	27	20	19	131	120	138	24	29	30	182	171	232
Innovation Patents	No.	0	0	0	0	0	0	2	0	3	0	0	0	2	0	3
National Phase	No.	0	0	0	59	38	38	376	269	263	88	69	88	523	376	389
Divisionals	No.	0	25	29	0	4	0	17	37	27	1	5	9	18	71	65
Plant Breeder Rights	No.	0	0	3	0	1	0	12	8	10	0	5	2	12	14	15
Registered Designs	No.	0	0	0	0	0	0	2	2	1	0	0	0	2	2	1
Trademarks	No.	6	19	12	3	2	1	45	50	21	5	3	10	59	74	44
New Other IP rights filed	No.	0	0	0	0	0	0	3	9	2	0	0	2	3	9	4
Total	**No.**	**102**	**149**	**158**	**120**	**93**	**86**	**837**	**791**	**793**	**176**	**158**	**186**	**1,234**	**1,191**	**1,222**

Table 7: Location of new patent and/or plant breeder rights applications filed in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	37	38	39	30	28	28	72	71	72
Filed in Australia	No.	78	90	54	59	60	61	369	395	417	62	60	53	568	605	585
Filed in the US	No.	15	14	19	28	15	10	96	99	108	40	29	31	179	157	168
Filed elsewhere	No.	3	1	44	30	12	14	279	199	216	69	61	81	381	273	356
Total	**No.**	**96**	**105**	**117**	**117**	**87**	**85**	**744**	**693**	**742**	**171**	**150**	**165**	**1,127**	**1,035**	**1,109**

Table 8: Location of total patent and/or plant breeder rights applications filed in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	37	38	39	30	28	28	72	71	72
Filed in Australia	No.	159	172	147	59	61	61	578	582	547	74	75	69	870	890	824
Filed in the US	No.	26	34	38	30	18	11	200	172	185	70	44	48	326	268	282
Filed elsewhere	No.	77	73	89	30	13	14	476	380	434	160	96	114	743	562	652
Total	**No.**	**262**	**279**	**274**	**119**	**92**	**86**	**1,253**	**1,134**	**1,167**	**304**	**215**	**231**	**1,938**	**1,720**	**1,758**
Patent families	**No.**	**93**	**172**	**108**	**86**	**64**	**63**	**562**	**559**	**647**	**162**	**141**	**157**	**903**	**936**	**975**

Table 9: Patent and/or plant breeder rights issued in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	36	37	38	30	26	26	71	68	69
Filed in Australia	No.	22	20	27	3	9	17	103	143	117	24	9	10	152	181	171
Filed in the US	No.	17	30	23	3	4	6	53	71	73	14	5	11	87	110	113
Filed elsewhere	No.	135	158	178	9	15	3	444	548	422	39	34	60	627	755	663
Total	**No.**	**174**	**208**	**228**	**15**	**28**	**26**	**600**	**762**	**613**	**77**	**48**	**81**	**866**	**1,046**	**948**
Patent families	**No.**	**106**	**100**	**83**	**12**	**16**	**16**	**212**	**169**	**191**	**40**	**27**	**42**	**370**	**312**	**332**

Table 10: Total patent and/or plant breeder rights held and pending as at the last day of the reporting period (cumulative number) for 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	37	39	39	29	28	28	71	72	72
Patents pending	No.	2,151	1,841	1,845	412	300	327	3,065	2,740	3,205	667	908	956	6,295	5,789	6,333
Patents issued	No.	1,568	1,619	1,707	177	94	196	1,860	1,740	1,914	522	793	855	4,127	4,246	4,672
Held - cumulative total	**No.**	**3,719**	**3,460**	**3,552**	**589**	**394**	**523**	**4,925**	**4,480**	**5,119**	**1,189**	**1,701**	**1,811**	**10,422**	**10,035**	**11,004**
Patent families	**No.**	**1,005**	**755**	**788**	**203**	**239**	**361**	**1,383**	**1,362**	**1,594**	**407**	**344**	**356**	**2,998**	**2,700**	**3,099**
Culled or lapsed	No.	752	166	264	17	28	0	818	522	335	189	129	126	1,776	845	725

Figure 2: Number of patent family filings, issuances and holdings in 2011

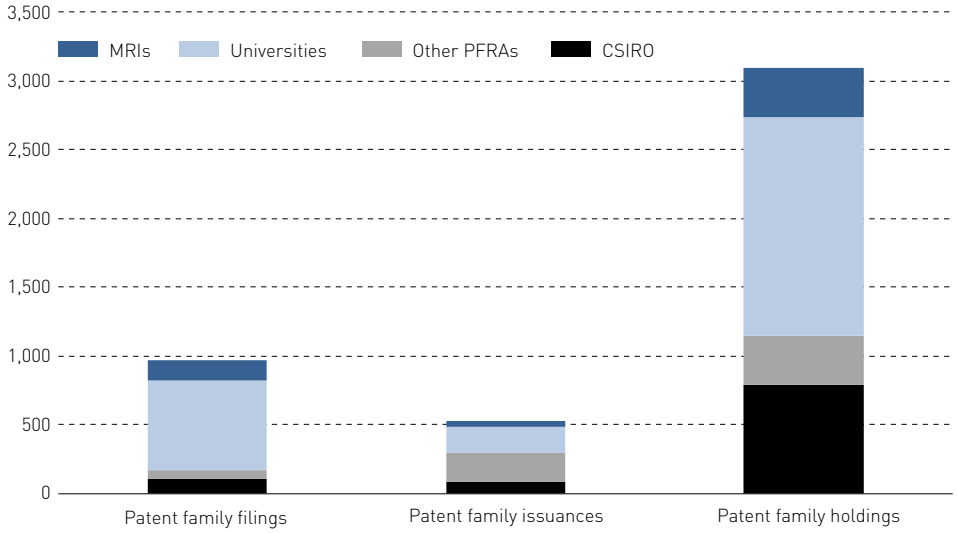


Figure 3: Number of new Australian and United States patent and/or plant breeder rights applications filed by sector 2000-11

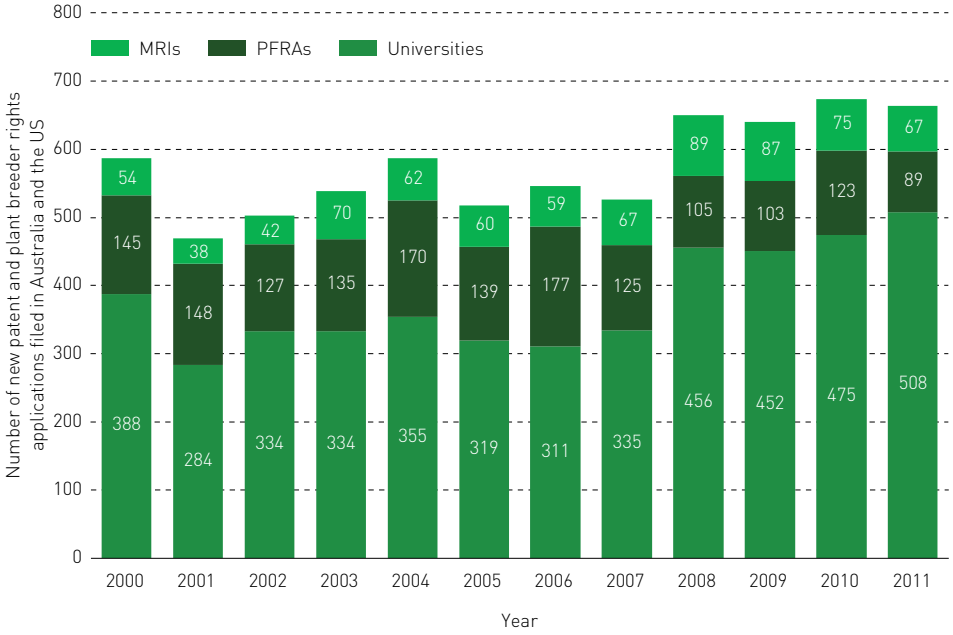
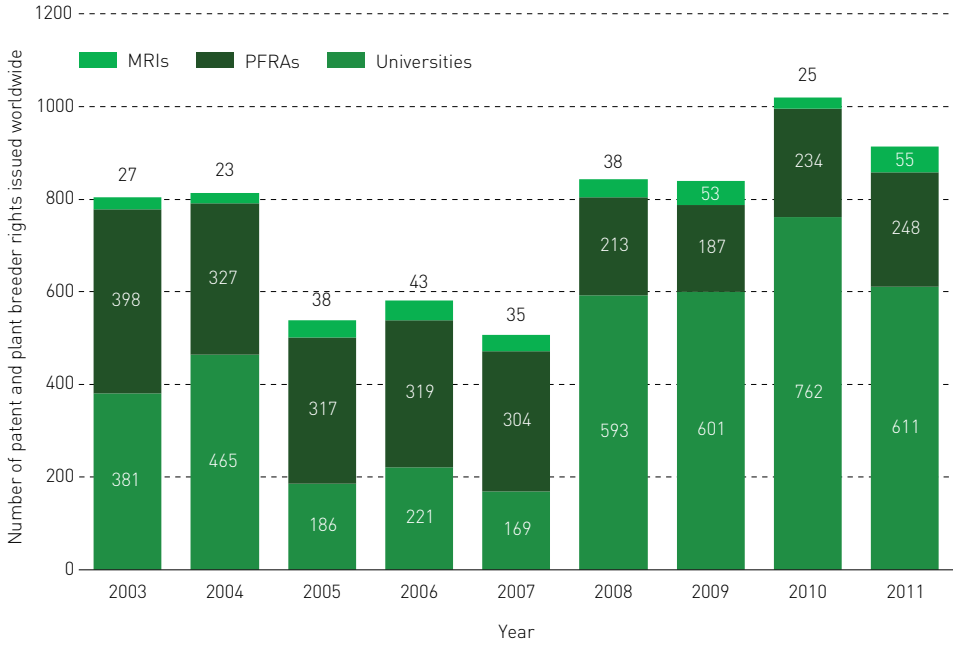


Figure 4: Patent and/or plant breeder rights issued worldwide by sector 2003-11[15]



TIME SERIES DATA FOR 2000-11

- The number of new patent and plant breeder rights applications filed in Australia and the US has continued to increase, mainly due to the university sector which increased steadily from a low of 311 in 2006 to a high of 508 in 2011 (See Figure 3).
- The number of patents and plant breeder rights issued worldwide to Australian PFROs continues to fluctuate, with a low of 273 in 2001 and a high in 2010 of 1,021 (See Figure 4 and Table 2).

15 Data pre-2003 is not represented as fields requesting patents filed in jurisdictions other than the US or Australia were not included in the survey instrument at the time.

LICENCES, OPTIONS AND ASSIGNMENTS (LOAs)

A licence agreement formalises the granting of IP rights between two parties where the owner of the IP (the licensor) permits the other party (the licensee) to access the rights to use the IP. An option agreement grants the potential licensee a period of time which it may evaluate the IP and negotiate the terms of a licence agreement. An assignment agreement conveys all rights, title and interest in and to the licensed subject matter to the named assignee.

The number and value of LOAs is an approximate measure of the value of IP created through research and development. Income from IP may have a long incubation period from when the original research was conducted. This provides an indication of the institutions' recent and past research activity and commercialisation practices.

LOAs are a complex indicator representing more than just new technology generated from research institutions. LOAs are usually granted to external companies or partners to exploit IP developed in research institutions. LOAs may also be used in an institutions start-up company as a way of commercialising the invention. LOAs can also be used as intellectual assets such as professional development courses being licensed to other education-providers.

The gross income of LOAs is adjusted by excluding the LOA income paid to other institutions or commercial entities and in-kind contributions.

A Material Transfer Agreement (MTA) is a contract that governs the transfer of tangible research materials between two organisations, when the recipient intends to use it for his or her own research purposes. The MTA defines the rights of the provider and the recipient with respect to the materials and any derivatives. Biological materials, such as reagents, cell lines, plasmids, and vectors, are the most frequently transferred materials, but MTAs may also be used for other types of materials, such as chemical compounds and even some types of software. Three types of MTAs are the most common at academic institutions: transfer between academic or research institutions, transfer from academia to industry, and transfer from industry to academia.[16]

Irrespective of whether there is a financial consideration associated with an MTA or not, MTAs are an indicator of linkages and potential collaborations.

16 http://www.spo.berkeley.edu/guide/mtaquick.html

KEY POINTS

DATA FOR 2010 AND 2011

- The number of MTAs entered into increased 11% from 928 in 2009 to 1,028 in 2011 (See Table 11).
- The income from MTAs was at its highest in 2010 at $2.47m, with over $2.0m recorded by CSIRO (See Table 11).
- In 2010 and 2011, 46% and 42% of responding institutions respectively reported no active LOAs (See Table 12).
- The number of active LOAs increased 56% from 1,838 in 2009 to 2,873, mainly due to an increase in the university sector (See Table 12).
- The number of LOAs yielding income increased 12% from 702 in 2009 to 789 in 2011. However, the proportion of LOAs yielding income fell from 38% in 2009 to 27% in 2011 (See Table 12).
- Over 50% of LOAs have been executed with Australian owned and based companies. The university sector had a high number of LOAs executed with foreign owned and based companies (See Table 12).
- The distribution of LOA agreements by income range has shifted from 2009 to 2011, with MRIs reporting a lower percentage of agreements in the $0-$10,000 range to higher percentage in the $200,000 and over range (See Figure 5).
- Adjusted gross LOA income dropped 62% from $315m in 2009 to $121m in 2011. The high 2009 figure is due to the successful CSIRO WLAN patent prosecution (See Table 12).

Figure 5: Distribution of LOA agreements by income range in 2011

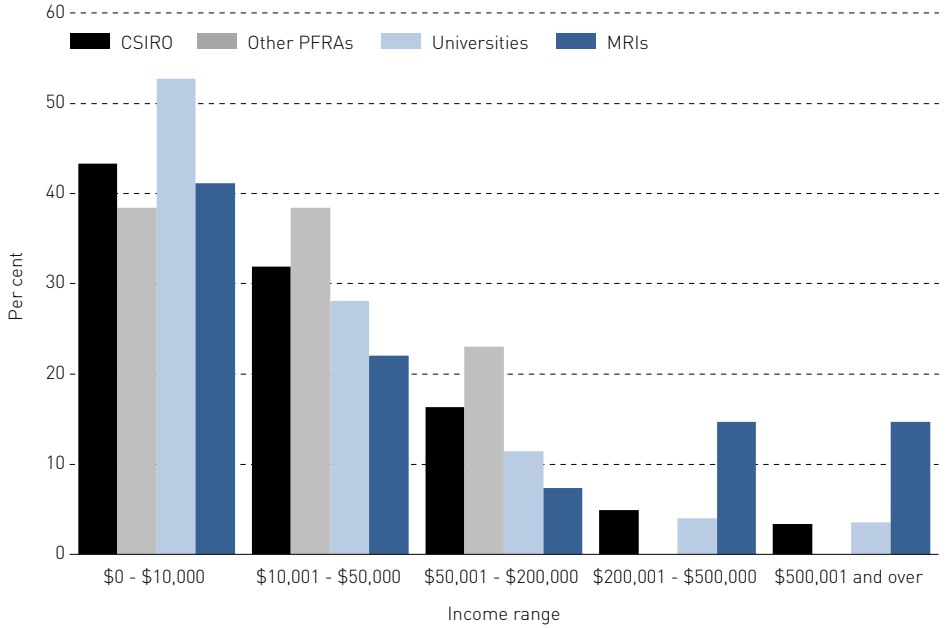


Table 11: Material Transfer Agreements in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	3	3	3	31	39	38	29	27	26	64	70	68
Number of MTAs entered into	No.	87	132	157	2	1	6	342	408	280	497	538	585	928	1,079	1,028
Income derived from MTAs executed	$'000	166	2,026	102	0	0	0	116	18	55	20	429	345	302	2,473	503

Table 12: Number of, and income from, licences, options and assignments (LOAs) in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	37	39	39	29	26	27	71	70	71
Institutions reporting no active LOAs	No.	0	0	0	1	1	2	9	14	13	11	17	15	21	32	30
Number of LOAs executed and active																
Licences executed	No.	102	106	108	16	10	19	139	279	222	87	38	60	344	433	409
Options executed	No.	0	0	0	0	0	0	64	26	37	8	9	2	72	35	39
Assignments executed	No.	0	0	0	5	3	1	63	40	46	24	5	7	92	48	54
LOAs executed	No.	102	106	108	21	13	20	266	345	305	119	52	69	508	516	502
Licences active	No.	470	470	488	101	100	116	740	1,526	1,688	227	247	278	1,538	2,343	2,570
Options active	No.	0	0	0	0	0	0	86	82	88	18	28	24	104	110	112
Assignments active	No.	0	0	0	21	20	20	110	103	148	65	20	23	196	143	191
LOAs active	No.	470	470	488	122	120	136	936	1,711	1,924	310	295	325	1,838	2,596	2,873
LOAs executed by type of company																
Executed with Australian owned and based companies	No.	102	106	108	1	7	12	124	163	120	80	20	17	307	296	257
Executed with Australian owned and foreign based companies	No.	0	0	0	0	0	0	1	5	2	0	0	1	1	5	3
Executed with foreign owned and Australian based	No.	0	0	0	0	1	3	13	29	24	13	0	0	26	30	27
Executed with foreign owned and foreign based companies/ organisations	No.	0	0	0	0	4	4	66	121	118	24	8	15	90	133	137
Executed with companies/ organisations where the location/ ownership is unknown	No.	0	0	0	20	1	1	62	27	41	2	24	36	84	52	78
Income yielding LOAs by type																
Running Royalties	No.	154	180	169	11	9	8	141	180	160	56	48	58	362	417	395
Cashed in equity	No.	11	6	4	0	0	0	3	11	29	4	0	0	18	17	33
Other types	No.	83	100	90	3	3	5	174	253	256	62	12	10	322	368	361
LOAs yielding income	No.	248	286	263	14	12	13	318	444	445	122	60	68	702	802	789
Proportion of LOAs yielding income	No.	53%	61%	54%	11%	10%	10%	34%	26%	23%	39%	20%	21%	38%	31%	27%

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
LOA income																
Running Royalties	$'000	17,245	25,252	28,650	497	432	454	38,452	34,454	41,869	21,257	23,699	36,514	77,451	83,838	107,486
Cashed in equity	$'000	14,058	39,176	2,441	0	0	0	521	1,676	2,143	20	0	0	14,599	40,852	4,584
Other	$'000	207,859	25,113	7,883	30	27	146	18,014	15,340	12,057	887	757	1,015	226,789	41,238	21,101
Gross Income	$'000	239,162	89,541	38,974	526	460	600	56,986	51,470	56,068	22,163	24,457	37,529	318,838	165,928	133,171
Income reported as paid to other entities	$'000	183	1,860	2,300	0	0	0	2,729	2,080	1,988	1,081	9,421	7,983	3,993	13,361	12,270
Adjusted gross LOA income	$'000	238,979	87,681	36,674	526	460	600	54,257	49,391	54,081	21,082	15,036	29,546	314,844	152,567	120,901
Income from LOAs																
$0 - $10,000	No.	100	111	114	8	6	5	99	224	235	82	32	28	289	373	382
$10,001 - $50,000	No.	56	87	84	3	3	5	78	137	125	18	10	15	155	237	229
$50,001 - $200,000	No.	52	71	43	3	2	3	104	54	51	10	9	5	169	136	102
$200,001 - $500,000	No.	14	7	13	0	1	0	15	18	18	6	1	10	35	27	41
$500,001 and over	No.	26	10	9	0	0	0	22	11	16	6	8	10	54	29	35

Figure 6: Number of LOAs executed by sector 2000-11

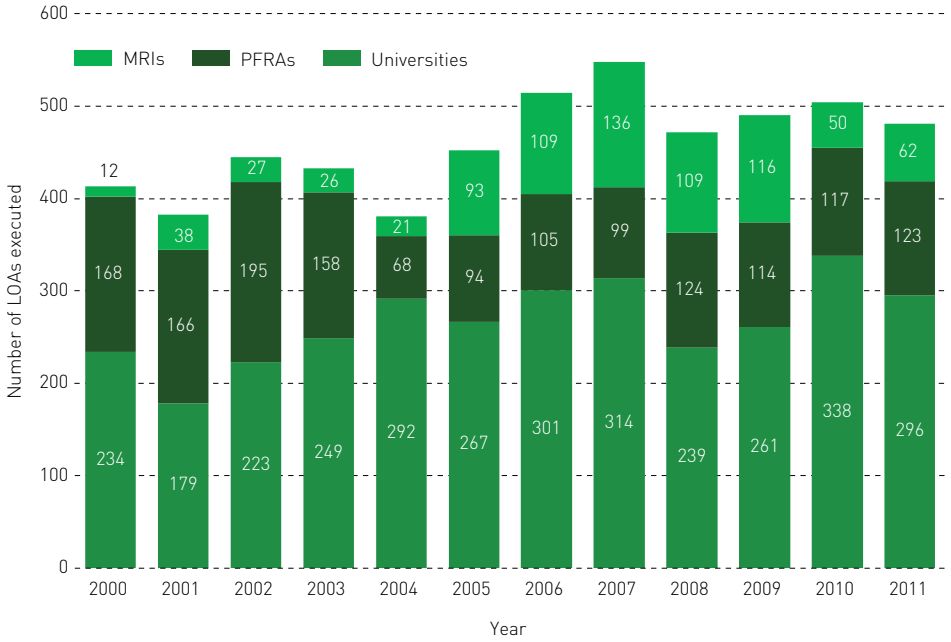


Figure 7: Number of LOAs yielding income by sector 2000-11

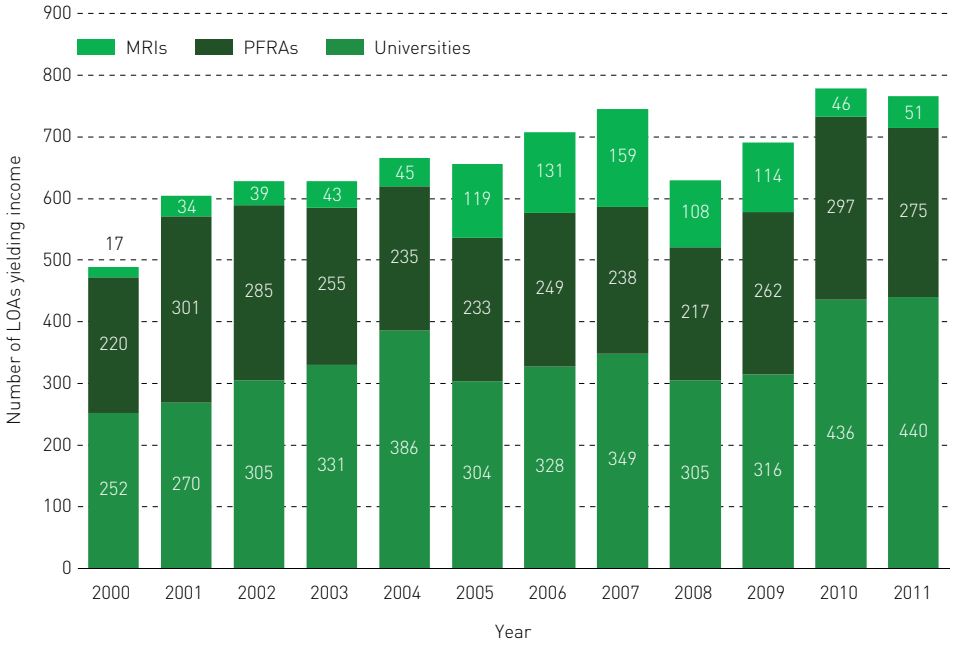
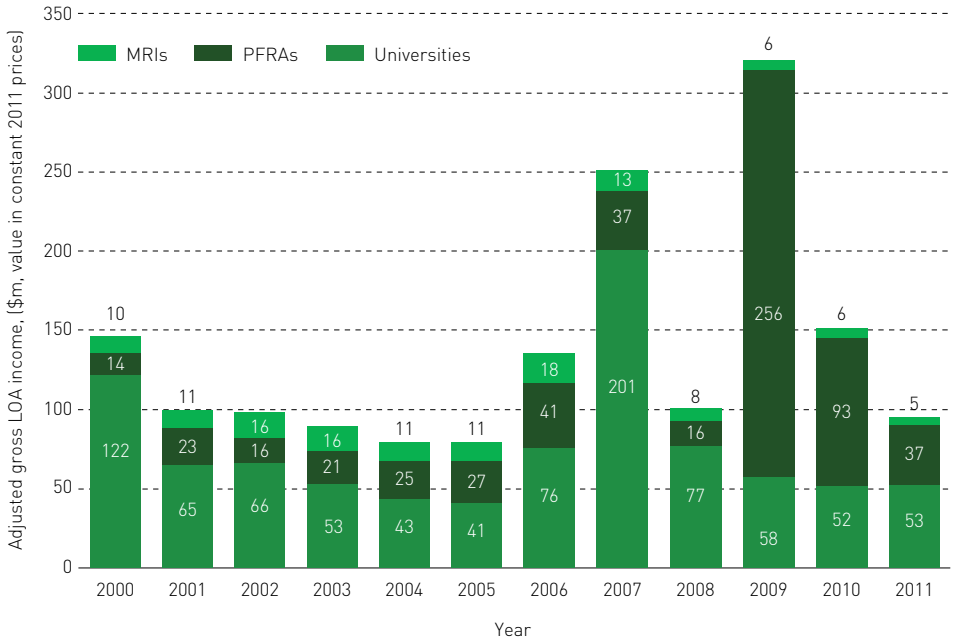


Figure 8: Adjusted gross LOA income by sector 2000-11



TIME SERIES DATA FOR 2000-11

- Overall, the number of LOAs executed has increased 16% from 2000 to 2011. The university sector recovered, after sharp drops in 2008 and 2009, to a record high of 338 LOAs executed in 2010. While PFRAs remained stable, the MRIs experienced a 47% decline in 2011 compared to 2009 (See Figure 6).
- The number of LOAs yielding income shows a similar trend as the number of LOAs executed, with the university sector recovering and MRIs numbers falling (See Figure 7).
- Adjusted LOA income has varied from year to year due to large LOA payments for a handful of successfully commercialised technologies. For instance in 2006, The University of Queensland reported income for GARDASIL™; in 2007 Monash University reported income from Monash IVF; and in 2009, CSIRO reported income from its WLAN technology (See Figure 8).

