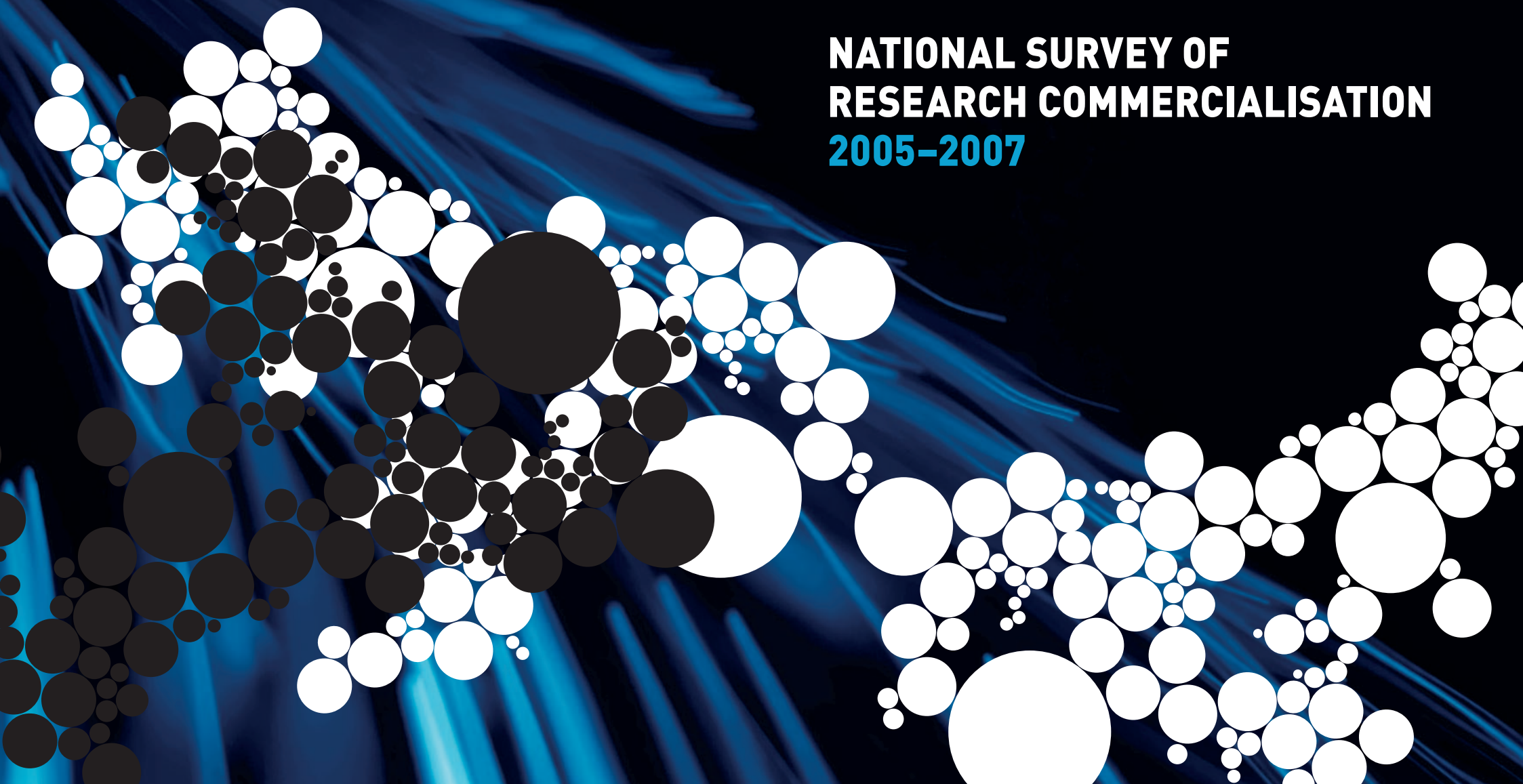




Australian Government

Department of Innovation
Industry, Science and Research

NATIONAL SURVEY OF RESEARCH COMMERCIALISATION 2005-2007



NATIONAL SURVEY OF RESEARCH COMMERCIALISATION 2005–2007

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

July 2009

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FOREWORD

The Australian research sector already makes an enormous contribution to the nation's innovation performance, and the Australian Government believes it has the potential to contribute even more.

In May, the Government released *Powering Ideas: An Innovation Agenda for the 21st Century*, backed by \$3.1 billion in new funding over the next four years. Total support for research and innovation in 2009–10 will reach \$8.6 billion, an increase of 25 per cent over the previous year.

Innovation is about translating ideas into economic and social value. Australia produces many great ideas, but too many of them end up being commercialised elsewhere, where most of the benefits accrue to others. That's why the Australian Government is establishing a Commonwealth Commercialisation Institute. It will help Australian innovators get their ideas to market, including by improving links between universities, publicly funded research agencies, medical research institutes and industry.

The National Survey of Research Commercialisation tracks the efforts of public researchers to translate their ideas into money-making products and services – both by developing them in-house, and by sharing them with the private sector, which may be better placed to exploit them. One ambition of *Powering Ideas* is to double the level of collaboration between Australian researchers and business over the next decade. This survey will help us measure our progress toward achieving that ambition.

The survey shows that while income from licensing and the value of equity holdings are both rising steadily, contract research and consultancies continue to generate the lion's share of commercialisation income for public sector researchers. It reminds us that we need to exploit every mechanism at our disposal – especially closer collaboration and including open access where appropriate – if we want to increase the pace and scale of knowledge transfer between the publicly funded research sector, industry and the wider community.



A handwritten signature in black ink, which appears to read 'Kim Carr'. The signature is written in a cursive, flowing style.

Senator the Honourable Kim Carr
Minister for Innovation, Industry, Science and Research

ACKNOWLEDGEMENTS

The Department wishes to acknowledge all of the respondent organisations for their input, and the contributions of Knowledge Commercialisation Australasia (KCA), and Dr John Howard and Partners including their permission to use the data they had collected.

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
AIMS	Australian Institute of Marine Science
ANSTO	Australian Nuclear Science and Technology Organisation
ARC	Australian Research Council
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
DEST	Department of Education, Science and Training
DITR	Department of Industry, Tourism and Resources
DIISR	Department of Innovation, Industry, Science and Research
DSTO	Defence Science and Technology Organisation
FTE	Full-Time Equivalent (staff)
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
MRIs	Medical Research Institutes
NHMRC	National Health and Medical Research Council
NSRC	National Survey of Research Commercialisation
PCT	Patent Cooperation Treaty
PFRA	Publicly Funded Research Agency (ANSTO, AIMS, CSIRO, DSTO)
R&D	Research and Development
RDC	Research and Development Corporation
UK	United Kingdom
UNICO	The University Companies Association (UK)
US	United States

KEY FINDINGS

The data collected in this report shows a continuing increase in research commercialisation against most metrics in Australia's universities, Publicly Funded Research Agencies (PFRA), Medical Research Institutes (MRIs) and Cooperative Research Centres (CRCs).

The new report highlights commercialisation of intellectual property (IP) as creating income for these institutions, at the same time offering a mechanism of knowledge exchange to industry and the community more broadly. Through commercialisation and other knowledge exchange activities, links with industry and the community can lead to collaborations and other knowledge-based transactions with important economic, social and environmental impacts.

MOST RECENTLY SURVEYED YEAR – 2007

There were 77 institutions that responded to the survey conducted in 2008. For the most recently surveyed year, 2007, institutions reported income from licences, options and assignments (LOAs) totalling \$214m, contracts and consultancies with end-users worth over \$1.2b and equity holdings valued at over \$196m (see Table 1 and Chapter 2). Determining the level of sales resulting from licensed IP is difficult. Based on running royalties alone, the estimated level of sales resulting from licensed IP more than doubled from \$3.8b in 2005 to \$8.3b in 2007 (Table 11). In 2007 the total cost to institutions of conducting research commercialisation activities, including staffing and legal costs was \$76m (see Table 1 and Chapter 2).

TIME SERIES 2000–2007

Based on a subset of 57 institutions for which time series data is available between 2000 and 2007 (See Table 2 and Chapter 2), the report shows that research commercialisation activities have increased over the period against most indicators:

- The number of dedicated commercialisation staff rose by 52%, from 190 in 2000 to 288 in 2007.
- The total number of invention disclosures increased by 126%, from 528 in 2000 to 1,193 in 2007.

- The total number of LOAs yielding income grew by 51%, from 489 in 2000 to 737 in 2007.
- Adjusted¹ LOA income across all institutions increased by 70%, from \$125m in 2000 to \$213m in 2007². This increase was dominated by two universities:
 - University of Queensland reported income of \$21m in 2006 and \$45m in 2007, including from the licensing of GARDASIL™.
 - Monash University reported LOA income of \$101m in 2007 alone from its assignment of Monash IVF.
- The total value of institutional equity held in start-ups increased by 21% from \$153m in 2000 to \$185m in 2007².
- Although the total number of start-up companies formed each year by the research sector fell by 30% from 47 in 2000 to 33 in 2007, the total number of start-ups operational at the end of the year increased by 179% over the same period, from 86 in 2000 to 240 in 2007, suggesting improved sustainability of the start-ups launched over the period.

A slight decline, however, has been recorded on patenting activities by these institutions over the same period (See Table 2 and Chapter 2).

- The total number of new patent and plant breeder's rights applications filed in both Australia and the US decreased by 9%, from 574 in 2000 to 525 in 2007.
- The number of patents and plant breeder's rights issued worldwide declined by 3% to 508 in 2007, from 524 in 2000. High variability in patents granted to universities contributed to this result.

As with previous surveys, the 2005–07 National Survey of Research Commercialisation (NSRC) found a large proportion of IP protection and LOA activity being carried out by a relatively small number of institutions, including the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and a selection of universities. These same institutions accounted for much of the income generation identified by this survey (see Chapter 2). Reporting rates for the number of active LOAs were 67%–70% across the sector (Table 11). However, a higher proportion of research institutions reported activity in research contracts and consultancies (74%–79%) between 2005 and 2007 (Table 14) suggesting activities such as research contracts and consultancies are being used by the broader research sector as mechanisms for knowledge exchange (see Chapter 2).

¹ Adjusted for payments made to other institutions.

² Dollar figures adjusted to 2007 dollars

INTERNATIONAL COMPARISONS

Comparisons of the Australian research sector with the United States (US), Canada and the United Kingdom (UK), after adjusting for research expenditure (per US\$100m) and purchasing power parity (see Table 3 and Chapter 3), show that:

- Australia improved its number of invention disclosures per \$US100m research expenditure relative to the US, Canada and the UK between 2000 and 2007. However, its rate of invention disclosure (28 invention disclosures per \$US100m research expenditure in 2006) remained behind these three countries (US (42), Canada (39) and UK (54) in 2006) (Table 3).
- The number of US patents issued per year per \$US100m of research expenditure fell significantly for the US (50%) and Canada (67%) between 2000 and 2006. Australia also declined (25%) over this period to be lower than the US but comparable with Canada by 2006 (Table 3, Figure 15a).
- The number of LOAs executed per \$US100m research expenditure in Australia has remained relatively stable between 2000 and 2007. By 2006, Australia (13) was on par with the US (11) and Canada (12) (Table 3, Figure 16), although the relative number of Australia's LOAs yielding income at 18 is low compared to the US (27) and Canada (25) (Table 3).
- In most years between 2000 and 2007, Australia generated higher LOA income as a percentage of research expenditure than the UK and Canada and approached US levels (Table 3). Recent growth in the Australian research sector from several large transactions has contributed to this result (Figure 17).
- Canada has experienced a steady and significant decrease in the generation of start-up companies per \$US100m research expenditure between 2000 and 2007. Over the same period, both the US and Australia also experienced a decline, though not as severe as Canada's decrease. The UK also showed a significant decrease between 2000 and 2004, with slight growth in 2005 and 2006. The 2006 results show that start-up company formation in the Australian research sector (1.2) is comparable with the US (1.2) and Canada (0.8) with the UK (3.2) much more active against this metric (Table 3, Figure 18).
- The number of dedicated commercialisation staff per institution in Australia has remained relatively stable since 2000 (4.1 in 2006), whilst the US (4.8 in 2006), and Canada (4.7 in 2006) have shown some modest growth. The UK has shown strong growth between 2001 (4.7) and 2005 (11.1) (Table 3, Figure 13).

COOPERATIVE RESEARCH CENTRES

The recent review of the Cooperative Research Centres (CRC) program *Collaborating to a Purpose*³ determined that CRCs typically have a low capacity for commercialisation. This point was emphasised by findings of the Productivity Commission which highlighted that very few CRCs generate sufficient commercial returns to operate successfully beyond the funding period.⁴ Despite this, CRCs play an important role in commercialisation, utilisation and knowledge exchange.

Data from the CRC program Management Data Questionnaire shows that:

- CRCs have focussed less on forming start-up companies in recent years and more on the licensing of IP arising out of research (Table 4).
 - The number of start-up companies formed per \$100m research expenditure⁵ by all CRCs declined from 2.7 to 0.3 (89%) between 2003–04 and 2007–08 (Figure 24).
 - Commensurately, the income generated from new start-up companies such as royalties and cashed in equity also fell significantly over the same period with no income generated in 2007–08 (Figure 25).
- The number of patent applications filed per \$100m research expenditure⁵ by all CRCs, in Australia and overseas, grew from 9 to 14 and 2 to 8 respectively between 2003–04 and 2007–08 (Table 4).
- Despite growth in patent filings, total CRC patent holdings (patents maintained) per \$100m research expenditure⁵ declined by 12% from 119 to 105 between 2003–04 and 2007–08 as major CRCs exited the program and passed on their patent holdings to former CRC participants (Table 4, Figure 20; see Chapter 4).
- The number of CRC LOAs executed per \$100m research expenditure⁵ grew by 230% from 203 to 670 between 2003–04 and 2007–08 while the income generated per \$100m research expenditure from LOAs increased by 162% from \$1.3m to \$3.4m over the same period (Table 4; Chapter 4).
 - The number of CRC LOAs was highly variable between 2003–04 and 2007–08, peaking in 2007–08 (Figure 22).
 - The number of CRC LOAs was dominated by high volume/low cost product licensing by the Environment sector (Table 4, Figure 22; Chapter 4).

3 <http://www.innovation.gov.au/innovationreview/Documents/CRCReviewReport.pdf>

4 Productivity Commission Research Report, *Public Support for Science and Innovation*, p. 450.

5 CRC activity was expressed as a function of research expenditure to account for the changing number of CRCs between years. For more information see the CRC section in the Methodology chapter.

- The number of contracts and consultancies generating income per \$100m research expenditure⁵ increased by 55% from 60 in 2003–04 to 93 in 2007–08 (Table 4, Figure 26). Income generated by these contracts grew marginally by 4% from \$6.9m to \$7.2m over this period. However, the highest income peak (\$8.5m) was in 2005–06 (Table 4).
- CRCs show substantial growth in knowledge exchange activities per \$100m research expenditure⁵ between 2003–04 and 2007–08 (Table 4) with relative increases in the numbers of;
 - training courses – up 55% from 29 to 45 (Figure 28)
 - conferences – up 53% from 59 to 90 (Figure 29)
 - publications – up 28% from 307 to 392 (Figure 31)
 - reports provided to end-users – up 9% from 144 to 157 (Figure 32)
 - postgraduate placements in industry – up 35% from 37 to 50 (Figure 33).
- Income generated from courses and conferences provided to end-users per \$100m research expenditure⁵ between 2003–04 and 2007–08 fell by 47% from \$378,000 to \$201,000 (Table 4; Figure 30).

Table 1: Summary of selected NSRC survey metrics for 2005, 2006 and 2007⁶

		CSIRO			Other PFRA's			Universities			MRIs			Total Activity		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Resourcing for commercialisation																
Dedicated and other ⁷ commercialisation staff	FTE	183	182	142	20	19	18	257	261	297	28	34	36	488	496	493
Commercialisation staff costs	\$'000	26,499	26,419	22,236	2,494	2,422	2,099	25,911	25,778	28,565	3,334	4,181	4,595	58,238	58,800	57,495
Other commercialisation costs ⁸	\$'000	4,875	6,607	5,542	758	815	720	7,784	8,404	9,282	2,632	3,516	2,955	16,049	19,341	18,499
Intellectual Property activity																
Invention disclosures received	No.	79	90	84	40	40	19	717	855	981	100	120	122	936	1,105	1,206
Patent and plant breeder's rights filed Total	No.	528	456	396	125	131	154	851	806	879	273	255	287	1,777	1,648	1,716
Patent and plant breeder's rights issued																
- In Australia	No.	32	40	30	8	6	8	41	48	37	11	10	9	92	104	84
- In the US	No.	40	42	20	8	11	15	33	42	37	10	14	7	91	109	79
- Elsewhere	No.	193	187	199	36	32	32	112	131	95	26	30	32	367	380	358
- Unspecified ⁹	No.									1	2			2		1
- Total	No.	265	269	249	52	49	55	186	221	170	49	54	48	552	593	522
Patent and plant breeder's rights holdings																
- Patents Pending	No.	1,906	2,004	1,991	248	246	240	2,605	2,866	3,500	608	746	681	5,367	5,862	6,412
- Patents issued (cumulative)	No.	2,124	2,210	2,175	102	115	133	1,327	1,417	1,690	537	564	594	4,090	4,306	4,592
- Unspecified ⁹	No.	0	0	0	0	0	0	554	554	0	313	381	233	867	935	233
- Total held	No.	4,030	4,214	4,166	350	361	373	4,486	4,837	5,190	1,458	1,691	1,508	10,324	11,103	11,237
Patent and plant breeder's rights culled or lapsed	No.	520	428	528	62	62	175	156	222	518	71	117	176	809	829	1,397

⁶ Note that all dollar values in this table are presented in constant 2007 prices (although elsewhere this is not the case).

⁷ Includes staff employed in the University of New England Agricultural Business Research Institute (ABRI) who are involved in producing, selling, upgrading and adapting to client requirements animal genetics software products. ABRI staff totalled 76, 78 and 80 in 2005, 2006 and 2007, respectively. The cost of these staff amounted to \$5.7m, \$6.0m and \$6.3m in 2005, 2006 and 2007, respectively.

⁸ The CSIRO did not report on internal fees and legal costs of commercialisation.

⁹ This indicates instances where institutions provided a total value, but did not specify which patent types contributed to that total.

		CSIRO			Other PFRA			Universities			MRIs			Total Activity		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Licensing activity																
LOAs executed	No.	80	87	80	13	18	19	269	305	315	95	113	139	457	523	553
LOAs active	No.	373	376	382	77	89	106	776	861	996	172	202	238	1,398	1,528	1,722
LOAs yielding income	No.	226	237	220	7	12	18	304	328	349	123	138	164	660	715	751
Adjusted gross LOA income ¹⁰	\$'000	22,305	33,909	30,578	544	981	601	34,710	64,615	171,287	9,807	17,346	12,008	67,366	116,851	214,474
Start-up company activity																
Start-ups formed	No.	6	7	9	0	2	0	30	29	26	4	5	2	40	43	37
Capital raising – total	\$'000	3,149	14,278	12,500	0	0	0	42,974	80,118	149,023	3,067	12,552	37,258	49,190	106,948	198,781
Operational start-up companies which are dependent on licensing/assignment of technologies	No.	17	23	25	3	5	5	176	179	182	30	36	35	226	243	247
Start-up companies in which institutions have an equity holding	No.	17	23	25	1	3	3	136	146	150	21	25	27	175	197	205
Value of all equity holdings	\$'000	16,229	36,326	50,154	0	0	0	146,776	136,184	127,486	11,078	20,656	17,973	174,083	193,166	195,613
Research contracts and consultancy activity																
Contracts & consultancy agreements entered into	No.	2,512	2,320	2,116	511	646	386	13,248	12,946	11,658	314	354	336	16,585	16,266	14,496
Total gross contracted value	\$'000	312,893	271,578	305,649	13,758	21,343	23,697	781,915	805,217	864,507	33,743	29,999	39,633	1,142,309	1,128,137	1,233,486
Average percentage of repeat business per institution	%	35%	31%	28%	51%	33%	54%	38%	36%	39%	55%	57%	57%	38%	35%	37%
Skills development and transfer activity																
Participants in research commercialisation and entrepreneurship training courses	No.	0	986	1,559	17	138	195	3,506	3,439	4,942	206	255	349	3,729	4,818	7,045
Research postgraduates employed in start-up companies	No.	0	0	0	0	0	0	53	53	54	31	38	47	84	91	101

¹⁰ Adjusted LOA income is the total amount of income from licences, options and assignments of intellectual property less amounts paid to other institutions in respect of the overall transaction.

Table 2: Summary of NSRC Metrics for surveys 2000–2007^{11,12}

		2000	2001	2002	2003	2004	2005	2006	2007
Resourcing for commercialisation									
Dedicated commercialisation staff	FTE	190	231	281	296	282	294	298	288
Intellectual Property activity									
Invention disclosures	No.	528	709	702	812	956	922	1,084	1,193
New Australian and United States Patent and plant breeder's rights applications filed	No.	574	464	501	539	587	515	544	525
Patent and plant breeder's rights issued worldwide ¹³	No.	524	273	315	841	879	539	582	508
Licensing activity									
LOAs executed	No.	414	354	437	432	381	448	510	546
LOAs yielding income	No.	489	602	627	629	665	649	700	737
Adjusted gross income from LOAs in constant 2007 prices ¹⁴	\$'000	124,717	84,283	83,583	76,203	67,101	66,354	114,169	213,217
Start-up company activity									
Start-up companies formed	No.	47	61	58	50	30	38	40	33
Start-up companies operational at the end of the year	No.	86	109	119	228	251	219	235	240
Start-up companies operational at the end of the year with institutional equity	No.	69	79	96	182	203	170	193	201
Value of equity holdings in constant 2007 prices	\$'000	153,417	154,713	132,364	178,358	208,889	166,552	183,380	185,216

11 For each of these metrics, the unit record files from previous surveys as well as the data provided by Knowledge Commercialisation Australasia were scrutinised and any inconsistencies or errors corrected. Consequently some values presented here will not be the same as previously reported.

12 The data represented here is drawn from the current time series cohort, representing 57 organisations (ie, this data is a subset of the total cohort data).

13 There is a discontinuity in the data for patents issued worldwide due to change in reporting by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Between 2000 and 2002 CSIRO only reported patent families and was not reporting applications and issues for each patent. The method of counting patents and applications for subsequent years is more internationally comparable.

14 Adjusted gross income is LOA income after payments to other institutions and commercial entities. In 2000 a single transaction reported by the University of Melbourne comprised \$50m of total LOA income reported. University of Queensland reported income of \$23m in 2006 and \$47m in 2007 from its licensing of GARDASIL™. Monash University reported LOA income of \$101m in 2007 from its assignment of Monash IVF.

Table 3: Summary of selected commercialisation metrics for Australian, US, Canadian and UK institutions 2000–2007^{15,16}

	2000	2001	2002	2003	2004	2005	2006	2007 ¹⁷
Resourcing for commercialisation								
Average no. of licensing FTEs per institution								
- Australia ¹⁸	3.9	3.3	3.8	4.2	4.1	4.1	4.1	4.0
- US	3.3	3.6 ¹⁵	3.9 ¹⁹	4.0	4.3 ¹⁵	4.4	4.8	5.0
- Canada	3.2	3.3	3.4	3.8	4.4	4.5	4.7	–
- United Kingdom ²⁰	–	4.7	6.0	9.5	9.6	11.1	–	–
Intellectual property activity								
Invention disclosures received per \$US100m research expenditure								
- Australia ¹⁸	20	25	24	23	27	25	28	28
- US	46 ¹⁹	42	41	40	41	41	42	41
- Canada	57	41	45	44 ¹⁵	40	41	39	–
- United Kingdom ²¹	47	49	50	53	49	54	54	–
US Patents issued per \$US100m research expenditure ²²								
- Australia ¹⁸	4 ¹⁵	2	2	4 ¹⁵	6 ¹⁵	2	3	2
- US	14 ¹⁹	12	10	10	9	8	7	7
- Canada	9	7	7	6	5	4	3	–
Licensing activity								
LOAs executed per \$US100m research expenditure								
- Australia ¹⁸	15	13	14	12	11	12	13	13
- US	16 ¹⁹	12	12	12	12	12	11	11
- Canada	19	15	14	15 ¹⁵	16 ¹⁵	16	12	–
- United Kingdom ²¹	16	12	14	38	34	42	47	–

15 Source: AUTM survey (US and Canada comparisons), the UNICO survey (UK comparisons of FTEs) and the HEFCE survey (All other UK comparisons). The research expenditures used to calculate the Australian metrics in this table are an aggregate of the total research expenditures reported by Australian institutions for a given year. For further information see the International Comparisons section in the Methodology chapter.

16 Differences other than specifically noted between the *NSRC 2003 & 2004* publication and the *NSRC 2005 to 2007* publication are due to rounding conventions.

17 At the date of publication of the *NSRC 2005 to 2007*, only the Survey Summary version of the AUTM FY2007 report was available which, unlike the Full Report, does not contain the information for all of the metrics listed in this table.

18 Current and historical data for Australia has been revised in line with original source data (unit record level).

19 Difference due to Full Report/Survey Summary differences.

20 Current and historical UK data for the *licensing FTEs per institution* metric have been revised in line with the UNICO source data.

21 The source for the UK data was changed from UNICO to HE-BCI for all metrics except *licensing FTEs per institution* to allow for greater coverage of the UK HEI sector. Refer to Methodology—International Comparisons.

22 HE-BCI does not supply data on US patents issued.

	2000	2001	2002	2003	2004	2005	2006	2007 ¹⁷
LOAs yielding income per research expenditure (%) ²³								
- Australia ¹⁸	18	21	20	18	18	17	18	18
- US	33 ¹⁹	30	29	28	28	28	27	-
- Canada	29	29	28	31	30 ¹⁵	28	25	-
LOA income as a percentage of research expenditure (%)								
- Australia ¹⁸	2.9	2.0	1.9	1.6	1.3	1.3	2.1	3.6
- US ¹⁹	4.8	3.5	3.5	3.4	3.4	5.3	4.8	-
- Canada ¹⁹	1.8	2.3	1.6	1.6	1.4	1.2	1.4	1.2
- United Kingdom ²¹	0.6	1.1	1.1	1.1	1.5	1.4	1.3	-
Start-up company activity								
Start-up companies formed per \$US100m of research expenditure								
- Australia ¹⁸	1.7	2.2	1.9	1.4	0.9	1.0	1.2	0.9
- US	1.5 ¹⁹	1.4	1.1	1.0	1.1	1.2	1.2	-
- Canada	3.8	3.0	1.9	2.0	1.4	1.0	0.8	-
- United Kingdom ²¹	5.4	4.2	3.6	2.9	2.4	2.9	3.2	-

²³ HE-BCI does not supply data on LOAs yielding income.

Table 4: Summary of selected Cooperative Research Centre (CRC) commercialisation metrics for 2003–04 to 2006–07²⁴, ²⁵

		2003–04	2004–05	2005–06	2006–07	2007–08
Number of CRCs responding	No.	72	69	69	55	57
Research expenditure	\$'000	807,909	842,213	793,845	695,579	636,116
Resourcing for commercialisation per \$100m research expenditure						
Commercialisation expenditure per \$100m research expenditure	\$'000	7,460	8,467	11,764	12,092	13,656
Intellectual property protection activity per \$100m research expenditure						
Patents filed In Australia	No.	9	8	9	12	14
Patents filed overseas	No.	2	3	7	8	8
Patents filed total	No.	11	11	16	20	22
Patents maintained in Australia	No.	44	34	32	31	32
Patents maintained overseas	No.	76	75	79	68	73
Patents maintained total	No.	119	109	111	99	105
Licensing activity per \$100m research expenditure						
LOAs executed ²⁶	No.	203	488	31	50	670
Income from LOAs	\$'000	1,285	1,261	2,586	2,531	3,432
Start-up company activity per \$100m research expenditure						
Start-up companies formed	No.	2.7	1.4	1.5	1.0	0.3
Income from start-up companies – total	\$'000	341	161	109	102	0
Research contracts and consultancy activity per \$100m research expenditure						
Contracts and consultancy agreements generating income	No.	60	75	74	88	93
Contracts and consultancy income	\$'000	6,879	7,149	8,510	7,999	7,178
Training, development and knowledge exchange activity per \$100m research expenditure						
Number of professional training courses offered to end-users	No.	29	34	45	31	45
Number of conferences provided for end-users	No.	59	94	71	67	90
Income from courses and conferences	\$'000	378	313	245	182	201
Number of CRC postgraduates taking up employment in industry	No.	37	38	46	48	50
Number of publications for end-users	No.	307	294	346	258	392
Number of confidential and unpublished reports for end-users	No.	144	138	118	130	157

²⁴ Source: CRC Program Management Data Questionnaire. Note that the CRC information contained within this report includes revisions to the MDQ data set and may therefore conflict with the MDQ as reported in earlier NSRC reports. At the time of publication one CRC had not yet responded for 2007–08.

²⁵ All dollar values are in constant 2007 prices.

²⁶ Several CRCs in the Environment sector reported software licences as well as licences to exploit intellectual property giving a highly variable result.

1. INTRODUCTION

The National Survey of Research Commercialisation (NSRC) provides information on commercialisation in Australian Publicly Funded Research Agencies (PFRAs), universities and Medical Research Institutes (MRIs). The survey was first conducted for the year 2000²⁷ and followed with surveys conducted for the years 2001 and 2002²⁸ and the years 2003 and 2004.²⁹ The results for the most recent survey, covering the years 2005 to 2007 inclusive, are provided in this report as well as information on the commercialisation activities of Cooperative Research Centres (CRCs).

SURVEY PURPOSE

The NSRC provides insights into the trends in commercialisation activity reported by Australian institutions performing the majority of work in this area. This report has been compiled as a reference document for subsequent analysis and policy development for research commercialisation activity. Quantitative information on commercialisation performance is provided in relation to a number of specific indicators. The NSRC does not reflect all the publicly funded research commercialisation activity in Australia, such as the Australian Research Council's Co-Funded Centres of Excellence³⁰, nor does it capture all of the social or environmental outcomes of this activity.

The report does not aim to promote research commercialisation as a core role for these institutions.³¹ The importance of the research sector is in educating the next generation of innovators, adding to the stock of useful knowledge, problem solving, and providing a public space for open dialogue and debate.³²

27 Australian Research Council et al. (2002) *National Survey of Research Commercialisation: Year 2000*, Available at: www.innovation.gov.au/Section/Innovation/Pages/TheNationalSurveyofResearchCommercialisation.aspx

28 Department of Education, Science and Training (2004) *National Survey of Research Commercialisation: Years 2001 and 2002*. Canberra, Department of Education, Science and Training. Available at: www.innovation.gov.au/Section/Innovation/Pages/TheNationalSurveyofResearchCommercialisation.aspx

29 Department of Education, Science and Training. 2007. *National Survey of Research Commercialisation 2003-2004 and commercialisation case studies*. Canberra, Department of Education, Science and Training. Available at www.innovation.gov.au/Section/Innovation/Pages/TheNationalSurveyofResearchCommercialisation.aspx

30 The NSRC report does not currently include commercialisation activities of the Australian Research Council's Co-Funded Centres of Excellence such as National Information & Communications Technologies Australia (NICTA) and the Australian Stem Cell Centre. Commercialisation activities of these organisations are significant. For example, NICTA provides pre-seed support, funds for proof-of concept development and provides training in commercialisation and entrepreneurship to its staff. In 2007 alone NICTA received 27 invention disclosures, filed 13 provisional patent applications, filed 13 Patent Cooperation Treaty applications, filed 17 National Phase patent applications and created three spin-out companies.

31 It is important to note that licensing revenues from research commercialisation are less than 2% of Australian university revenue streams.

32 Cutler T (2008) *Venturous Australia: Building strength in innovation*. Cutler and Company, Melbourne, p67.

THE ROLE OF RESEARCH COMMERCIALISATION FOR AUSTRALIA'S FUTURE

Commercialisation is only one element of the knowledge exchange process between publicly funded research institutions and other sectors, albeit, an important element of the national innovation system. While commercialisation is not the core function of most publicly funded research organisations, these organisations can develop and nurture innovations to the point where they are commercially viable.

Commercialisation is also a process which links the research and industry sectors and allows them to develop mechanisms for knowledge exchange and collaboration. These links are important to improve the flow of ideas and information, and increase the capacity for further productive opportunities to develop. Commercialisation of research contributes to innovation in Australian organisations, lifting productivity and/or profitability and driving competitive advantage in the market. In aggregate, commercialisation of publicly funded research contributes to Australia being an innovative and globally competitive economy.

Innovative publicly funded research organisations, in partnership with industry, have demonstrated Australia's capability to meet significant economic, social and environmental challenges effectively. GARDASIL™, the world's first vaccine for the human papilloma virus: the number one cause of cervical cancer, Relenza™, a drug that can significantly reduce the duration and severity of influenza symptoms and the Australian Bionic Ear (cochlear implant), are just three examples where publicly funded research has developed into world-changing innovations that have contributed to our social wellbeing, stimulated new business ventures and created high value-added jobs.

SURVEY METHODOLOGY

The NSRC questionnaire was originally based on the United States Association of University Technology Managers (AUTM) licensing survey. In accordance with the recommendations of the Coordination Committee on Science and Technology (CCST) Working Group on Metrics of Commercialisation report³³, the NSRC has continued with the broader definition of 'research commercialisation' including research contracts, consultancies and skills development and transfer as introduced in the 2003–04 NSRC report. Advice sought from stakeholders and participants of previous surveys showed the importance of continuing stability in the current set of survey questions³⁴. Wherever possible, the NSRC has drawn upon reliable third party data to reduce respondent burden and enhance data comparability, including inclusion of data for the CRCs drawn from the CRC management data questionnaire (MDQ).

³³ 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.

³⁴ See Appendix 5.

2. RESULTS

The results presented **in blue** below are for all institutions responding to the NSRC for 2005, 2006 and 2007. Time series data are presented **in green** for a subset of institutions that consistently responded to the NSRC between 2000 and 2007.³⁵ Notes on the survey methodology can be found in Chapter 5.

INTELLECTUAL PROPERTY ACTIVITY

INVENTION DISCLOSURES

An invention disclosure occurs when a device, material, or method that is novel and useful is made known to research management within the 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. A number of institutions covered in the survey (such as CSIRO) have a decentralised approach to commercialisation with divisions/ departments of the institution monitoring invention disclosures and applying for IP protection without oversight by a central office. As a result, care should be taken in comparing the absolute number of disclosures between institutions.

KEY POINTS

DATA FOR 2005–07

- The total number of invention disclosures increased by 29% from 936 in 2005 to 1,206 in 2007 (Table 5).

TIME SERIES DATA FOR 2000–07

- The time series data shows that between 2000 and 2007 the overall number of disclosures more than doubled, from 528 to 1,193 for the time series cohort, with all institution types making significant contributions to this increase (Figure 1).

Figure 1: Number of invention disclosures by sector 2000–2007



³⁵ 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 2005, 2006 and 2007

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	36	38	38	30	31	32	70	73	74
Invention disclosures received	No.	79	90	84	40	40	19	717	855	981	100	120	122	936	1,105	1,206

Table 6: Intellectual property protection applications filed in 2005, 2006 and 2007

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	36	38	38	30	30	32	69	73	73
Number of institutions filing no applications	No.	0	0	0	1	1	1	8	7	10	12	12	14	21	20	25
Provisional patents	No.	100	162	106	14	9	3	249	258	274	49	56	68	412	485	451
PCT patents	No.	60	50	63	3	2	2	111	127	123	29	19	34	203	198	222
Innovation patents	No.	1	1	0	0	0	0	1	0	1	0	0	0	2	1	1
Other ³⁶	No.	298	209	190	0	16	52	301	345	344	82	94	41	681	664	627
Total	No.	459	422	359	17	27	57	662	730	742	160	169	143	1,298	1,348	1,301

³⁶ 'Other' refers to other types of intellectual property protection applications such as for National Phase Patents and Plant Breeder's Rights. This category does not include Trademark or Design applications.

PATENT AND PLANT BREEDER'S 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's rights establish legally enforceable protection of rights over intellectual property 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's rights applications filed and issued indicates the level of production of new knowledge that is perceived to have commercial application.

A standard national phase patent gives protection and control over an invention for up to 20 years. Before proceeding to national phase patent applications in Australia or elsewhere, many institutions either take out provisional patents, or seek protection through the Patent Cooperation Treaty (PCT) arrangements³⁷.

An innovation patent is an Australian mechanism specifically designed to protect inventions for a period of eight years that do not meet the inventive threshold required for standard patents. 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.

KEY POINTS

DATA FOR 2005–07

- A small number of institutions account for the majority of patenting activity, most notably CSIRO, which filed the largest total number of applications for a single institution in all three years. In 2005, 2006 and 2007, 30%, 27% and 34% of institutions respectively reported no patent applications filed (Table 6).
- Between 2005 and 2007, the number of patent and plant breeder's rights applications filed by CSIRO fell from 459 to 359, while universities increased from 662 to 742 (Table 6).

³⁷ 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.

- The number of innovation patent applications filed by the entire research sector has remained very low (Table 6) compared to the industry sector.³⁸
- Between 2005 and 2007, the university sector had the highest proportion of new patent applications filed (60%–63%), followed by CSIRO (15%–20%) and then MRIs (15%–19%; Table 7).
- Between 2005 and 2007, 62%–64% of total IP protection applications by the entire research sector were filed outside of Australia. Over the same period, the proportion of total applications filed in Australia and the US remained relatively stable, at approximately 37% and 16% respectively (Table 8).
- Significantly more patents applications were filed 'elsewhere' than in the US (Tables 7 and 8).
- A majority of the total applications filed by CSIRO were outside Australia between 2005 and 2007 (Table 8). However new applications were filed exclusively in Australia and the US over the same period (Table 7). This is a reversal from 2004 results where the majority of new applications were filed elsewhere.
- The number of patents and plant breeder's rights issued increased from 552 in 2005 to 593 in 2006 and then decreased back to 522 in 2007, mainly due to fluctuations in the number of issues to universities (Table 9).
- The total stock of patents and plant breeder's rights has grown from 10,324 in 2005 to 11,237 in 2007 (Table 10). Growth in all areas of the research sector contributed to this result.

TIME SERIES DATA FOR 2000–07

- The number of patents and plant breeder's rights issued worldwide to all respondents declined significantly from 879 in 2004 to a level between 500 and 600 per year during 2005, 2006 and 2007. This is primarily attributable to the high variability in the numbers of patents granted to universities. (Figure 3).

³⁸ Christie AF and Moritz SL (2004; Revised April 2005) Australia's Second-Tier Patent System: A Preliminary Review. Intellectual Property Research Institute of Australia Report No. 02/04.

Table 7: Location of new patent and/or plant breeder's rights applications filed in 2005, 2006 and 2007

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	37	38	38	29	29	29	70	71	71
Filed in Australia	No.	106	153	101	14	10	6	264	260	288	50	48	43	434	471	438
Filed in the US	No.	19	12	14	0	1	4	60	59	57	36	32	44	115	104	119
Filed elsewhere	No.	0	0	0	3	15	41	135	177	145	57	55	33	195	247	219
Total	No.	125	165	115	17	26	51	459	496	490	143	135	120	744	822	776

Table 8: Location of total patent and/or plant breeder's rights applications filed in 2005, 2006 and 2007

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	36	37	37	29	30	30	69	71	71
Filed in Australia	No.	151	185	136	37	34	29	379	334	373	82	79	87	649	632	625
Filed in the US	No.	72	50	56	10	11	16	122	142	122	87	64	82	291	267	276
Filed elsewhere	No.	305	221	204	78	86	109	350	330	384	104	112	118	837	749	815
Total	No.	528	456	396	125	131	154	851	806	879	273	255	287	1,777	1,648	1,716

Table 9: Patent and plant breeder's rights issued in 2005, 2006 and 2007

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	2	2	2	37	38	38	29	30	30	69	71	71
Issued – in Australia	No.	32	40	30	8	6	8	41	48	37	11	10	9	92	104	84
Issued – in the US	No.	40	42	20	8	11	15	33	42	37	10	14	7	91	109	79
Issued – elsewhere	No.	193	187	199	36	32	32	112	131	95	26	30	32	367	380	358
Unspecified ³⁹	No.	0	0	0	0	0	0	0	0	1	2	0	0	2	0	1
Total	No.	265	269	249	52	49	55	186	221	170	49	54	48	552	593	522

³⁹ Indicates instances where institutions provided a total value, but did not specify type.