START-UP COMPANY ACTIVITY

Start-up company formation has been a significant avenue for commercialisation for Australian research institutions and can showcase the impact that publicly funded research can have on Australia's economy and society. The number, capital raising and value of institutional equity in start-up companies are intermediate measures of the business value generated from IP. Start-up companies are engaged in activities initially based on the licensing or assignment of IP from research institutions. Due to the need for access to finance, this avenue for commercialisation was (and remains) dependent on financial markets.

A list of start-up companies formed by PFROs in 2010 and 2011 can be found in Appendix 4.

KEY POINTS

DATA FOR 2010 AND 2011

- Capital raising for research commercialisation activities increased from $138m in 2009 to $165m in 2011 (See Table 13).
- The university sector raised the highest amount of capital in 2010 and 2011, at $151m, followed by CSIRO at $110m and MRIs at $30m (See Table 13).
- Only one university reported any Initial Public Offering (IPO) activity in 2010, at a value of $84,000 (See Table 13).
- In 2010 and 2011, the research sector held equity in 90% of operational start-up companies which were dependent on the licensing of IP from their host institution (See Table 14).
- In 2010, the value of equity holdings fully or partially exited by the research sector increased, from $19m in 2009 to $56m in 2010. CSIRO accounted for $39m of this value (See Table 14).
- The value of equity holdings fell 40% from $234m in 2009 to $140m in 2011. This drop was mostly due to CSIRO, with equity holding value dropping 65%, from $82m in 2009 to $29m in 2011 (See Table 14)

TIME SERIES DATA FOR 2000-11

- The number of new start-up companies formed each year across the research sector decreased by 75% from 61 in 2001, at its highest, to 15 in 2011 (See Figure 9).
- The number of start-up companies operational with institutional equity increased from 69 in 2000 to 200 in 2007. Since 2008, the number has been steadily dropping to 163 in 2011 (See Figure 10).
- The value of equity holdings for the university sector has remained relatively consistent since 2008 with an average of $109m. The large increases for the PFRAs, mainly by CSIRO, in 2008 and 2009 were not repeated in 2010 and 2011, with PFRAs reporting only $29m in 2011. The MRIs recorded their lowest level of equity holding at just $1m in 2010 and 2011 (See Figure 11).

Figure 9: Number of new start-up companies formed per year by sector 2000-11

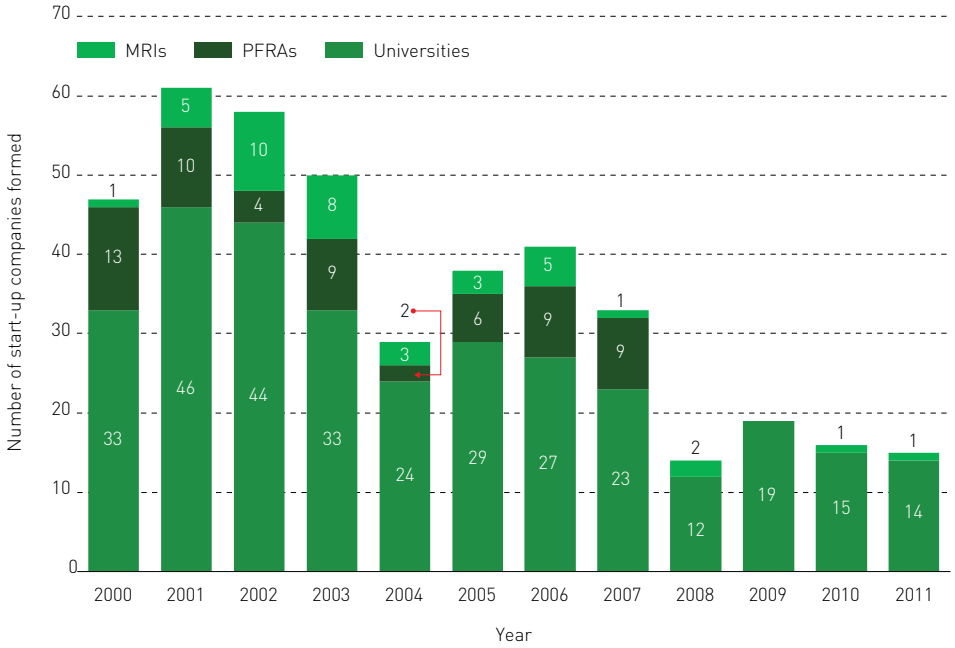


Table 13: Capital raising for research commercialisation activities in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	35	37	37	29	25	25	69	67	67
Initial Public Offerings	No.	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
	$'000	0	0	0	0	0	0	0	84	0	0	0	0	0	84	0
Other	No.	7	5	6	0	0	1	36	23	20	2	2	2	45	30	29
	$'000	58,523	37,074	72,800	0	0	3,000	73,604	87,360	63,908	6,036	5,300	24,900	138,163	129,734	164,608
Total Financing	**No.**	**7**	**5**	**6**	**0**	**0**	**1**	**36**	**24**	**20**	**2**	**2**	**2**	**45**	**31**	**29**
	$'000	**58,523**	**37,074**	**72,800**	**0**	**0**	**3,000**	**73,604**	**87,444**	**63,908**	**6,036**	**5,300**	**24,900**	**138,163**	**129,818**	**164,608**

Table 14: Start-up company formation and equity positions in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	37	38	38	30	27	27	72	70	70
New start-up companies formed	No.	0	0	0	2	1	2	24	15	14	1	1	1	27	17	17
Institutions responding	No.	1	1	1	4	4	4	33	39	39	29	25	25	67	69	69
Value of all equity holdings	$'000	81,780	34,687	28,906	713	1,460	1,557	111,797	108,923	108,417	39,923	1,989	929	234,213	147,058	139,809
Institutions responding	No.	1	1	1	4	4	4	36	39	39	30	26	26	71	70	70
Equity holding positions fully or partially exited	No.	11	6	4	0	1	1	13	12	7	1	1	0	25	20	12
Value of equity holdings fully or partially exited	$'000	14,058	39,176	2,441	0	250	94	5,129	16,259	6,191	0	58	0	19,187	55,743	8,726
Operational start-up companies which are dependent on licensing/ assignment of technologies	No.	18	16	7	6	7	6	168	164	172	24	14	14	216	201	199
Start-up companies in which institutions have an equity holding	No.	18	16	5	6	5	5	152	144	156	20	15	13	196	180	179
Start-up companies dependant on licensing that ceased operations	No.	11	1	1	1	1	1	31	19	15	6	1	1	49	22	18
Gross percentage of start-up companies with an equity holding by an institution that are dependent on the same institution's IP	%	100%	100%	71%	100%	71%	83%	90%	88%	91%	83%	107%	93%	91%	90%	90%

Figure 10: Number of start-up companies operational at year's end with institutional equity stake by sector 2000-11

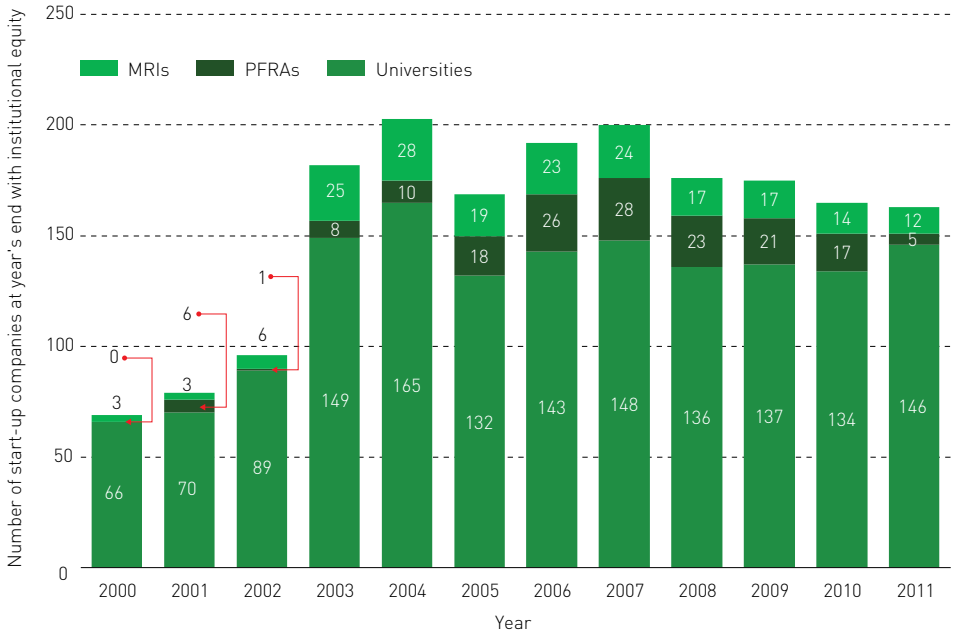
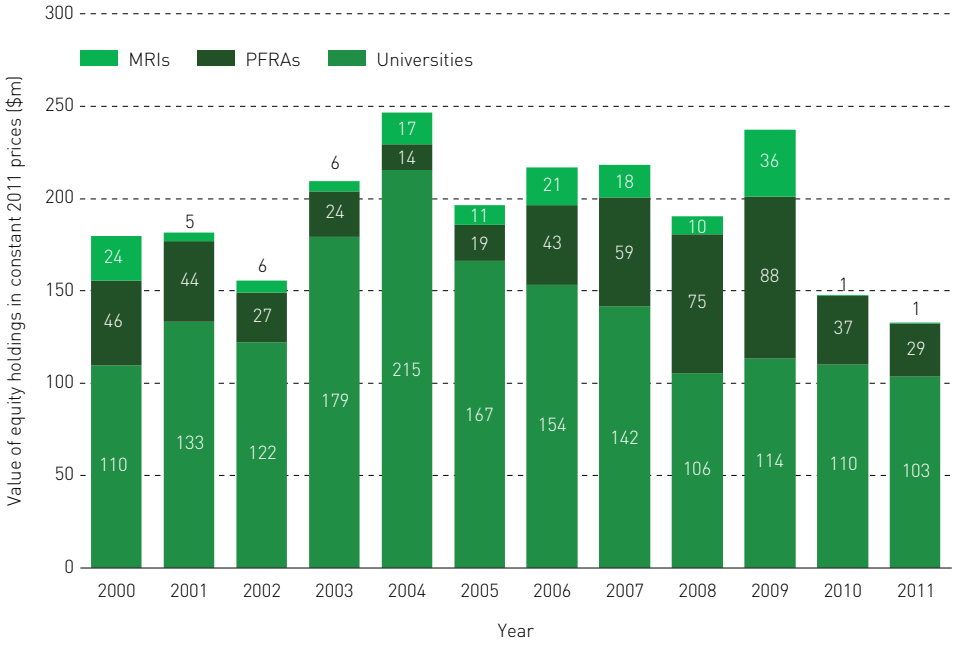


Figure 11: Value of research commercialisation equity holding by sector 2000-11



RESEARCH CONTRACTS AND CONSULTANCIES AND DIRECT SALES

The number and value of research contracts and consultancy activity provide additional indicators of the impact of Australian research institutions beyond the income received for the direct commercialisation of IP. Direct sales capture income earned by institutions that commercialised the results of their research direct to market without licensing their IP. Direct sales measure physical products produced by the reporting institution which embody technology-based IP (including both formally secured IP and know-how).

Contract research is usually a bilateral relationship between a research institution and an external client where the institution provides a research service with objectives set by the client.

Consultancy is the innovative application of existing knowledge and can often provide more immediate solutions for clients in need of knowledge other than formal contract research. The problem-solving approach of researchers can be translated into immediate economic benefit because similar problems may have been faced before, perhaps by a different client in the same sector or a client in a different sector.

Income represented in research contracts includes contracts with partners in grant funded research but does not include funding from the granting agency itself. Income reported may also include public sector contracts won by tender. Research contracts and consultancies serve as a useful proxy for the value and impact of knowledge exchange, collaboration between research and industry sectors, and other related activities which impact on the economy and society.

KEY POINTS

DATA FOR 2010 AND 2011

- The total number of research contracts increased by 25% from 8,822 in 2009 to 10,995 in 2011. The total value of contracts also increased to a high of $1.19b in 2010 (See Table 15 and Figure 14).
- The university sector had the highest amount of research contracts, with 64% having a value of under $50,000, 18% with a value between $50,000 and $200,000 and 18% with a value over $200,000 (See Table 15 and Figure 12).
- The total number of research consultancies fell 18% from 5,575 in 2009 to 4,575 in 2011. However the total value of consultancies increased 4% from $272m in 2009 to $284m in 2011 (See Table 15 and Figure 13).
- In 2011, CSIRO had the largest amount of consultancies over $500,000 at a total value of $120m (See Table 15).
- The total number of contracts and consultancies for MRIs increased in 2010 and 2011, however their value was lower than in 2009 (See Table 15).
- The total number of direct sales was at its highest in 2010 at 15,626, at a value of $62m. This increase was mainly due to an increase in direct sales for other PFRAs and the university sector (See Table 15).
- The majority of direct sales are by CSIRO and are below $10,000 (See Table 15).

Table 15: Research contracts, consultancies and direct sales number, and value in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	34	37	38	28	26	26	67	68	69
Institutions reporting no contracts	No.	0	0	0	0	0	1	3	7	5	13	13	11	16	20	17
Contracts	No.	1,467	1,430	1,436	51	533	484	6,949	8,163	8,589	355	491	486	8,822	10,617	10,995
Value of contracts	$'000	219,188	205,094	223,349	8,154	40,334	31,137	658,693	896,246	824,266	65,885	52,099	55,329	951,920	1,193,773	1,134,081
Gross contracted value																
$0 - $10,000	No.	634	610	583	4	251	19	2,634	2,551	2,710	45	32	56	3,317	3,444	3,368
$10,001 - $50,000	No.	385	375	374	18	208	19	2,220	2,663	2,757	119	120	114	2,742	3,366	3,264
$50,001 - $200,000	No.	272	254	273	18	64	15	1,264	1,468	1,541	116	209	186	1,670	1,995	2,015
$200,001 - $500,000	No.	101	118	117	4	3	7	373	522	509	47	51	64	525	694	697
$500,001 and over	No.	75	73	89	7	7	8	210	413	271	26	23	19	318	516	387
Unspecified	No.	0	0	0	0	0	416	248	546	801	2	56	47	250	602	1,264
Total	**No.**	**1,467**	**1,430**	**1,436**	**51**	**533**	**484**	**6,949**	**8,163**	**8,589**	**355**	**491**	**486**	**8,822**	**10,617**	**10,995**

Research Consultancies

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	34	39	39	29	24	25	68	68	69
Institutions reporting no consultancies	No.	0	0	0	1	2	2	8	6	5	20	20	18	29	28	25
Consultancies	No.	791	772	774	1,409	377	328	3,222	3,748	3,401	153	73	72	5,575	4,970	4,575
Value of consultancies	$'000	118,025	110,707	120,347	19,066	9,945	7,137	132,415	137,162	154,638	2,959	1,105	1,846	272,463	258,919	283,967
Gross consultancies value																
$0 - $10,000	No.	342	330	315	1,132	2	10	1,678	1,938	1,680	101	50	42	3,253	2,320	2,047
$10,001 - $50,000	No.	208	203	202	197	158	19	1,039	993	826	35	18	24	1,479	1,372	1,071
$50,001 - $200,000	No.	146	137	148	62	12	21	359	327	295	15	5	5	582	481	469
$200,001 - $500,000	No.	55	63	63	18	7	14	62	64	69	2	0	1	137	134	147
$500,001 and over	No.	40	39	46	0	3	7	28	33	25	0	0	0	68	75	78
Unspecified	No.	0	0	0	0	195	257	56	393	506	0	0	0	56	588	763
Total	**No.**	**791**	**772**	**774**	**1,409**	**377**	**328**	**3,222**	**3,748**	**3,401**	**153**	**73**	**72**	**5,575**	**4,970**	**4,575**

Direct sales

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	32	36	36	28	24	25	65	65	66
Institutions reporting no direct sales	No.	0	0	0	4	2	2	29	27	37	27	24	24	60	53	63
Direct sales transactions	No.	14,707	15,321	14,444	0	60	9	43	94	54	53	151	135	14,803	15,626	14,642
Value of direct sales	$'000	20,937	21,183	19,867	0	33,246	58	6,193	6,308	5	123	1,195	983	27,252	61,932	20,912
Gross direct sales value																
$0 - $10,000	No.	14,329	14,954	14,123	0	35	0	41	91	53	53	84	76	14,423	15,164	14,252
$10,001 - $50,000	No.	341	331	290	0	20	1	0	2	0	0	17	17	341	370	308
$50,001 - $200,000	No.	37	34	28	0	0	0	1	1	0	0	0	1	38	35	29
$200,001 - $500,000	No.	0	2	3	0	0	0	0	0	0	0	0	0	0	2	3
$500,001 and over	No.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unspecified	No.	0	0	0	0	5	8	1	0	1	0	50	41	1	55	50
Total	**No.**	**14,707**	**15,321**	**14,444**	**0**	**60**	**9**	**43**	**94**	**54**	**53**	**151**	**135**	**14,803**	**15,626**	**14,642**

Figure 12: Number of research contracts by range of contract value in 2011

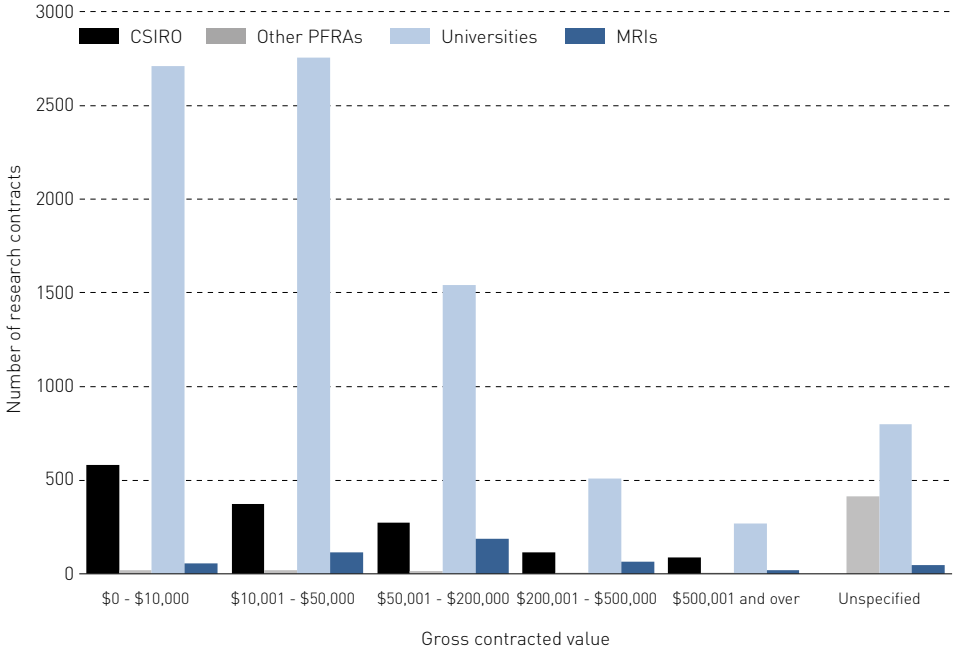


Figure 13: Number of research consultancies by range of contract value in 2011

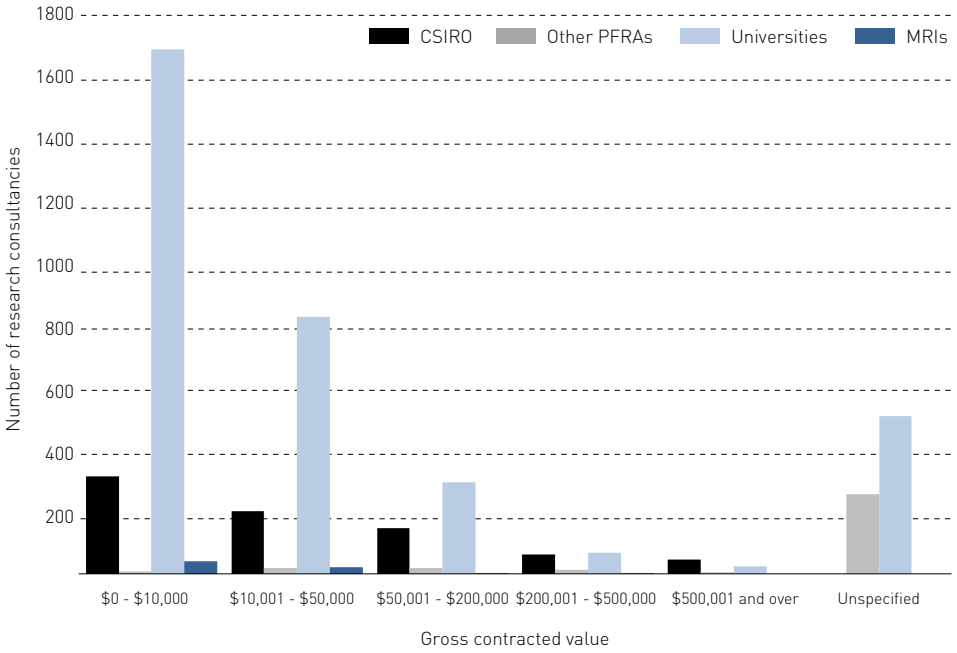
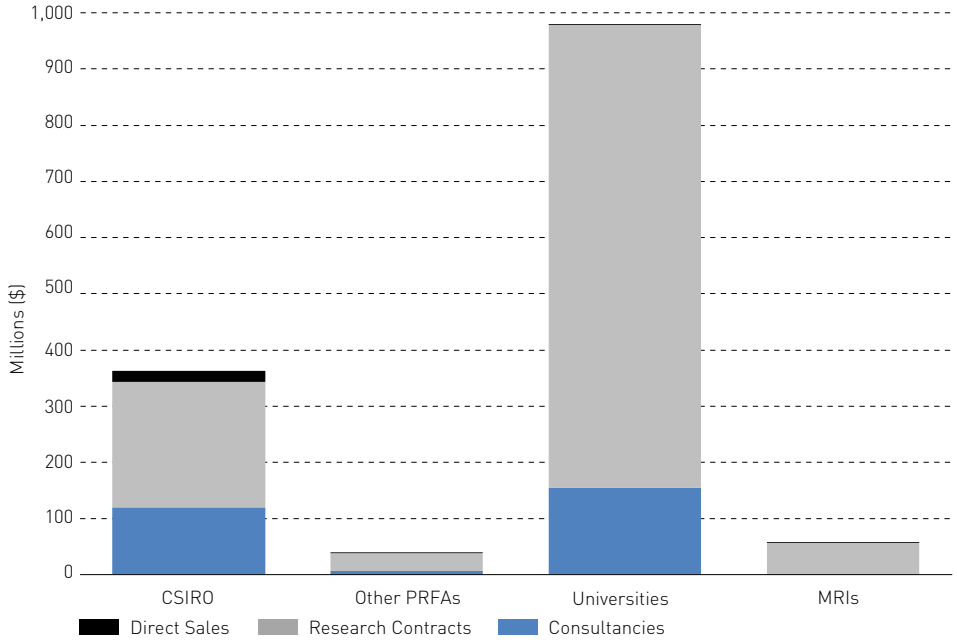


Figure 14: Value of research contracts, consultancies and/or direct sales executed by sector in 2011



SKILLS DEVELOPMENT AND KNOWLEDGE EXCHANGE ACTIVITY

Research institutions' efforts to realise their commercialisation potential through professional development and knowledge transfer activities are well documented. The NSRC sought information on educational, training and development programs aimed at research staff or higher degree research students to develop skills and understanding in entrepreneurship and research commercialisation processes. Information was also sought in relation to programs aimed at helping industry and other individuals and organisations to better understand the research process, research findings and their implications.

KEY POINTS

DATA FOR 2010 AND 2011

- In 2011, the percentage of institutions offering research training to its staff and students either through in-house or external training was 58%, which is down from 2009 at 67% (See Table 16).
- The number of in-house training participants increased 41% from 3,887 in 2009 to 5,491 in 2011. This rise is mainly due to an increase in the university sector (See Table 16).
- In 2010 and 2011, 144 and 139 research postgraduates respectively were employed in start-up companies (See Table 16).
- The total number of staff employed in start-up companies fell 77% from 115 in 2009 to 27 in 2010 and 2011 (See Table 16). This trend reflects the reduction in start-up company formations (See Table 14).

Table 16: Skills development and transfer in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	37	39	39	30	28	28	72	72	72
Institutions offering in-house and/or external training	No.	1	0	0	3	3	3	32	30	31	12	8	8	48	41	42
Training offered to researchers and research students																
Institutions offering in-house training	No.	1	1	0	3	3	3	27	30	31	8	8	8	38	42	42
In-house training participants	No.	0	0	0	406	54	100	3,276	5,095	5,232	205	163	159	3,887	5,312	5,491
Institutions offering external training	No.	0	0	0	1	1	2	11	9	11	6	3	3	18	13	16
External training participants	No.	0	0	0	4	0	0	340	204	223	39	5	9	383	209	232
Institutional employment in start-up companies																
Research post-graduate employment in start-up companies	No.	37	37	38	3	0	1	59	78	65	12	29	35	111	144	139
Postdoctoral employment in start-up companies	No.	0	0	0	4	0	0	25	6	6	15	2	2	43	8	8
Academic staff employed in start-up companies	No.	0	0	0	0	0	0	8	6	6	5	1	1	13	6	6
Other institution employees employed in start-up companies	No.	0	0	0	2	6	6	40	7	7	17	1	0	58	14	13
Total number of staff employed in start-up companies	**No.**	**0**	**0**	**0**	**6**	**6**	**6**	**72**	**19**	**19**	**37**	**3**	**2**	**115**	**27**	**27**

RESOURCES FOR RESEARCH COMMERCIALISATION

The commitment of institutions to capture commercial benefit from their research is indicated by staffing and other resources allocated by institutions to commercialisation activities. Commercialisation staff and administrative costs include the salaries and other associated costs of staff employed in commercialisation offices as well as the costs of legal and other fees incurred in commercialisation activities. Commercialisation and support staff may be employed within an office dedicated to commercialisation activities, a commercialisation company or in functional units within an institution.

KEY POINTS

DATA FOR 2010 AND 2011

- In 2010 and 2011, 24% and 25% of institutions responding respectively reported no commercialisation staff, compared to 20% in 2009 (See Table 17).
- The number of dedicated commercialisation legal staff increased 55% from 31 in 2009 to 48 in 2011, at a cost of $7m (See Table 17).
- While the total number of commercialisation staff fell 4% from 706 in 2009 to 681 in 2011, the total staff cost was higher at $91m. This is due to increases in cost per FTE (See Table 17).
- Net commercialisation costs, including marketing, legal, staff and non-staff costs was $134m, up 11% from 2009 (See Table 17).