Table 10: Total patent and/or plant breeder's rights held and pending as at the last day of the reporting period (cumulative number) for 2005, 2006 and 2007

		CSIRO			Other PFRAs			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	37	38	38	30	31	32	71	73	74
Patents pending	No.	1,906	2,004	1,991	248	246	240	2,605	2,866	3,500	608	746	681	5,367	5,862	6,412
Patents issued	No.	2,124	2,210	2,175	102	115	133	1,327	1,417	1,690	537	564	594	4,090	4,306	4,592
Unspecified ³⁹	No.	0	0	0	0	0	0	554	554	0	313	381	233	867	935	233
Held – cumulative total	No.	4,030	4,214	4,166	350	361	373	4,486	4,837	5,190	1,458	1,691	1,508	10,324	11,103	11,237
Culled or lapsed	No.	520	428	528	62	62	175	156	222	518	71	117	176	809	829	1,397

Figure 2: Number of new Australian and US patent and/or patent breeder's rights applications filed by sector 2000–2007

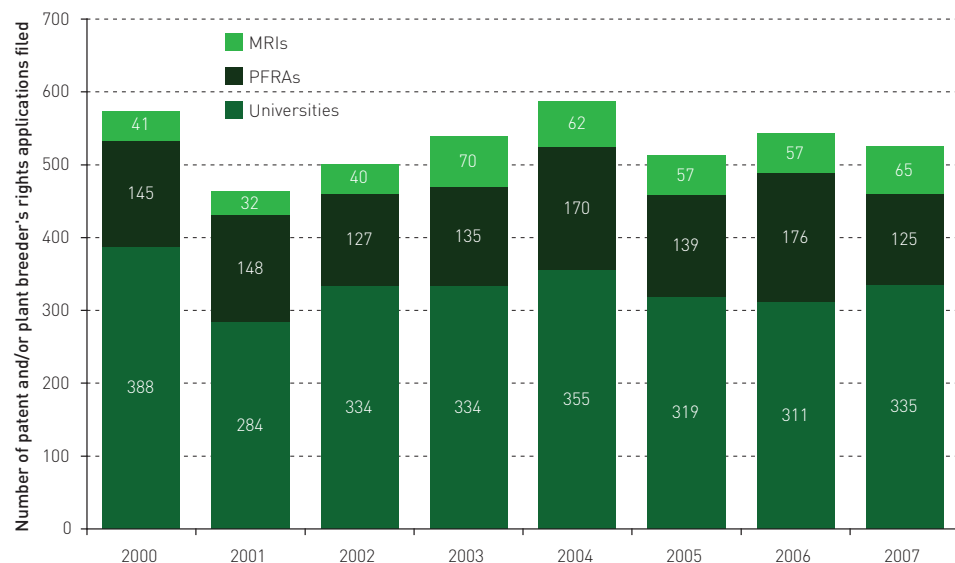
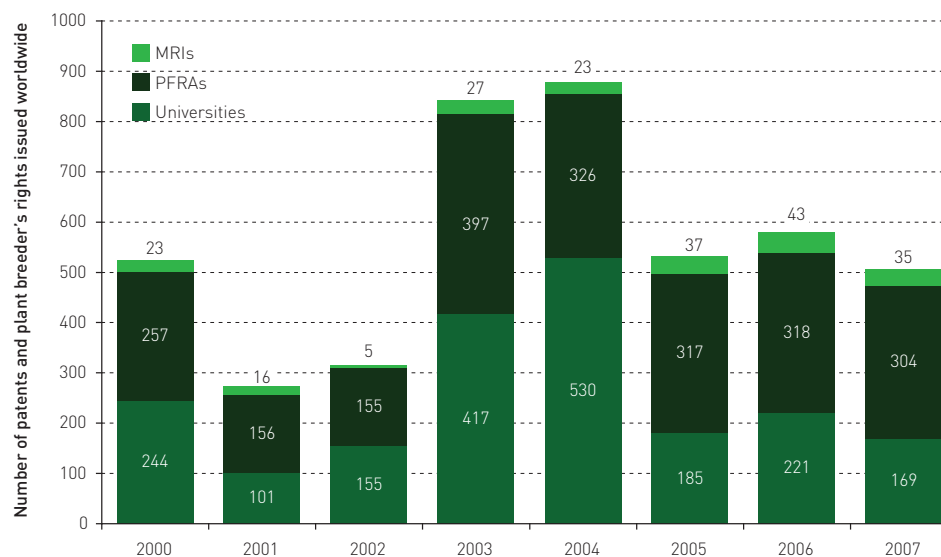


Figure 3: Patent and/or plant breeder's rights issued worldwide by sector 2000–2007⁴⁰



⁴⁰ In figure 3 there is a discontinuity in the data for total patents issued worldwide due to changes in reporting by the Commonwealth Science and Industrial Research Organisation (CSIRO). Between 2000 and 2002 CSIRO only reported patent families.

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 time period during 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 value of LOAs is an approximate measure of the value of intellectual property created through research and development. Income from IP may have a long incubation period from when the original research was conducted, saying as much about institutions' research activity over the last five to ten years as it does about recent developments in 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 intellectual property developed in research institutions but they may also be used where a start-up company is being formed by the institution itself to exploit the invention. LOAs may be granted to develop a new technology but might also represent other intellectual assets such as professional development courses being licensed to other education providers.

The adjusted gross LOA income refers to the gross income of LOAs excluding the LOA income paid to other institutions or commercial entities, including in-kind contributions. Institutions reported uncertainty in estimating the level of sales resulting from licensed IP as many products involve several IP sources and attribution of an income stream becomes difficult. Details of the methodology used can be found in the questionnaire and explanatory notes at Appendix 2 and 3 respectively.

KEY POINTS

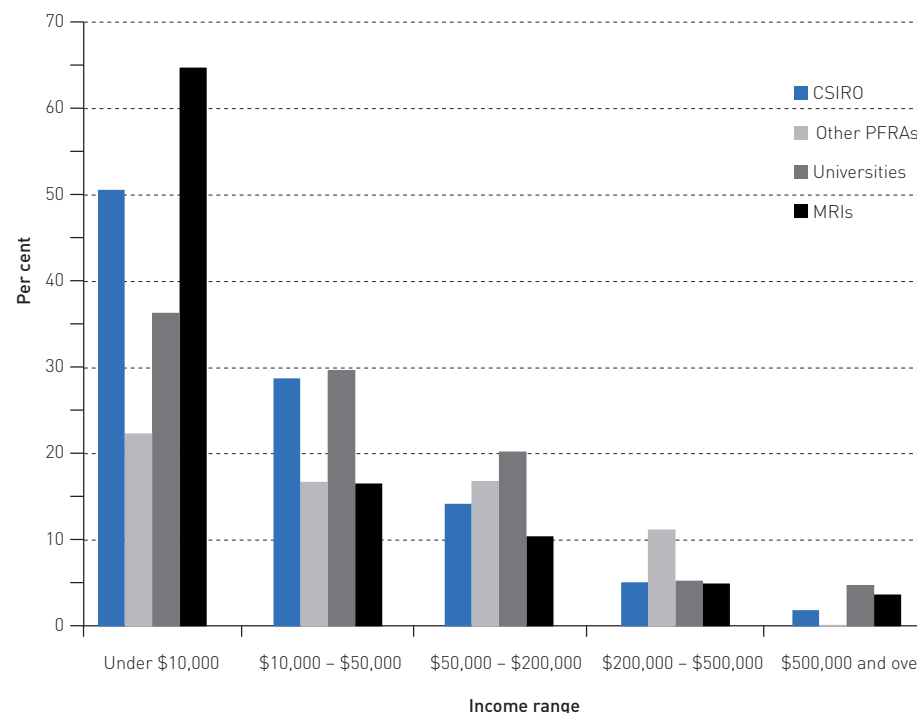
DATA FOR 2005–07

- As with patenting, a small number of institutions account for the majority (up to 75%) of LOA activity.⁴¹ Between 30% and 33% of responding institutions reported no active LOAs in each given year between 2005 and 2007 (Table 11).
- Adjusted gross LOA income for the publicly funded research sector more than tripled between 2005 and 2007 to \$214m (Table 11).

⁴¹ Based on unit record data.

- In aggregate the universities are the most active in the execution of LOAs, followed by the MRIs, CSIRO, and the other PFRAs (Table 11). However, the proportion of these active LOAs yielding income is much higher for CSIRO and MRIs compared to the universities and the other PFRAs.
- As also noted in the 2003–04 NSRC report, the majority of LOA agreements involve very small amounts of income. In 2007 over half of all LOAs were for amounts less than \$50,000 (Figure 4). In 2004 MRIs showed a more even distribution of LOA agreements across all income ranges⁴¹. This is no longer the case.
- The number of cashed in equity transactions varied between 8 and 12 per year for the entire research sector, however, the market value of the cashed in equity increased dramatically from \$8m in 2005 to \$101m in 2007 (Table 11).
- Based on running royalties alone, the estimated level of sales resulting from licensed IP more than doubled from \$3.8b in 2005 to \$8.3b in 2007 (Table 11).

Figure 4: Distribution of LOA agreements by income range in 2007⁴²



⁴² Note that the displayed percentages may not total to 100% as there were a number of LOAs reported where the income range was not specified.

Table 11: Licences, options and assignments (LOAs) in 2005, 2006 and 2007

		CSIRO			Other PFRA			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	34	36	37	31	31	32	69	71	73
Number of institutions reporting no active LOAs	No.	0	0	0	0	0	0	8	7	8	14	14	16	22	21	24
Number of LOAs executed and active																
LOAs executed	No.	80	87	80	13	18	19	269	305	315	95	113	139	457	523	553
LOAs active	No.	373	376	382	77	89	106	776	861	996	172	202	238	1,398	1,528	1,722
Number of Income yielding LOAs by type																
Running Royalties	No.	131	141	143	4	9	14	162	163	196	24	26	26	321	339	379
Cashed in equity	No.	5	1	3	0	0	0	5	11	5	0	0	0	10	12	8
Other types	No.	90	95	74	3	3	4	137	148	144	91	104	129	321	350	351
Unspecified ⁴³	No.	0	0	0	0	0	0	0	6	4	8	8	9	8	14	13
LOAs yielding income	No.	226	237	220	7	12	18	304	328	349	123	138	164	660	715	751
Proportion of LOAs yielding income	No.	61%	63%	58%	9%	13%	17%	39%	38%	35%	72%	68%	69%	47%	47%	44%
LOA income (\$'000)																
Running Royalties	\$'000	14,852	23,485	18,304	361	738	461	11,177	13,686	13,572	5,981	5,546	5,953	32,371	43,455	38,290
Cashed in equity	\$'000	4,478	2,600	381	0	0	0	3,506	17,563	100,117	0	200	276	7,984	20,363	100,774
Other ⁴⁴	\$'000	3,652	10,847	14,723	136	200	140	9,575	11,135	14,866	5,125	13,361	7,969	18,488	35,543	37,698
Unspecified ⁴³	\$'000	0	0	0	0	0	0	9,249	21,081	44,746	0	0	0	9,249	21,081	44,746
Gross income	\$'000	22,982	36,932	33,408	497	938	601	33,507	63,466	173,301	11,106	19,107	14,198	68,092	120,443	221,508
Income reported as paid to other entities	\$'000	2,617	4,514	2,830	0	0	0	1,816	1,692	2,013	2,152	2,524	2,190	6,585	8,730	7,033
Adjusted gross LOA income ⁴⁵	\$'000	20,365	32,418	30,578	497	938	601	31,691	61,773	171,287	8,954	16,583	12,008	61,507	111,712	214,474
Estimated level of sales resulting from licensed technologies (\$'000)																
Estimate based on running royalties	\$'000	1,480,000	2,338,000	1,823,000	24,375	27,355	29,826	2,097,660	2,435,517	6,231,272	231,914	238,776	236,468	3,833,949	5,039,648	8,320,566

⁴³ Indicates instances where institutions provided a total value, but did not specify type.

⁴⁴ 'Other' refers to all remaining types of LOA income not covered by running royalties or cashed in equity.

⁴⁵ Adjusted LOA income is the total amount of income from licences, options and assignments of intellectual property, less amounts paid to other institutions in respect of the overall transaction.

TIME SERIES DATA FOR 2000–07

- Overall, the number of LOAs executed per year has increased by 32% (Figure 5) and the number yielding income per year has increased by 51% (Figure 6) from 2000 to 2007. In constant 2007 prices, overall adjusted gross LOA income has increased by 70% from \$125m in 2000 to \$213m in 2007 (Figure 7).
- Income derived from LOAs is highly variable and long term trends can be interrupted by single transactions. For example, in 2000 the University of Melbourne recorded a single transaction worth \$50m in current prices.⁴⁶
- MRIs have exhibited strong growth with the number of LOAs executed per year increasing from 12 in 2000 to 133 in 2007 (Figure 5). In addition, the number of LOAs yielding income for MRIs has increased from 17 in 2000 to 150 in 2007 (Figure 6). The adjusted LOA income in 2007 prices has remained low (Figure 7). This result is consistent with the distribution of the number of LOAs yielding income towards lower value categories (Figure 4).
- The number of LOAs executed per year by universities has increased by 34% between 2000 and 2007 (Figure 5). The total number of LOAs yielding income for universities grew by 38% from 252 in 2000 to 349 in 2007 (Figure 6). Adjusted LOA income declined steadily between 2000 and 2005 but showed dramatic increases in 2006 and 2007 (Figure 7). These increases were dominated by two universities: University of Queensland reported income of \$21m in 2006 and \$45m in 2007, in part comprising earnings from its licensing of GARDASIL™. Monash University reported LOA income of \$101m in 2007, including earnings from its assignment of Monash IVF.
- For the PFRAs, the number of LOAs executed per year showed great variability, with a low point in 2004 (Figure 5).
- For the PFRAs, the number of LOAs yielding income has remained high by reference to the university sector (averaging approximately 80% that reported for all universities between 2000 and 2007) and was relatively stable between 2004 and 2007 at around 239 per year (Figure 6).
- For the PFRAs, adjusted LOA income more than doubled from \$12m in 2000 to \$31m in 2007 (Figure 7). These PFRA results are dominated by CSIRO. The degree of this dominance is evident by considering the 2005–07 data in Table 11 which shows that in each of these years CSIRO makes up greater than 97% of the LOA income generated by the PFRAs.

⁴⁶ Australian Research Council et al. (2002) *National Survey of Research Commercialisation: Year 2000*, Available at: www.innovation.gov.au/Section/Innovation/Pages/TheNationalSurveyofResearchCommercialisation.aspx

Figure 5: Number of LOAs executed by sector 2000–2007

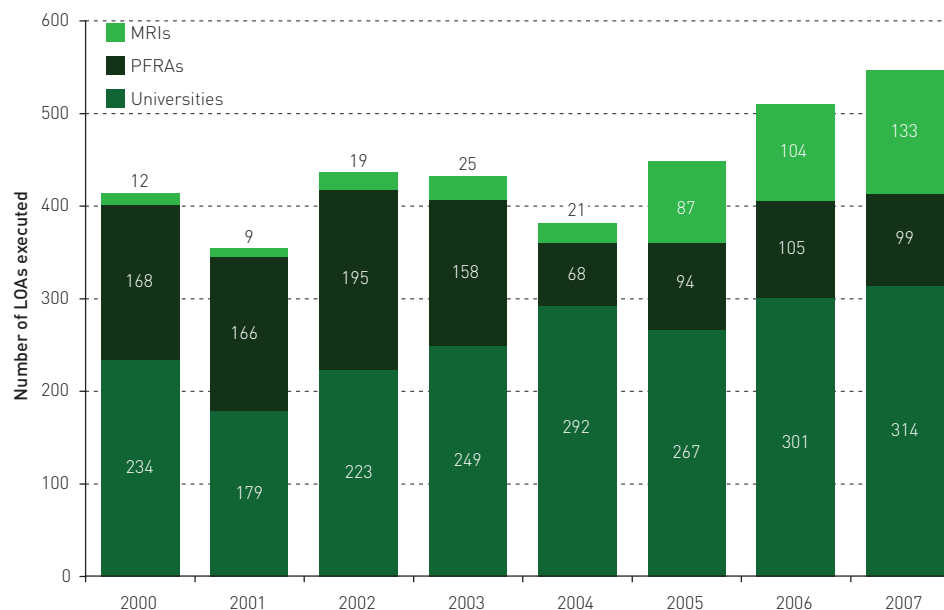


Figure 6: Number of LOAs yielding income by sector 2000–2007

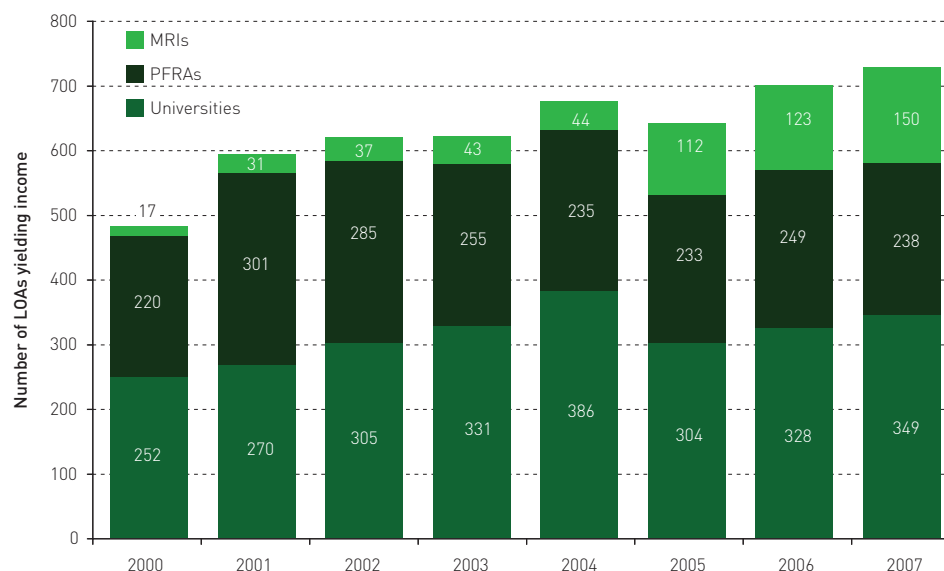
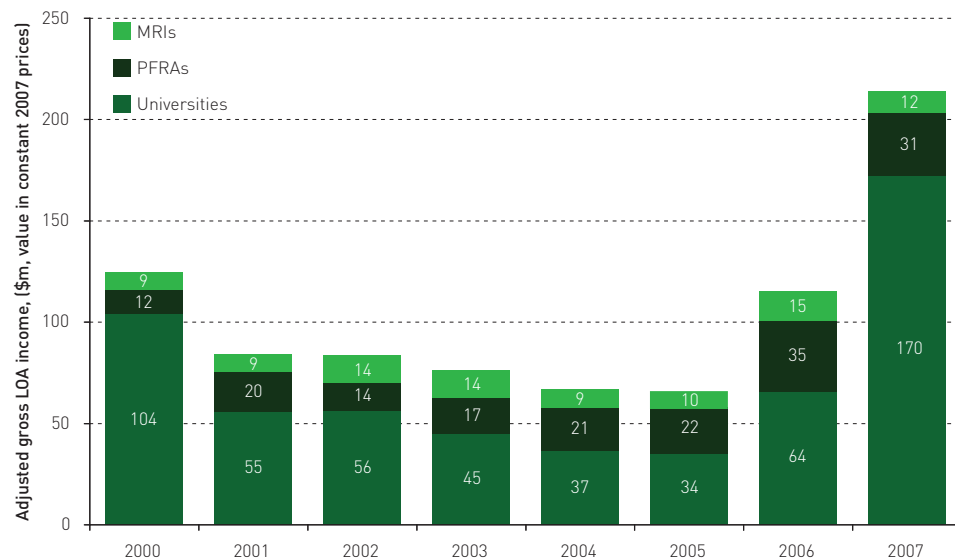


Figure 7: Adjusted gross LOA income by sector 2000–2007



START-UP COMPANY ACTIVITY

Start-up company formation is a significant avenue for commercialisation for Australian research institutions and can provide some insight into 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 intellectual property. Start-up companies are engaged in activities initially based on the licensing or assignment of intellectual property from research institutions. A list of start-ups formed in 2005, 2006 and 2007 can be found in Appendix 4.

KEY POINTS

DATA FOR 2005–07

- Capital raising for research commercialisation activities increased from \$45m in 2005 to \$199m in 2007. Universities were most active in capital raising, being responsible for between 87%–75% of total financing over the three year period 2005–2007 (Table 12). Unlike the trends seen in IP protection and LOA activity the MRIs raise roughly equivalent or more capital than the PFRAs combined (Table 12).
- Initial public offerings generated a considerable proportion (58%) of total capital raised for universities in 2007. However most capital raising over the 2005–2007 period occurred through other mechanisms, for example, UniSeed funding or other venture capital investment (Table 12).
- The MRIs significantly grew in their capital raising from a very low base in 2005, achieving \$37.3m in 2007 (Table 12).
- The research sector held equity in 77%–83% of start-up companies which were dependent on licensing IP from its host institution between 2005 and 2007 (Table 13). The value of institutional equity holdings for the research sector increased from \$159m in 2005 to \$196m in 2007 (Table 13). Although the universities have the highest number and value of equity holdings, the growth in the value of all equity holdings was driven by CSIRO and the MRIs.

TIME SERIES DATA FOR 2000–07

- The number of start-up companies formed each year for the research sector has decreased by 30% from 47 in 2000 to 33 in 2007 (Figure 8). However, the total number of start-ups operational with institutional equity has increased by 191% from 69 in 2000 to 201 in 2007, suggesting good sustainability of new start-ups (Figure 9). This growth was across all sectors.
- The value of institutional equity in start-ups increased by 21% from \$153m in 2000 to \$185m in 2007 (Figure 10). These results are complex. University equity holdings peaked in 2004 and then declined. PFRAs' equity holdings declined from 2000 to 2004 but have shown relatively high growth between 2004 and 2007. After a large devaluation between 2000 and 2001, MRIs have subsequently shown trend growth in equity holdings (Figure 10).

- Similar to the findings of previous surveys,^{47,48} most of the start-ups have been formed from intellectual property generated from life science research.

Figure 8: Number of start-up companies formed per year by sector 2000–2007

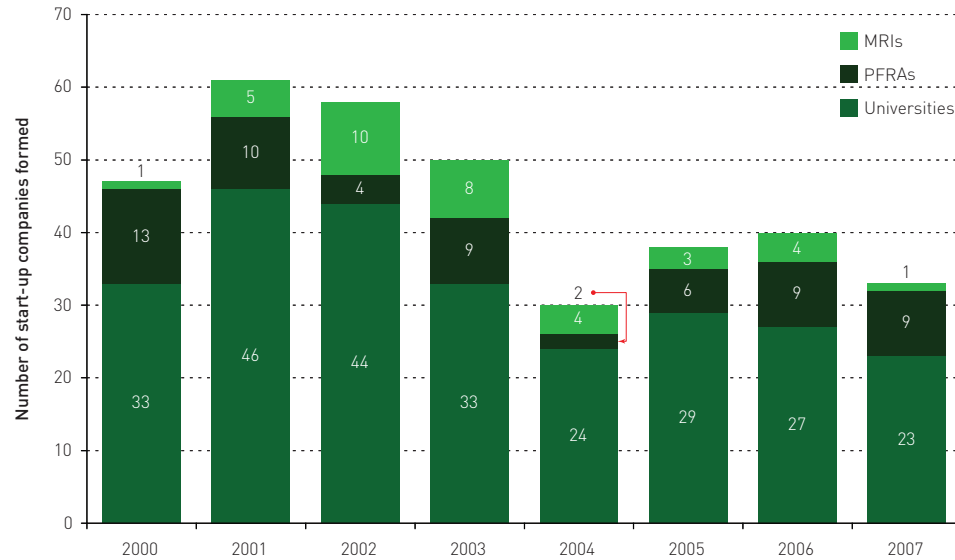


Figure 9: Number of start-up companies operational at year's end with institutional equity stake by sector 2000–2007

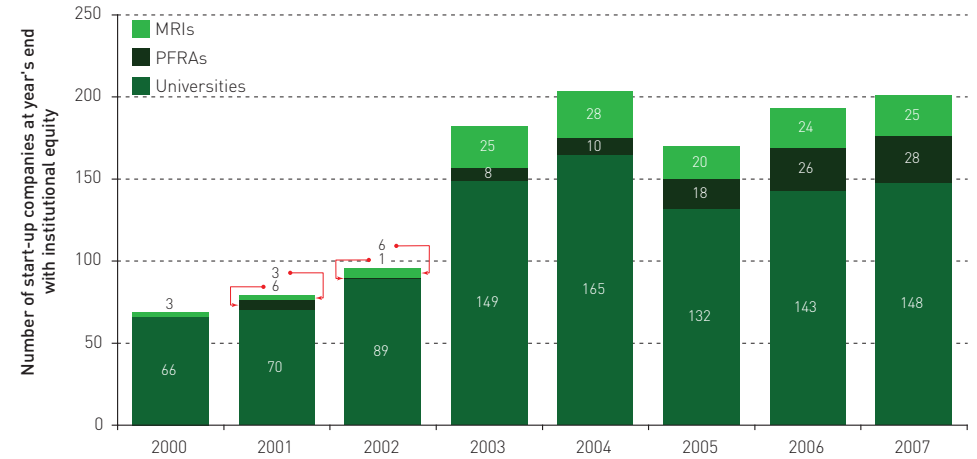
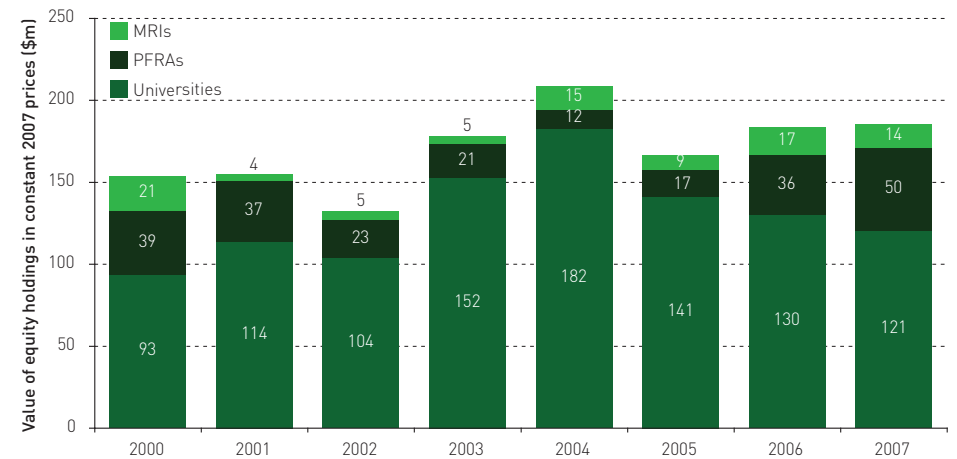


Figure 10: Value of research commercialisation equity holdings by sector 2000–2007



47 Department of Education, Science and Training. 2004. *National Survey of Research Commercialisation: Years 2001 and 2002*. Canberra: Department of Education, Science and Training (page 24). Available at www.innovation.gov.au/Section/Innovation/Pages/TheNationalSurveyofResearchCommercialisation.aspx

48 Department of Education, Science and Training. 2007. *National Survey of Research Commercialisation 2003–2004 and commercialisation case studies*. Canberra, Department of Education, Science and Training. Available at www.innovation.gov.au/Section/Innovation/Pages/TheNationalSurveyofResearchCommercialisation.aspx

Table 12: Capital raising for research commercialisation activities in 2005, 2006 and 2007⁴⁹

		CSIRO			Other PFRAAs			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	33	34	35	29	30	31	66	68	70
Initial Public Offerings ⁴⁹	No.	0	0	0	0	0	0	1	0	3	0	2	1	1	2	4
	\$'000	0	0	0	0	0	0	3,500	0	86,000	0	0	8,312	3,500	0	94,312
Other	No.	1	6	4	0	0	0	32	41	47	2	4	4	35	51	55
	\$'000	2,875	13,650	12,500	0	0	0	35,736	76,594	63,023	2,800	12,000	28,946	41,411	102,244	104,469
Total Financing	No.	1	6	4	0	0	0	33	41	50	2	6	5	36	53	59
	\$'000	2,875	13,650	12,500	0	0	0	39,236	76,594	149,023	2,800	12,000	37,258	44,911	102,244	198,781

Table 13: Start-up company formation and equity positions in 2005, 2006 and 2007

		CSIRO			Other PFRAAs			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	35	37	36	30	30	31	69	71	71
New start-up companies formed ⁵⁰	No.	6	7	9	0	2	0	30	29	26	4	5	2	40	43	37
Number of institutions responding	No.	1	1	1	3	3	3	34	37	36	30	30	31	68	71	71
Operational start-up companies which are dependent on licensing/ assignment of technologies	No.	17	23	25	3	5	5	176	179	182	30	36	35	226	243	247
Start-up companies in which institutions have an equity holding	No.	17	23	25	1	3	3	136	146	150	21	25	27	175	197	205
Gross percentage of start-up companies with an equity holding by an institution that are dependent on the same institution's IP ⁵¹	%	100%	100%	100%	33%	60%	60%	77%	82%	82%	70%	69%	77%	77%	81%	83%
Number of institutions responding	No.	1	1	1	3	3	3	36	37	37	27	29	30	67	70	71
Value of all equity holdings	\$'000	14,817	34,728	50,154	0	0	0	134,009	130,194	127,486	10,114	19,747	17,973	158,940	184,669	195,613

49 An MRI reported initial public offerings in 2006 but did not report capital generated from those offerings.

50 Two universities reported a total of 3, 5 and 7 start-up companies formed for 2005, 2006 and 2007 respectively, but did not name these companies. Hence, whilst they are included in this table, they do not appear in Appendix 4.

51 This represents an average percentage, only for institutions that responded, of start up companies dependent on an institution's IP for their operation where the same institution holds equity.

RESEARCH CONTRACTS AND CONSULTANCY ACTIVITY

The number and value of research contracts and consultancies shows that the impact of the Australian research base is broader than the income received by institutions for the direct commercialisation of their intellectual property. Contract research usually involves a bilateral relationship between a research institution and an external client where the institution provides a research service with objectives dictated by the client.

Consultancy on the other hand 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 client in a different sector.

In the 2005–07 NSRC, institutions were asked to identify consultancy agreements and research conducted for external clients, as well as the provision of expert advice based on existing research knowledge, skills and capabilities. Income presented 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. These data serve as a useful proxy for the value and impact of knowledge exchange, the degree of collaboration between research and industry sectors, and other related activities which impact on the economy and society.

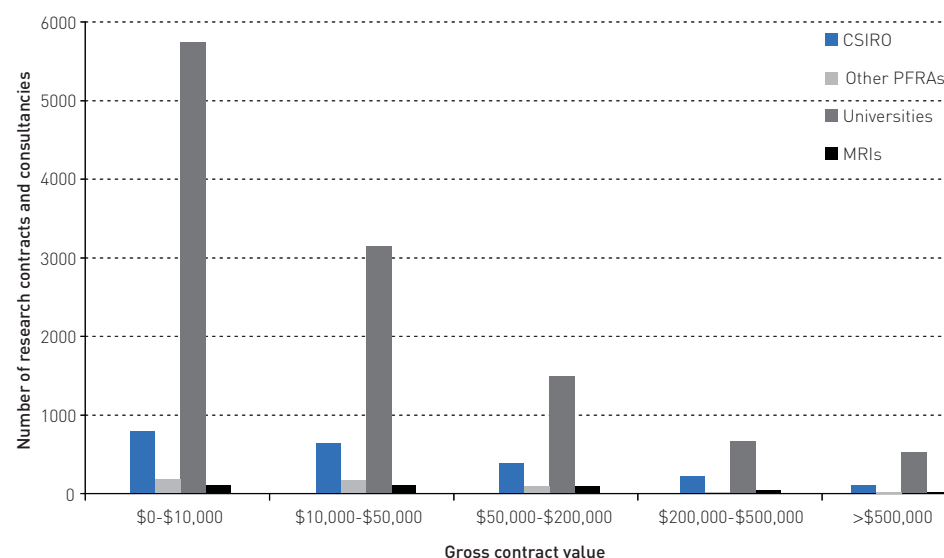
KEY POINTS

DATA FOR 2005–07

- In the period 2005 to 2007, 74%–79% of respondent institutions reported research contracts or consultancies (Table 14). This is a higher participation rate relative to other commercialisation activities such as patenting and LOA activity which have participation rates of 67%–70% (Table 11).
- Although the total number of research contracts and consultancies declined by 13% from 16,585 in 2005 to 14,496 in 2007, the total value of research contracts and consultancies grew by 18% from \$1.0b in 2005 to exceed \$1.2b in 2007 (Table 14).

- Many institutions did not identify repeat business. Of those that did respond, the percentage of contracts and consultancies that were repeat business was 25%–32% between 2005 and 2007 (Table 14).
- For 2007, the value of individual contracts and consultancies were highly skewed to low values. Greater than 75% of contracts and consultancies were for amounts less than \$50,000 and 47% for amounts less than \$10,000 (Figure 11). Although the results for 2007 only are presented in Figure 11, the results are similar for 2005 and 2006.

Figure 11: Number of research contracts and consultancies by range of contract value in 2007⁵²



⁵² 80 University research contracts and consultancies were not reported by contract value.

Table 14: Research contracts and consultancies number and value in 2005, 2006 and 2007

		CSIRO			Other PFRA's			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	37	38	32	30	31	38	71	73	74
Number of institutions reporting no contracts and consultancies	No.	0	0	0	0	0	0	4	6	4	11	13	14	15	19	18
Number of contracts and consultancies	No.	2,512	2,320	2,116	511	646	386	13,248	12,946	11,658	314	354	336	16,585	16,266	14,496
Value of contracts and consultancies	\$'000	285,676	259,633	305,649	12,561	20,404	23,697	713,901	769,801	864,507	30,808	28,680	39,633	1,042,946	1,078,518	1,233,486
Number of institutions responding to repeat business question	No.	1	1	1	3	3	3	21	23	23	27	30	30	52	57	57
Number of contracts and consultancies for institutions responding to this question	No.	2,512	2,320	2,116	511	646	386	7,599	4,831	4,986	279	349	329	10,901	8,146	7,817
Number of contracts and consultancies that were for repeat business	No.	880	715	594	263	215	209	1,421	1,422	1,487	172	201	193	2,736	2,553	2,483
Gross percentage of repeat business per institution ⁵³	%	35%	31%	28%	51%	33%	54%	19%	29%	30%	62%	58%	59%	25%	31%	32%
Gross contracted value																
\$0-\$10,000	No.	1,065	895	789	321	454	156	7,218	7,050	5,753	81	102	82	8,685	8,501	6,780
\$10,000-\$50,000	No.	701	699	637	140	122	138	3,331	3,149	3,152	105	118	120	4,277	4,088	4,047
\$50,000-\$200,000	No.	470	426	381	37	55	77	1,371	1,710	1,491	91	99	88	1,969	2,290	2,037
\$200,000-\$500,000	No.	173	173	208	7	14	11	737	735	663	20	23	30	937	945	912
>\$500,000	No.	103	127	101	6	1	4	591	302	519	17	12	16	717	442	640
Unspecified ⁵⁴										80						80
Total	No.	2,512	2,320	2,116	511	646	386	13,248	12,946	11,658	314	354	336	16,585	16,266	14,496

53 A limited number of respondents answered this question. For this reason the percentage of repeat business is only calculated for those who did respond to the question.

54 Indicates instances where institutions provided a total value, but did not specify value bracket.

SKILLS DEVELOPMENT AND KNOWLEDGE EXCHANGE ACTIVITY

Research institutions' efforts to realise their commercialisation potential through professional development and other knowledge transfer activities are well documented. The NSRC obtained 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 its implications.

KEY POINTS

DATA FOR 2005–07

- Between 2005 and 2007 the percentage of institutions offering research commercialisation and entrepreneurship training to its staff and students either through in-house or external training, increased slightly from 63% to 66% (Table 15).
- Participation by researchers and research students increased significantly by 61% from 2,345 in 2005 to 3,784 participants in 2007. This was driven by a large increase in 2007 within the university sector (Table 15).
- The percentage of institutions offering training to end users of research, such as industry, to help them understand research findings is low (11%–16%) compared to other training courses offered to staff and students (Table 15). This end user training increased in 2007 when four more universities offered these courses.
- The number of research postgraduates employed by start up companies grew by 20% from 84 in 2005 to 101 in 2007 (Table 15). This growth was driven by MRI postgraduates employed by start-up companies. These numbers are similar to 2003 and 2004 levels.

Table 15: Skills development and transfer in 2005, 2006 and 2007

		CSIRO			Other PFRA's			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	0	1	1	3	3	3	36	37	37	28	29	32	67	70	73
Institutions offering in-house and/or external training	No.	0	1	1	2	2	2	27	30	32	13	14	13	42	47	48
Training offered to researchers and research students																
Institutions offering in-house training	No.	0	1	1	1	2	2	25	27	27	10	11	10	36	41	40
In-house training participants	No.	0	83	128	0	126	195	2,230	2,265	3,234	115	162	227	2,345	2,636	3,784
Institutions offering external training	No.	0	0	0	2	2	1	18	20	18	8	8	8	28	30	27
External training participants	No.	0	0	0	17	12	0	318	270	299	2	3	3	337	285	302
Training offered to industry & others to assist understanding of research findings																
Institutions offering training	No.	0	1	1	0	0	0	7	6	10	1	1	1	8	8	12
Number of participants	No.	0	903	1,431	0	0	0	958	904	1,409	89	90	119	1,047	1,897	2,959
Research post graduates employed in start-up companies	No.	0	0	0	0	0	0	53	53	54	31	38	47	84	91	101

RESEARCH COMMERCIALISATION RESOURCES

The commitment of institutions to capture the 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 with functional units within an institution.

Table 16: Commercialisation staff numbers and staff costs in 2005, 2006 and 2007

		CSIRO			Other PFRA's			Universities			MRIs			Total		
		2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007
Number of institutions responding	No.	1	1	1	3	3	3	37	38	38	31	31	32	72	73	74
Number of institutions reporting no commercialisation staff	No.	0	0	0	0	0	0	4	5	3	11	12	13	15	17	16
Number of dedicated commercialisation staff	No.	140	139	110	13	12	10	125	131	152	21	24	25	299	306	297
Number of Other ⁵⁵ staff	No.	43	43	32	7	7	8	132	130	145	7	10	11	189	190	196
Number of commercialisation staff total	No.	183	182	142	20	19	18	257	261	297	28	34	36	488	496	493
Cost of dedicated commercialisation staff	\$'000	20,418	21,237	19,164	1,670	1,628	1,331	14,138	14,647	17,161	1,925	2,697	2,963	38,151	40,209	40,619
Cost of other staff	\$'000	3,776	4,020	3,072	607	687	768	9,519	9,997	11,404	801	977	1,170	14,703	15,681	16,414
Unspecified ⁵⁶	\$'000										318	323	462	318	323	462
Cost of commercialisation staff total	\$'000	24,194	25,257	22,236	2,277	2,315	2,099	23,657	24,644	28,565	3,044	3,997	4,595	53,172	56,213	57,495
External fees and legal costs	\$'000	5,141	7,125	6,045	685	763	879	8,491	9,602	12,489	2,825	3,824	3,419	17,142	21,314	22,832
Internal fees and legal costs ⁵⁷	\$'000				37	49	60	831	901	1,139	218	223	196	1,086	1,173	1,395
Revenue from licensees as reimbursement of expenses	\$'000	690	809	503	30	33	219	2,215	2,469	4,346	640	686	660	3,575	3,997	5,728
Net total other commercialisation costs⁵⁸	\$'000	4,451	6,316	5,542	692	779	720	7,107	8,034	9,282	2,403	3,361	2,955	14,653	18,490	18,499
Total commercialisation staff and other costs	\$'000	28,645	31,573	27,778	2,969	3,094	2,819	30,764	32,678	37,847	5,447	7,358	7,550	67,825	74,703	75,994

⁵⁵ Includes staff employed in the University of New England Agricultural Business Research Institute (ABRI) who are involved in producing, selling, upgrading and adapting to client requirements animal genetics software products. ABRI staff totalled 76, 78 and 80 in 2005, 2006 and 2007, respectively. The cost of these staff amounted to \$5.7, \$6.0 and \$6.3m in 2005, 2006 and 2007, respectively.

⁵⁶ Indicates instances where institutions provided a total value, but did not specify type.

⁵⁷ The CSIRO did not report on internal fees and legal costs of commercialisation.

⁵⁸ Revenue from licensees as reimbursement of expenses is offset against fees and costs to arrive at the net total other commercialisation costs.

KEY POINTS

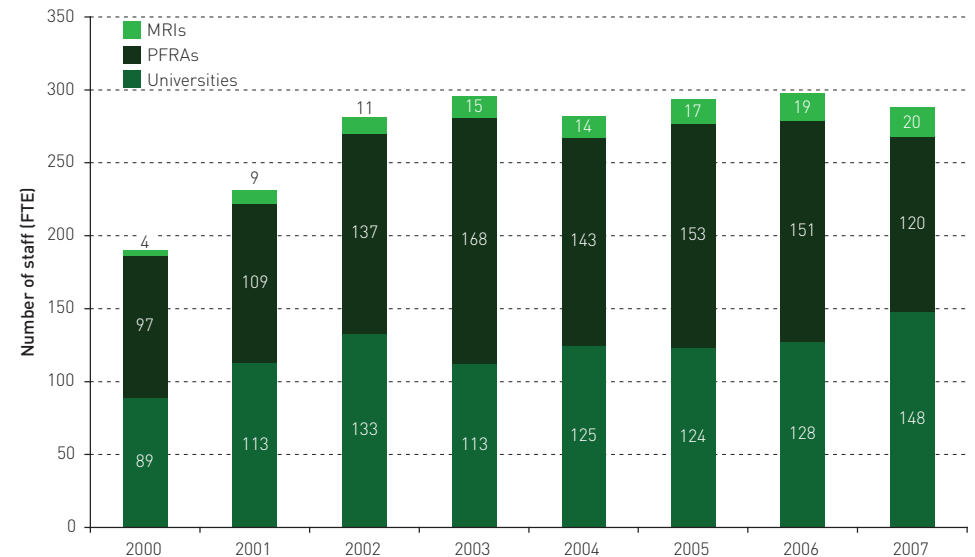
DATA FOR 2005–07

- Between 21%–23% of all institutions indicated they had no staff engaged in a dedicated commercialisation role or as commercialisation support staff (Table 16).
- The commercialisation staff levels over the 2005 to 2007 period remained stable just below 500 full-time equivalent (FTE) (Table 16). However a decline in total staff for CSIRO and an increase for the universities underlies this stability in total staffing levels, notably between 2006 and 2007.
- The cost to institutions of conducting research commercialisation activities, including staffing and other costs, increased by 12% from \$68m in 2005 to \$76m in 2007 (Table 16). Although there was a 60% increase in revenue from the reimbursement of expenses from \$3.6m in 2005 to \$5.7m in 2007, this was offset by a 33% increase in fees and legal costs from \$18.3m in 2005 to \$24.2m in 2007 (Table 16).