TIME SERIES DATA 2000-11

- Over the period 2000 to 2011, the total level of dedicated commercialisation staff has increased by 61%. The level grew rapidly from 191 FTE in 2000 to 296 FTE in 2003 and has remained relatively stable to 2011 (307 FTE) (See Table 2 and Figure 15).

Figure 15: Number of dedicated commercialisation staff by sector 2000-11

Table 17: Commercialisation staff numbers and staff costs in 2009, 2010 and 2011

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Institutions responding	No.	1	1	1	4	4	4	36	39	39	30	27	27	71	71	71
Institutions reporting no commercialisation staff	No.	0	0	0	0	0	0	3	5	5	11	12	13	14	17	18
Dedicated commercialisation legal staff	No.	4	6	10	2	8	7	22	25	26	2	4	5	31	43	48
Dedicated commercialisation marketing staff	No.	1	0	0	1	6	6	14	10	11	11	8	7	27	24	24
Dedicated commercialisation staff	No.	128	112	114	16	20	20	165	171	169	22	17	18	332	319	322
Industry engagement staff	No.	0	0	0	22	6	5	104	100	100	3	7	8	130	114	113
Other Staff	No.	20	17	19	4	11	10	154	141	142	9	3	3	188	172	174
Commercialisation staff total	**No.**	**153**	**135**	**143**	**45**	**50**	**48**	**460**	**448**	**448**	**48**	**39**	**42**	**706**	**672**	**681**
Cost of dedicated commercialisation legal staff	$'000	600	900	1,581	305	858	982	3,067	3,354	3,685	273	526	670	4,246	5,637	6,918
Cost of dedicated commercialisation marketing staff	$'000	110	0	0	45	519	480	841	1,072	1,109	2,143	1,673	1,650	3,139	3,264	3,239
Cost of dedicated commercialisation staff	$'000	19,500	17,546	17,784	2,484	3,255	3,375	21,349	24,213	24,569	3,556	2,597	2,936	46,888	47,611	48,664
Cost of dedicated industry / community engagement staff	$'000	0	0	0	4,747	951	820	11,427	12,398	14,289	656	899	986	16,829	14,248	16,096
Cost of other staff	$'000	1,600	1,530	1,634	485	532	498	13,824	13,023	13,864	993	384	406	16,901	15,469	16,401
Cost of Commercialisation staff total	**$'000**	**21,810**	**19,976**	**20,999**	**8,065**	**6,115**	**6,154**	**50,508**	**54,060**	**57,517**	**7,620**	**6,078**	**6,648**	**88,003**	**86,230**	**91,317**
External fees and legal costs	$'000	9	69	50	45	203	272	1,153	1,220	1,322	569	1,466	1,089	1,776	2,958	2,733
Internal fees and legal costs	$'000	0	0	0	23	282	270	4,352	5,652	6,737	1,294	1,698	1,991	5,669	7,633	8,998
Sub-total non-employment and non-legal costs	**$'000**	**9**	**69**	**50**	**68**	**485**	**542**	**5,505**	**6,872**	**8,059**	**1,862**	**3,165**	**3,080**	**7,444**	**10,591**	**11,730**
IPR external fees and legal costs	$'000	8,251	7,949	7,544	1,159	934	1,332	12,281	10,233	10,667	4,364	4,185	5,535	26,055	23,301	25,077
Revenue from licensees as reimbursement of expenses	$'000	1,226	1,737	1,649	39	111	29	5,054	3,089	4,080	1,180	273	319	7,499	5,210	6,077
Net total other commercialisation staff costs	**$'000**	**7,034**	**6,281**	**5,944**	**1,188**	**1,308**	**1,845**	**12,732**	**14,017**	**14,646**	**5,046**	**7,077**	**8,296**	**26,000**	**28,682**	**30,731**

3. INTERNATIONAL COMPARISONS

In this chapter the commercialisation performance of Australian public institutions are compared with their international counterparts: the United States (US), Canada, the United Kingdom (UK) and Europe, for the period from 2000 to 2011.

Metrics used to undertake the international comparisons are:

- Full-Time Equivalents (FTEs) dedicated to commercialisation per institution;
- Invention disclosures per US$100m research expenditure;
- US patents issued per US$100m research expenditure;
- Licences, Options and Assignments (LOAs) executed per $US100m research expenditure;
- LOA income per $US100m research expenditure; and
- Start-up companies formed per $US100m research expenditure.

Research expenditure in US dollar Purchasing Power Parity terms is used to adjust commercialisation activity relative to the scale of funding inputs. This allows comparison of commercialisation activity across countries.

The comparisons set out below are based on survey data not census data. All surveys are not expected to collect data from all public research institutions. Panel data for institutions that consistently responded to a survey are not available for all surveys for all years. This can introduce considerable variation between survey years depending on which major institutions responded to a survey.

The Australian time series data is from the *NSRC* survey conducted by the Department of Industry, Innovation, Science, Research and Tertiary Education. European time series data, which excludes UK institutions, is derived from the *Association of European Science and Technology Transfer Professionals (ASTP) survey*, *European Knowledge Transfer Indicators survey,* the *Code of Practice implementation survey and* the *interview with firms active in four R&D intensive sectors*. The time series data for the US and Canada is obtained from the *Association of University Technology Managers (AUTM) U.S and Canadian Licensing Activity Survey*. The UK time series data is collected from the *Higher Education – Business and Community Interaction Survey (HE-BCIS)*[17].

International comparisons are difficult to make because there are substantial scale, structural and systemic differences between each country's higher education and publicly funded research systems. Differences in survey scope, data availability, methodology and definitions also make comparisons difficult. There are also differences in legislation, industry structure, market characteristics and government policy. These factors all impact on the incentives and strategies for research commercialisation in each of these countries.

This chapter therefore provides insights into the major areas of activity as reported by the institutions performing the majority of work in each country. Where significant variation exists this has been explained.

ANALYSIS

KEY POINTS

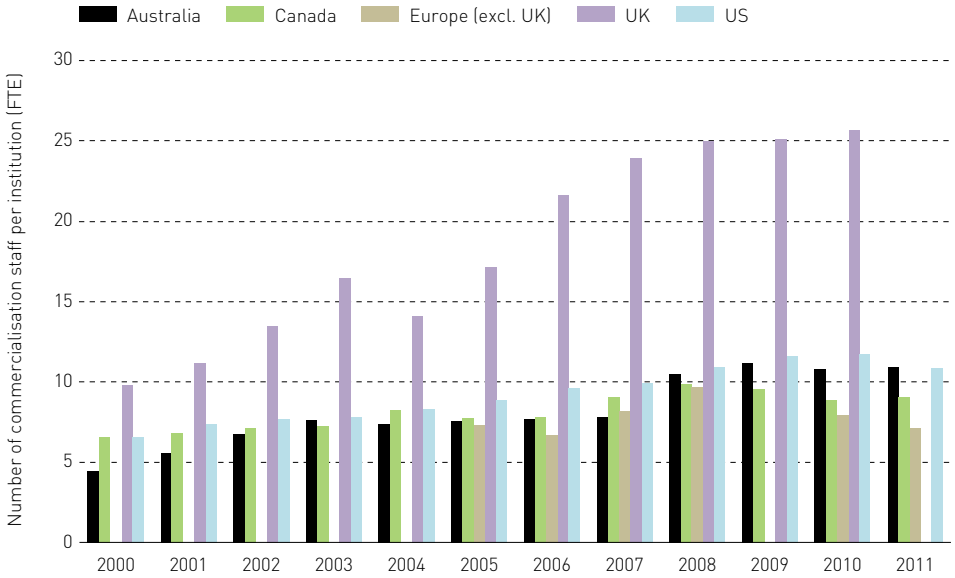
- The total number of FTEs[18] dedicated to commercialisation by Australian institutions remained stable at around 11.0 FTEs per institution since 2009. These levels were similar to the US, but higher than Canada and Europe over the same period. However, the total number of commercialisation FTEs in the UK institutions was significantly higher than that of other countries during the same period (see Figure 16 and Table 3).
- The number of invention disclosures per $US100m research expenditure by Australian institutions increased from 25.6 in 2009 to 28.8 in 2011. The Australian level of disclosure in 2011 was similar to institutions across Europe (28.4 in 2011) but lower than the US (35.8 in 2011), Canada (41.6 in 2011) and the UK (43.7 in 2010) (See Figure 17 and Table 3).
- The number of US patents issued to Australian institutions per $US100m research expenditure rose from 1.5 in 2009 to 2.0 in 2011. In comparison, in 2011, the number of US patents issued per $US100m research expenditure to Canada and Europe was 4.1 and 3.5, respectively. The US in 2011and the UK in 2010 continued to display a higher rate in issued US patents per $US100m research expenditure than that of other countries at 7.7 and 7.8, respectively (see Figure 18 and Table 3).

17 See Chapter 6 for details.

18 FTEs include both licensing FTEs and other FTEs.

- Recent data[19] shows that Australia is the first location of choice for Australian institutions and their partners for a patent filing. The vast majority of Australian institutions and their partners also prefer to file their patents to the Patent Cooperation Treaty, administered by the World Intellectual Property Organisation. This may explain in part why the number of US patents issued to Australian institutions per $US100m research expenditure has been lower than that of other countries.
- The number of LOAs executed per $US100m research expenditure by Australian institutions declined from 9.0 in 2009 to 8.3 in 2011, compared with 13.2 in Canada, 10.6 in Europe and 9.9 in the US, in 2011. The UK data shows a large number of LOAs executed in 2010 at 52.6 (see Figure 19 and Table 3).
- In 2011, Australia's LOA income as a percentage of research expenditure fell from 4.1% in 2009 to 1.5% in 2008. The licence income from CSIRO's WLAN technology helped Australia to boost its LOA income in 2009, and it is expected that the WLAN technology will bring more LOA income for Australia by 2013 when the patents expire. Nevertheless, Australia's LOA income as a percentage of research expenditure in 2011 was better than the rate in the UK (1.1% in 2010) and Canada (1.2% in 2011), but slightly lower than the rate in Europe (1.6% in 2011). The US has the highest ratio of LOA income to total research expenditure at 4.1% in 2011 compared with that of other countries (see Figure 20 and Table 3).
- It appears that investing in innovation and technologies is a key to increasing LOA income. Australia, Canada, Europe, the UK and the US all performed well in LOA income as a percentage of research expenditure over the recent years, even in the current economic climate.
- Australian start-up companies formed per $US100m research expenditure have gradually declined from a peak of 2.2 in 2001 to 0.3 in 2011. The data in the UK and Canada showed a similar declining trend over the same period, but the number was much higher at 2.8 in the UK in 2010, 3.2 in Europe and 1.6 in Canada in 2011. While the US maintained a stable rate of start-up company formation per $US100m research expenditure at around 1.1 over the last decade (see Table 3 and Figure 21).

Figure 16: International comparison of the total numbers of commercialisation staff (FTEs) per institution, 2000-11



19 Thomson Reuters, 2012, *Analysis of Australian academic IP commercialisation.*

Figure 17: International comparison of the number of invention disclosures per $US100m research expenditure, 2000-11

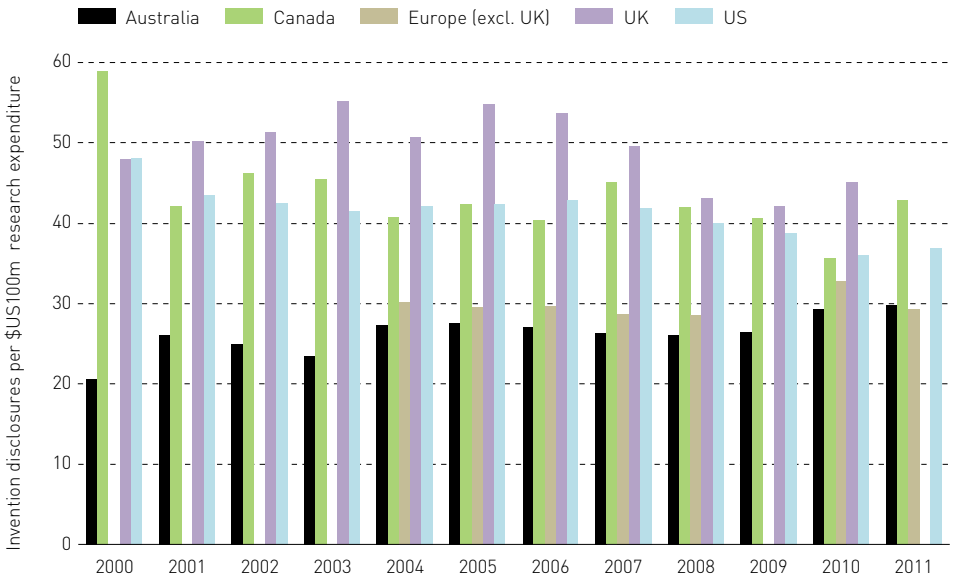


Figure 18: International comparison of the number of US patents issued per $US100m research expenditure, 2000-11

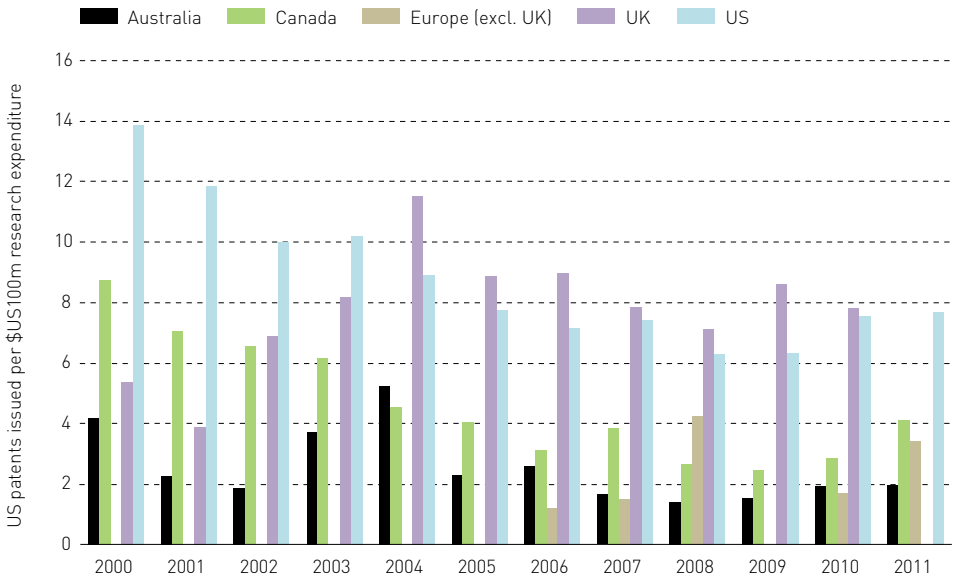


Figure 19: International comparison of the number of LOAs executed per $100m research expenditure, 2000-11

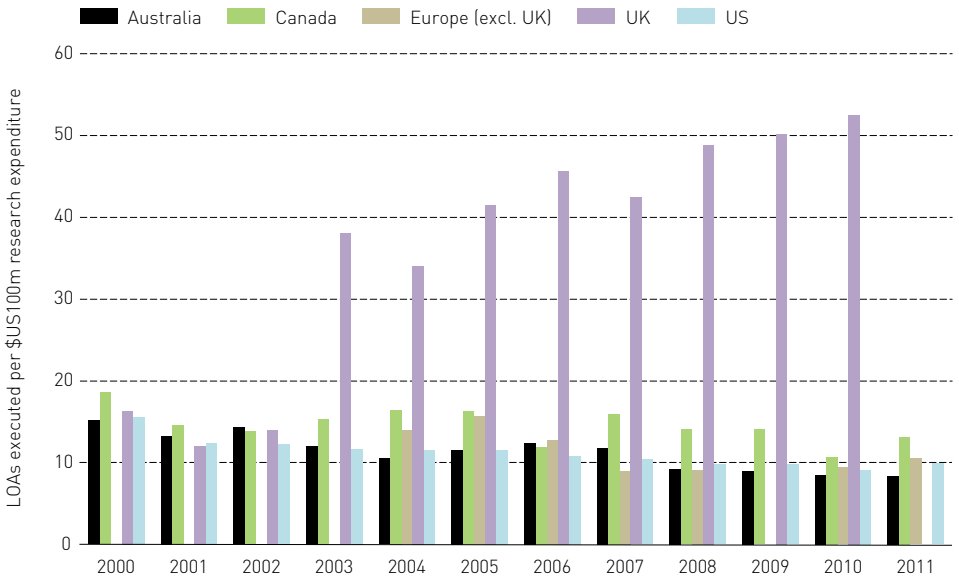


Figure 20: International comparison of LOA income as a percentage of research expenditure, 2000-11

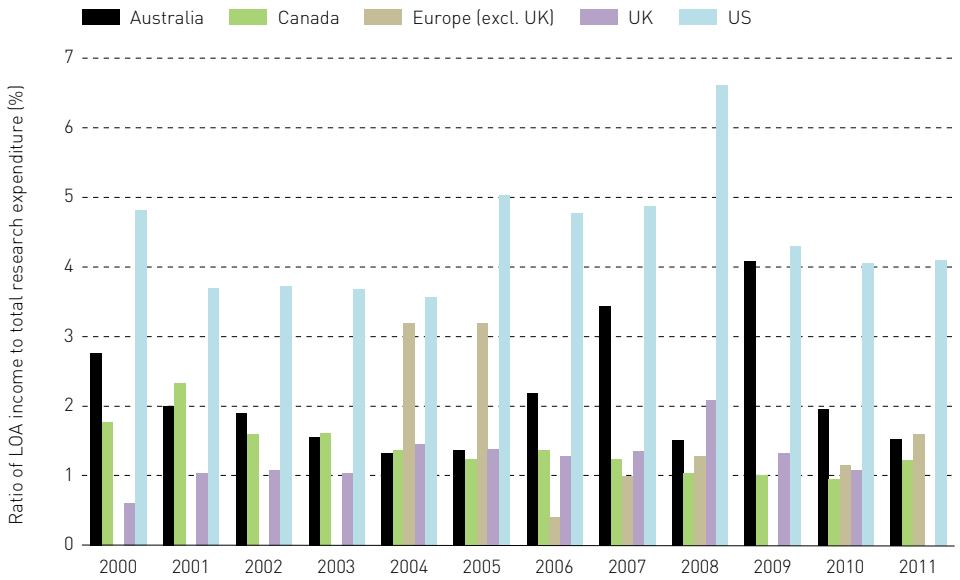
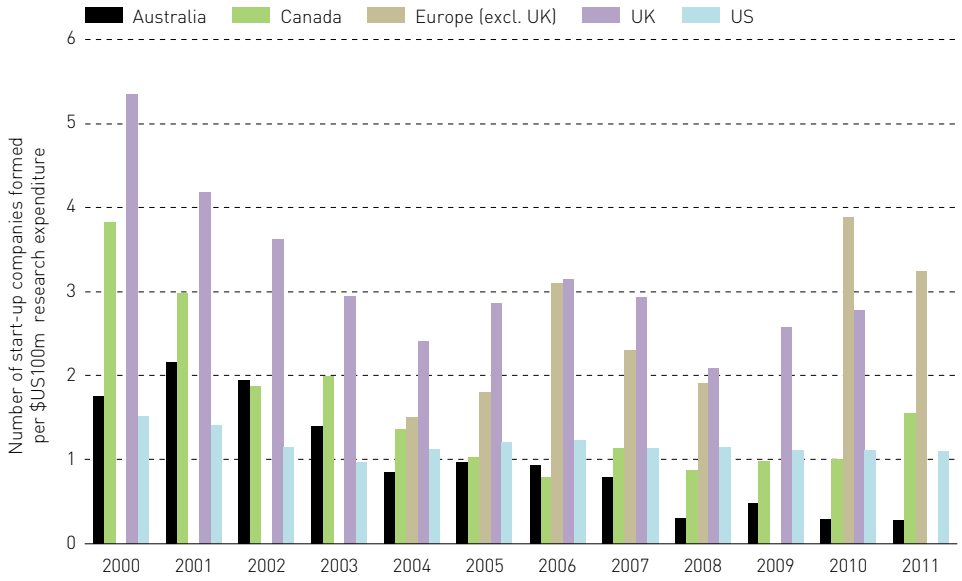


Figure 21: International comparison of start-up companies formed per $US100m research expenditure, 2000-11



4. COOPERATIVE RESEARCH CENTRES (CRCs)

Since the inception of the CRC program in 1991, 196 CRCs have been funded. The Australian Government has committed more than $3.5 billion in CRC program funding. Participants in CRCs have committed a further $11.4 billion in cash and in-kind contributions.

The CRC program contributes directly to improving skills and expanding research capacity, increasing innovation in business, government and the community sector and boosting collaboration within Australia and between Australia and other countries. Public good (social and environmental benefits) is a key objective of the CRC program.

The CRC program aims to overcome many of the barriers to capturing the benefits of basic research by linking in end user organisations at the early 'design' stage of research. Each CRC also has a research agenda informed by end user needs with involvement right through to adoption and commercialisation of research outcomes.

Over the period of the survey, CRCs operated in four broad industry sectors: the *Agriculture, Forestry and Fishing* industry; the *Manufacturing* industry; the *Mining* industry; and the *Services* sector.[20] As demonstrated below, some sectors, such as mining and manufacturing, can exhibit significant variation in their performance due to the relatively small population size.

This chapter presents data from the CRC Management Data Questionnaire (MDQ) from 2005-06 to 2010-11[21]. MDQ data was not combined with NSRC data as there is potential for outputs shared between CRCs and other institutions included in the NSRC to be counted more than once. All dollar values in the figures and tables have been converted to 2011 prices to enable comparisons over time.[22]

There are several contributing factors which may account for the apparent reduction in CRC commercialisation activities. As increased funding to the CRC program under the Backing Australia's Ability initiative (2001-2010) concluded and returned to normal funding levels, there has been a commensurate decline trend in the total number of CRCs (see Table 18). While end user adoption of CRC research has always been a major focus, prior to a 2008 review of the program this was largely achieved through a focus on commercialisation. Since 2008 this has been broadened to a focus on utilisation and translation of research outputs in keeping with the reinstatement of public good as a key objective of the program. For these reasons data is presented as a proportion of research expenditure.

Table 18: Numbers of Cooperative Research Centres, 2005-06 to 2010-11[23]

	Number of Cooperative Research Centres					
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Agriculture, Forestry and Fishing	21	18	19	16	14	11
Manufacturing	9	5	6	5	6	5
Mining	4	4	4	3	3	4
Services	32	26	27	22	27	22
Total	**66**	**53**	**56**	**46**	**50**	**42**

20 These categories have changed to align with ANZSIC codes since 2008-09.

21 From 2010-11 onwards, the wording of some MDQ questions were changed to better meet CRC program reporting objectives.

22 All dollar values presented in charts are expressed in constant 2011 prices using the implicit price deflators for Gross Domestic Product from the Australian System of National Accounts (5204.0), 2011-2012.

23 All dollar values presented in tables are expressed in current prices.

RESOURCING FOR COMMERCIALISATION

KEY POINTS

- Between 2008-09 and 2010-11, the total CRC research expenditure declined by 8% and the total CRC program expenditure on commercialisation fell by 26%. These were in line with a decline in total number of CRCs (down by 9%) over the same period (see Tables 18 and 19).
- In the Services sector and over 2010-11, commercialisation expenditure was 53% of the total ($66m), while research expenditure was 60% of the total ($475m) (see Table 19). This reflects that the greatest number of CRCs have operated in the Services sector, the largest sector in the Australian economy.
- The total ratio of commercialisation expenditure as a proportion of research expenditure for all CRCs fell from 17% in 2008-09 to 14% in 2010-11. Over the same period, the sectors of Agriculture, Forestry and Fishing, and Manufacturing have increased their proportion of commercialisation expenditure, but the sectors of Mining and Services have invested less funding in commercialisation activities (see Table 19 and Figure 22).
- In general, newly established CRCs have a higher ratio of research related expenditure to commercialisation expenditure as they invest fewer resources in commercialisation activities early in their funding term. However, as a CRC approaches the end of its funding term or in the case of CRCs that are funded for more than one term with pre-existing research in the pipeline, greater investment would be devoted to commercialisation and utilisation of its research outputs. Thus, the CRC's commercialisation expenditures are expected to rise towards the end of their funding term and/or be greater for CRCs that have received multiple funding terms.

Figure 22: Commercialisation expenditure per $100m research expenditure for each CRC sector, 2005-06 to 2010-11 Inset figure: Commercialisation expenditure per $100m research expenditure for all CRCs over the same period.

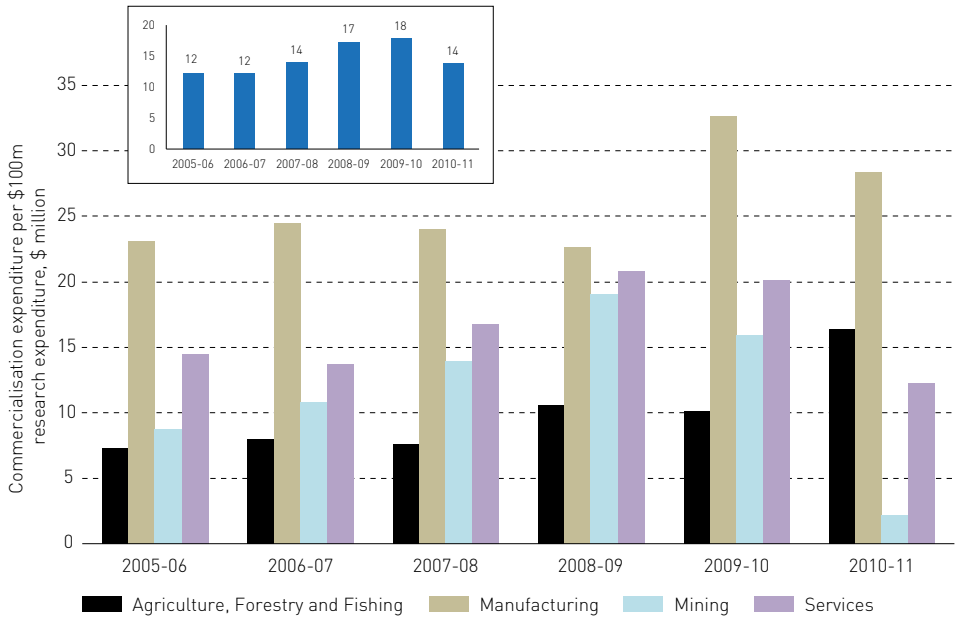


Table 19: CRC research and commercialisation expenditure, 2005-06 to 2010-11

	Commercialisation expenditure ($'000)						Research expenditure ($'000)						Commercialisation expenditure as a percentage of research expenditure					
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Agriculture, Forestry and Fishing	15,893	17,288	15,034	18,476	16,064	17,444	218,799	217,128	197,979	175,382	158,445	106,619	7.3%	8.0%	7.6%	10.5%	10.1%	16.4%
Manufacturing	10,758	10,677	10,531	10,239	13,761	12,412	46,547	43,623	43,838	45,183	42,167	43,827	23.1%	24.5%	24.0%	22.7%	32.6%	28.3%
Mining	4,840	6,414	8,411	7,030	3,977	843	55,313	59,674	60,496	36,955	24,957	38,674	8.8%	10.7%	13.9%	19.0%	15.9%	2.2%
Services	50,253	44,925	52,006	53,421	58,806	34,966	347,266	327,863	311,077	256,869	292,214	285,682	14.5%	13.7%	16.7%	20.8%	20.1%	12.2%
Total	**81,744**	**79,304**	**85,982**	**89,166**	**92,608**	**65,665**	**667,925**	**648,288**	**613,390**	**514,389**	**517,783**	**474,802**	**12.2%**	**12.2%**	**14.0%**	**17.3%**	**17.9%**	**13.8%**

Table 20: CRC patent filing activity, 2005-06 to 2010-11

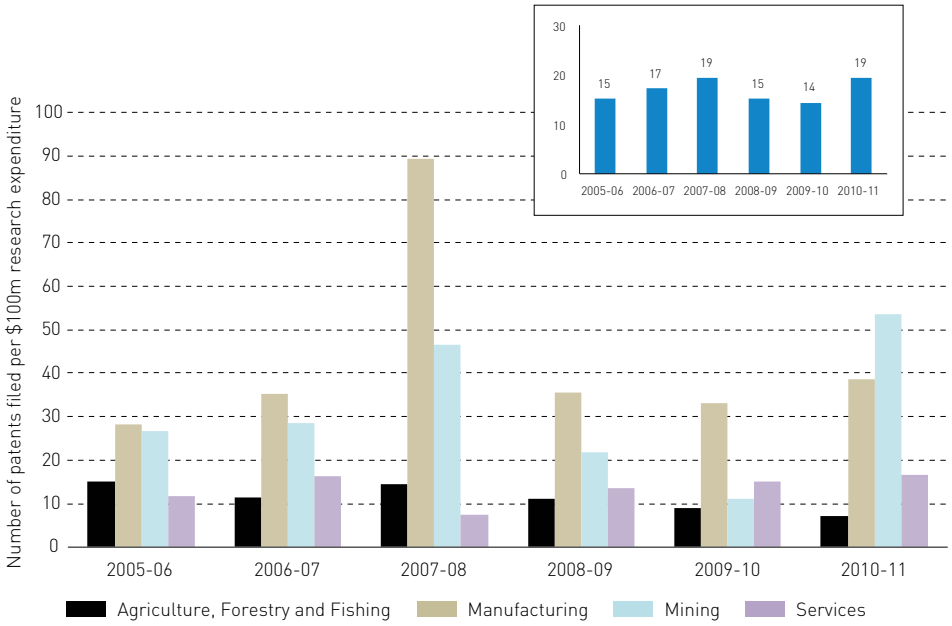
	Patents filed (No.)																	
	In Australia						Overseas						Total					
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Agriculture, Forestry and Fishing	24	20	21	9	11	7	19	11	13	13	4	1	43	31	34	22	15	8
Manufacturing	16	11	30	13	12	9	1	8	16	5	3	9	17	19	46	18	15	18
Mining	8	21	21	7	2	8	11	0	12	2	1	14	19	21	33	9	3	22
Services	26	30	16	23	17	23	26	36	11	16	30	27	52	66	27	39	47	50
Total	**74**	**82**	**88**	**52**	**42**	**47**	**57**	**55**	**52**	**36**	**38**	**51**	**131**	**137**	**140**	**88**	**80**	**98**

INTELLECTUAL PROPERTY PROTECTION ACTIVITY

KEY POINTS

- The total CRC patent filing activity rose by 11% from 88 in 2008-09 to 98 in 2010-11, of which, patent filings fell by 10% in Australia but it surged by 42% offshore. Over the same period, patent filings in the sector of Agriculture, Forestry and Fishing declined, but it increased in the sectors of Services and Mining, and remained unchanged in the Manufacturing sector (see Table 20).
- The total number of patents filed increased from 15 patents per $100m research expenditure in 2008-09 to 19 in 2010-11. The growth came from the Mining, the Manufacturing and Services sectors (see Table 4 and Figure 23).
- The total number of patent holdings jumped by 92% between 2008-09 and 2010-11. A rise of patent holdings in both overseas (up by 121%) and domestic (increased by 13%) contributed to the growth[24]. Patent holdings in the Services sector soared by 274%, followed by Manufacturing (up by 50%) and Mining (up by 8%), but it declined by 73% in the Agriculture, Forestry and Fishing sector (see Table 21).
- The total number of patents maintained per $100m research expenditure rose from 116 in 2008-09 to 256 in 2010-11, largely, as a result of strong growth in the Services sector (see Table 21 and Figure 24).
- The income from Licences, Options and Assignments (LOAs) rose by 11% over the period from 2008-09 to 2009-10 but fell by 57% from 2008-09 to 2010-11, although the number of LOAs executed by CRCs increased from 222 in 2008-09 to 225 in 2010-11[25] (see Table 22). A fall in reported license revenue from one CRC was mainly responsible for the decline in income from LOAs in 2010-11.
- Income derived from LOA activity per $100m research expenditure rose from $5.3m in 2008-09 to $5.8m in 2009-10 but dropped to $2.4m in 2010-11 (see Figure 25).
- The fall in income from LOAs in 2010-11 was also due to a combination of factors, which include a downward correction adjustment for some CRCs from previous years, and an impact from the change in the MDQ questions in relation to LOAs.

Figure 23: Total number of patents filed per $100m research expenditure for each CRC sector, 2005-06 to 2010-11 Inset figure: Total number of patents filed per $100m research expenditure for all CRCs over the same period.



24 In some cases large increases and decreases relate to the performance of one or two CRCs.
25 The total number of LOAs jumped by 204% from 74 in 2005-06 to 225 in 2010-11.

Figure 24: Total number of patents maintained per $100m research expenditure for each CRC sector, 2005-06 to 2010-11 Inset figure: Total number of patents maintained per $100m research expenditure for all CRCs over the same period.

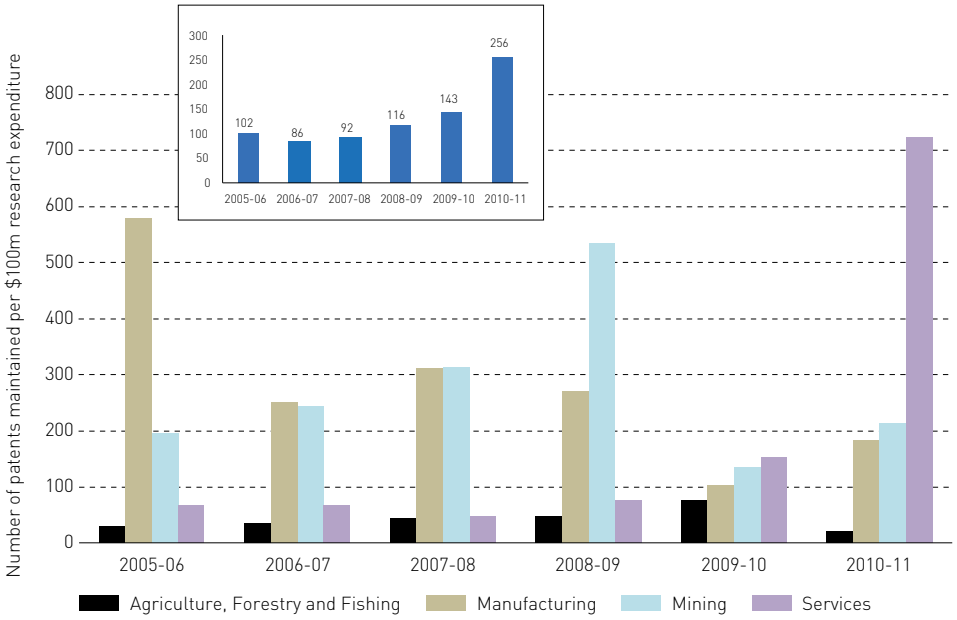


Figure 25: Income from licences, options and assignments (LOAs) per $100m research expenditure for each CRC sector, 2005-06 to 2010-11 Inset figure: Income from LOAs per $100m research expenditure for all CRCs over the same period.

Table 21: CRC patent holdings, 2005-06 to 2010-11

	Patents maintained (No.)																	
	In Australia						Overseas						Total					
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Agriculture, Forestry and Fishing	36	45	41	37	36	14	52	50	65	57	93	11	88	95	106	94	129	25
Manufacturing	91	34	42	38	47	42	257	101	119	100	129	165	348	135	161	138	176	207
Mining	21	42	41	31	35	33	118	138	182	191	193	207	139	180	223	222	228	240
Services	102	92	77	75	100	115	203	184	99	144	160	703	305	276	176	219	260	818
Total	**250**	**213**	**201**	**181**	**218**	**204**	**630**	**473**	**465**	**492**	**575**	**1,086**	**880**	**686**	**666**	**673**	**793**	**1,290**

Table 22: CRC licence, options and assignments activity, 2005-06 to 2010-11

	Number of LOAs						LOA income ($'000)					
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Agriculture, Forestry and Fishing	14	18	17	34	52	64	56	180	72	188	135	81
Manufacturing	24	15	20	22	24	46	1,095	35	31	19	37	5
Mining	2	2	3	8	0	10	750	770	7	0	375	0
Services	34	97	62	158	84	105	16,164	15,157	20,168	26,960	29,694	11,540
Total	**74**	**132**	**102**	**222**	**160**	**225**	**18,065**	**16,142**	**20,278**	**27,167**	**30,241**	**11,626**

START-UP COMPANY ACTIVITY

KEY POINTS

- A total of 9 start-up companies were formed by CRCs between 2009-10 and 2010-11, earning an income of $28,000 from sources such as royalties, contributions and realised equity, but no income was reported for 2009-10 (see Table 23).
- The number of new start-up companies per $100m research expenditure declined slightly from 0.5 in 2008-09 to 0.4 in 2010-11 (see Figure 26).
- Income from new start-up company activity increased from $2,000 per $100m research expenditure in 2008-09 to $6,000 in 2010-11, following nil income per $100m research expenditure in 2009-10 (see Figure 27).
- Income from new start-up companies per $100m research expenditure over 2010-11 came from the Agriculture, Forestry and Fishing sector (see Figure 27).
- Licensing of IP arising out of research appears a more common avenue for commercialisation compared with the formation of start-up companies. From 2005-06 to 2010-11, the number of LOAs soared by 204% (see Table 22), in contrast, the number of start-up companies formed fell by 82% (see Table 23).

Figure 26: Number of new start-up companies per $100m research expenditure for each CRC sector, 2005-06 to 2010-11 Inset Figure: Number of new start-up companies per $100m research expenditure for all CRCs over the same period.

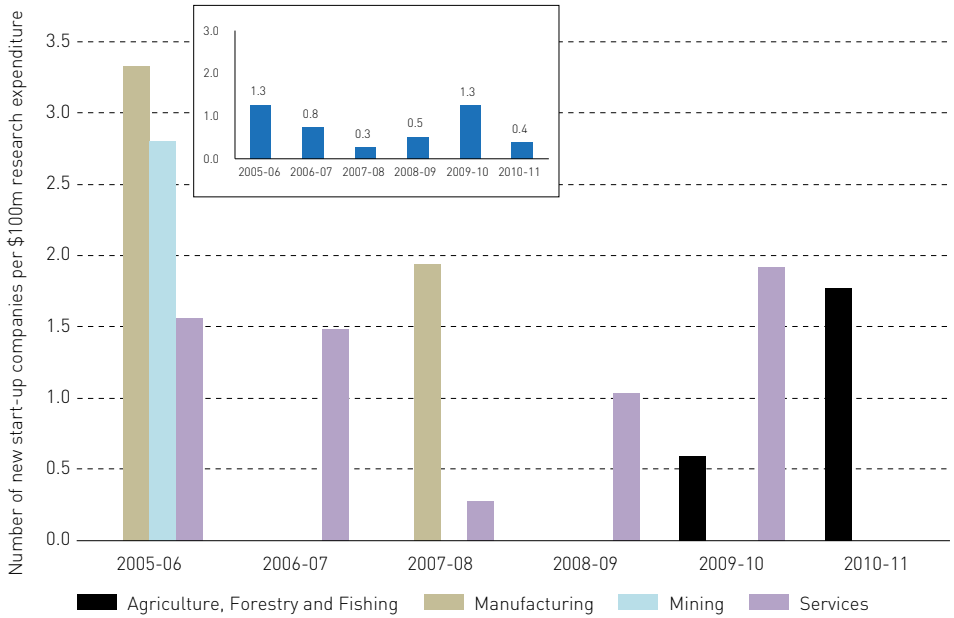
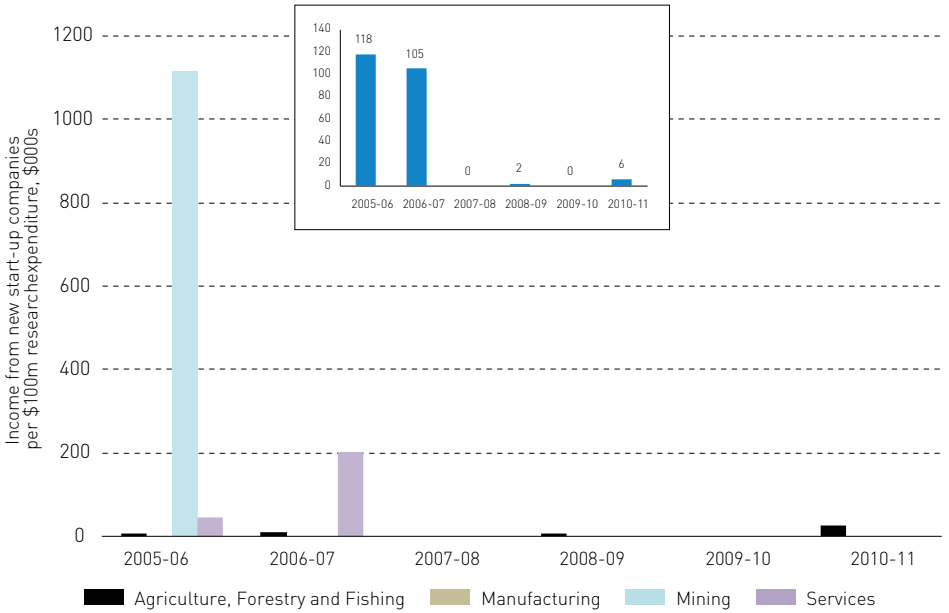


Table 23: CRC new start-up companies formed and income received, 2005-06 to 2010-11

	New start-up companies (No.)						Income received from start-up companies ($'000)					
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Agriculture, Forestry and Fishing	0	0	0	0	1	2	16	20	0	12	0	28
Manufacturing	2	0	1	0	0	0	0	0	0	0	0	0
Mining	2	0	0	0	0	0	618	0	0	0	0	0
Services	7	6	1	3	6	0	155	661	0	0	0	0
Total	**11**	**6**	**2**	**3**	**7**	**2**	**789**	**681**	**0**	**12**	**0**	**28**

Figure 27: Income from new start-up companies per $100m research expenditure for each CRC sector, 2005-06 to 2010-11 Inset figure: Income from new start-up companies per $100m research expenditure for all CRCs over the same period.



RESEARCH CONTRACTS AND CONSULTANCY ACTIVITY

KEY POINTS

- In 2009-10[26], CRCs entered into 427 research contracts and consultancies with a total value of $41m. Greatest research contract and consultancies income came from the Agriculture, Forestry and Fishing, and Services sectors, and followed by Mining and Manufacturing sectors (see Table 24).
- The number of research contracts and consultancies per $100m research expenditure fell from 94 in 2008-09 to 77 in 2009-10. This has been driven by a fall in the number of research contracts and consultancies in the sectors of Manufacturing and Agriculture, Forestry and Fishing (see Figure 28).
- The total income from research contracts and consultancies per $100m research expenditure declined from $8.8m in 2008-09 to $7.8m in 2009-10 (see Figure 29).

Figure 28: Number of research contracts and consultancies per $100m research expenditure for each CRC sector, 2005-06 to 2009-10 Inset figure: Number of research contracts and consultancies per $100m research expenditure for all CRCs over the same period.

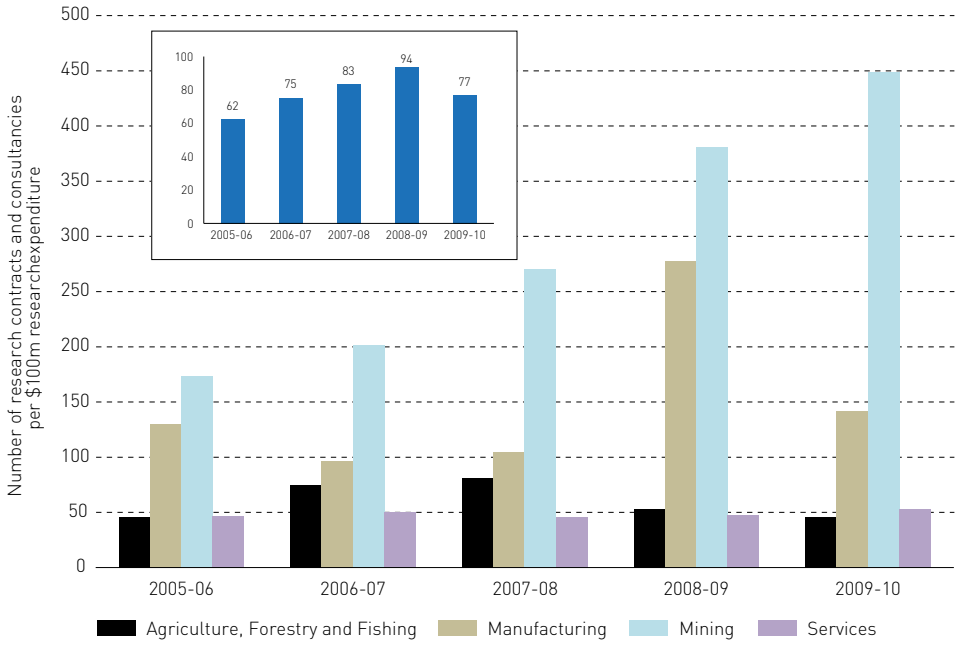
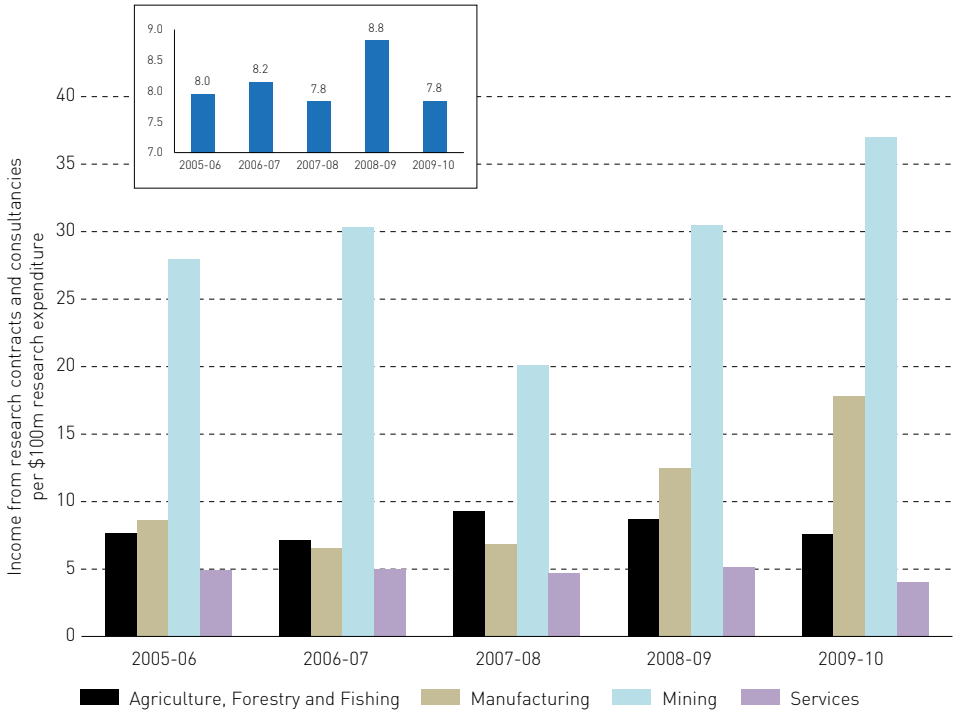


Table 24: CRC research contracts and consultancies, 2005-06 to 2009-10

	Research contracts and consultancies (No.)					Income from research contracts and consultancies ($'000)				
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**
Agriculture, Forestry and Fishing	129	200	188	105	78	16,670	15,548	18,358	15,197	12,065
Manufacturing	78	52	54	141	64	4,009	2,865	3,019	5,650	7,509
Mining	124	148	192	158	120	15,481	18,098	12,169	11,276	9,237
Services	208	203	167	138	165	16,948	16,335	14,497	13,268	11,810
Total	**539**	**603**	**601**	**542**	**427**	**53,108**	**52,846**	**48,043**	**45,391**	**40,621**

26 From 2010-11 onwards, questions in the CRC Program MDQ have been changed, as a result, data on the number of research contracts and consultancies and income derived from these activities for 2010-11 are not comparable with the statistics in previous years.

Figure 29: Income from research contracts and consultancies per $100m research expenditure for each CRC sector, 2005-06 to 2009-10 Inset figure: Income from research contracts and consultancies per $100m research expenditure for all CRCs over the same period.



PROFESSIONAL DEVELOPMENT AND OTHER KNOWLEDGE EXCHANGE ACTIVITY[27]

KEY POINTS

- In 2009-10, CRCs provided 306 training courses and 398 conferences to end users of research with a total value of $0.7m (see Table 25).
- The Services and Agriculture, Forestry and Fishing sectors offered most training courses and conferences in 2009-10, but 79% of the total income derived from courses and conferences came from the Services sector (see Table 25).
- CRCs generated 2,831 publications between 2009-10 and 2010-11 and 788 confidential or unpublished reports in 2009-10 (see Table 26).
- In 2009-10, the total number of training courses and conferences offered to end-users per $100m research expenditure were 55 and 72, respectively (see Figures 30 and 31).
- The income generated from conferences and courses per $100m research expenditure declined from $176,000 in 2008-09 to $144,000 in 2009-10 (see Figure 32).
- The number of publications for end-users per $100m research expenditure decreased by 22% between 2008-09 and 2010-11, and the number of confidential or unpublished reports for end-users per $100m research expenditure also fell by 23% between 2008-09 and 2009-10 (see Figures 33 and 34).
- Between 2009-10 and 2010-11, 627 postgraduates sourced from CRCs were employed in industry (see Table 26). Over the same period, the number of CRC postgraduates taking up employment in industry per $100m research expenditure was 119 (see Figure 35).

27 From 2010-11 onwards, questions in the CRC Program Management Data Questionnaire (MDQ) were changed, as a result, data on the number of training courses and conferences offered to end-users and income derived from these activities is no longer collected.

Figure 30: Number of training courses offered to end-users per $100m research expenditure for each CRC sector, 2005-06 to 2009-10[28] Inset figure: Number of training courses offered to end-users per $100m research expenditure for all CRCs over the same period.

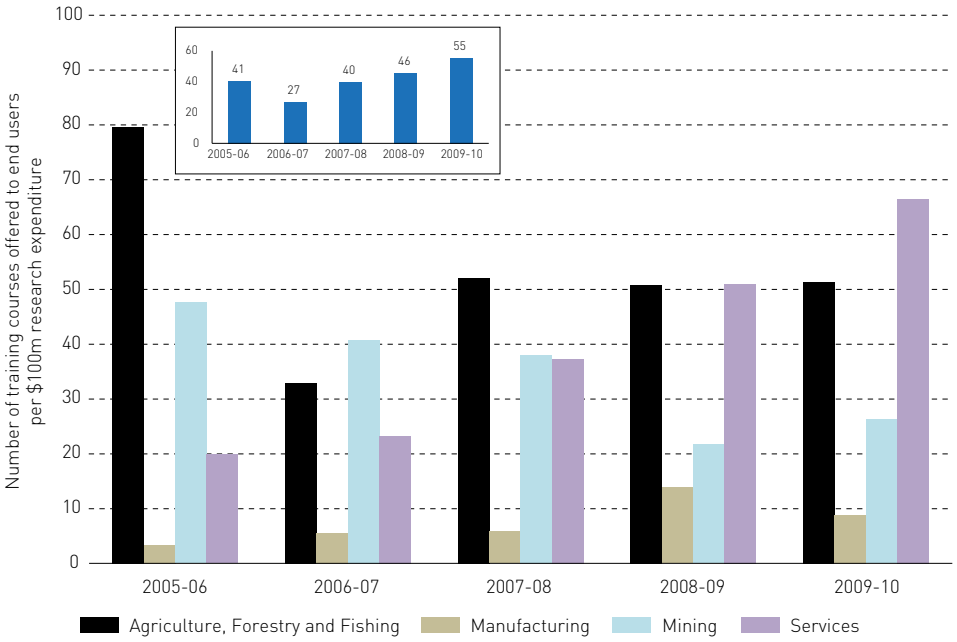
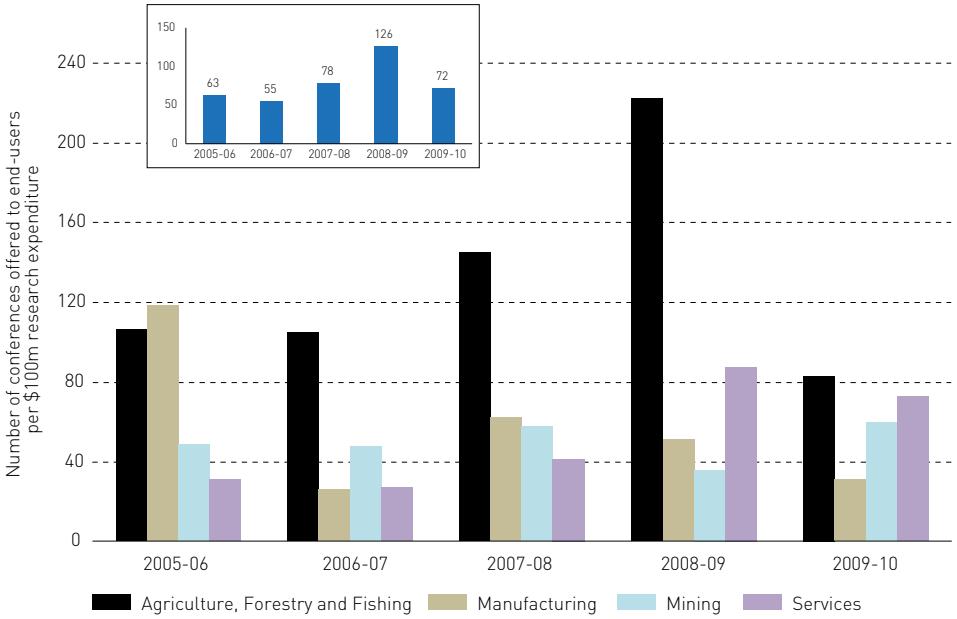


Figure 31: Number of conferences offered to end-users per $100m research expenditure for each CRC sector, 2005-06 to 2009-10 Inset figure: Number of conferences offered to end-users per $100m research expenditure for all CRCs over the same period.