TIME SERIES DATA FOR 2000–07

- The time series data shows that over the period from 2000 to 2007, the total level of commercialisation staff across all research institutions increased by 52%. The level grew rapidly from 190 in 2000 to 296 in 2003 and has remained relatively stable to 2007. The MRIs have shown significant growth throughout this period from a low base of 4 FTEs in 2000 to 20 in 2007 (Figure 12).

Figure 12: Number of dedicated commercialisation staff by sector 2000–2007



3. COUNTRY COMPARISONS

Broad comparisons between Australian and overseas performance in commercialisation are made in this chapter. Metrics used to undertake the international comparisons are:

- Full-Time Equivalent staff (FTE) dedicated to licensing intellectual property (or commercialising research in general) per institution;
- invention disclosures per US\$100m research expenditure;
- patents issued per US\$100m research expenditure;
- licences, options and assignments (LOAs) executed per US\$100m research expenditure;
- LOA income per US\$100m research expenditure; and
- start-up company activity per US\$100m research expenditure.

The total research expenditure is used to normalise the reported commercialisation activity in the four countries. This allows comparison of commercialisation activity between the significantly different systems operating in Australia, United States (US), Canada and the United Kingdom (UK). Reported values are also adjusted using purchasing price parity indices.

As noted above, there are substantial scale, structural and systemic differences between each country's higher education and publicly funded research systems, which impact on the interactions between research institutions, industry and government. Differences in legislation, industry structure, market characteristics and government policy all impact on the incentives and strategies for research commercialisation in each of these countries.

Consequently, the data in the surveys is not intended to capture all of the publicly funded research commercialisation activity; rather it provides insights into the major areas of activity as reported by the institutions performing the majority of work in each country.

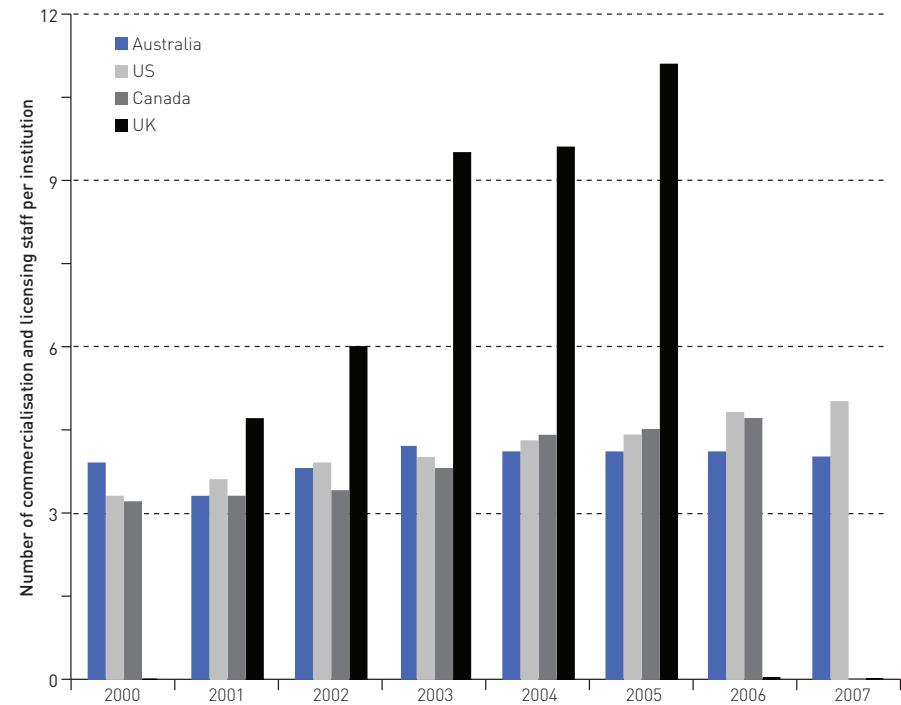
RESULTS

KEY POINTS (REFERENCE TABLE 3)

- The number of Full-Time Equivalents (FTEs) dedicated to research commercialisation by Australian institutions averaged 3.9 between 2000 and 2007 (Figure 13), with a low point in 2001. The US and Canadian results showed a gradual increase since 2000. The UK commercialisation staff levels have also increased since 2001, with significantly higher levels (11.1) than Australia, the US and Canada by 2005 .
- The number of invention disclosures per \$US100m research expenditure by Australian institutions increased by 40% from a low base between 2000 (20) and 2007 (28) (Figure 14). Between 2000 and 2006, the US, Canada showed declines against this metric, and the UK had a 15% increase. The averages between 2000 and 2006 for the US, Canada and the UK are 42, 44 and 51 respectively.
- The number of US patents issued to Australian institutions per \$US100m research expenditure oscillated between 2000 and 2007, starting at 4 in 2000, peaking at 6 in 2004, and falling to 2 in 2007 (Table 3, Figure 15a). The US and Canada display a consistent decline in issued US patents per research expenditure between 2000 and 2007 (Figure 15a). Between 2000 and 2003, for both Canada and the US, this decline is due to a higher rate of increasing research expenditure than the slightly increasing rate of absolute US patents issued. Between 2003 and 2006, the decline is due to an increasing research expenditure, **and** a steady decrease in the absolute number of US patents.
- For Australia, the oscillatory trend present in the number of US patents issued (Figure 15a) is also reflected in the total number of patents issued (Figure 15b). The UK shows a gradual increase in the total number of patents issued from 2001 to 2004, at which point it declines slightly and plateaus till 2006 (Figure 15b). The total number of patents issued for the UK is significantly lower than Australian levels, especially for 2003 and 2004.

- The number of LOAs executed per \$US100m research expenditure by Australian institutions since 2000 has remained relatively stable, varying around an average of 12.9 (Figure 16). This is in line with the US and Canada LOAs executed that have remained comparably constant between 2000 and 2006, the exception being Canada in 2006. Canada reported a decline of 25% from 2005 to 2006. The UK experienced a dramatic increase in LOAs executed in 2003 and has maintained those levels, greatly exceeding Australia, Canada and the US, at 47 in 2006. The HE-BCI report attributes the 2003 jump to two Higher Education Institutions. However, the report acknowledges that this rapid increase could be a consequence of better reporting as well as an increase in the level of licensing activity.⁵⁹
- Australia's LOA income as a percentage of research expenditure has been highly variable, starting from 2.9% in 2000, then falling to 1.3% in 2004 and 2005, only to rapidly increase from 2006 to 3.6% in 2007 (Figure 17). In both 2000 and 2006, the sharp rises can be attributed to a few individual LOAs. This provides a clear indication of the sensitivity of the metric to just a few transactions. The Canadian results show a gradual decline from a peak of 2.3% in 2001 to 1.2% in 2007. Between 2000 and 2006, the US has a significantly higher average rate of return at 4.1%. The UK has displayed a gradual increase since 2000, bringing it into near parity with Canada by 2006.
- Australian start-up companies formed per \$US100m research expenditure have gradually declined from a peak of 2.2 in 2001 to 0.9 in 2007 (Figure 18). The US declined in 2002 and has subsequently remained roughly constant. Canada has followed the Australian example, declining from the high level of 3.8 in 2000 to 0.8 by 2006, below the Australian and US values of 1.2 and 1.2 respectively in 2006. The UK also declined against this metric from 5.4 in 2000 to 2.4 in 2004. However, this trend was reversed in 2005 and 2006, increasing to 3.2 by 2006.

Figure 13: International comparison of average numbers of commercialisation and licensing staff (FTEs) per institution, 2000–2007⁶⁰



⁵⁹ Higher Education Funding Council for England (2006) Higher Education – Business and Community Interaction Survey 2003–04. Policy Development Report on survey July 2006/25, HEFCE, Bristol, UK. Available at www.hefce.ac.uk

⁶⁰ Staff numbers are licensing full time equivalents (FTEs) only and do not include other staff who may support commercialisation activities. Data relates only to those institutions that had some commercialisation staff or commercialisation activity in the period.

Figure 14: International comparison of the number of invention disclosures per \$US100m research expenditure, 2000–2007

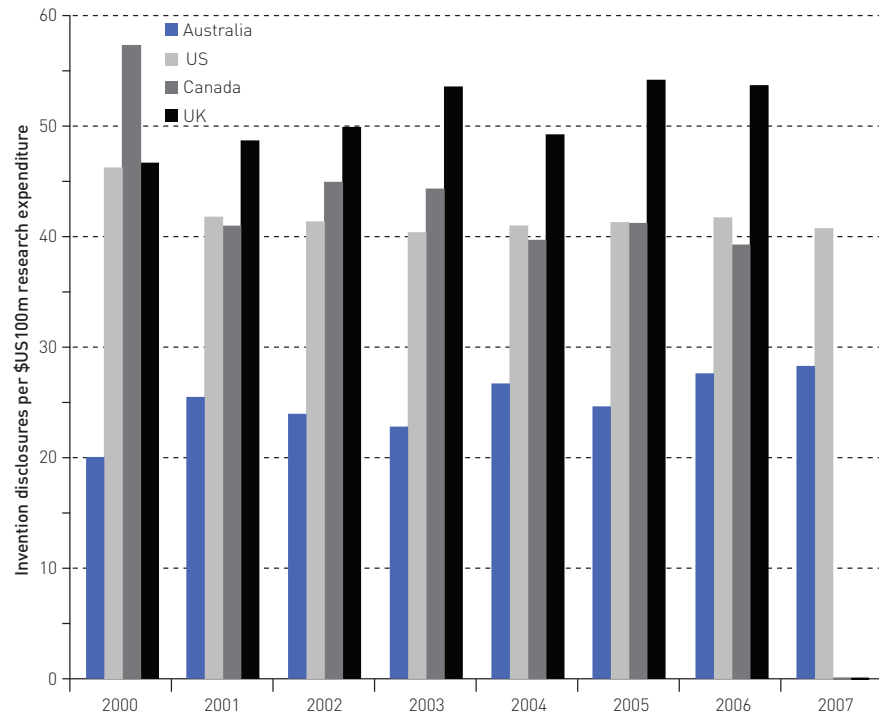
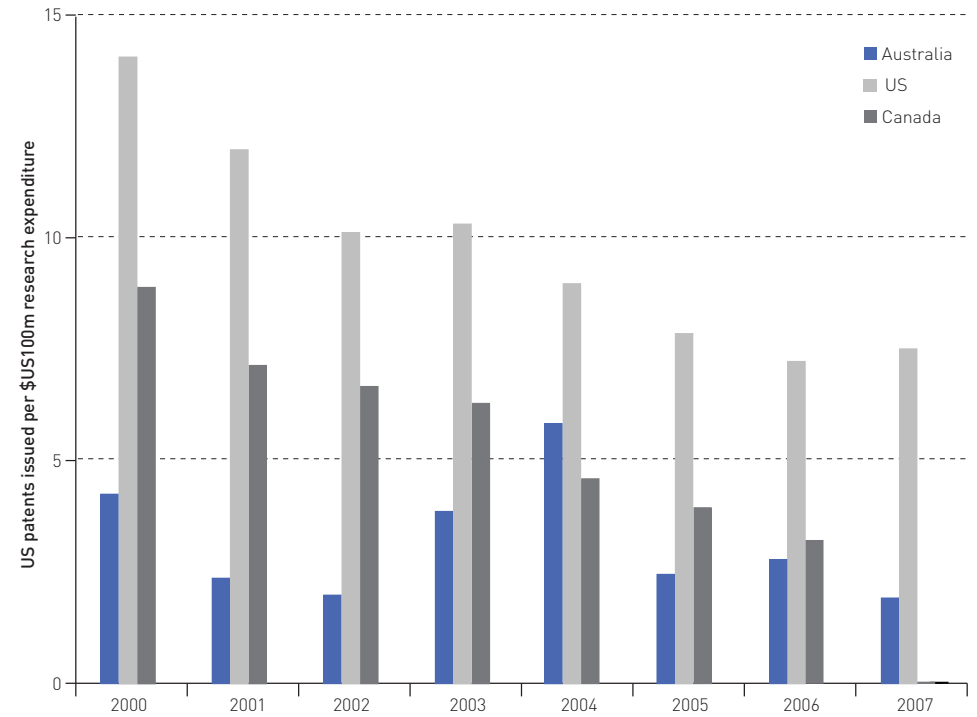


Figure 15a: International comparison of the number of US patents issued per \$US100m research expenditure, 2000–2007⁶¹



⁶¹ US patents issued was not available for the UK as a function of research expenditure. The metric used for the UK is the total number of patents issued, including domestic and international (refer to Figure 15b).

Figure 15b: Comparison of total patents issued per \$US100m research expenditure for the UK and Australia, 2000–2007^{62 63}

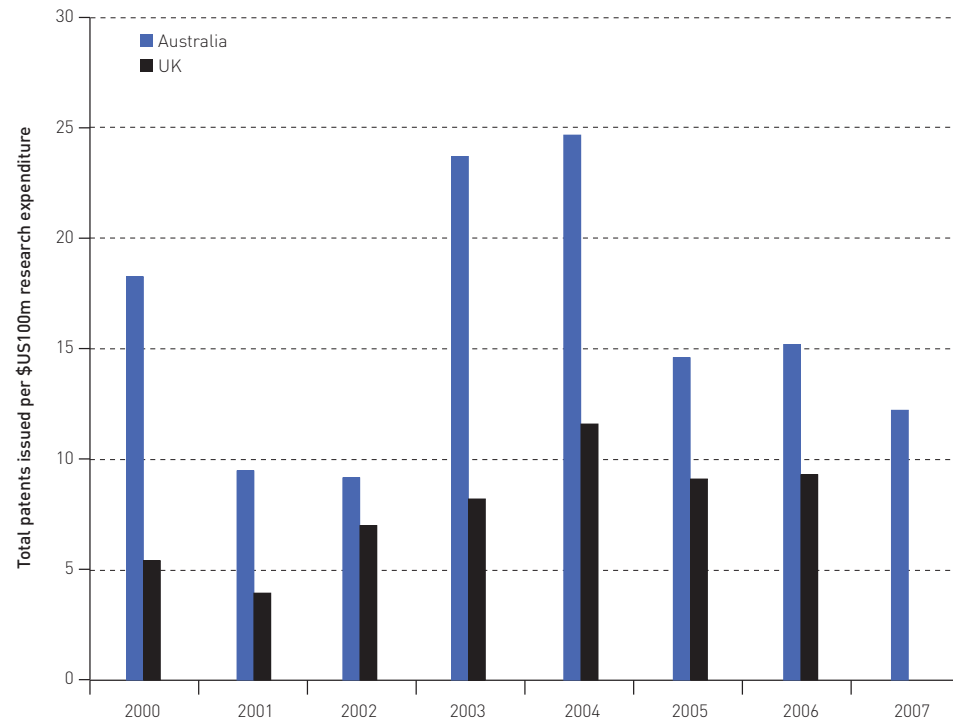
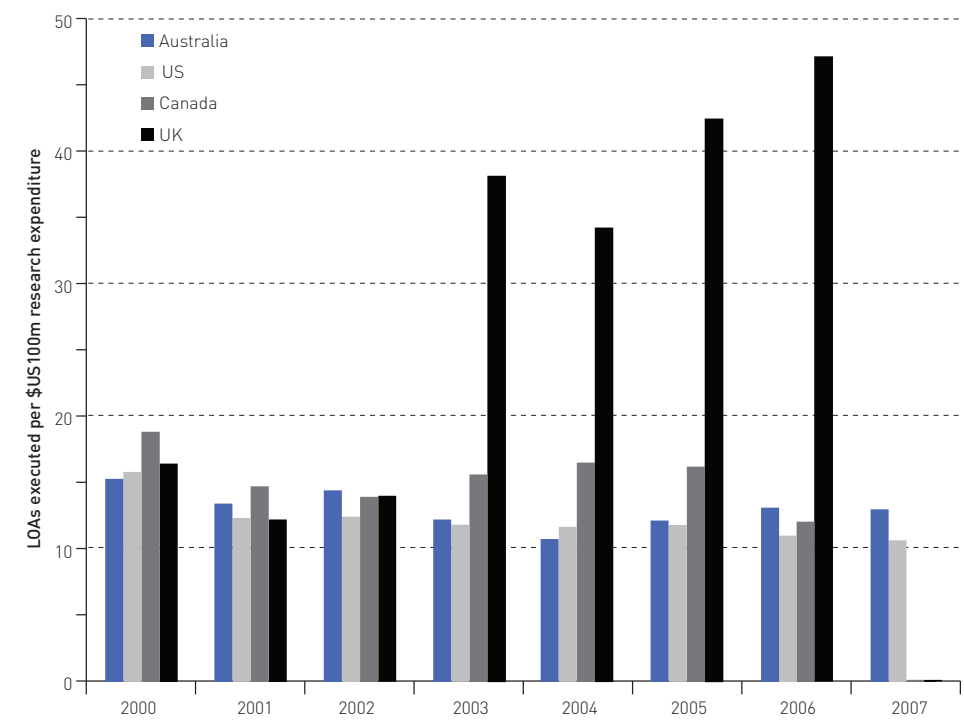


Figure 16: International comparison of the number of LOAs executed per \$US100m research expenditure, 2000–2007⁶⁴



62 There is a discontinuity in the Australian data for total patents issued worldwide (see also table 2) that affects this international comparison of total patents issued in the United States, due to changes in reporting by the Commonwealth Science and Industrial Research Organisation (CSIRO). Between 2000 and 2002 CSIRO only reported patent families and was not reporting applications and issues for each patent. The method of counting patents and applications for 2003 and 2004 is more internationally comparable.

63 Given only Australian and UK data is available, figure 15b is included for illustrative rather than direct comparative purposes.

64 Refer to the Key Points Box for an explanation of the jump in 2003 for the UK.

Figure 17: International comparison of LOA income as a percentage of research expenditure, 2000–2007⁶⁵

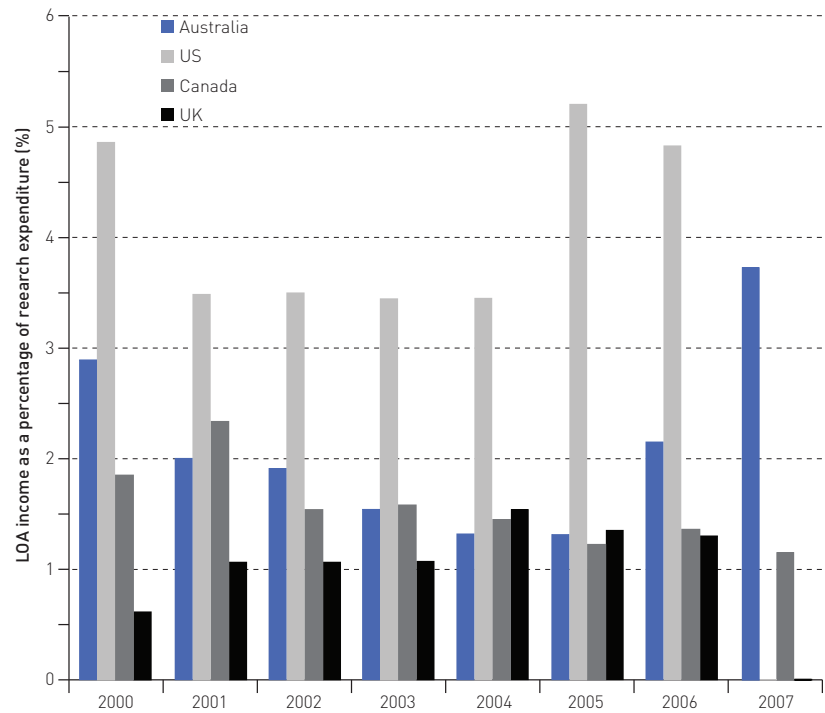
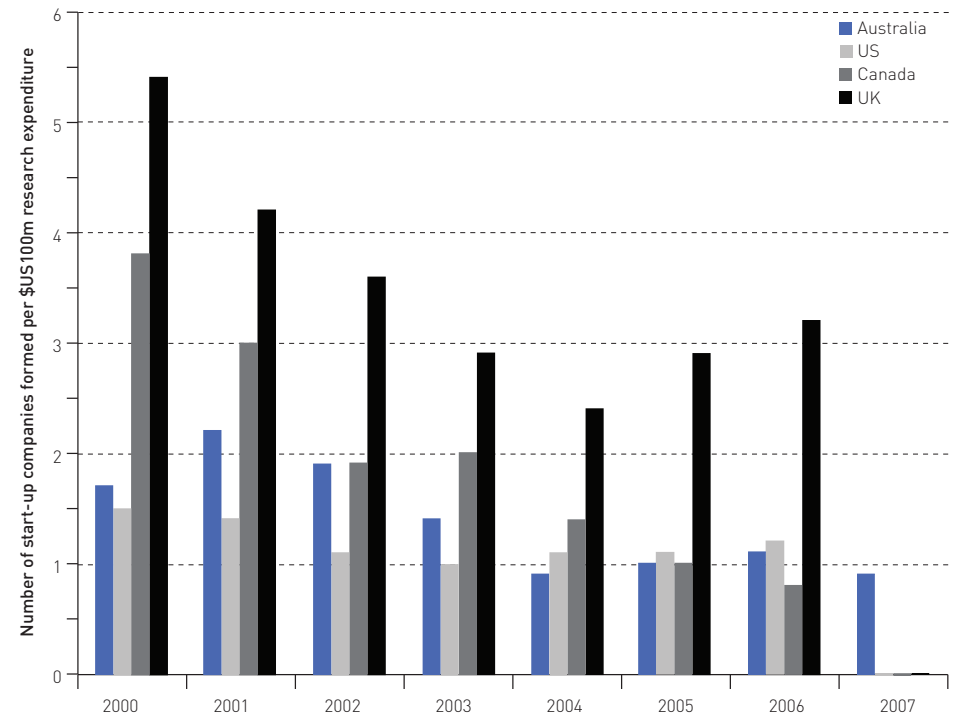


Figure 18: International comparison of the number of start-up companies formed per \$US100m research expenditure 2000–2007



⁶⁵ In figure 17 the 2000 figure includes a single transaction that created income of \$50m for the University of Melbourne. For further information see: Australian Research Council et al, 2002, *National Survey of Research Commercialisation: Year 2000*. The dramatic increase in 2007 is due to mainly two universities: University of Queensland reported income of \$23m in 2006 and \$47m in 2007. Monash University reported LOA income of \$101m in 2007 alone.