28 From 2010-11 onwards, questions in the CRC Program Management Data Questionnaire (MDQ) were changed, as a result, data on the number of training courses and conferences offered to end-users and income derived from these activities is no longer collected.

Table 25: Number of training courses and conferences offered to end-users and income from these activities, 2005-06 to 2009-10*

	Training courses offered to end-users (No.)					Conferences provided to end-users (No.)					Income from courses and conferences ($'000)				
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**
Agriculture, Forestry and Fishing	225	88	121	100	87	301	280	337	438	141	422	246	158	108	55
Manufacturing	2	3	3	7	4	71	14	32	26	14	257	13	183	38	71
Mining	34	30	27	9	7	35	35	41	15	16	163	253	202	222	28
Services	89	94	136	147	208	139	110	151	252	227	890	699	734	535	594
Total	**350**	**215**	**287**	**263**	**306**	**546**	**439**	**561**	**731**	**398**	**1,732**	**1,211**	**1,277**	**903**	**748**

Note: *From 2010-11 onwards, questions in the CRC Program Management Data Questionnaire (MDQ) were changed, as a result, data on the number of training courses and conferences offered to end-users and income derived from these activities is no longer collected.

Table 26: Publications and reports prepared for end-users and postgraduate employment in industry, 2005-06 to 2010-11*

	Publications prepared for end-users (No.)						Confidential and unpublished reports for end-users (No.)*					Postgraduates employed with industry (No.)					
Industry Sector	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2005-06**	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**
Agriculture, Forestry and Fishing	1,089	600	747	951	444	629	137	120	141	179	127	96	92	114	89	76	125
Manufacturing	108	124	187	148	242	105	202	307	376	253	315	41	17	17	5	16	24
Mining	188	284	262	185	19	66	154	129	110	109	48	14	34	26	12	14	12
Services	1,121	489	1,119	692	780	546	355	334	367	522	298	189	181	158	94	199	161
Total	**2,506**	**1,497**	**2,315**	**1,976**	**1,485**	**1,346**	**848**	**890**	**994**	**1,063**	**788**	**340**	**324**	**315**	**200**	**305**	**322**

Note: *From 2010-11 onwards the CRC Program Management Data Questionnaire (MDQ) questions were changed, as a result, data on the number of confidential and unpublished reports for end-users is no longer collected.

Figure 32: Income from courses and conferences provided to end-users per $100m research expenditure for each CRC sector, 2005-06 to 2009-10
Inset figure: Income from courses and conferences provided to end-users per $100m research expenditure for all CRCs over the same period.

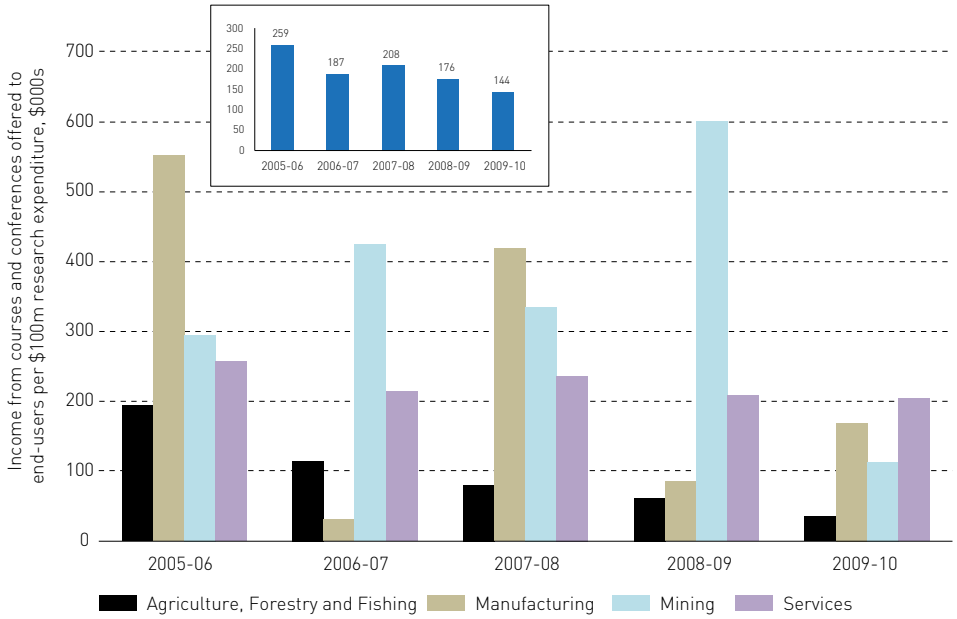


Figure 33: Number of publications for end-users per $100m research expenditure for each CRC sector, 2005-06 to 2010-11 Inset figure: Number of publications for end-users per $100m research expenditure for all CRCs over the same period.

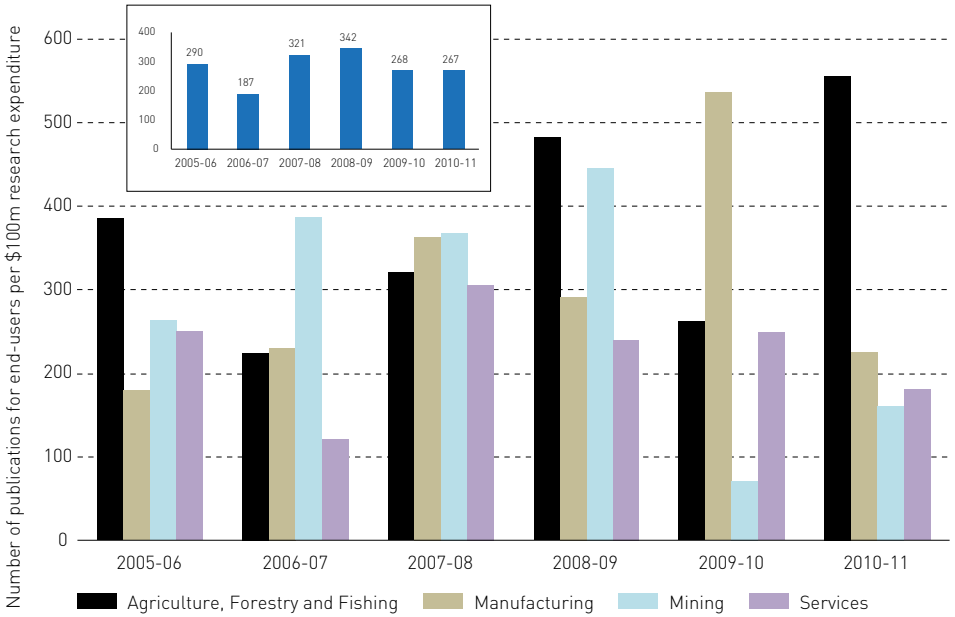


Figure 34: Number of confidential and unpublished reports for end-users per $100m research expenditure for each CRC sector, 2005-06 to 2009-10[29]

Inset figure: Number of confidential and unpublished reports for end-users per $100m research expenditure for all CRCs over the same period.

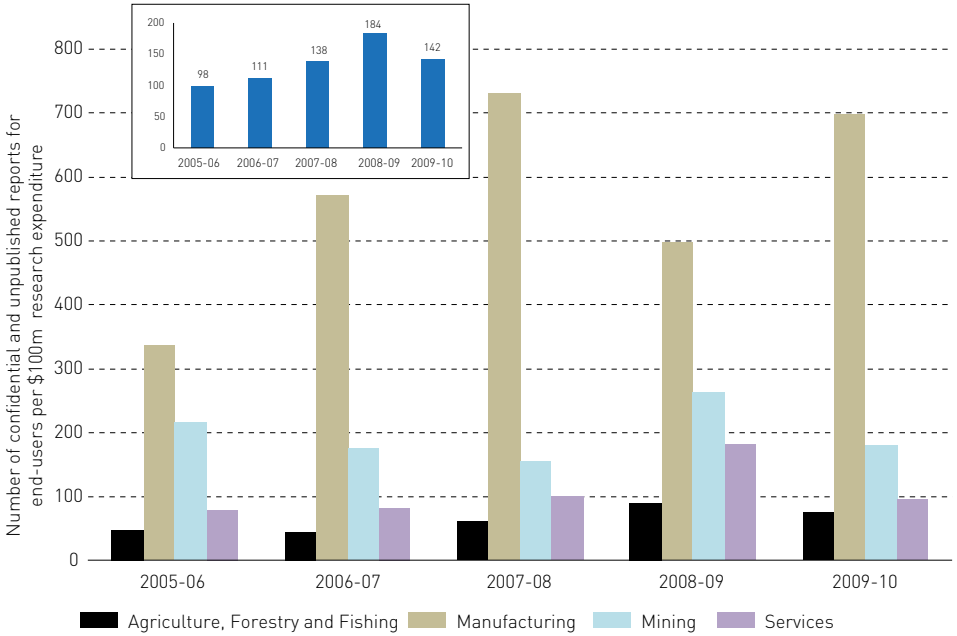
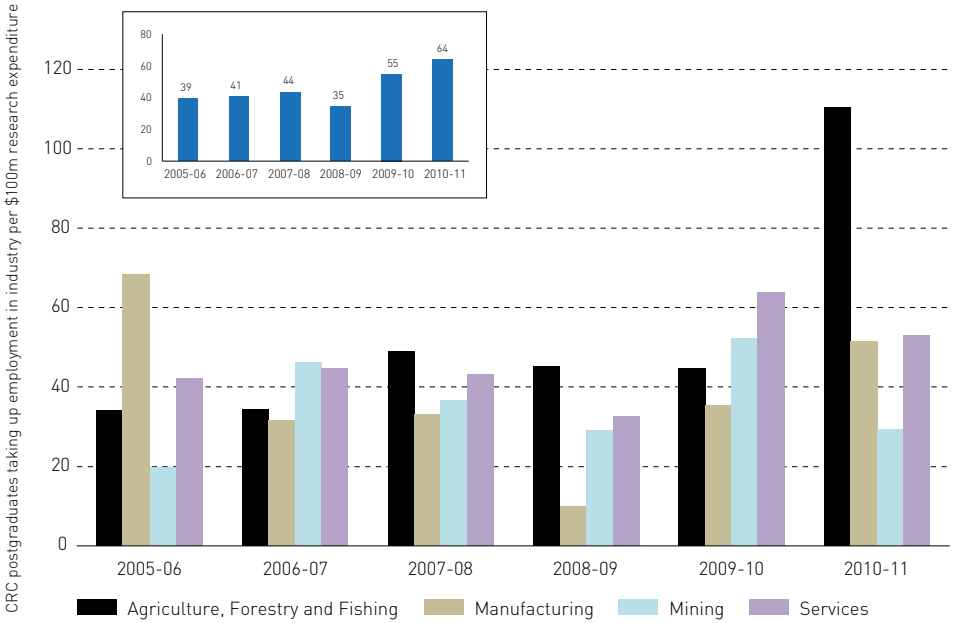


Figure 35: Number of CRC postgraduates to take up employment in industry per $100m research expenditure for each CRC sector, 2005-06 to 2010-11

Inset figure: Number of CRC postgraduates to take up employment in industry per $100m research expenditure for all CRCs over the same period.



29 From 2010-11 onwards, questions in the CRC Program Management Data Questionnaire (MDQ) were changed, as a result, data on the number of confidential and unpublished reports for end-users is no longer collected.

5. INTELLECTUAL PROPERTY ANALYTICS

The National Survey of Research Commercialization (NSRC) has been collecting commercialisation data from Australia's Publicly Funded Research Organisations (PRFOs) since 2000. This data has been used to assist government in developing and evaluating policy relating to the commercialisation of Australian research.

To develop a greater understanding of commercialisation activities and intent, an assessment of Australia's PRFOs Intellectual Property (IP) activity was commissioned. The aim of the assessment was to analyse commercialisation activities, though citation and technology transfer rates and identify any trends and areas of specialisation.

The project used the Derwent World Patents Index (DWPI), a database produced by Thomson Reuters in addition to 'first level' original patent databases available via the Thomson Innovation platform. The databases were interrogated using search strings of institutions names, and their associated start-up companies, of regular NSRC respondents.

This assessment includes, granted patents, patent applications and pending rights, under the assumption that a large proportion of applications and pending patents will convert into issued patents at some point in the next 3-5 years.

The earliest known priority filing date for each patent family was used and each related patent application and granted patent was added to the DWPI family record. This reduces patent duplication and shows an overall picture of innovation for the sector.

This definition is likely to under-report technology transfer activities, as licensing activities could not be included due to issues with obtaining records, such as confidentiality agreements.

The retrieved patent families were then analysed for commercialisation intent using the following definition:

"Any patent right that is associated through co-ownership or applicant status with a for-profit organisation (excluding university transfer corporations themselves), or has ownership transferred to a for-profit organisation is determined to be successfully commercialised."

The following analysis should be used as a guide to the nature and commercialisation landscape of Australia's PRFO IP activity and technology transfer.

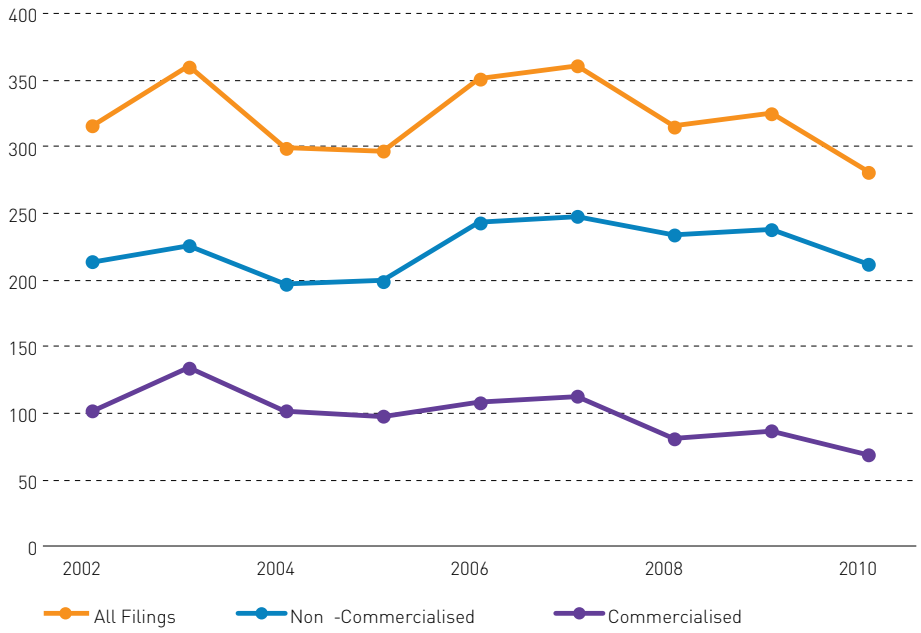
SUMMARY

- One-third of the IP rights associated with Australian PFROs involve commercial entities or have been transferred to a corporation.
- Successfully commercialised patents tend to be stronger rights. They are protected in more countries, more heavily referenced by 3rd party patent applications and granted more frequently.
- For example, inventions retained by not-for-profit institutions are routinely filed in Australia and the United States (US), whereas those associated with a commercial entity are also routinely filed in Europe (with some filing for wider protection in Japan and China).
- This level of upfront investment in commercial patent rights suggests that applicants have a higher confidence of an economic return or have expectations of a commercial technology transfer agreement.
- Most commercialised IP rights are life science related. Fields such as food, agriculture and telecommunications show higher rates of commercialisation on a percentage basis. In terms of volume, the Australian research system appears to be primarily converting research into economic gain within the pharmaceuticals and biotechnology sectors.
- The more basic sciences (e.g. optics, semiconductors and instrumentation) show lower levels of commercial transfer. This type of IP is fundamental in nature and may be retained by institutions for direct licensing opportunities.
- Emerging energy-related IP rights, particularly around solar power, shows healthy patent characteristics but are currently under-commercialised in comparison with other fields.
- Patent assignees across all technical fields include PFROs in partnership with small and medium enterprises; start-up companies; multinational business; and with other PFROs.

PATENT ACTIVITY

- In total 75 institutions and 392 related companies were searched, between 2000 and 2011, retrieving 3,736 DWPI patent families.
- During the 2000-2011 period, 1,225 DWPI patent families (33%) were classified as having an association with a commercial or for-profit entity.
- Patenting activity declined during the 2006-2010 timeframe (See Figure 36), with large numerical falls in the medical devices and pharmaceuticals fields.
- The steady decline in commercialised IP from 2008 is likely due to the requirement for inventions to mature before proceeding to commercialisation.

Figure 36: Timeline of Australian PFRO's IP Activity, 2002 to 2010



- Australia is the first filing location of choice for the majority of patent fillings, followed by the US (See Table 27).
- A small number of patents have a first filing location, in the United Kingdom (UK), Japan, European Patent Office, Taiwan and Mexico. On average, these patents have a higher rate of commercialisation (74%), compared to Australia (30%) and the US (42%) (See Table 27)).

Table 27: Top 10 first filing locations by Australian PFROs from 2000 to 2011

First Filing Location	All Academic IP	Commercialised Academic IP	Percentage Commercialised
Australia	2,745	818	30%
United States	820	342	42%
United Kingdom	79	58	73%
Japan	50	36	72%
Canada	36	6	17%
European Patent Office	31	22	71%
Taiwan	26	21	81%
China	21	7	33%
Mexico	19	14	74%
South Africa	15	4	27%

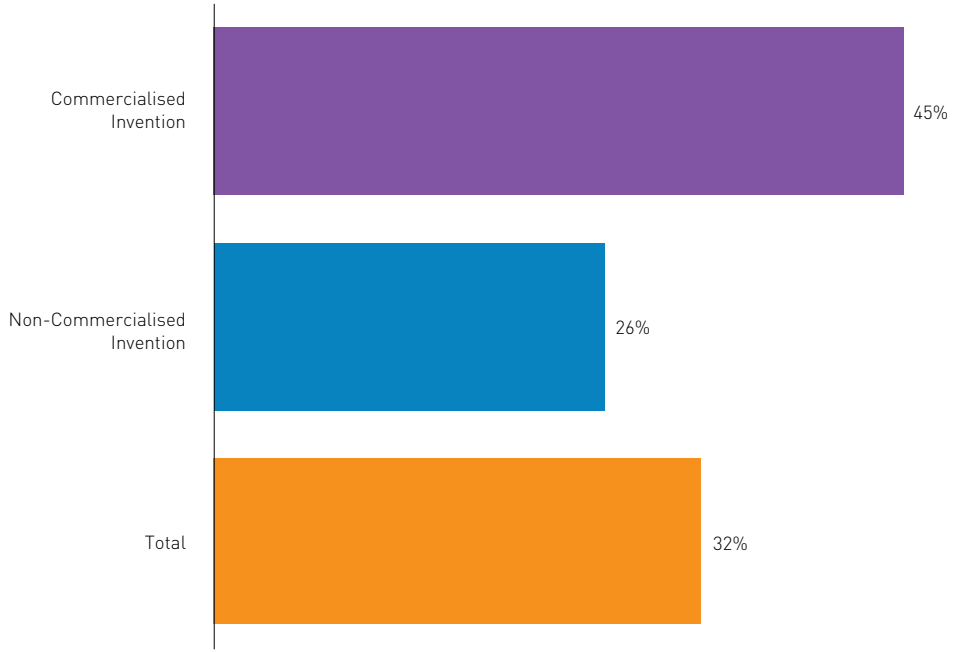
- The vast majority of IP filings are via Patent Cooperation Treaty (PCT) fast track application process, administered by the World Intellectual Property Organisation (WIPO) (See Table 28).
- A large proportion of IP rights are filed as national phase filings in Australia, US and Europe and to some extent in Japan and China (See Table 28).
- Commercialised inventions have a higher average of filing locations per patent family (4.2) compared to non-commercialised inventions (2.9) and total inventions (3.3).

Table 28: Top 10 filing locations of all Australian PFROs patents from 2000 to 2011

All Filing Locations	All Academic IP	Commercialised Academic IP	Percentage Commercialised
PCT Applications	3,382	1,115	33%
Australia	2,314	816	35%
United States	2,268	865	38%
European Patent Office	1,755	731	42%
Japan	1,054	503	48%
China	856	394	46%
Canada	580	244	42%
India	454	209	46%
South Korea	412	222	54%
New Zealand	373	186	50%

- The rate of conversion from patent application to granted patent in at least one territory within the 47 jurisdiction covered by DWPI is higher for commercialised IP (See Figure 37).

Figure 37: Percentage of patent families achieving grant status in at least one jurisdiction, 2000 to 2011



TECHNOLOGY FIELDS

The patent collection was segmented, using patented technologies classification codes, to provide an analysis of technology commercial transfer at a subject-matter level (See Figure 38 and Figure 39).

- Most commercialised IP rights are life science related. The more basic sciences show lower levels of commercial transfer, such as in optics (23%), semiconductors (27%) and measurement and instrumentation (25%) (See Figure 38).
- Weapons and explosives is the smallest technology field but has the highest rate of commercialisation (44%) (See Figure 38). Patent assignees include major multinational companies from the mining services and IT industries, highly innovative small and medium enterprises in defence systems, Australian universities and associated commercialisation entities, and in some cases, university spin off companies, and Australian government and foreign government research organisations.
- Other fields also have high rates of commercialisation on a percentage basis, such as telecommunications (42%), consumer products (42%) and food and agriculture (38%) (See Figure 38). As expected, patent assignees in these sectors reflect the diversity of the technical fields and include Australian medical research institutes, universities, government research organisation, multinational companies, and small and medium enterprises.
- Patent assignees in most technical fields indicate that PFROs are in partnership with a wide range of entities including small and medium enterprises; multinational corporations; early stage start-up firms; and other PFROs.
- The Australian research system appears to be primarily converting research into economic return within the pharmaceutical and biotechnology sectors (See Figure 39).

Figure 38: Percentage of commercialised patents per technical field (2000-2011)

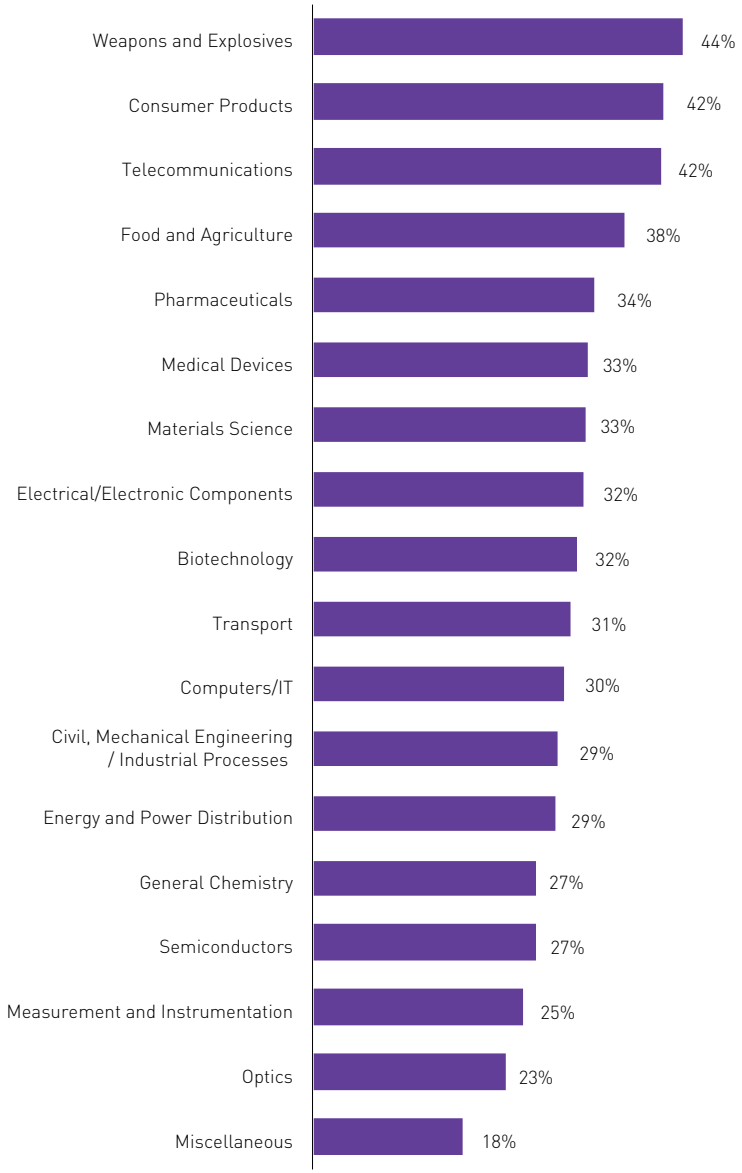
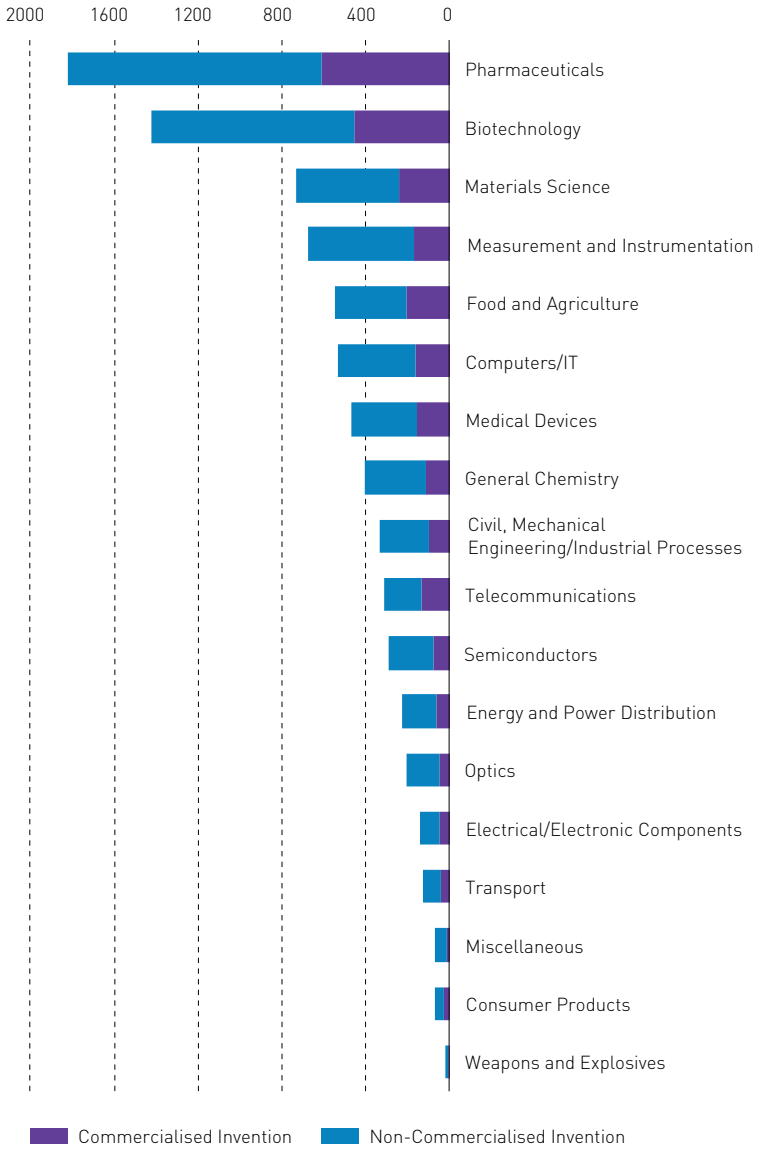


Figure 39: PFRO's patents per technical field (2000-2011)



COMMERCIALISATION TRENDS

A thematic concept map (Figure 40) shows the landscape of Australia's PFRO patent rights. Each patent family or invention is situated in a single location in the landscape map, its location determined by the frequency and proximity of terms it shares with other patent families in the collection.