4. COOPERATIVE RESEARCH CENTRES (CRCs)

The CRC program was established in 1990 by the Australian Government to encourage collaboration in R&D between the private sector and public sector research bodies. The CRC program also aims to achieve a concentration of world-class research teams and has a strong education component with a focus on producing graduates with industry relevant skills.

Over the period of the survey, CRCs operated in six broad fields of research: environment, agriculture and rural-based manufacturing, information and communication technology, mining and energy, medical science and technology, and manufacturing technology.⁶⁶

CRCs enhance Australia's industrial, commercial and economic growth through the development of sustained, user-driven, cooperative public-private research centres that achieve outcomes in utilisation. The recent review of the CRC program *Collaborating to a Purpose*⁶⁷ determined that CRCs themselves typically have a low capacity for commercialisation. Despite this evaluation the data shows that CRC commercialisation activity is increasing and that collectively, CRCs show more commercialisation than the MRIs and most PFRAs.

This chapter presents data from the CRC Management Data Questionnaire (MDQ) from 2005–06 to 2007–08 and time series data from 2003–04 to 2007–08.⁶⁸ 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 are as reported for the relevant year in Tables 18–25. All dollar values in Figures 19–33 have been converted to 2007 prices to enable time series comparisons.⁶⁹ It is important to note that between 2003–04 and 2007–08 the number of CRCs has declined (Table 17). In some cases these declining numbers may explain

⁶⁶ In future these categories will change to align with ANZSIC codes.

⁶⁷ <http://www.innovation.gov.au/innovationreview/Documents/CRCReviewReport.pdf>

⁶⁸ Note that the CRC information contained within this report includes revisions to the MDQ data set and may therefore conflict with the MDQ as reported in earlier NSRC reports. One CRC in the Environment sector had not reported by the time this report was published.

⁶⁹ All dollar values presented are expressed in constant 2007 prices using the implicit price deflators for Gross Domestic Product from the Australian System of National Accounts. Specifically, the deflators used were 0.956 for 2006–07, 0.913 for 2005–06, 0.880 for 2004–05 and 0.850 for 2003–04.

reductions in commercialisation activities between these years. For this reason the time series data is presented as a proportion of \$100m research expenditure.

Table 17: Numbers of Cooperative Research Centres, 2005–06 to 2007–08

Research Sector	Number of Cooperative Research Centres		
	2005–06	2006–07	2007–08
Manufacturing technology	10	8	9
Information and communications technology	9	5	5
Mining and energy	8	7	7
Agriculture and rural based manufacturing	16	14	16
Environment	17	13	11
Medical science and technology	9	8	9
Total	69	55	57

RESOURCING FOR COMMERCIALISATION

KEY POINTS

DATA FOR 2005–07

- Despite a 12% decline in total CRC research expenditure in part due to a decline in the number of CRCs, the total CRC program expenditure on commercialisation remained above \$80m per annum (Table 18).
- The ratio of total CRC commercialisation expenditure to research expenditure increased from 11.8% in 2005–06 to 13.7% in 2007–08 (Table 18).

TIME SERIES DATA FOR 2003–04 TO 2007–08

- The ratio of total commercialisation expenditure to research expenditure per \$100m research expenditure for all CRCs almost doubled from 7.5% in 2003–04 to 13.7% in 2007–08 (Figure 19). This growth stemmed from all research sectors except the *Information and communications technology* sector, which declined after 2005–06.

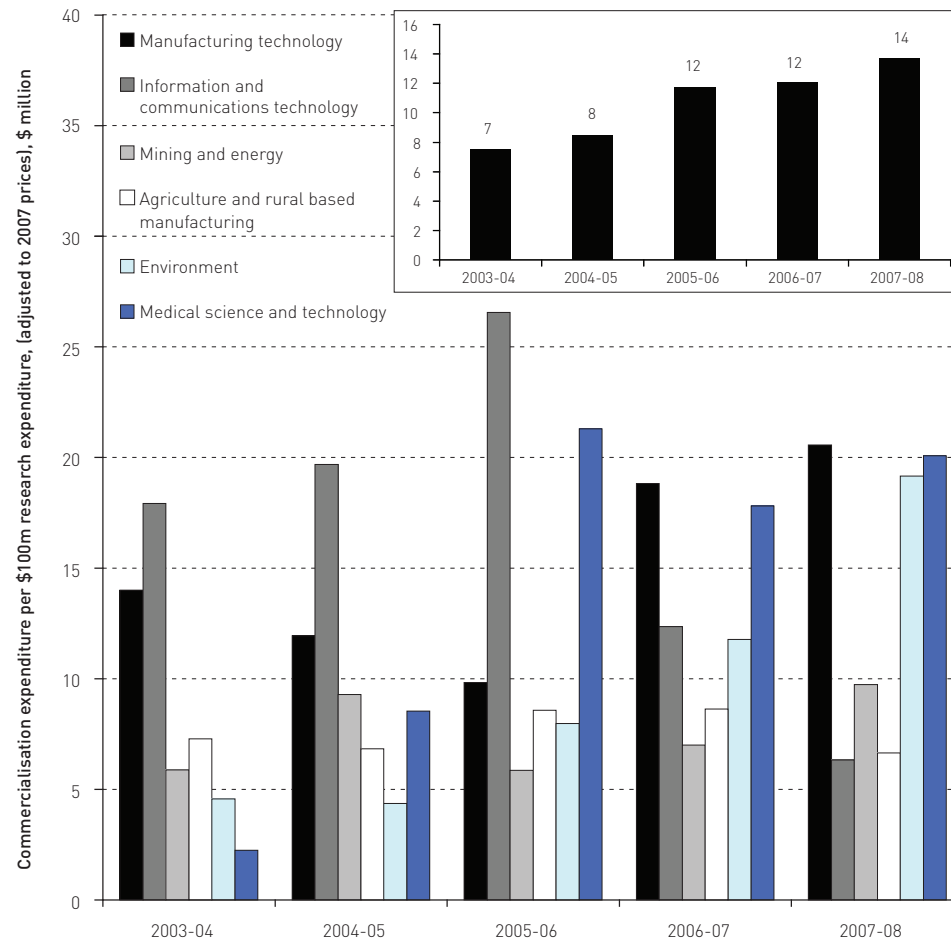
Table 18: CRC research and commercialisation expenditure, 2005–06 to 2007–08

Research Sector	Commercialisation expenditure (\$'000)			Research Expenditure (\$'000)			Commercialisation exp. as a percentage of research expenditure		
	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08
Manufacturing technology	6,387	12,048	12,428	64,905	64,009	60,428	9.8%	18.8%	20.6%
Information and communications technology	15,328	5,542	2,665	57,705	44,873	42,113	26.6%	12.4%	6.3%
Mining and energy	6,190	7,937	10,618	105,566	113,178	108,935	5.9%	7.0%	9.7%
Agriculture and rural based manufacturing	13,524	13,358	11,345	157,615	154,612	170,668	8.6%	8.6%	6.6%
Environment	17,004	19,156	24,491	212,989	162,691	127,848	8.0%	11.8%	19.2%
Medical science and technology	26,833	22,369	25,321	126,001	125,607	126,124	21.3%	17.8%	20.1%
Total	85,266	80,410	86,868	724,781	664,970	636,116	11.8%	12.1%	13.7%

Table 19: CRC patent filing activity, 2005–06 to 2007–08

Research Sector	Patents filed (No.)								
	In Australia			Overseas			Total		
	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08
Manufacturing technology	14	12	30	0	8	16	14	20	46
Information and communication technology	11	4	0	2	16	0	13	20	0
Mining and energy	9	23	23	12	1	14	21	24	37
Agriculture and rural based manufacturing	21	19	21	13	8	13	34	27	34
Environment	5	8	2	14	4	2	19	12	4
Medical science and technology	14	17	12	16	18	7	30	35	19
Total	74	83	88	57	55	52	131	138	140

Figure 19: Commercialisation expenditure per \$100m research expenditure for each CRC sector, 2003–04 to 2007–08. Inset figure: Commercialisation expenditure per \$100m research expenditure for all CRCs over the same period.



INTELLECTUAL PROPERTY PROTECTION ACTIVITY

KEY POINTS

DATA FOR 2005–06 TO 2007–08

- Patent filing activity increased by 7% from 131 in 2005–06 to 140 in 2007–08 as a result of increases in domestic patenting (Table 19).
- The total number of patents maintained by CRCs in Australia and overseas declined between 2005–06 and 2007–08 by 20% and 26%, respectively (Table 20). CRCs maintained a total of 201 patents in Australia and 465 overseas in 2007–08 (Table 20). There were significant increases in the patent holdings of the *Mining and energy* sector due to *CRC Mining Australia* that maintained 24 out of 46 patents in Australia and 171 out of 186 patents overseas in 2007–08.
- Patenting activity by the *Medical science and technology* sector declined both in terms of filings and holdings domestically and internationally. The *Information and communications technology* sector also showed a sharp decline, with no patents maintained or filed in 2007–08 (Tables 19 and 20).
- The large drop in total CRC patent holdings between 2005–06 and 2006–07 is due to the closure of the *CRC for Vaccine Technology* that maintained 111 patents in 2005–06 (Table 20).
- The number of Licences, Options and Assignments (LOAs) executed by CRCs increased from 244 in 2005–06 to 4,262 between 2005–06 and 2007–08 (Table 21). The high number of LOAs executed by the *Environment* sector in 2007–08 comes from the *eWater CRC* recording 4,148 licences/options. This CRC licensed a software tool called the 'Model for Urban Stormwater Improvement Conceptualisation' that is a high volume, low cost download.
- Earnings from LOAs amounted to a total of \$57.4m between 2005–06 and 2007–08 with highly variable earnings between research sectors and between years (Table 21). Ninety per cent of earnings came from one sector: *Medical science and technology* (\$51.5m over the three years to 2007–08; Table 21). The *Vision CRC* was responsible for the majority of these earnings with, for example, licence revenues accounting for \$16.8m of the \$19.2m reported for the *Medical science and technology* sector in 2007–08.

Table 20: CRC patent holdings, 2005–06 to 2007–08

Research Sector	Patents maintained (No.)								
	In Australia			Overseas			Total		
	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08
Manufacturing technology	61	44	50	114	109	127	175	153	177
Information and communication technology	39	17	0	79	40	0	118	57	0
Mining and energy	27	42	46	124	138	186	151	180	232
Agriculture and rural based manufacturing	30	42	38	45	42	56	75	84	94
Environment	17	10	13	80	61	13	97	71	26
Medical science and technology	78	60	54	187	83	83	265	143	137
Total	252	215	201	629	473	465	881	688	666

Table 21: CRC licences, options and assignments activity, 2005–06 to 2007–08

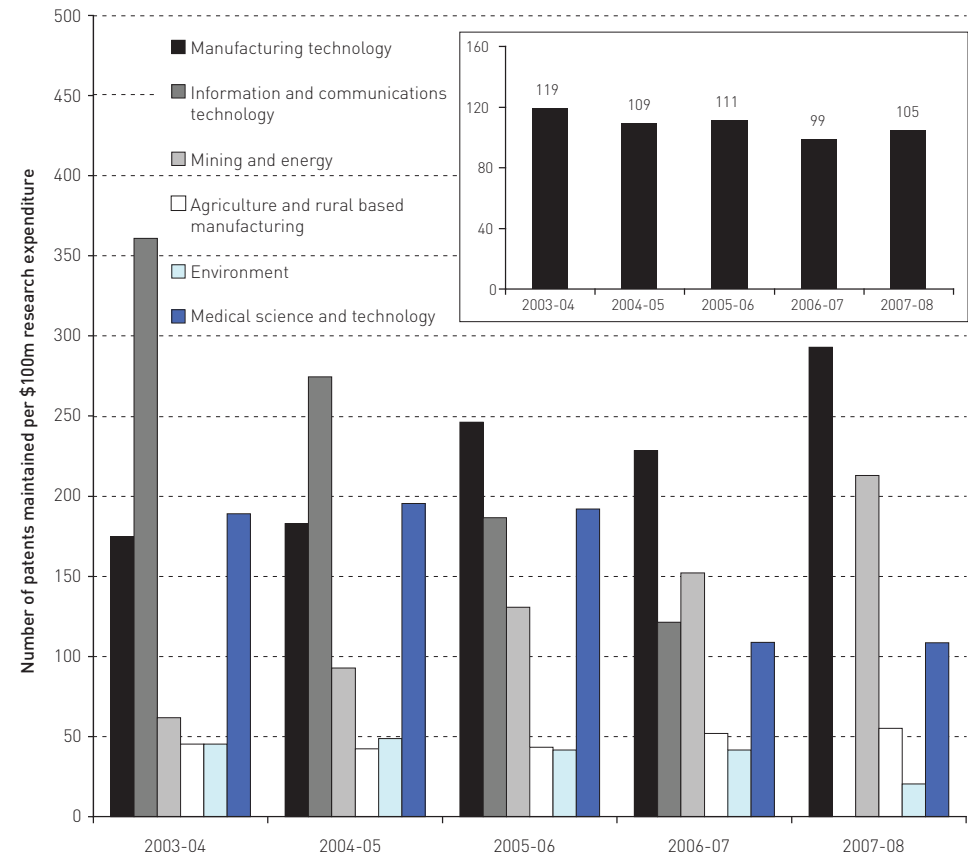
Research Sector	LOAs executed (No.)			LOA income (\$'000)		
	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08
Manufacturing technology	26	25	24	129	124	32
Information and communication technology	11	4	5	0	133	216
Mining and energy	3	3	10	1,393	770	1,435
Agriculture and rural based manufacturing	12	15	17	56	180	375
Environment ⁷⁰	181	283	4,198	40	447	553
Medical science and technology	11	16	8	17,128	15,177	19,222
Total	244	346	4262	18,746	16,831	21,833

⁷⁰ Several CRCs in the Environment sector reported software licences as well as licences to exploit intellectual property giving a highly variable result. See text for explanation.

TIME SERIES DATA FOR 2003–04 TO 2007–08

- The total number of patents maintained per \$100m research expenditure by CRCs declined by 12% from 119 in 2003–04 to 105 in 2007–08 (Figure 20 inset) despite strong growth in the *Manufacturing technology* and the *Mining and energy* sectors (Figure 20).
- Between 2003–04 and 2007–08 the total number of patents filed by all CRCs doubled from 11 to 22 patents per \$100m research expenditure (Figure 21 inset). Growth in patent filings predominantly came from the *Mining and energy*, *Agriculture and rural-based manufacturing* and the *Manufacturing technology* sectors (Figure 21).
- The number of LOAs executed is highly variable between sectors and between years and is dominated by the *Environment* sector where some CRCs report high numbers of product licensing in addition to licensing of IP for exploitation (Figure 22). Similar to the high numbers in 2007–08 (Table 21), *Environment* sector LOAs in 2003–04 and 2004–05 come from the *CRC for Catchment Hydrology*. This CRC accounts for 1,540 of 1,549 licences in 2003–04 and 4,000 of 4,010 licences in 2004–05. The high numbers come from licensing of software products from the CRC's 'Catchment Modelling Toolkit'.
- Income derived from LOAs varied significantly creating an uneven trend dominated by the *Medical science and technology* sector between 2003–04 and 2007–08 (except in 2004–05; Figure 23). Income derived from LOA activity per \$100m research expenditure increased by 162% from \$1.3m in 2003–04 to \$3.4m in 2007–08 (Figure 23 inset).

Figure 20: Total number of patents maintained per \$100m research expenditure for each CRC sector, 2003–04 to 2007–08. Inset figure: Total number of patents maintained per \$100m research expenditure for all CRCs over the same period⁷¹



⁷¹ Note that throughout this CRC chapter the absence of a column in any figure indicates a zero result rather than a non-response.

Figure 21: Total number of patents filed per \$100m research expenditure for each CRC sector, 2003-04 to 2007-08. Inset figure: Total number of patents filed per \$100m research expenditure for all CRCs over the same period