Areas of higher patent density (i.e. mountainous areas) represent technical topics shared across many inventions and therefore of greater popularity. This assists to identify particular technology sub-areas in which different institutions are concentrating their R&D and patenting activity.

- More than half of the landscape relates to pharmaceutical and biotechnology related inventions, such as cancer therapy, agricultural biotechnology and immunology as well as drugs for diabetes, Alzheimer's and inflammatory disease.
- The life science theme is continued into medical devices.
- The densest region of the map appear in telecommunications and semiconductor devices, particularly in mobile communications, photonic waveguides (i.e. fibre optics) and photovoltaic (i.e. solar) cells.
- Emerging energy-related IP rights, particularly around solar power, show strong patent growth and healthy patent characteristics but are currently under-commercialised in comparison to other fields.
- The annual growth rate of PFRO patents fell during the 2006-2010 timeframe, with weapons and explosives, electronic components having large percentage falls in output (See Figure 41) however both categories are numerically small.
- The energy and power distribution field showed strong patent growth at 16% from 2006-2010 (See Figure 40), which corresponds to the solar energy peak in the overall technology landscape (See Figure 41).
- Growth in patents is also shown in the consumer products and general chemistry fields, this growth is form a low baseline (See Figure 41).

Figure 40: Thematic concept map of Australia's PFRO patent rights, 2000-2011

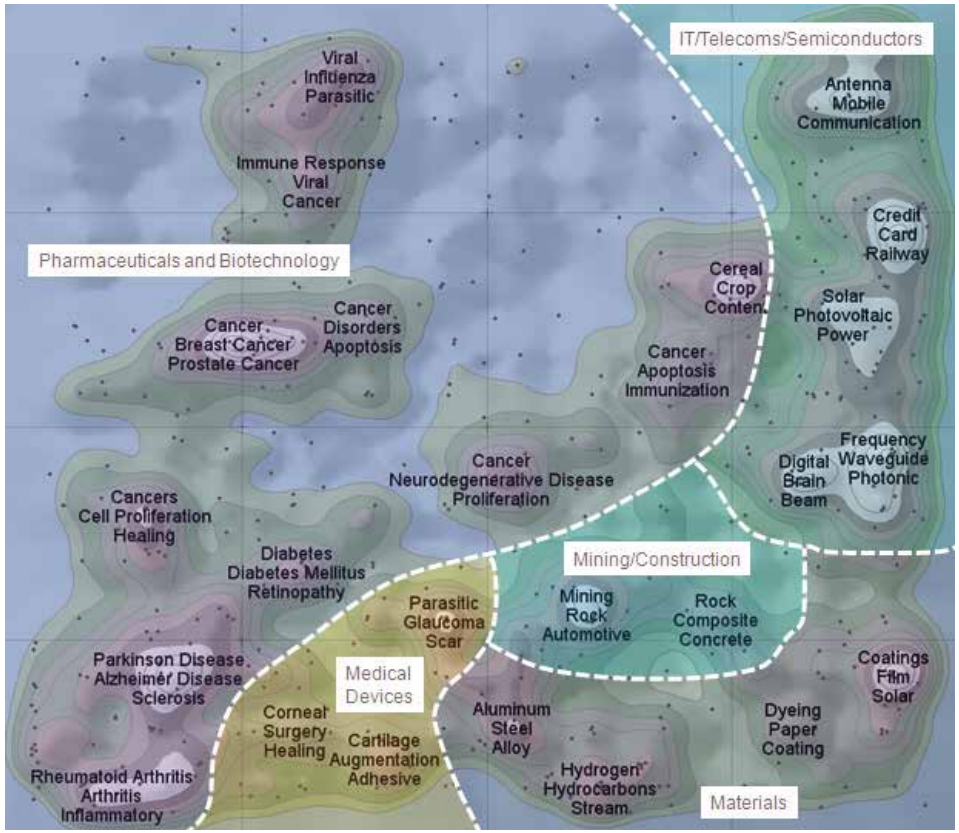
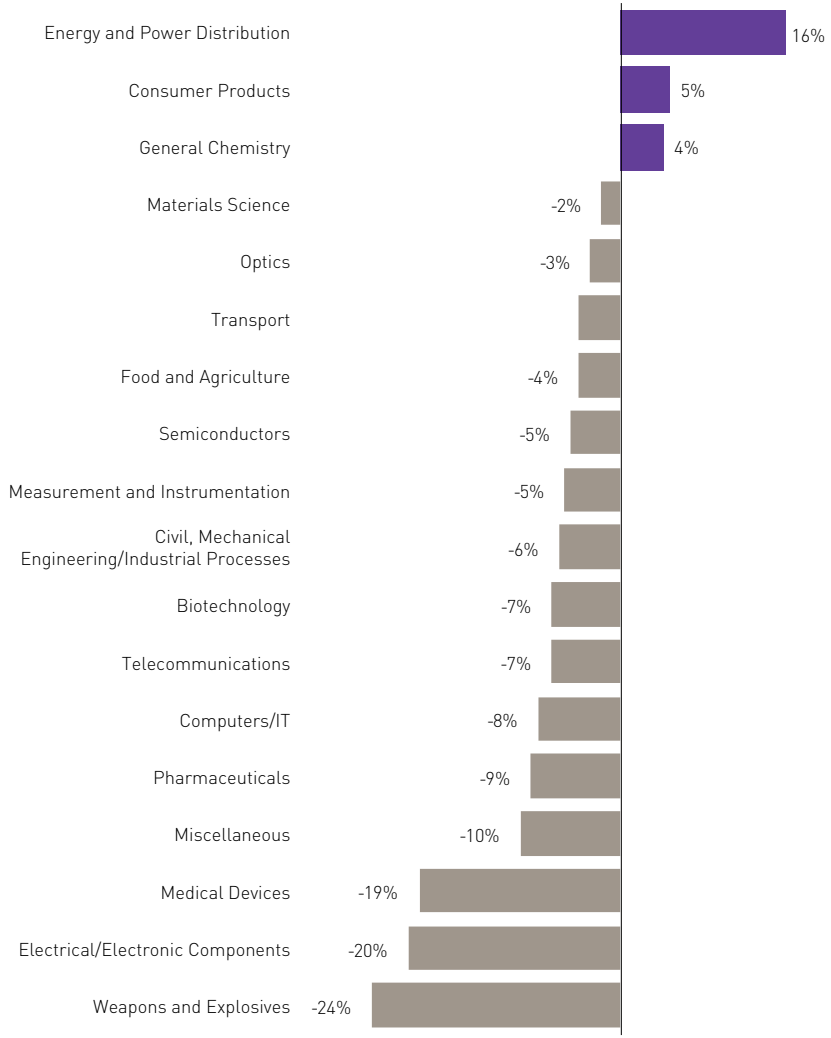


Figure 41: Recent technology trends in PFRO IP output. Compound annual growth rate from 2006-2010



PATENT STRENGTH INDICATOR

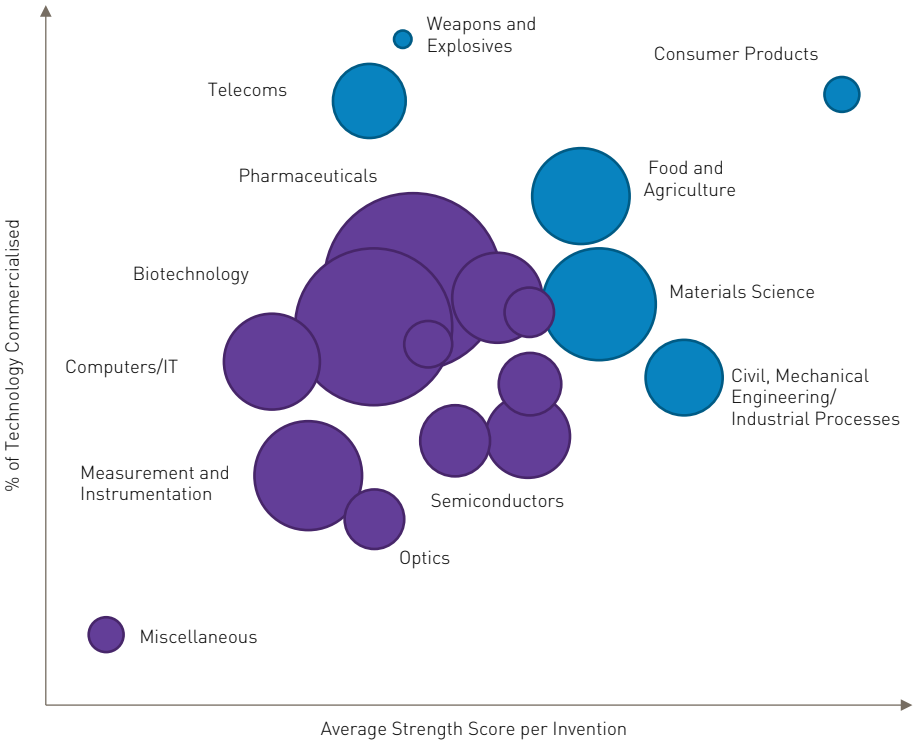
A proxy indicator for patent strength was developed using desirable factors for patents, such as geographic protection breadth, grant success, youth and citation impact.

The patent strength indicator identified that commercialised IP rights are stronger than non-commercialised IP, meaning that they are of greater quality, convert more easily into issued patents and have a greater impact in the marketplace.

An indication of commercialisation success was developed by comparing the average IP strength per invention (x-axis) to the percentage of technology commercialised (y-axis). The bubble represents the overall volume of inventions for the technology field (Figure 42).

- Consumer products, food and agriculture and materials science have high IP strength and have above average commercialisation rates.
- Civil, mechanical and industrial processes have a particularly high IP strength, but are under-commercialised.
- Telecommunications are well-commercialised; however the patents are not as strong as in some other fields.
- Optics, instrumentation and semiconductor devices are both under-commercialised and relatively under-strength.
- Pharmaceuticals and Biotechnology regress around the mean of commercialised patents and patent strength.

Figure 42: Commercialisation success: Percentage commercialised vs. IP strength by technology field



PRFO COLLABORATIONS

- Collaboration on IP was assessed by using the assignee/applicant fields of the patent documents for each patent family in the project collection (See Table 29).
- The strongest collaboration is between Australian Universities and "Other" Corporate entities (i.e. non start-up Australian corporate entities, or multi-national/ foreign corporations).
- CSIRO and MRIs also show strong collaboration with other corporate entities, other universities and not-for profit entities.
- Other Universities and Not for Profit Entities also have strong collaborations to Other Corporate (Non-Start-up) entities.

Table 29: Number of collaborations between categories of patent applicant, 2000-2011

	ANSTO	CSIRO	MRIs	Other Corporate (Non-Startup)	Other Universities and Not for Profit Entities	Startup	Australian Universities
ANSTO	**32**			3	9		
CSIRO		**727**	9	169	55	11	52
MRIs			**552**	108	99	24	47
Other Corporate (Non-Startup)				**784**	126	119	383
Other Universities and Not for Profit Entities					**441**	32	198
Startup						**578**	68
Australian Universities							**1896**

6. METHODOLOGY

This report involves four different data sets:

- NSRC data from the 72 responding institutions for the years 2010 and 2011;
- NSRC time series data covering 2000 to 2011 using a time series cohort of 59 institutions;
- International comparison data for Canada, US, Europe and UK covering 2000 to 2011; and
- Data for all Cooperative Research Centres (CRCs) covering 2005-06 to 2010-11.

NSRC DATA FOR 2010 AND 2011

NSRC data for 2010 and 2011 was collected through the NSRC survey questionnaire that consists of 32 questions.

A total of 72 institutions responded to some questions of the survey questionnaire for at least one of the two years from 2010 to 2011 (see Appendix 1).

In total, 75 institutions were approached to take part:

- 5 publicly funded research agencies — 5 responded (100%);
- 39 universities — 39 responded (100%); and
- 31 medical research institutes (MRIs) — 28 responded (90%).

The number of MRIs approached was smaller than previous years. This was due to a number of MRIs disbanding, amalgamating or having previously requested to be removed from the NSRC contact list.

The questionnaire consisted of 32 questions covering research expenditure, intellectual property protection activity, start-up company formation, research contracts and consultancies and skills development and transfer. The survey questionnaire and explanatory notes are included at Appendix 2 and 3 respectively. A list of start-up companies reported as being formed in 2010 and 2011 is provided at Appendix 4.

The NSRC questionnaire was originally based on the United States Association of University Technology Managers licensing survey. It was then modified to include recommendations of the former Coordination Committee on Science and Technology (CCST) Working Group on Metrics of Commercialisation report[30].

Following the fourth iteration of the survey (NSRC 2005-07), an advisory group was formed of key stakeholders to provide advice on the direction of the survey. As a result of its advice some survey questions were expanded or deleted and a small number of new questions were introduced. None of the existing time series contributing metrics were removed or redefined, however, some of the questions were disaggregated to allow the capture of more detailed information.

The collection vehicle for the NSRC is via a "smart" form developed within the department to facilitate consistency of data responses across the questionnaire. In the few instances of inconsistent data provided by institutions, respondents were contacted for an explanation/resolution and all instances of inconsistent data provided were able to be addressed through this process.

The reporting period covers the calendar years 2010 to 2011 or the financial years 2009-10 to 2010-11, depending on the institution's normal reporting period. Where an institution reported on a financial year basis, values were converted into a calendar year by averaging values reported for successive financial years. All dollar values are as reported for the relevant year unless otherwise indicated.

NSRC TIME SERIES 2000 TO 2011

To identify trends and cycles in commercialisation activity it was necessary to construct a consistent dataset covering the years from 2000 to 2011. The following methodology was used to construct the time series.

All dollar values presented are expressed in constant 2011 prices using the chain-volume index applied to the Gross Domestic Product in the Australian System of National Accounts.[31]

Only metrics for which the survey questions have remained consistent over the period were included. These 16 metrics, which are listed in Table 30, allow derived metrics to be calculated. For each of these metrics, the unit record files from previous surveys were scrutinised and any inconsistencies or errors corrected where possible following discussions with the relevant institution.

Any institution with a response rate of greater than or equal to 70% for these metrics was included in the consistent time series dataset for 2000 to 2011. Data coverage

30 Coordination Committee on Science and Technology. 2005. Metrics for Research Commercialisation: A Report to the Coordination Committee on Science and Technology. Canberra: Department of Education, Science and Training. p.12.

31 Dollar figures adjusted to 2011 dollars for all time-series data using the chain-volume index applied to the Gross Domestic Product in the Australian Bureau of Statistics, Australian System of National Accounts 2011-12, cat. no. 5204.0.

was calculated by counting for each institution the number of years for which a usable response had been provided. Blank, unknown and N/A (not applicable) responses were not incorporated. The response count for each institution was then expressed as a percentage of the maximum possible count of 192 (that is, twelve years of usable data multiplied by 16 metrics). For example, if an institution did not respond for the year 2000, but responded in the years 2001-11 to a sufficient number of questions to make the 2000-11 overall response rate greater than 70%, then the institution was included in the time series.

Table 30: List of metrics covered in the NSRC consistent time series dataset for 2000-11

Dedicated commercialisation staff
Invention disclosures
New US patent and plant breeder rights applications filed
New Australian patent and plant breeder rights applications filed
New Patent Cooperation Treaty patent applications
Australian patent and plant breeder rights issues
US patent and plant breeder rights issues
Patent and plant breeder rights issued worldwide
LOAs executed
LOAs yielding income
LOA gross income
LOA income paid to others
Start-up companies formed during the year
Start-up companies operational at year end dependent on assignment of technology
Start-up companies operational at year end with institutional equity stakes
Value of equity holdings

A list of the 59 institutions included in the time series cohort is given in Appendix A. The time series cohort has changed slightly from the 2008-09 report with the removal of one institution and the inclusion of two new institutions.

Table 31 details the movement of each of these 16 metrics on a year by year basis. Table 32 contains measurements of the difference between the full sample and the sample provided by the consistent time series dataset for 2000 to 2011. The average percentage coverage of the consistent time series dataset and the full dataset for all 16 metrics is 89%, which is lower than the 2009 average percentage coverage of 91%.

All reported time series financial data in this report have been adjusted using the 2011 chain volume measure. Tables reporting on financial data collected during the current survey are as reported (in nominal terms) – with the exception of the Summary Table (see Table 1), where financial data is expressed in 2011 constant prices.

Table 31: Total metric values in the consistent time series dataset 2000-11[32,33]

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Dedicated commercialisation staff	FTE	191	231	281	296	282	295	299	289	309	309	305	307
Invention disclosures	No.	544	716	707	810	956	926	1,081	1,196	1,300	1,409	1,503	1,489
New US patent and plant breeder rights applications filed	No.	177	125	108	80	119	104	98	112	149	148	146	153
New Australian patent and plant breeder rights applications filed	No.	410	345	395	459	469	414	449	415	502	494	527	511
New Patent Cooperation Treaty patent applications	No.	206	217	218	162	167	193	190	212	174	157	145	208
Australian patent and plant breeder rights issues	No.	143	82	106	142	173	91	103	84	157	138	177	166
US patent and plant breeder rights issues	No.	115	64	54	126	191	92	105	79	67	83	107	108
Patent and plant breeder rights issued worldwide	No.	524	273	315	805	814	540	582	508	844	841	1,021	914
LOAs executed	No.	414	383	445	433	381	453	515	549	472	491	505	481
LOAs yielding income	No.	489	605	629	629	666	656	708	746	630	692	779	766
LOA gross income in constant 2011 prices	$'000	152,675	107,827	108,658	104,700	88,950	87,811	146,193	259,353	107,323	324,515	157,219	100,528
LOA income paid to others in constant 2011 prices	$'000	6,375	8,278	10,188	15,112	9,689	8,508	10,563	8,265	6,362	4,275	5,731	5,648
Start-up companies formed during the year	No.	47	61	58	50	29	38	41	33	14	19	16	15
Start-up companies operational at year end dependent on assignment of technology	No.	86	109	119	228	251	220	237	242	196	195	180	180
Start-up companies operational at year end with institutional equity stakes	No.	69	79	96	182	203	169	192	200	176	175	165	163
Value of equity holdings in constant 2011 prices	$'000	179,966	181,630	155,523	209,688	246,742	196,543	217,072	218,497	190,698	237,533	148,027	133,054

32 As described in the Methodology (NSRC time series 2000 to 2011), in order to maintain a time series set of data, an institution is included if it provided ≥ 70% data coverage. This means that the time series cohort and values will vary between NSRC Reports.
33 As all financial data has been updated to reflect 2011 dollars, figures have changed from those published in previous NSRC Reports.

Table 32: Differences between totals in the full sample and the consistent time series dataset in 2011

	Unit	Consistent time series sample total as a percentage of overall sample total in 2011	Value of difference between full sample and consistent dataset sample in 2009
Dedicated commercialisation staff	FTE	96%	14
Invention disclosures	No.	87%	216
New US patent and plant breeder rights applications filed	No.	91%	15
New Australian patent and plant breeder rights applications filed	No.	87%	74
New Patent Cooperation Treaty patent applications	No.	90%	24
Australian patent and plant breeder rights issues	No.	97%	5
US patent and plant breeder rights issues	No.	96%	5
Patent and plant breeder rights issued worldwide	No.	96%	34
LOAs executed	No.	96%	21
LOAs yielding income	No.	97%	23
LOA gross income	$'000	75%	32,643
LOA income paid to others	$'000	46%	6,622
Start-up companies formed during the year	No.	88%	2
Start-up companies operational at year end dependent on assignment of technology	No.	90%	19
Start-up companies operational at year end with institutional equity stakes	No.	91%	16
Value of equity holdings	$'000	95%	6,755

INTERNATIONAL COMPARISONS

The report compares a small number of commercialisation indicators, over the period 2000 to 2011, of Australian PFROs with the United States (US), Canada, Europe and the United Kingdom (UK). Comparative data is drawn from:

- The *National Surveys of Research Commercialisation (NSRC)* covering the years 2000 to 2011, of Australia's publicly funded research institutions, universities and medical research institutes.[34]
- The Association of University Technology Managers (AUTM) U.S. Licensing Activity Survey for the financial years 2001, 2006 and 2010, and the AUTM U.S. Licensing Activity Survey Highlights for 2011.
- The AUTM Canadian Licensing Activity Survey for the financial years 2001, 2006 and 2010, and the AUTM Canadian Licensing Activity Survey Highlights for 2011.
- The *Higher Education Business and Community Interaction Surveys* (HE-BCIS) (2000 to 2011), Higher Education Funding Council for England (HEFCE)[35].
- *Summary Respondent: ASTP Survey for Fiscal Year 2008*, UNU-MERIT and Association for European Science and Technology Professionals, Masstricht, Netherlands.
- *Respondent Report of the Knowledge Transfer Study (data for 2010),* empirica GmbH, Fachhochschule Nordwestschweiz and UNU-MERIT for the European Commission, DG Research and Innovation[36].

The comparisons have been prepared within the following parameters:

- The data has been adjusted to calendar years to increase the ease of comparison wherever required.

34 The data reported each year was used rather than time series data presented elsewhere in this report

35 The most recent UK data of FTEs and the number of institutions responded to the HE-BCIS survey was provided directly on request by the Higher Education Statistics Agency (HESA) and the HEFCE of UK.

36 The European data was provided and derived from the source by Professor Anthony Arundel and Mr Nordine Es-Sadki of UNU-MERIT.

- For each country, research expenditure and LOA income received were reported in local currency. This value was converted to US dollars by dividing that expenditure by the purchasing power parities developed by the Organisation for Economic Cooperation and Development (OECD) for each year respectively. This was not necessary for "Average number of licensing FTE per institution" metric or "LOA income as a % of research expenditure" metric.
- The Australian research expenditure used was that reported in the current and past NSRC surveys, with institutions that had no commercialisation activity excluded from the analysis.
- Australian totals for 2000 to 2011, exclude data for CRCs. However, if any institution inadvertently included CRC data in their response that data was included.

RESEARCH EXPENDITURE

Research expenditures for the majority of Australian respondents are only calculated for every second year (in response to a biennial Australian Bureau of Statistics (ABS) survey). This corresponds to the years 2000, 2002, 2004, 2006, 2008 and 2010. The 2001, 2003, 2005, 2007, 2009 and 2011 research expenditure data are taken to be the adjusted trend value of its time series, after taking into consideration of the actual research and development expenditure in the Australian Government's 2012-13 Science, Research and Innovation Budget Tables. The same method is also used for estimating some of the 2010 research expenditure data.

COOPERATIVE RESEARCH CENTRES (CRC)

For 2001 and 2002, CRCs were included as respondents to the NSRC. For the 2003 survey and onwards, it was decided that CRC commercialisation information would be obtained through CRC annual reporting and the CRC Management Data Questionnaire (MDQ). The questionnaire is a monitoring and evaluation instrument used by DIISRTE specifically for the CRC program.

The MDQ is not fully consistent with all of the metrics used in the NSRC, but there is sufficient commonality for reporting data in relation to a number of metrics. To reduce the risk of double counting or under-reporting against a number of the metrics, CRC data were not aggregated with NSRC data.

In order to present consistent time series trends in commercialisation activity, the CRC MDQ data has been presented from financial years 2005-06 to 2010-11. CRC time series data was prepared by expressing figures as a proportion of research expenditure to account for the changing number of CRCs between years. Although many metrics are reported back to 1992, research expenditures are only reported back to 2005-06. For this reason the time series was prepared for 2005-06 to 2010-11. As for the NSRC time series data, all dollar values presented are expressed in constant 2011 prices using the chain-volume measure applied to the Gross Domestic Product in the Australian System of National Accounts.

It should be noted that Research Expenditures reported by the CRCs may be an under-estimate of actual expenditure since the education component includes the cost of postgraduate students who undertake significant amounts of research.

The MDQ information is provided by CRCs and has not been verified or independently assessed by DIISRTE.[37] As the MDQ data is annually reported, previous years data can be revised. As such the MDQ data presented in this report may not match the data presented in previous NSRC reports.