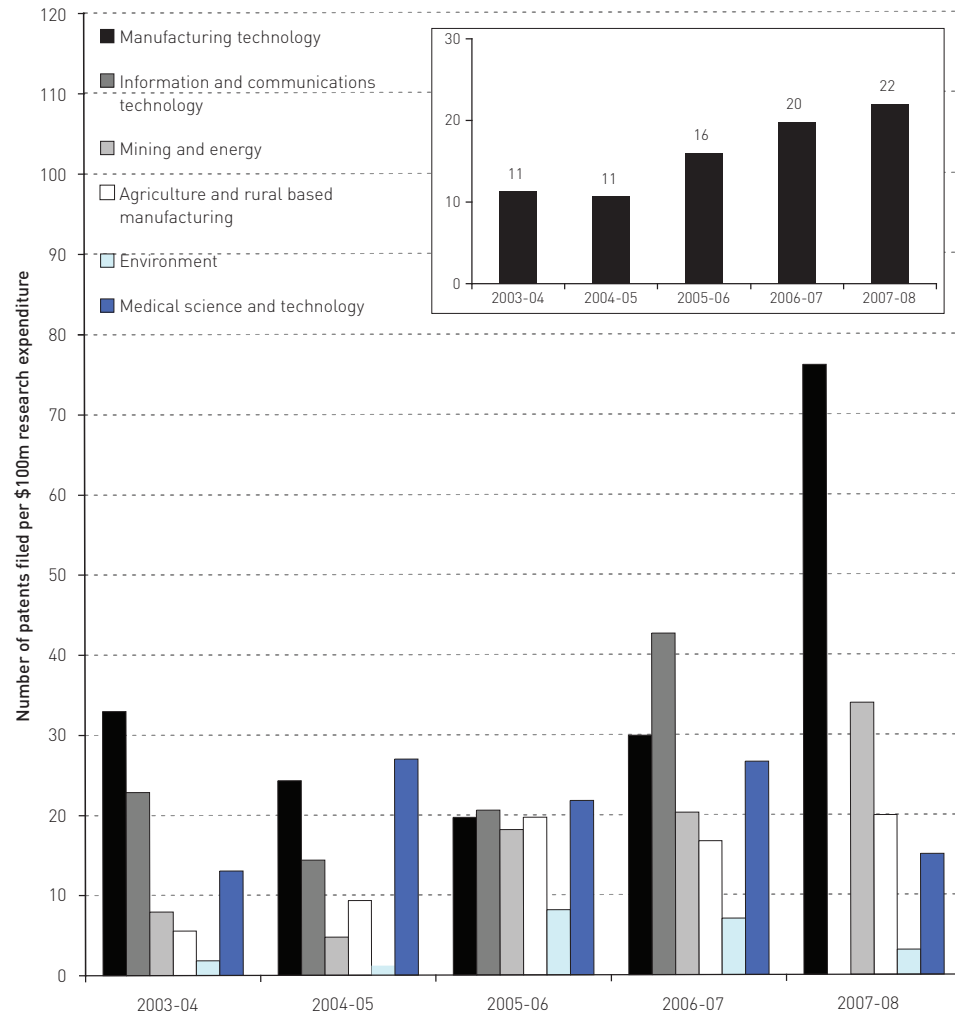
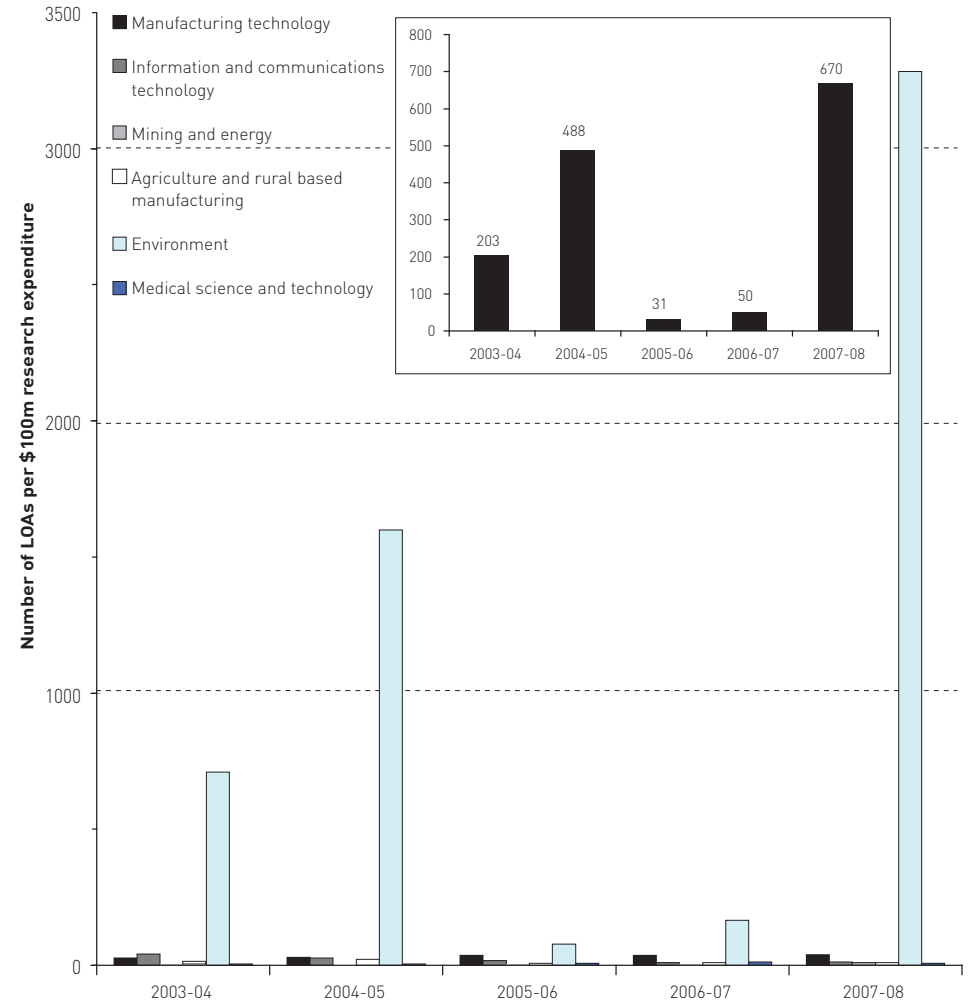
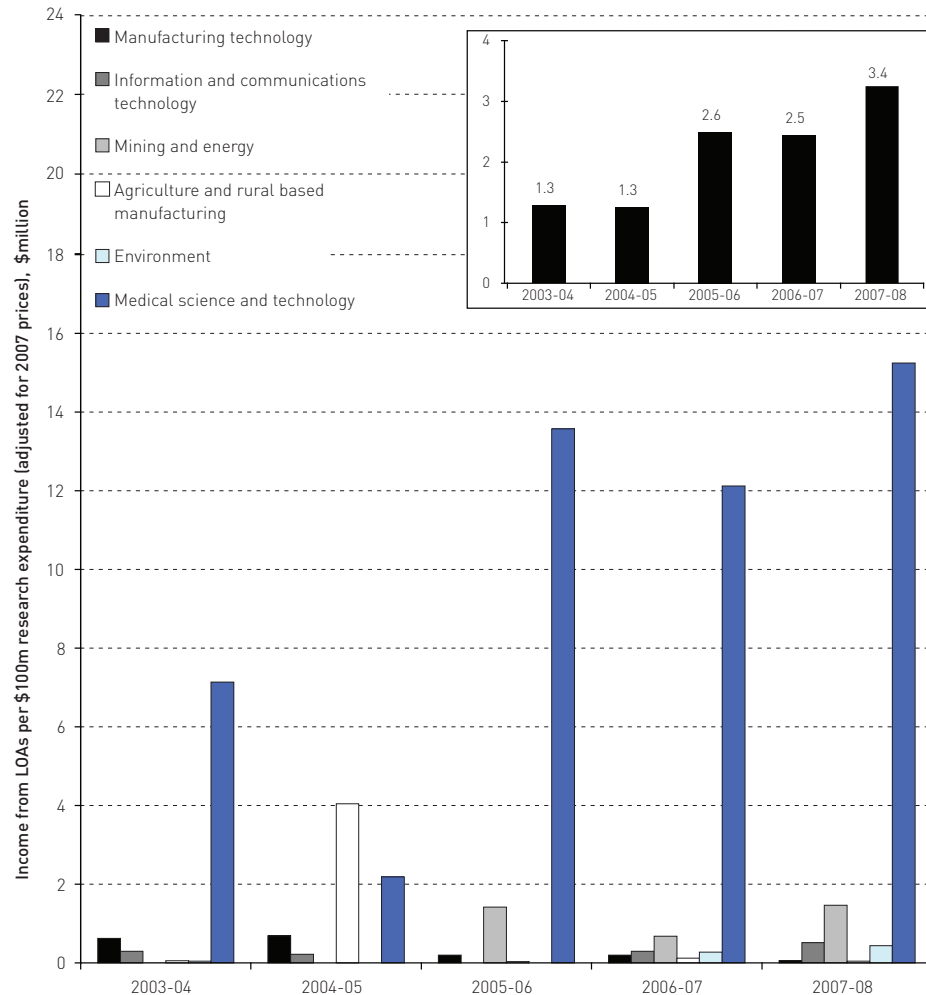


Figure 22: Number of licences, options and assignments (LOAs) per \$100m research expenditure for each CRC sector, 2003-04 to 2007-08⁷². Inset figure: Number of LOAs per \$100m research expenditure for all CRCs over the same period



⁷² Note that the figures for the Environment sector include product use licences in addition to the IP transfer definition of licence which is used in the NSRC survey.

Figure 23: Income from licences, options and assignments (LOAs) per \$100m research expenditure for each CRC sector, 2003–04 to 2007–08. Inset figure: Income from LOAs per \$100m research expenditure for all CRCs over the same period



START-UP COMPANY ACTIVITY

KEY POINTS

DATA FOR 2005–06 TO 2007–08

- A total of 21 start-up companies were formed by CRCs between 2005–06 and 2007–08, earning CRCs an income of \$1.47m from sources such as royalties, contributions and cashed in equity (Table 22). Note that many of the CRCs reporting start-ups did not report income received from those start-ups (Table 22). This is not uncommon.
- Start-up formation shows a distinct decreasing trend (both in terms of numbers and income). This decrease in the number of start-ups is consistent with findings within the university sector (Table 13), possibly indicating a more selective approach or other change in policy taken by CRCs towards start-up company formation (Table 22).

TIME SERIES DATA FOR 2003–04 TO 2007–08

- When expressed as a proportion of research expenditure total CRC start up company formation has declined by 89% from 2.7 in 2003–04 to a very low 0.3 in 2007–08 (Figure 24 inset).
- Income from aggregate CRC start-up company activity declined from \$341,000 per \$100m research expenditure in 2003–04 to \$0 in 2007–08 (Figure 25 inset).

Table 22: CRC start-up companies formed and income received, 2005–06 to 2007–08

Research Sector	New start-up companies (No.)			Income received from start-up companies (\$'000)		
	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08
Manufacturing technology	4	2	1	0	0	0
Information and communication technology	3	2	0	155	24	0
Mining and energy	3	0	0	618	0	0
Agriculture and rural based manufacturing	0	0	0	16	20	0
Environment	1	1	1	0	0	0
Medical science and technology	1	2	0	0	637	0
Total	12	7	2	789	681	0

Figure 24: Number of start-up companies formed per \$100m research expenditure for each CRC sector, 2003-04 to 2007-08. Inset figure: Number of start-up companies formed per \$100m research expenditure for all CRCs over the same period

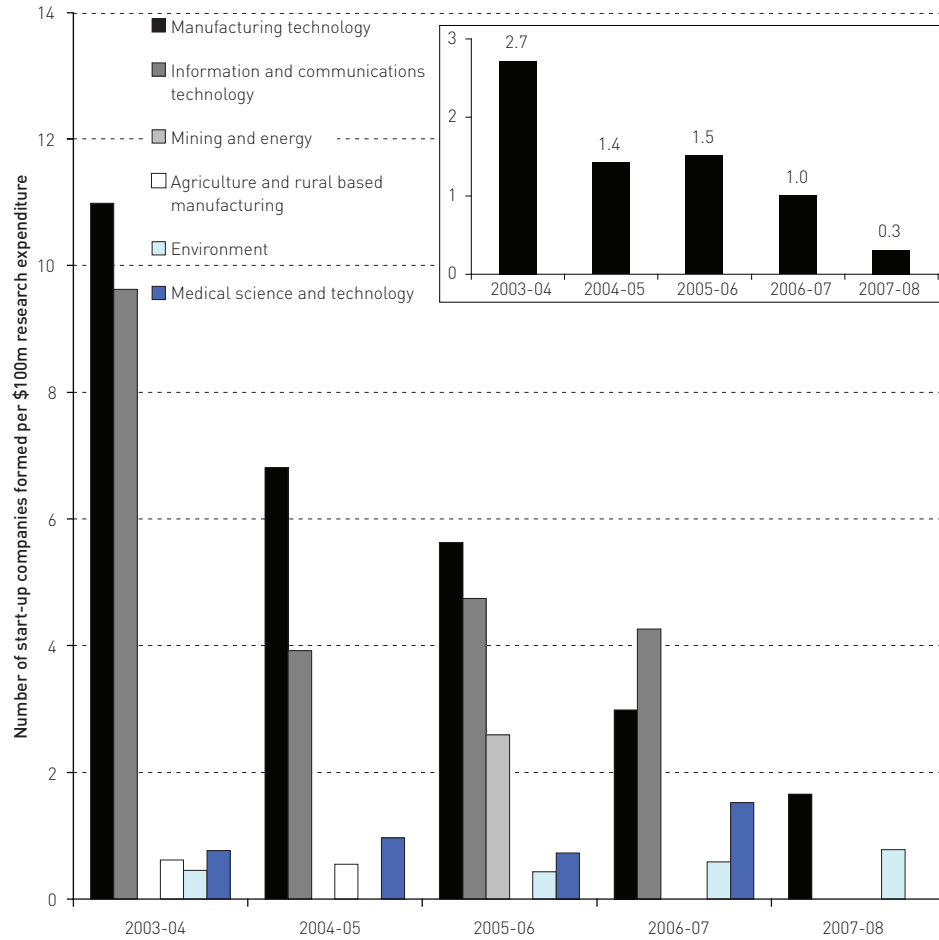
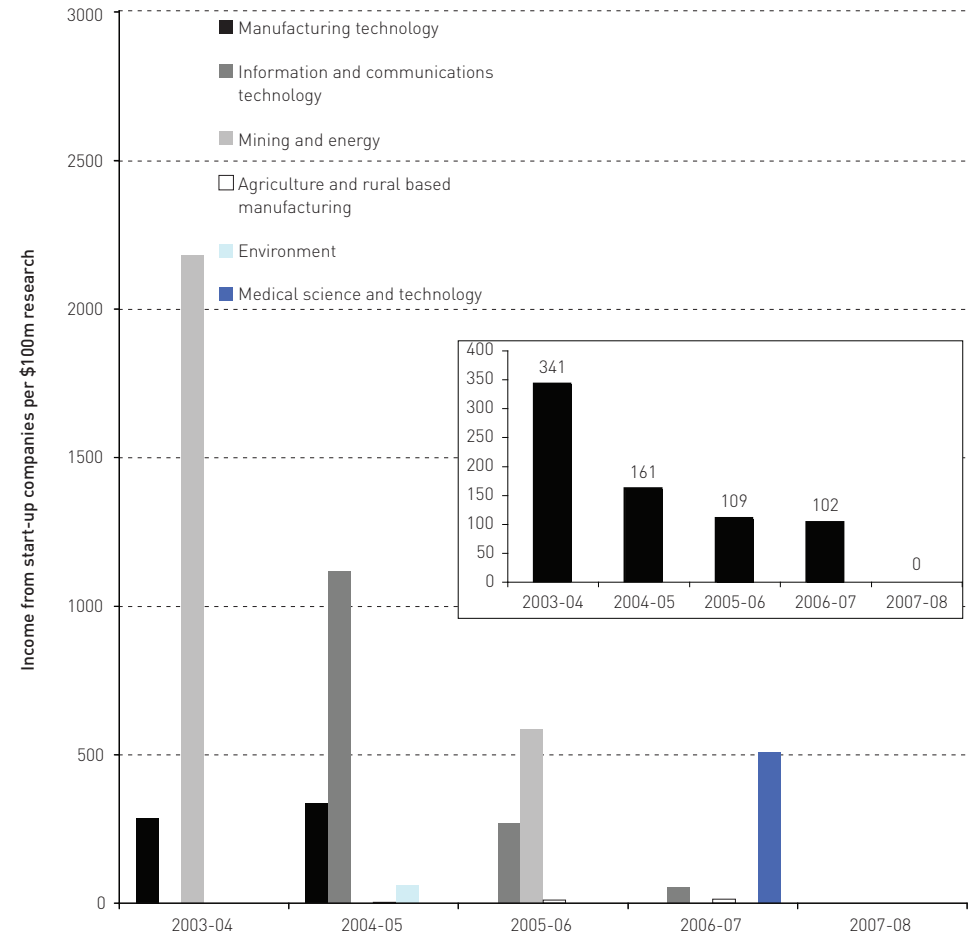


Figure 25: Income from start-up companies per \$100m research expenditure for each CRC sector, 2003-04 to 2007-08. Inset figure: Income from start-up companies per \$100m research expenditure for all CRCs over the same period



RESEARCH CONTRACTS AND CONSULTANCY ACTIVITY

KEY POINTS

DATA FOR 2005–06 TO 2007–08

- Between 2005–06 and 2007–08 the CRCs entered into 1,785 research contracts and consultancies with a total value of \$160.5m (Table 23). The greatest research contract income came from the *Mining and energy* (\$58.8m), the *Agriculture and rural based manufacturing* (\$45.4m) and the *Environment* (\$36.7m) sectors during this period.

TIME SERIES DATA FOR 2003–04 TO 2007–08

- The number of research contracts and consultancies per \$100m research expenditure increased by 55% from 60 in 2003–04 to 93 in 2007–08 (Figure 26 inset). This increase has been driven by growth in contracts negotiated by the *Manufacturing technology*, *Mining and energy* and *Agriculture and rural based manufacturing* sectors (Figure 26).
- The income from research contracts and consultancies per \$100m research expenditure has varied between \$7m and \$9m between 2003–04 and 2007–08 (Figure 27 with inset).

Table 23: CRC research contracts and consultancies, 2005–06 to 2007–08

Research Sector	Research contracts and consultancies (No.)			Income from research contracts and consultancies (\$'000)		
	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08
Manufacturing technology	76	52	55	3,568	2,865	3,069
Information and communication technology	33	31	26	3,075	1,149	2,936
Mining and energy	188	217	225	19,484	23,615	15,670
Agriculture and rural based manufacturing	96	193	174	13,422	14,422	17,596
Environment	181	104	99	21,129	10,314	5,226
Medical science and technology	10	14	11	999	826	1,166
Total	584	611	590	61,677	53,191	45,663

Figure 26: Number of research contracts and consultancies per \$100m research expenditure for each CRC sector, 2003–04 to 2007–08. Inset figure: Number of research contracts and consultancies per \$100m research expenditure for all CRCs over the same period

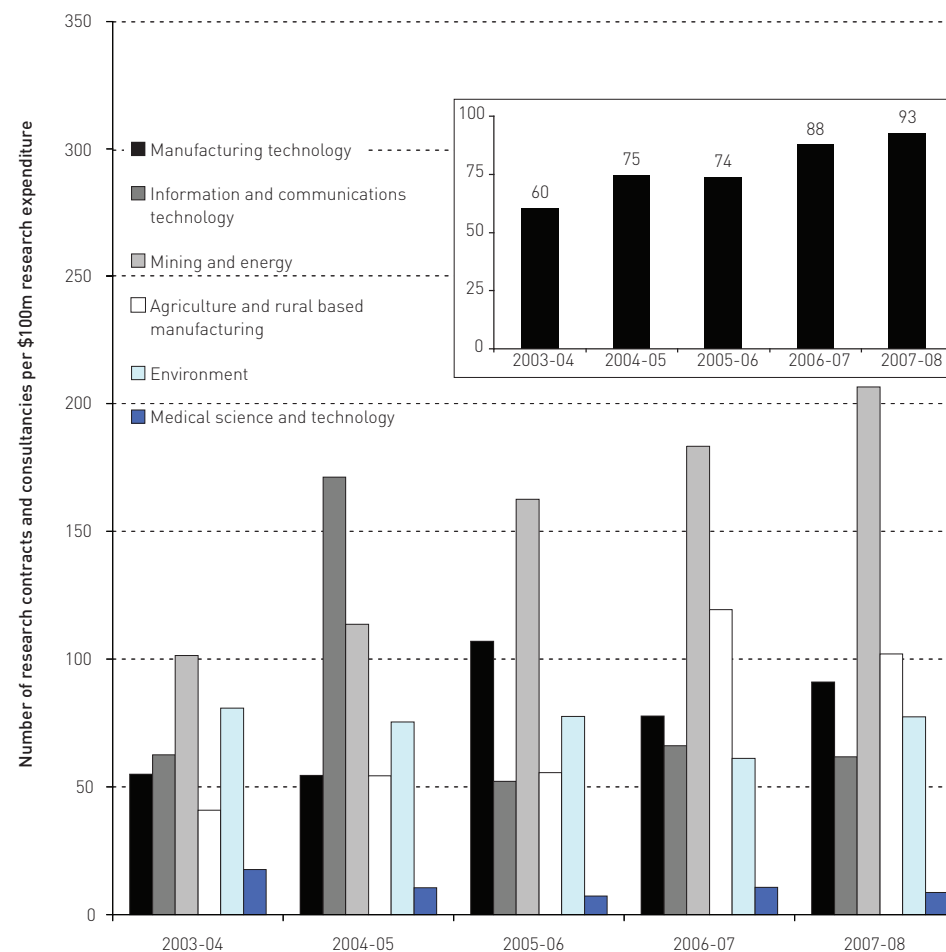
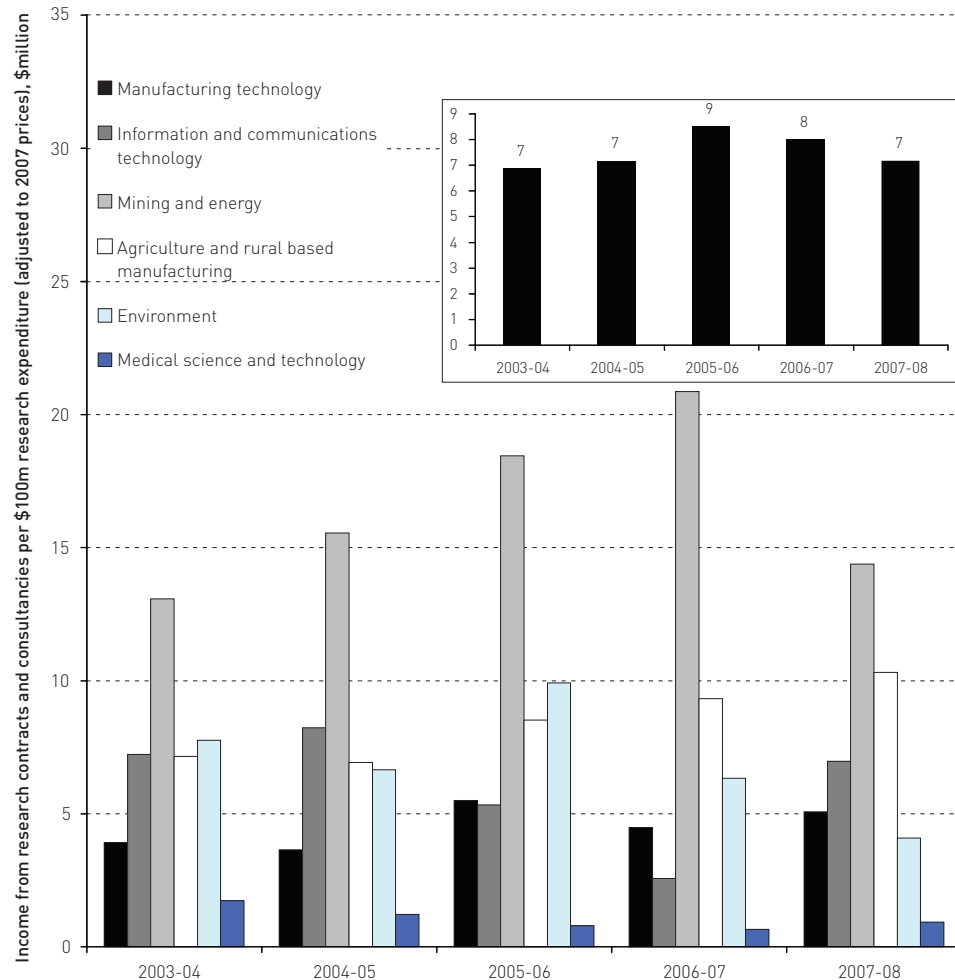