Over the period of the latest survey, CRCs operated in four broad sectors: Agriculture, Forestry and Fishing; Manufacturing; Mining; and Services. From 2010-11 onwards, the wording of some MDQ questions were changed to better meet CRC program reporting objectives. As a result, for some MDQ questions data is no longer collected or there has been a change in the data set.

37 DIISRTE makes no representation as to the accuracy of this information. Persons or organisations should not rely upon this information without first seeking to verify the accuracy of the information.

APPENDIX 1: SURVEY RESPONDENTS FOR 2010 AND 2011. INCLUSION IN THE 2011 TIME SERIES DATASET

Institution Name	Responded for 2010	Responded for 2011	Included in Timeseries
Publicly funded research agencies			
Australian Institute of Marine Science	Y	Y	Y
Australian Nuclear Science and Technology Organisation	Y	Y	Y
Commonwealth Scientific and Industrial Research Organisation	Y	Y	Y
Defence Science & Technology Organisation	Y	Y	Y
NICTA	Y	Y	N
Universities			
Australian Catholic University	Y	Y	Y
Bond University	Y	Y	N
Central Queensland University	Y	Y	N
Charles Darwin University	Y	Y	Y
Charles Sturt University	Y	Y	Y
Curtin University of Technology	Y	Y	Y
Deakin University	Y	Y	Y
Edith Cowan University	Y	Y	Y
Flinders University	Y	Y	Y
Griffith University	Y	Y	Y
James Cook University	Y	Y	Y
La Trobe University	Y	Y	Y
Macquarie University	Y	Y	Y
Monash University	Y	Y	Y
Murdoch University	Y	Y	Y
Queensland University of Technology	Y	Y	Y
RMIT University	Y	Y	Y
Southern Cross University	Y	Y	Y
Swinburne University of Technology	Y	Y	Y
The Australian National University	Y	Y	Y
The University of Adelaide	Y	Y	Y
The University of Melbourne	Y	Y	Y
The University of New England	Y	Y	Y
The University of New South Wales	Y	Y	Y
The University of Newcastle	Y	Y	Y
The University of Notre Dame Australia	Y	Y	Y
The University of Queensland	Y	Y	Y
The University of Sydney	Y	Y	Y
The University of Western Australia	Y	Y	Y
University of Ballarat	Y	Y	Y
University of Canberra	Y	Y	Y
University of South Australia	Y	Y	Y
University of Southern Queensland	Y	Y	Y
University of Tasmania	Y	Y	Y
University of Technology, Sydney	Y	Y	Y
University of the Sunshine Coast	Y	Y	Y

Institution Name	Responded for 2010	Responded for 2011	Included in Timeseries
University of Western Sydney	Y	Y	Y
University of Wollongong	Y	Y	Y
Victoria University	Y	Y	Y
Medical Research Institute			
Baker IDI Heart and Diabetes Institute	Y	Y	Y
Brien Holden Vision Institute	Y	Y	N
Burnet Institute	Y	Y	Y
Cancer Council Queensland	Y	Y	N
Cancer Council Victoria	Y	Y	Y
Centenary Institute of Cancer Medicine and Cell Biology	Y	Y	Y
Children's Medical Research Institute	Y	Y	N
Florey Neuroscience Institute	Y	Y	Y
Garvan Institute for Medical Research	Y	Y	N
Institute for Breathing and Sleep	Y	Y	N
Institute of Dental Research	Y	Y	N
Kolling Institute of Medical Research	N	N	N
Lions Eye Institute	Y	Y	N
Ludwig Institute for Cancer Research	Y	Y	Y
Mental Health Research Institute of Victoria	Y	Y	Y
Murdoch Childrens Research Institute	Y	Y	Y
National Ageing Research Institute	Y	Y	N
National Heart Foundation of Australia	Y	Y	N
Neuroscience Research Australia	Y	Y	Y
Peter MacCallum Cancer Centre	Y	Y	Y
Prince Henry's Institute of Medical Research	Y	Y	Y
Queensland Institute of Medical Research	Y	Y	Y
Royal Brisbane and Women's Hospital Research Foundation	Y	Y	Y
Schizophrenia Research Institute	Y	Y	N
Telethon Institute for Child Health Research	N	N	Y
The Heart Research Institute	Y	Y	Y
The Walter and Eliza Hall Institute of Medical Research	Y	Y	Y
The Wesley Research Institute	Y	Y	N
Victor Chang Cardiac Research Institute	Y	Y	Y
Women's and Children's Health Research Institute	Y	Y	Y
Woolcock Institute of Medical Research	N	N	N

APPENDIX 2: SURVEY QUESTIONNAIRE 2010 AND 2011

DIISRTE NATIONAL SURVEY OF RESEARCH COMMERCIALISATION 2010 AND 2011

Please ensure that you have read the Survey Instructions and Explanatory Notes Part 1 and 2 before preparing your responses to this survey. Please note that this is a reference only version of the survey and that the survey should be completed electronically in the provided response template.

PART 1: PRELIMINARIES

1a. Name of institution_____

1b. Please provide the ABN of the operational entity under which commercialisation activities are conducted. If you organisation has more than one such entity, please provide all relevant ABNs.

ABN/s or ACN/s: _____

1c. Please provide the postcode for the headquarters or operational location of the commercialisation activities for your organisation.

Postcode: _____

RESEARCH EXPENDITURE

2a. Have you completed the most recent Australian Bureau of Statistics (ABS) Survey (i.e. 31 December 2010 or 30 June 2011*)?

Yes/No

If Yes, what was your institution's research and experimental development expenditure as reported in the most recent Australian Bureau of Statistics (ABS) survey (i.e. 31 December 2010 or 30 June 2011)?

2010 Number	2011 Number

If No, please supply your best estimate or internal calculations of you research expenditure. If an estimate please take care not to overestimate probable expenditure.

2010 Number	2011 Number

2b. Please indicate the end date for the relevant ABS survey reporting period*:

❒ 31 December 2010 ❒ 30 June 2011 ❒ 31 December 2011 ❒ 30 June 2012

*Note that this reporting period is not identical to the reference period for this survey (2010-2011)

PART 2: INTELLECTUAL PROPERTY

This Part is structured to broadly follow the IP commercialisation process, i.e. from resourcing, through invention disclosure, to licensing and spin-out formation. Please see the Explanatory Notes for guidance on activities that are to be included.

RESOURCING

3. In the reporting period, how many Full Time Equivalents (FTE) were employed in, or engaged by, your institution, and what were their associated costs, for the purposes of driving or supporting commercialisation in the following areas?

	2010 FTE Number	2010 Staff/ Budget Cost	2011 FTE Number	2011 Staff/ Budget Cost
a. Dedicated legal staff		$		$
b. Dedicated marketing staff		$		$
c. Dedicated commercialisation staff		$		$
d. Industry community engagement staff		$		$
e. Other commercialisation support staff		$		$
f. Total		$		$

4. In the reporting year what was your institution's Technology Transfer Office (TTO) or external commercialisation related costs, excluding employment and legal costs?

	2010 Cost	2011 Cost
a. Marketing	$	$
b. Other	$	$
c. Total	$	$
Please specify other 2010/2011		

5. What did your institution spend to secure or defend statutory protection of intellectual property rights (e.g. patents, plant breeder rights, copyright, trademarks and/or registered designs) in 2010/2011?

	2010 Cost	2011 Cost
External fees and legal costs	$	$

* If "External fees and legal costs" is not answered or equal to zero, proceed to Question 7.

6. What amount was received by your institution from licensees as reimbursements of expenses reported in Question 5 (External fees and legal costs)?

2010 Number	2011 Number

7. How many invention disclosures did your institution receive in 2010/2011?

2010 Number	2011 Number

PATENT AND PLANT BREEDER RIGHTS APPLICATION

8. How many patent and/or plant breeder rights applications were filed in 2010/2011?

	2010 Total Applications	2010 New Applications	2011 Total Applications	2011 New Applications
a. In Australia				
b. In the United States				
c. Elsewhere				
d. Total				

9. How many new applications filed in 2010/2011 were for each of the following:

	2010 Number	2011 Number
a. Provisional patents		
b. Patent Cooperation Treaty (PCT) patents		
c. Innovation patents		
d. National Phase		
e. Divisionals		
f. Plant Breeder Rights		
Subtotal		
g. Registered design		
h. Trademarks		
i. Other		
j. Total		

10. How many separate patent and/or plant breeder rights families are represented in the total patent and/or plant breeder rights applications specified as having been filed in 2010/2011 (as reported in question 8)?

2010 Number	2011 Number

PATENTS AND PLANT BREEDER RIGHTS ISSUED (INCLUDING RENEWALS)

11. How many patents and/or plant breeder rights were issued to your institution in 2010/2011?

	2010 Number	2010 Number
a. In Australia		
b. In the United States		
c. Elsewhere		
d. Total		

12. How many patent and/or plant breeder rights families are represented in the patents and/or plant breeder rights issued to your institution in 2010/2011 (as reported in question 11)?

2010 Number	2011 Number

PATENT AND PLANT BREEDER RIGHTS HOLDINGS

13. How many patents and/or plant breeder rights did your institution hold as of 31 December 2010/2011?

	2010 Number	2011 Number
a. Patents and/or plant breeder rights pending		
b. Patents and/or plant breeder rights issued		
c. Total		

14. How many patent and/or plant breeder right families did your institution hold as of 31 December 2010/2011?

2010 Number	2011 Number

15. How many patents and/or plant breeder rights were culled or allowed to lapse from your institution's holdings in 2010/2011?

2010 Number	2011 Number

LICENCES/OPTIONS/ASSIGNMENTS (LOA)

This section refers to Licences/Options/Assignments (LOA) negotiated on full commercial terms only.

16a. How many Material Transfer Agreements did your institution enter into where your institutions provided the materials?

2010 Number	2011 Number

16b. What income did you derive from the agreements executed?

2010 Number	2011 Number

17. How many Licences/Options/Assignments (LOAs) did your institution:

a. Execute?

	2010 Number	2011 Number
i. Licences		
ii. Options		
iii. Assignments		
iv. Total		

The 'active' portion of this question will initially be repopulated with values from the 'execute' section as minimum values. These values can be edited to a greater or equal number.

b. Have active?

	2010 Number	2011 Number
i. Licences		
ii. Options		
iii. Assignments		
iv. Total		

18. During 2010/2011 what was the location/ownership profile of the organizations with which LOAs were executed:

	2010 Number	2011 Number
a. Australian owned and based companies / organisations		
b. Australian owned and foreign based companies / organisations		
c. Foreign owned and Australian based companies / organisations		
d. Foreign owned and foreign based companies / organisations		
e. Unknown		
f. Total		

19. How many active LOAs yielded income in 2010/2011?*

*(if Q19 is not answered or equal to zero, proceed to Question 23)

2010 Number	2011 Number

*These 2010/2011 values cannot exceed the TOTAL ACTIVE Licenses and Options specified in Question 17

20. For those active LOAs that yielded income in 2010/2011 (question 19), how many LOA incomes can be attributed to the following income categories? What is the value of income derived from each income category?

	2010 Number	2010 Income	2011 Number	2011 Income
a. Running royalties				
b. Cashed-in equity				
c. Other				
d. Total*				

*TOTAL for the 2010/2011 number cannot exceed the value specified in Question 19 2010/2011

21. For those active LOAs that yielded income in 2010/2011 (as stated in question 19), how many LOA incomes can be placed into each of the following income ranges?

	2010 Number	2011 Number
a. Between $0 and $10,000		
b. Between $10,001 and $50,000		
c. Between $50,001 and $200,000		
d. Between $200,001 and $500,000		
e. $500,001 and over		
f. Total*		
Please specify other 2010/2011		

*TOTAL for the 2010/2011 number cannot exceed the value specified in Question 20 2010/2011

22. In 2010/2011, how much of the income reported in the "Total Income" of Question 20 was paid to other institutions or commercial entities?

2010 Number	2011 Number

CAPITAL RAISING, INITIAL PUBLIC OFFERINGS AND EQUITY

23. Did your institution participate in any capital raising for research commercialisation activities, including Initial Public Offerings (IPO), in 2010/2011?

	2010 Number	2010 Final Capital Raised	2011 Number	2011 Final Capital Raised
a. IPOs				
b. Other capital raising activities				
c. Total final capital raised				

24. What was the value of all research commercialisation equity holdings as of 31 December 2010/2011?

2010 Number	2011 Number

25a. How many research commercialisation equity holding positions were fully or partially exited (i.e. by trade sale or buy-out) during 2010/2011?

2010 Number	2011 Number

25b. What was the total value of equity received from all research commercialisation equity holdings that were fully or partially exited during 2010/2011?

2010 Number	2011 Number

START-UP COMPANIES

26. For all start-up companies your institution was formally involved with and were operational as of 31 December 2010/2011:

	2010 Number	2011 Number
a. How many were dependent upon the licensing/ assignment of your institution's technology for initiation?		
b. In how many of the companies identified in question 26, above, did your institution hold equity?		

27. What was the number of start-up companies dependent upon the licensing of your institution's technologies that ceased operations in 2010/2011?

2010 Number	2011 Number

NAMES AND CONTACT DETAILS OF NEW START-UP COMPANIES

28. How many start-up companies did your institution launch in 2010/2011?

2010 Number	2011 Number

Please provide details for each of the start-up companies that were formed in 2010/2011, to allow for survey follow-up if required.

(Please complete a sub-form for each company nominated.)

Name of company: _____

Address: _____

Suburb: _____

State: _____

Postcode: _____

Country: _____

Telephone: _____

Email: _____

ABN: _____

ACN: _____

What was the start-up company's funding source(s)?

	Approximate Dollar Amount
a. Internal funding	
b. Your institution	
c. Venture capital	
d. Corporate partner(s)	
e. IPO	
f. Government funding	
g. Individual angel(s)	
h. Friends and family	
i. Debt	
j. Other	
Please specify other 2010/2011	

PART 3: RESEARCH CONTRACTS, CONSULTANCIES AND DIRECT SALES

Please see the Explanatory Notes for clarification on the activities covered by Research Contracts and Consultancies and Direct Sales.

29. For research consultancies and contracts your institution entered into in 2010/2011 please identify the:

	2010 Number	2011 Number
Number of consultancies		
Total gross contracted value of consultancies	$	$
Number of contracts		
Total gross contracted value of contracts	$	$
Number of direct sale transactions		
Total gross value of direct sales	$	$

Note: 'Gross contracted value' refers to the full contracted value of the work, regardless of whether any or all payments were made in the reporting year.

30. Of those research consultancies, contracts and direct sales shown in question 29, please identify:

a. The number of research consultancies according to total gross contracted value.

	2010 Number	2011 Number
i. Between $0 and $10,000		
ii. Between $10,001 and $50,000		
iii. Between $50,001 and $200,000		
iv. Between $200,001 and $500,000		
v. $500,001 and over		
vi. Unspecified		
vii. Total		

b. The number of research contracts according to total gross contracted value.

	2010 Number	2011 Number
i. Between $0 and $10,000		
ii. Between $10,001 and $50,000		
iii. Between $50,001 and $200,000		
iv. Between $200,001 and $500,000		
v. $500,001 and over		
vi. Unspecified		
vii. Total		

c. The number of direct sales according to total gross contracted value.

	2010 Number	2011 Number
i. Between $0 and $10,000		
ii. Between $10,001 and $50,000		
iii. Between $50,001 and $200,000		
iv. Between $200,001 and $500,000		
v. $500,001 and over		
vi. Unspecified		
vii. Total		

PART 4: SKILLS DEVELOPMENT AND TRANSFER

31a. Does your institution offer training and/or presentations / seminars / workshop courses to its researchers and/or research students in commercialisation and entrepreneurship that is undertaken as professional development and is not higher education qualification related:

Yes /No [*If yes please go to question 31b, if no go to 32*]

31b. Does this training include in-house training?

Yes /No [*If yes please go to question 31b2, if no go to question 32*]

31b2: How many participants completed in-house training programs in 2010/2011?

2010 Number	2011 Number

31c. Does this training include delivery by an external provider?

Yes /No [*If yes please go to question 31c2, if no go to question 32*]

31c2: How many participants completed external training programs in 2010/2011?

2010 Number	2011 Number

32. With reference to the start-up companies in operation as of 31 December 2010/2011 that were dependent upon the licensing/assignment of your institution's technology for initiation (i.e. those identified in response to question 26a):

a. How many research postgraduates were employed in those firms during 2010/2011 (FTE)?

	2010 FTE	2011 FTE
i. Research postgraduates		

b. How many of your institution's staff were employed in those firms during 2010/2011 (FTE)?

	2010 FTE	2011 FTE
i. Postdoctoral staff		
ii. Academic staff		
iii. Other institutional employees		
iv. Total		

PART 5: ADDITIONAL INFORMATION

33. Is there any other additional information you wish to provide regarding the research commercialisation activities and performance of your institution?

APPENDIX 3: EXPLANATORY NOTES TO THE SURVEY QUESTIONNAIRE 2010 AND 2011

SECTION 1: GENERAL

PURPOSE OF SURVEY

The National Survey of Research Commercialisation (NSRC) seeks to obtain information on the research commercialisation activities and results of Australian universities as well as selected Publicly Funded Research Agencies (PFRA) and Medical Research Institutes (MRI). The information gathered through the NSRC is used to assist government to develop and evaluate policy relating to the innovation system. Additionally, individual institutions and researchers use this information to monitor and compare their own performance and results.

The survey data will be owned by the Commonwealth and published in a written report to be made available on the DIISRTE website. The report will be due for release in late 2012.

The NSRC has previously been conducted for the years 2000 to 2009. The present survey extends the series by obtaining data for 2010 and 2011. Consistent with the recommendations of the Coordination Committee on Science and Technology (CCST) Working Group on Metrics Commercialisation, this survey is based on a broad definition of 'research commercialisation'. The definition includes and goes beyond a focus on commercialisation based on intellectual property rights in the form of patents, to also include research contracts and consultancies, and skills development and transfer.

Previous NSRC reports covering the period from 2000 to 2009 are available at the following link:

http://www.innovation.gov.au/Innovation/ReportsandStudies/Pages/NationalSurveyofResearchCommercialisation.aspx

You may wish to refer to previous NSRC reports for assistance in responding to some questions.

USING THE EXPLANATORY NOTES

These Explanatory Notes are divided into two sections.

- Section 1 provides general guidance on the survey and matters that relate to all questions.
- Section 2 addresses each question and provides definitions for key terms.

CONTACTS

If assistance is required when completing the NSRC regarding:

- institution wide coordination of the survey response; and,
- final submission of the data on behalf of your institution,
- please contact your Institutional Contact Officer (ICO).

For further guidance in completing this survey, please contact either:

Ms Gordana Josipovic
Phone: (02) 6276 1128
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If making contact by telephone, please call weekdays between 9 am and 5 pm AEST. Please also use the above Department contact details for submitting any additional information via email, facsimile or post.

SURVEY TIMING

The survey is being conducted over six weeks, from 12 July to 23 August 2012 inclusive.

REPORTING YEAR

All data collected via the survey will be reported on a calendar year basis. It is therefore requested that data be provided for the relevant calendar year.

If your institution collects data sought by the NSRC on a financial year basis, please supply the two sets of financial year data for the relevant calendar year in the 'comments' area of the particular question.

'NIL' AND 'NOT APPLICABLE' RESPONSES

For questions where your institution has no activity, we seek a response of 'nil' (i.e., "0") so that the response can be differentiated from a missing response. A missed (or null) response will be assumed to be equivalent to zero, except where other reported values imply a non-zero value in which case the value may be inferred.

ESTIMATES OF RESPONSES

In instances where you do not have exact data, please provide your best estimate and an explanation of your estimating method in the comments field at the end of the form. For example, if you are unable to provide disaggregated data against given metrics (for example, disaggregating contracts from consultancies) it is recommended that you use one of the following three methods:

- where you are confident that the split is almost complete or is entirely complete in one category, allocate 100% to that category;
- where you have a sense of what the split is, you may assign proportionate amounts to the split (for example if there are two categories you may choose to apportion 70% to one category and 30% to the other);
- where you are completely unsure, you may wish to assign equivalent proportions of your output against that question to each of the components of it (where there are three categories, you would choose 1/3).

FRACTIONAL RESPONSES

Where your institution shares ownership or responsibility for a reporting unit (e.g. a patent or income from a licence) and you are able to identify that proportion, please report on that fraction to the second decimal point (e.g. a one third share would be reported as 0.33). If you are unable to identify the proportion, report it as a whole share.

Specific guidance on this issue is provided in the Explanatory Notes to relevant questions.

COOPERATIVE RESEARCH CENTRES

Data for Cooperative Research Centres (CRC) will be obtained through the CRC Programme and reported separately to this survey. As such, institutions who are members of CRCs **should not report any research commercialisation information that relates to their participation in the CRC Program unless otherwise indicated**. This includes costs, staffing, outputs (such as patents and spin-out companies) and revenues (such as licensing income or research consultancies and contracts) information.

Specific guidance on this issue is provided in the Explanatory Notes to relevant questions.

CURRENCY

Please report all financial values in Australian dollars.

SECTION 2: QUESTIONS AND DEFINITIONS

PART 1: PRELIMINARIES

QUESTION 1

Provision of Australian Business Number(s) (ABN) and/or Australian Company Number(s) (ACN).

Please enter all of the ABNs/ACNs used or potentially used by your institution in the lodging of patent applications and in the earning of commercialisation earnings.

RESEARCH AND DEVELOPMENT EXPENDITURE

QUESTION 2A

RESEARCH AND EXPERIMENTAL DEVELOPMENT EXPENDITURE: all expenditure on Research and Development (R&D). The definition of R&D, as given by the Australian Bureau of Statistics (ABS) in its surveys of 'Research & Experimental Development', is defined in accordance with the Organisation for Economic Co-operation and Development (OECD) standard as "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications".

Business:

- for calendar year 2010 please use the AVERAGE of the financial year R&D expenditure figures reported by your institution in response to the annual ABS *Surveys of Research and Experimental Development*, 2010-11 (Catalogue Number 8104.0): http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/BAE5FB25D2121F6DCA2568A9001393EF?opendocument
- for calendar year **2011** please use an **IN HOUSE** estimate / calculation of R&D expenditure.

Government and Private Non-Profit Organisations:

- for calendar year 2010 please use the AVERAGE of the financial year R&D expenditure figures for financial years 2009-10 and 2010-11, the same methodology used by your institution in response to the bi-annual ABS Survey of *Research and Experimental Development, Government and Private Non-Profit Organisations, Australia,* 2011-12 (Catalogue Number 8109.0): http://www.abs.gov.au/ausstats/abs@.nsf/ProductsbyCatalogue/0AE638AFEA290E1BCA256964007CF648?OpenDocument
- for calendar year **2011** please use an **IN HOUSE** estimate / calculation of R&D expenditure using the same financial year methodology as specified above.

Higher Education Organisations:

- for calendar year 2010 please use the 2010 calendar year R&D expenditure figure reported by your institution in response to the bi-annual ABS Survey of *Research and Experimental Development, Higher Education Organisations, Australia, 2010* (Catalogue Number 8111.0): http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/AE02B963FB1D51B2CA2571B60075B1C0?opendocument
- for calendar year 2011 please use an IN HOUSE estimate / calculation of R&D expenditure.

If your institution did not respond to the ABS Surveys of Research & Experimental Development referred to above, please provide an **IN HOUSE** estimate / calculation of R&D expenditure for the relevant calendar year.

If your institution participates in a Cooperative Research Centre (CRC), include research expenditure related to your institution's role as a CRC participant.

> **Exclude** any amount for a Capital Use Charge (which is paid back to the government for accrual accounting purposes) applied in the relevant year. Relevant only to Australian Government organisations.

QUESTION 2B

END DATE: Please refer to the end date associated with the survey that you completed in relation to question 2a, i.e. either 30 June 2011 or 31 December 2011.

PART 2: INTELLECTUAL PROPERTY

Part two is structured to broadly follow the Intellectual Property (IP) commercialisation process, i.e. from resourcing, through invention disclosure, to licensing and spin-out formation.

INTELLECTUAL PROPERTY COMMERCIALISATION ACTIVITIES are activities associated with the identification, documentation, evaluation, protection, marketing, and licensing of technology (including trademarks but not insignia) and intellectual property management in general. It encompasses activities such as assisting with the negotiation of research agreements, Material Transfer Agreements (MTA), reporting of inventions to sponsors, and all other duties performed by the office. Specific inclusions or exclusions are addressed in the notes for each question.

RESOURCING

QUESTION 3

For all elements to this question staff that are either direct employees of the respondent organisation, or are employed by them through an out-sourced employment mechanism should be counted.

a. DEDICATED COMMERCIALISATION LEGAL STAFF: person(s) employed by the institution in either full or fractional Full Time Equivalent (FTE) allocation whose duties are specifically and solely concerned with legal issues in a commercialisation context; such as licence agreement drafting and negotiation in support of commercialisation.

b. DEDICATED COMMERCIALISATION MARKETING STAFF: person(s) employed by the institution in either full or fractional FTE allocation whose duties are specifically and solely concerned with marketing issues in a commercialisation context; such as marketing of technology in support of commercialisation.

c. DEDICATED COMMERCIALISATION STAFF: person(s) employed in the institution in either full or fractional FTE allocation whose duties are specifically involved with commercialisation activities; such as licensing and patenting processes: licensee solicitation; technology valuation; and start-up activity efforts, and which are not included in 3a or 3b.

d. INDUSTRY/COMMUNITY ENGAGEMENT STAFF: person(s) employed either as full time or fractional FTE allocation whose duties and responsibilities are specifically and solely concerned with industry or community engagement activities; such as initiating, negotiating and managing contracts and consultancies or organising community information sessions.

e. OTHER COMMERCIALISATION SUPPORT STAFF: person(s) employed either as full time or fractional FTE allocation whose duties and responsibilities are to provide professional, administrative, or staff support of COMMERCIALISATION ACTIVITIES that are not otherwise included in DEDICATED COMMERCIALISATION STAFF. Such duties might include: management; compliance reporting; licence maintenance; negotiation of research agreements; contract management; accounting; Material Transfer Agreement (MTA) activity; and general office activity, including general secretarial/administrative assistance.

   Include FTEs working on commercialisation through licensing, sale of intellectual property or formation of start-up companies. Please note FTEs reported may or may not have a formal commercialisation or similar job title and may or may not have been in an organisational unit with 'commercialisation' or 'technology transfer' in its title, i.e. a commercialisation office or company.

   Exclude external legal counsel. Do not include people working on contracts for research (other than as part of licensing), course delivery, consulting or other activities.

f. TOTAL: all the direct and indirect salary and related costs of the staff reported for questions 3a, 3b, 3c, 3d and 3e.

   Include:
   - wages;
   - on-costs (including tax, superannuation, leave accruals and all allowances); and
   - administration and infrastructure (including travel, building, office and consumables).

In instances where you do not have adequate data, please provide your best estimate and an explanation of your estimating method in the comments field at the end of the form. If you are unable to provide disaggregated data against given metrics (for example, contracts and consultancies) it is recommended that you use one of the following three methods:

- where you are confident that the split is almost complete or is completely in one category, allocate 100% to that category;
- where you have a sense of what the split is, you may assign proportionate amounts to the split (for example if there are two categories you may choose to apportion 70% to one category and 30% to the other);
- where you are completely unsure, you may wish to assign equivalent proportions of your output against that question to each of the components for example (where there are three categories, you would choose 1/3 split).

QUESTION 4

a. MARKETING: costs incurred in marketing activities, that is, in direct promotion of services either via printed material, web site construction/maintenance, market research, or through the hosting of forums or promotion specific events. The aim of this question is to capture the total marketing costs other than staff and IP protection costs.

   Exclude employment and legal costs.

b. OTHER: other costs incurred (egg. subscription to, or purchasing of, databases).

   Exclude employment and legal costs.

c. TOTAL: all the costs reported for questions 4a and 4b.

QUESTION 5

EXTERNAL FEES AND LEGAL COSTS: the amount spent by your institution in fees for patents, plant breeder rights, copyright, trademarks, maintaining patents filed in prior years and/or registered designs.

Include all fees and costs associated with:
- patent applications;
- securing background IP; and
- external legal fees may include: patent and copyright prosecution including patent searches; maintenance; and interference costs; as well as minor litigation expenses that are included in everyday office expenditures (an example of a minor litigation expense might be the cost of an initial letter to a potential infringer written by counsel).

Exclude direct payment of any of these costs by licensees (see question 6 for patent fee reimbursements from licensees), and legal fees for contract drafting or advice.

QUESTION 6

If no answer is provided for Question 5, please proceed directly to Question 7.

PATENT/LEGAL FEES REIMBURSEMENTS: the amount reimbursed by licensees to the institution for EXTERNAL FEES AND LEGAL COSTS (reported in question 5a).

Include patent fee recovery only.

Exclude all other licence revenue.

QUESTION 7

Please record the number of invention disclosures your institution received.

PATENT AND PLANT BREEDER RIGHTS APPLICATIONS

QUESTION 8

TOTAL APPLICATIONS

Include (and only include):
- provisional applications;
- provisional applications that are converted to regular applications;
- new filings (such as Patent Cooperation Treaty (PCT) and National Phase applications);
- all plant breeder rights applications: and
- if applicable to Australia, the US or elsewhere, Continuations-In-Part (CIP), continuations, divisionals, and reissues.

NEW APPLICATIONS

A provisional application filed in the reporting year may be counted as new. If a provisional application is converted in the reporting year to a regular application, then the corresponding regular application should not be counted as new.

Exclude:
- continuations;
- divisionals;
- reissues;
- continuations-in-part (CIP);
- all activity for Cooperative Research Centres where your institution is a participant; and
- all activity undertaken with Australian Universities if you are a Medical Research Institute (unless you establish that your partner Australian University will not be counting your joint activity in their survey return).

Note: All patents in a single patent family, including when filed in multiple jurisdictions, are to be included. For example, a PCT is counted as one application. When a PCT progresses to national phase in a specific country, this is counted as a separate application.

Fractional reporting: where your institution (or its commercialisation company) is a party to a joint patent application, please report accordingly to the second decimal point. For example, if there are three parties listed on the patent application, then report your institution's share as 0.33.

QUESTION 9

Note: the total for this question may be greater than the total provided for Question 8dii as this question concerns broader forms of registered IP beyond patents. The sum of the elements a – f of this question however should be representative of the values provided for the previous question.

a. PROVISIONAL PATENTS: a form of patent available through both Intellectual Property Australia (IPA) and the United States Patent and Trademark Office (USPTO) as a lower cost first patent filing option.

b. PATENT COOPERATION TREATY PATENTS: a form of patent open to States party to the Paris Convention for the Protection of Industrial Property, administered by the World Intellectual Property Organization (WIPO). PCTs offer inventors and industry a route for obtaining natural patent protection in Contracting States by filing an 'international' patent application.

c. INNOVATION PATENTS: in Australia these are a protection option that is designed to protect inventions that are not sufficiently inventive to meet the inventive threshold required for standard patents.

d. NATIONAL PHASE: when an international PCT application proceeds separately in any or all of the countries which are party to the PCT or when a complete specification is filed directly in a country.

e. DIVISIONALS: an application to protect your rights if more than one invention is described in a complete patent specification.

f. PLANT BREEDER RIGHTS: a form of intellectual property providing exclusive commercial rights to a registered plant variety.

g. REGISTERED DESIGNS: a commercial legally enforceable right to use, license or sell a design. Design refers to the features of shape, configuration, pattern or ornamentation which, when applied to a product, gives the product a unique appearance.

h. TRADEMARKS: a commercial legally enforceable right to use a letter, number, word, phrase, sound, smell, shape, logo, picture, aspect of packaging, or any combination of these, used to distinguish goods and services of one trade from those of another.

i. OTHER: Any other types of non-patent registered IP rights applications not addressed above.

j. TOTAL: sum of the applications reported for 9a, 9b, 9c, 9d, 9e, 9f, 9g, 9h and 9i.

Exclude all activity for Cooperative Research Centres where your institution is a participant.

Note: All patents in a single patent or plant breeder rights family including when filed in multiple jurisdictions are to be included. For example, a PCT is counted as one application. When a PCT progresses to national phase in a specific country, this is counted as a separate application.

Fractional reporting: where your institution (or its commercialisation company) is a party to a joint patent application, please report accordingly to the second decimal point. For example, if there are three equal parties to the patent application, then report your institution's share as 0.33.

Other registered IP rights applications: if you entered a non-zero value in the "Other" category please specify what forms of IP rights you undertook in relation to your recorded activity.

QUESTION 10

PATENT and PLANT BREEDER RIGHTS FAMILY: a group of patent or plant breeder rights applications or grants emanating from a single filing.

Note: this question only concerns **patent and plant breeder rights families**, and is not in reference to families of other forms of registered IP (i.e. trademarks).

PATENTS AND PLANT BREEDER RIGHTS ISSUED (INCLUDING RENEWALS)

QUESTION 11

Include

- the number of patents and plant breeder rights issued to your institution in the reporting year; and
- annuity payment renewals granted

Exclude all activities for Cooperative Research Centres where your institution is a participant.

Note: All patents in a single patent family, including when filed in multiple jurisdictions, are to be included. For example, a PCT is counted as one application. When a PCT progresses to national phase in a specific country, this is counted as a separate application.

Fractional reporting: where your institution (or its commercialisation company) is a joint owner of a patent, please report accordingly to the second decimal point. For example, if your institution has a quarter share in a patent, then report your institution's share as 0.25.

QUESTION 12

PATENT and PLANT BREEDER RIGHTS FAMILY: a group of patent or plant breeder rights applications or grants emanating from a single filing.

PATENT AND PLANT BREEDER RIGHTS HOLDINGS

QUESTION 13

This question is asking for a snapshot of your institution's total patent and/or plant breeder rights holdings on the last day of the reporting period, with separate counts for pending and issued.

a. PATENTS/PLANT BREEDER RIGHTS PENDING:

Include:

- all provisional patents;
- PCT patents; and
- national phase filings.

b. PATENTS/ PLANT BREEDER RIGHTS ISSUED:

Include patents and Plant Breeder Rights accepted and allowed by patent offices.

Exclude all activities for Cooperative Research Centres where your institution is a participant.

Note: All patents or plant breeder rights in a single patent family, including when filed in multiple jurisdictions, are to be included. For example, a PCT is counted as one application. When a PCT progresses to national phase in a specific country, this is counted as a separate application.

Fractional reporting: where your institution (or its commercialisation company) is a joint owner of a patent, please report accordingly to the second decimal point. For example, if your institution has a quarter share in a patent, then report your institution's share as 0.25.

QUESTION 14

PATENT and PLANT BREEDER RIGHTS FAMILY: a group of patent or plant breeder rights applications or grants emanating from a single filing.

QUESTION 15

Include:

- all provisional patent applications;
- PCT and national phase applications; and
- granted patents.

Exclude all activity for Cooperative Research Centres where your institution is a participant.

Fractional reporting: where your institution (or its commercialisation company) was a joint owner of a patent, please report accordingly to the second decimal point. For example, if your institution had a quarter share in a patent, then report your institution's share as 0.25.

LICENCES / OPTIONS / ASSIGNMENTS (LOAs)

A LICENCE agreement formalises the transfer of technology between two parties, where the owner of the technology (licensor) grants rights to the other party (licensee).

An OPTION agreement grants the potential licensee a time period during which it may evaluate the technology and negotiate the terms of a licence agreement. An option agreement is not constituted by an Option clause in a research agreement that grants rights to future inventions, until an actual invention has occurred that is subject to that Option.

An ASSIGNMENT agreement conveys all right, title and interest in and to the licensed subject matter to the named assignee.

BACKGROUND INTELLECTUAL PROPERTY: Pre-existing Intellectual Property not created as part of the research project and which is required by the originators for the purposes of exercising their rights with respect to the research project.

Note: this includes only Licences / Options / Assignments (LOA) negotiated on full commercial terms, granting access to institutional intellectual property (patented or otherwise) in return for royalties or licence fees.

In instances where you do not have adequate data, please provide your best estimate and an explanation of your estimating method in the comments field at the end of the form. For example, if you are unable to provide disaggregated data against given metrics (for example, contracts and consultancies) it is recommended that you use one of the following three methods:

- where you are confident that the split is almost complete or is completely in one category, allocate 100% to that category;
- where you have a sense of what the split is, you may assign proportionate amounts to the split (for example if there are two categories you may choose to apportion 70% to one category and 30% to the other);
- where you are completely unsure, you may wish to assign equivalent proportions of your output against that question to each of the components of it (where there are three categories, you would choose a 1/3 split).

QUESTION 16

a. MATERIAL TRANSFER AGREEMENT: An agreement outlining conditions under which material is provided from the owner to another entity for a specific use.

b. INCOME: please sum all earnings achieved through the supplying of an MTA.

Exclude implicit or explicit MTA rights granted under licence or under terms of a research contract.

Note: This question only applies to MTAs in which the institution is providing its "materials" to an external business user, and does not apply for agreements where the institution is the recipient of materials.

QUESTION 17

a. EXECUTE: Count the number of LOAs that were executed in the year indicated for all technologies. Each agreement, exclusive or non-exclusive, should be counted separately.

b. ACTIVE: 'Legally enforceable' licences and options that earned income in the reporting year, or which are contracted to provide income in future years and for which there is a reasonable expectation that income will be paid, or, when there is no financial consideration associated with the LOA, that the LOA reflects a continuing relationship between parties.

Include:

- LOAs generated as a result of competitive research grant projects (e.g. Australian Research Council Linkage Grants and National Health & Medical Research Council Development Grants), including where LOAs are provided to industry participants;
- multiple individual licences for the same software product worth $1,000 or more (per package) must be counted as a single technology licence. This applies irrespective of whether the product is patent protected or not; and
- Licences and Assignments to other research institutions, including those provided as inputs to Cooperative Research Centres.

Exclude:

- MTAs, including the provision of biological material (this is captured in question 16);
- licences granted in research contracts to an institution (and thereby an institution's researchers) enabling researchers the freedom to operate for the purposes of teaching and undertaking further research for the project identified in the research contract;
- provision for the use of institutional background intellectual property within a licensing agreement should not be separately counted;
- LOAs generated as a result of work completed by Cooperative Research Centres, that is as CRC outputs (this information will be obtained separately through the CRC Programme); and
- LOAs for individual (personal) use software licences.

Fractional reporting: where your institution (or its commercialisation company) is a joint owner of a patent, please report accordingly, to the second decimal point. For example, if your institution has a quarter share in a patent, then report your institution's share of the LOA as 0.25.

In instances where you do not have adequate data, please provide your best estimate and an explanation of your estimating method in the comments field at the end of the form. For example, if you are unable to provide disaggregated data against given metrics (for example, contracts and consultancies) it is recommended that you use one of the following three methods:

- where you are confident that the split is almost complete or is completely in one category, allocate 100% to that category;
- where you have a sense of what the split is, you may assign proportionate amounts to the split (for example if there are two categories you may choose to apportion 70% to one category and 30% to the other);
- where you are completely unsure, you may wish to assign equivalent proportions of your output against that question to each of the components of it (where there are three categories, you would choose a1/3 split).

QUESTION 18

a. AUSTRALIAN OWNED AND AUSTRALIAN BASED COMPANIES / ORGANISATIONS: companies that are majority Australian owned with operations within Australia.

b. AUSTRALIAN OWNED AND FOREIGN BASED COMPANIES / ORGANISATIONS: companies majority owned in Australia with no operations within Australia.

c. FOREIGN OWNED AND AUSTRALIAN BASED COMPANIES / ORGANISATIONS: companies majority owned overseas with operations within Australia.

d. FOREIGN OWNED AND FOREIGN BASED COMPANIES / ORGANISATIONS: companies majority owned overseas with no operations within Australia.

e. UNKNOWN: companies for which the ownership status is unclear or not determined.

Note: The jurisdictional ownership status specified should be determined in relation to the arm, division or local status of the office with which the negotiations are formally concluded.

QUESTION 19

This question refers to LOAs identified in question 17b.

See notes for question 20 for details of types of income to be included.

Exclude all activities for Cooperative Research Centres where your institution is a participant.

Fractional reporting: where your institution (or its commercialisation company) is a joint owner of a patent, please report accordingly, to the second decimal point. For example, if your institution has a quarter share in a patent, then report your institution's share as 0.25.

QUESTION 20

The yearly number totals for question 20 should be the same as the relevant values supplied for question 19.

LOA INCOME includes the gross amount (before deduction of service fees, if any) of: licence issue fees; payments under options; annual minimums; running royalties; termination payments; the amount of equity received when cashed-in; and software end-user licence; but not research funding; patent expense reimbursement; a valuation of equity not cashed-in; software and biological material end-user licence fees; or trademark licensing royalties from university insignia. LOA income also does not include income received in support of the cost to make and transfer materials under Material Transfer Agreements.

EQUITY is ownership interest (e.g. stock and rights to receiving stock) in a start-up company which was dependent upon the licensing of IP or the bestowing of tacit knowledge from your institution or its commercialisation company in order to become operational.

a. RUNNING ROYALTIES: Royalties earned on the sale of products. Excluded from this number are licence issue fees, payments under options, termination payments, and the amount of annual minimums not supported by sales.
b. CASHED-IN EQUITY: This includes the amount received from cashing in EQUITY holdings, resulting in a cash transfer to the institution (or its commercialisation company). The amount reported should be reduced by the cost basis, if any, on which the EQUITY was acquired. Excluded from this amount is any type of analysis or process whereby a value for the EQUITY holdings is determined but a cash transaction does not take place through the sale of these holdings.
c. OTHER: Any remaining types of LOA INCOME not covered by RUNNING ROYALTIES or CASHED-IN EQUITY.

   Exclude:
   - all activities for Cooperative Research Centres where your institution is a participant;
   - in-kind contributions; and,
   - earnings from Material Transfer Agreements.

d. TOTAL: sum totals for the numbers and incomes reported for 20a, 20b and 20c.

Optional: If "other" income category is applicable, you may optionally indicate the form(s) and value of the associated income(s) in the text field provided.

Fractional reporting: where your institution (or its commercialisation company) is a joint owner of a patent, please report accordingly, to the second decimal point. For example, if your institution has a quarter share in a patent, then report your institution's share as 0.25.

QUESTION 21

The yearly totals for question 21 should be the same as the relevant values supplied for question 19, and the number totals for question 20.

Please report on cash based transactions only. If you wish to identify other forms of income (e.g. in kind contributions), these can be reported in the free text field Question 35.

Fractional reporting: where your institution (or its commercialisation company) is a joint owner of a patent, please report accordingly to the second decimal point. For example, if your institution has a quarter share in a patent, then report your institution's share as 0.25.

QUESTION 22

LOA income paid to other institutions or commercial entities will be used to help identify any double-count of LOA income reported under this survey.

Include cash amounts paid to other institutions under inter-institutional agreements.

Exclude:
- fees for background IP and expert advice (reported in Question 5); and,
- in kind payments, please report cash payments only.

CAPITAL RAISING, INITIAL PUBLIC OFFERINGS AND EQUITY

QUESTION 23

a. INITIAL PUBLIC OFFERING (IPO): refers to when a company first sells its shares to the public.
b. OTHER CAPITAL RAISING ACTIVITIES: capital raised through activities other than IPO(s), including post-float share offers, private share offers, etc.
c. TOTAL FINAL CAPITAL RAISED: refers to the total amount of capital raised through the IPO(s) and/or other capital raising activities.

Optional: if "other" capital raising category is applicable, you may optionally indicate the form and value of the associated capital raising in the text field(s) provided.

QUESTION 24

This question asks for the value of current EQUITY holdings as at the end of the reporting period. It is not intended to capture the proceeds of capital investments in companies, or general investments in the share market.

EQUITY is ownership interest (e.g. stock and rights to receiving stock) in a start-up company which was dependent upon the licensing of IP or the bestowing of tacit knowledge from your institution or its commercialisation company in order to become operational.

An equity position in a currently government funded CRC should not be included. Equity in companies spun out of CRCs as separate entities that required no direct funding from the CRC Program may be included. Similarly, equity in organisations that were Commonwealth funded CRCs but have exited the program and where a market value for the organisation has been established can be counted.

Valuations must be independently determined based upon a market assigned valuation of the organisation or must be derived in a manner that is consistent with the application of the International Financial Reporting Standards. The following guidelines may assist:

- value of all equity holdings refers to equity that is related to the licensing/intellectual property assignment activity of the institution;
- if your institution holds equity in a publicly-traded/listed company, use the market price of your institution's holdings on the closing day of the period for which you are reporting;
- if your institution held equity in a private company, use the price established in the most recent transaction as the fair market price. For example, if you formed a company with an investor in 2009 and they put in $3 million for 60% of the company and there have been no more investments since, then your value for both years (2010-2011) will be $2 million (i.e. the institution's 40% share value). If there have been no transactions, treat value as zero.

QUESTION 25

This question asks for the number and value of EQUITY holdings exited as at the end of the reporting period. It is not intended to capture the proceeds of capital investments in companies, or general investments in the share market.

EQUITY is ownership interest (e.g. stock and rights to receiving stock) in a start-up company which was dependent upon the licensing of IP or the bestowing of tacit knowledge from your institution or its commercialisation company in order to become operational.

Value, in some cases, may be difficult to determine. As a general principle, please ensure that valuations used to arrive at this figure are consistent with the International Financial Reporting Standards (see Question 24).

START-UP COMPANIES

QUESTION 26

START-UP COMPANIES: companies or traders as persons engaged in businesses that were partially or entirely dependent upon licensing or assignment of your institution's technology for initiation.

OPERATIONAL: a company is operational when it possesses sufficient financial resources and expends these resources to make progress toward stated business goals. The company must also be diligent in its efforts to achieve these goals.

EQUITY: an ownership interest in a company (e.g. stock and/or rights to receiving stock) by your institution or its commercialisation company.

Include start-up companies that were created in the five years up to and including the reporting date for the question.

Exclude start-up companies that were created greater than five years before the reporting period for the question.

QUESTION 27

This question asks for the number of start-up companies that CEASED operations in the reporting period, irrespective of their date of commencement.

START-UP COMPANIES: companies or traders as persons engaged in businesses that were partially or entirely dependent upon licensing or assignment of your institution's technology for initiation.

OPERATIONAL: a company is operational when it possesses sufficient financial resources and expends these resources to make progress toward stated business goals. The company must also be diligent in its efforts to achieve these goals.

QUESTION 28

This question asks you to nominate how many start-up companies your organisation launched in the survey reporting years. You will then be prompted to provide details for EACH of those companies via drop-down sub-forms.

PART 3: RESEARCH CONTRACTS, CONSULTANCIES AND DIRECT SALES

QUESTION 29

RESEARCH CONTRACTS, CONSULTANCIES AND DIRECT SALES are considered to include:

- consultancy agreements and contracts for the conduct of research on behalf of clients external to your institution;
- consultancy agreements for the provision of expert advice based on your institution's existing research knowledge, skills and capabilities;
- contracts with partners in grant funded research, but do not include the funding from the granting agency;
- research contracts and consultancies with partners in competitive research grant projects (e.g. Australian Research Council Linkage Grants and National Health & Medical Research Council Development Grants), but not contracts or agreements with the granting agency itself; and
- direct sale by your institution of physical products generated by your institution which embody technology-based IP (as opposed to the provision of research or expertise).

  Exclude:
  - earnings from Material Transfer Agreements already mentioned in Question 16;
  - earnings from software sales already mentioned in Question 17;
  - sales of products able to be bought through retail outlets; and
  - direct sales of goods which embody non-technology based IP (e.g. university press books and audio-visual products).

RESEARCH is considered to include:

- creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications;
- any activity classified as research which is characterised by originality; it should have investigation as a primary objective and should have the potential to produce results that are sufficiently general for humanity's stock of knowledge (theoretical and/or practical) to be recognisably increased. Most higher education research work would qualify as research; and
- pure basic research, strategic basic research, applied research and experimental development.

GROSS CONTRACT VALUE: the full contracted value of the work, regardless of whether any or all payments were made in the reporting year. Contracts and consultancies should only be indicated if they were executed in the year specified: continuing contracts and consultancies executed in previous years should not be represented in any out years. Where the contract is not for a fixed price but for services at a capped rate, count the capped value of the contract. Please report cash value only; in-kind contributions can be reported in the free text provided in Question 35.

In instances where you do not have adequate data, please provide your best estimate and an explanation of your estimating method in the comments field at the end of the form. For example, if you are unable to provide disaggregated data against given metrics (for example, contracts and consultancies) it is recommended that you use one of the following three methods:

- where you are confident that the split is almost complete or is entirely completely in one category, allocate 100% to that category;
- where you have a sense of what the split is, you may assign proportionate amounts to the split (for example if there are two categories you may choose to apportion 70% to one category and 30% to the other;
- where you are completely unsure, you may wish to assign equivalent proportions of your output against that question to each of the components of it (where there are three categories, you would choose 1/3).

QUESTION 30

The total at question 30a.vii, 30b.vii and 30c.vii must be the same as the figure supplied at question 29a, 29c and 29e respectively.

PART 4: SKILLS DEVELOPMENT AND TRANSFER

QUESTION 31

TRAINING IN COMMERCIALISATION AND ENTREPRENEURSHIP: refers to educational, training and development programs aimed at research staff or higher degree by research students that seek to develop skills in and/or understanding of the research commercialisation process, i.e. translating research outputs into marketable products, processes and services.

Include students who are accessing the Commercialisation Training Scheme.

Exclude training which is provided to researchers or research students in their capacity as participants in a CRC.

QUESTION 32

Only consider relevant FTEs who were employed during the course of each reporting period, irrespective of when the start-up company was launched. Employees who commenced their employment prior to 1 January 2009 (for 2010 reporting period) or 1 January 2010 (for the 2011 reporting period) should not be considered. That is:

- for 2010 consider any employee, whether they first commenced start-up employment in 2009 or 2010, but only report their 2010 FTE employment;
- for 2011 consider any employee, whether they first commenced start-up employment in 2010 or 2011, but only report their 2011 FTE employment.

a. Note: this part of this question is intended to establish the total number of research postgraduate students finding employment in start-up companies.

b. Note: this part of question is intended to establish the total number of your institution's employees working with institutional IP dependent start-ups.

Note: The above is only to apply to start-up companies which were still operational at the end of the reporting year.

Include individuals who were employed by your institution but were employed full time or part time for the purposes of working in the start-up company ("Virtual employees").

PART 5: ADDITIONAL INFORMATION

QUESTION 33

This question provides the opportunity to:

- list any other commercialisation activities your institution undertook not already captured in this questionnaire;
- provide information on estimated responses in relevant questions; and
- provide examples of where your institution's expertise was critical to an enterprise obtaining commercial benefit.

Where you provide additional information for a specific question, please identify that question here.

PART 6: SURVEY PROCESS

QUESTION 34

Nil.

QUESTION 35

Nil.

QUESTION 36

Please enter the details for the individual primarily responsible for entering the data into the online form. The nominated individual would be contacted in the event of there being any queries in respect of the form.

APPENDIX 4: START-UP COMPANIES FORMED IN 2010 AND 2011

Table 33: Start-up companies formed in 2010[38]

Institution	Name of Company
Medical Research Institute	
The Walter and Eliza Hall Institute of Medical Research	BACE Therapeutics PTY Ltd
Publicly funded research agencies	
NICTA	Cohesive Data
Universities	
Flinders University	ThereItIs
Murdoch University	Muradel Pty Ltd
	SciCom Pty Ltd
The University of Adelaide	Muradel Pty Ltd
The University of Melbourne	Harmonix Instruments Pty Ltd
	Clarity Pharmaceuticals Pty Ltd
The University of South Australia	Ceridia
	Lased Technologies
The University of Queensland	Metallotek Pty Limited
	Progel Pty Limited
	TSA VAM Pty Limited
	W2F Pty Limited
	Bioherbicides Australia Pty Limited
The University of Western Australia	Hazer Pty Ltd.
	MiReven Pty Ltd

Table 34: Start-up companies formed in 2011

Institution	Name of Company
Medical Research Institute	
Murdoch Childrens Research Institute	GI Therapies
Publicly funded research agencies	
NICTA	Nitero
NICTA	Interferex
Universities	
Central Queensland University	Mask-Ed International Pty Ltd
Flinders University	Clevertar
	Strategiize
	Flinders Creations
The Australian National University	Beta Therapeutics Pty Ltd
The University of Melbourne	MetaCDN Pty Ltd
The University of New South Wales	Smart Sparrow Pty Limited
The University of Queensland	Duracyc Power Pty Ltd
	Brisbane Material Technologies Pty Ltd
	Cloevis Pty Ltd
	MoleQular Pty Ltd
	Vaxxas Pty Ltd
	SUSOP Pty Ltd
	R2Mining

38 Muradel Pty Ltd is a joint venture between Murdoch University and the University of Adelaide.

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