Figure 27: Income from research contracts and consultancies per \$100m research expenditure for each CRC sector, 2003–04 to 2007–08. Inset figure: Income from research contracts and consultancies per \$100m research expenditure for all CRCs over the same period



PROFESSIONAL DEVELOPMENT AND OTHER KNOWLEDGE EXCHANGE ACTIVITY

KEY POINTS

DATA FOR 2005–06 TO 2007–08

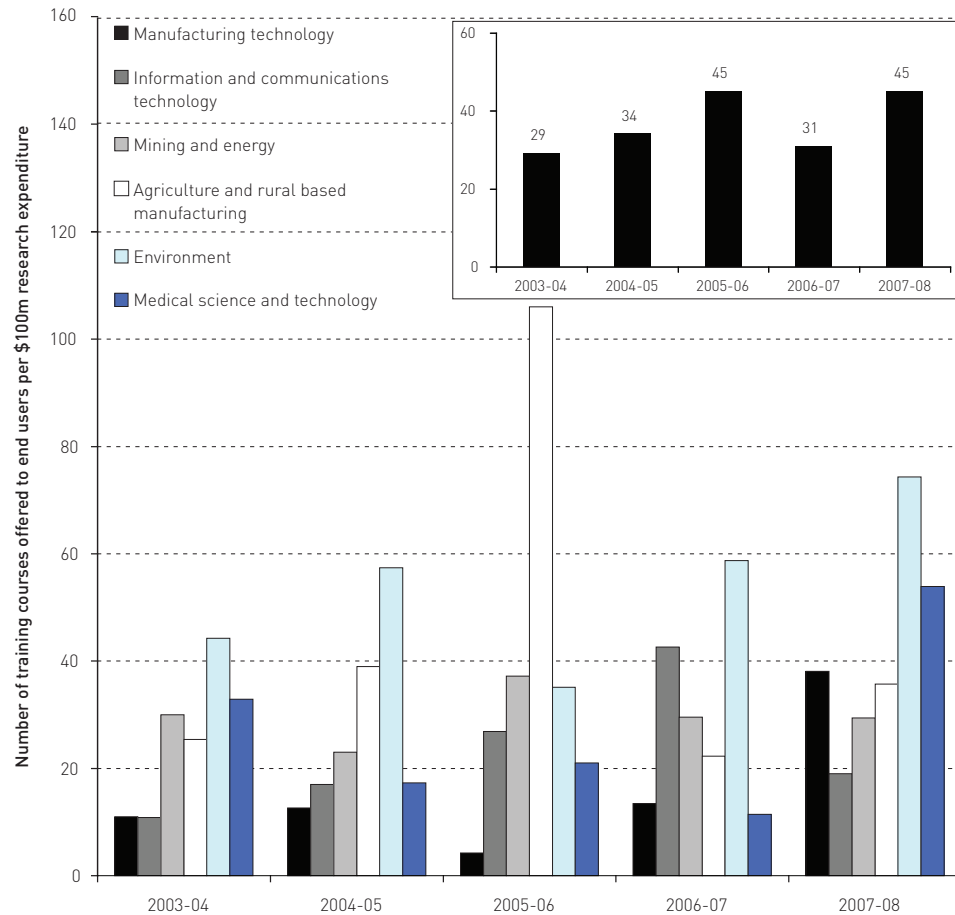
- Between 2005–06 and 2007–08 CRCs provided 859 training courses and 1,601 conferences to end users of research with a total value of \$4.3m (Table 24). The high number of training courses offered by the *Agriculture and rural based manufacturing* sector in 2005–06 was from the *CRC for Viticulture* that conducted 143 extension programs in their final year of reporting.
- Forty-seven percent of conferences held between 2005–06 and 2007–08 were initiated by the *Agriculture and rural based manufacturing* sector (Table 24). The *Cotton Catchment Communities CRC* is the largest contributor to this result from the large number of small conferences they conduct in cotton growing areas where they travel to stakeholders. Similarly, the *CRC for Forestry* conducted 91 conferences in 2005–06.
- Between 2005–06 and 2007–08 the CRCs generated 7,036 publications and 2,840 confidential or unpublished reports for end-users (Table 25).
- Importantly, 1,013 postgraduates sourced from CRCs were employed in industry between 2005 and 2007 (Table 25).

TIME SERIES DATA FOR 2003–04 TO 2007–08

- The number of training courses and conferences offered by CRCs per \$100m research expenditure has grown by 55% and 53%, respectively (Figures 28 and 29). The growth in training courses was supported by multiple sectors, particularly the *Manufacturing technology*, *Environment* and *Medical science and technology* sectors (Figure 28). The growth in conferences was supported by the *Environment* and *Agriculture and rural based manufacturing* sectors with many CRCs initiating many smaller conferences in regional and rural areas (Figure 29). The income generated from conferences and courses per \$100m research expenditure has declined by 47% from \$378,000 in 2003–04 to \$201,000 in 2007–08 (Figure 30).

- The number of publications and confidential or unpublished reports grew by 28% and 9%, respectively, between 2003–04 and 2007–08 (Figures 31 and 32). Publications from the *Mining and energy* sector grew significantly in 2007–08. Confidential and unpublished reports from the *Manufacturing technology* sector also show strong continuous growth each year since 2003–04 (Figures 31 and 32).

Figure 28: Number of training courses offered to end-users per \$100m research expenditure for each CRC sector, 2003–04 to 2007–08. Inset figure: Number of training courses offered to end-users per \$100m research expenditure for all CRCs over the same period



- The number of CRC postgraduates taking up employment in industry per \$100m research expenditure increased by 35% from 37 in 2003–04 to 50 in 2007–08 (Figure 33 inset). As with previous time series data sets, trends are somewhat confused and vary between CRC sectors and years considerably, however, all sectors except for the *Manufacturing technology* and *Environment* sectors contributed to this strong growth (Figure 33) – noting that the overall number of postgraduates involved is relatively low.

Figure 29: Number of conferences offered to end-users per \$100m research expenditure for each CRC sector, 2003–04 to 2007–08. Inset figure: Number of conferences offered to end-users per \$100m research expenditure for all CRCs over the same period

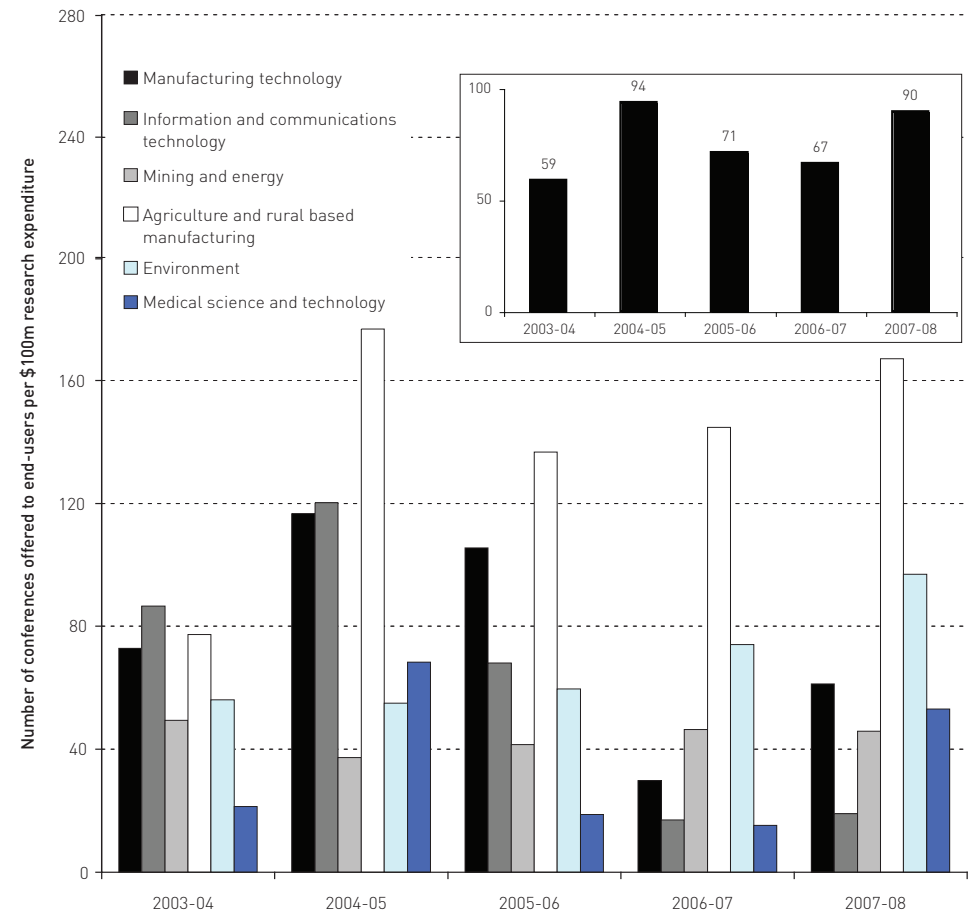


Table 24: Number of training courses and conferences offered to end-users and income derived from these activities, 2005–06 to 2007–08

Research Sector	Training courses offered to end-users (No.)			Conferences provided to end-users (No.)			Income from courses and conferences (\$'000)		
	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08
Manufacturing technology	3	9	23	75	20	37	403	18	266
Information and communication technology	17	20	8	43	8	8	47	160	55
Mining and energy	43	35	32	48	55	50	202	373	215
Agriculture and rural based manufacturing	183	36	61	236	234	285	362	242	85
Environment	82	100	95	139	126	124	303	252	486
Medical science and technology	29	15	68	26	20	67	461	166	170
Total	357	215	287	567	463	571	1,778	1,211	1,277

Table 25: Publication and reports prepared for end-users and postgraduate employment in industry, 2005–06 to 2007–08

Research Sector	Publications prepared for end-users (No.)			Confidential and unpublished reports for end-users (No.)			Postgraduates employed with industry (No.)		
	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08	2005–06	2006–07	2007–08
Manufacturing technology	185	259	231	274	322	398	46	31	22
Information and communication technology	86	48	104	27	68	68	62	48	31
Mining and energy	349	367	853	221	214	195	41	54	66
Agriculture and rural based manufacturing	650	445	578	95	99	93	58	66	101
Environment	1,401	637	581	209	65	98	107	87	63
Medical science and technology	76	39	147	113	137	144	50	48	32
Total	2,747	1,795	2,494	939	905	996	364	334	315

Figure 30: Income from courses and conferences provided to end-users per \$100m research expenditure for each CRC sector, 2003-04 to 2007-08. Inset figure: Income from courses and conferences provided to end-users per \$100m research expenditure for all CRCs over the same period

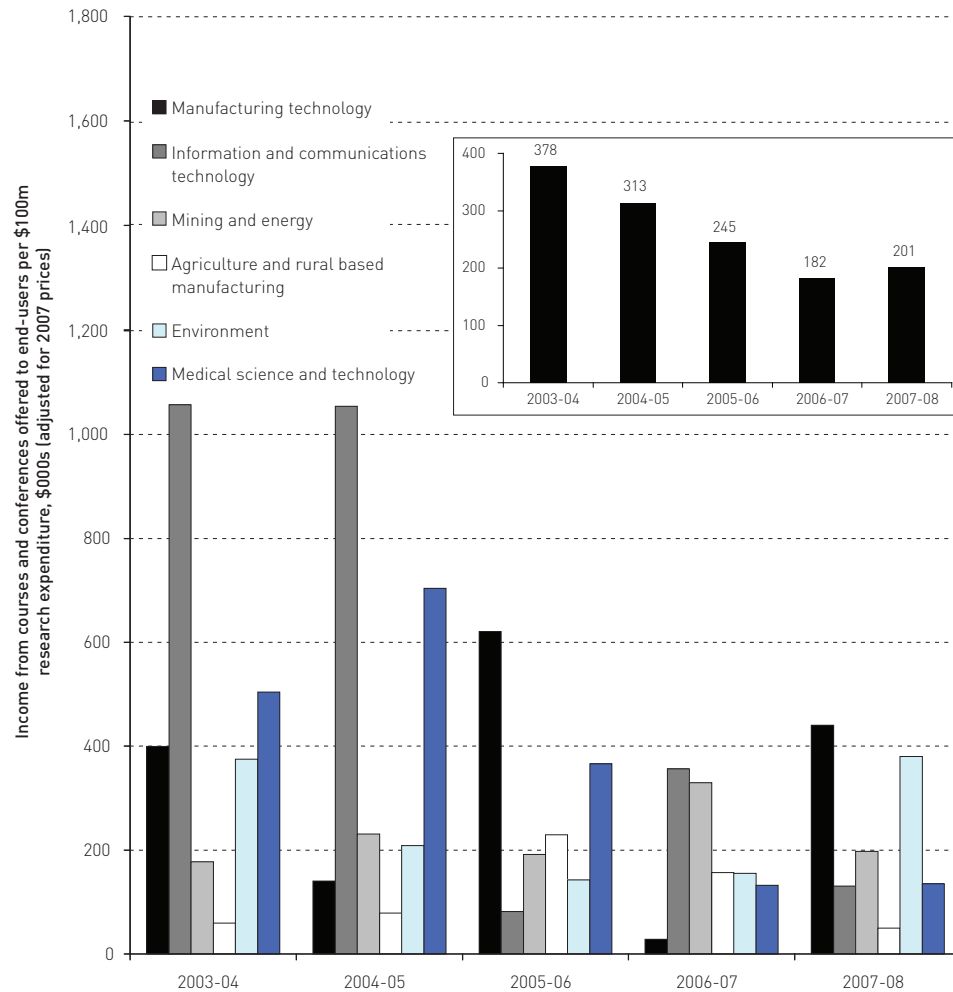


Figure 31: Number of publications for end-users per \$100m research expenditure for each CRC sector, 2003-04 to 2007-08. Inset figure: Number of publications for end-users per \$100m research expenditure for all CRCs over the same period

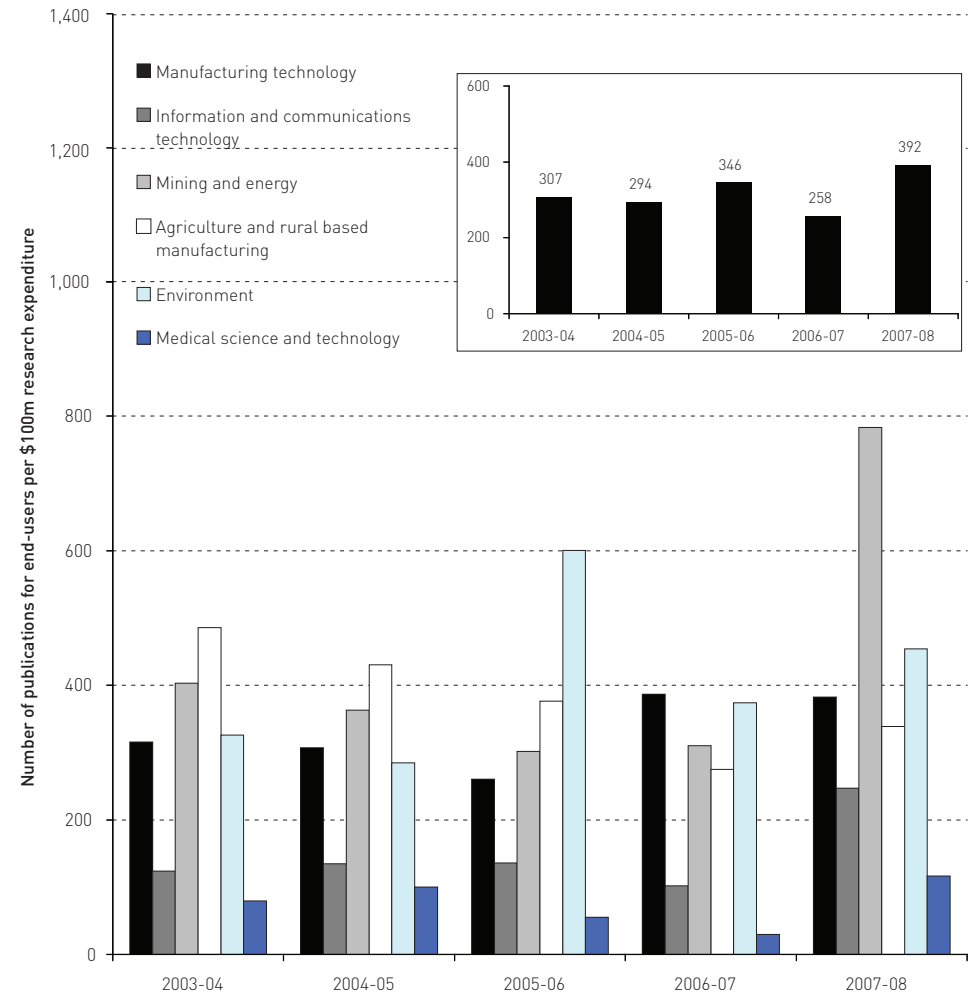


Figure 32: Number of confidential and unpublished reports for end-users per \$100m research expenditure for each CRC sector, 2003-04 to 2007-08. Inset figure: Number of confidential and unpublished reports for end-users per \$100m research expenditure for all CRCs over the same period

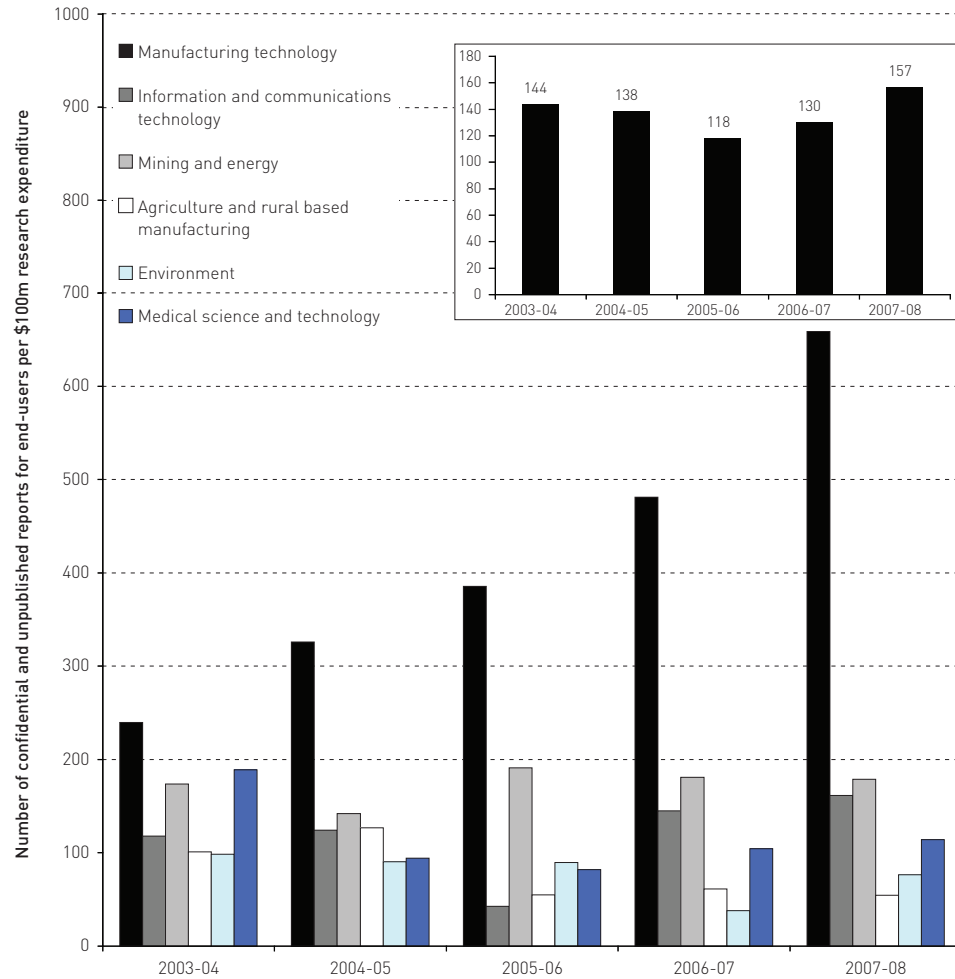
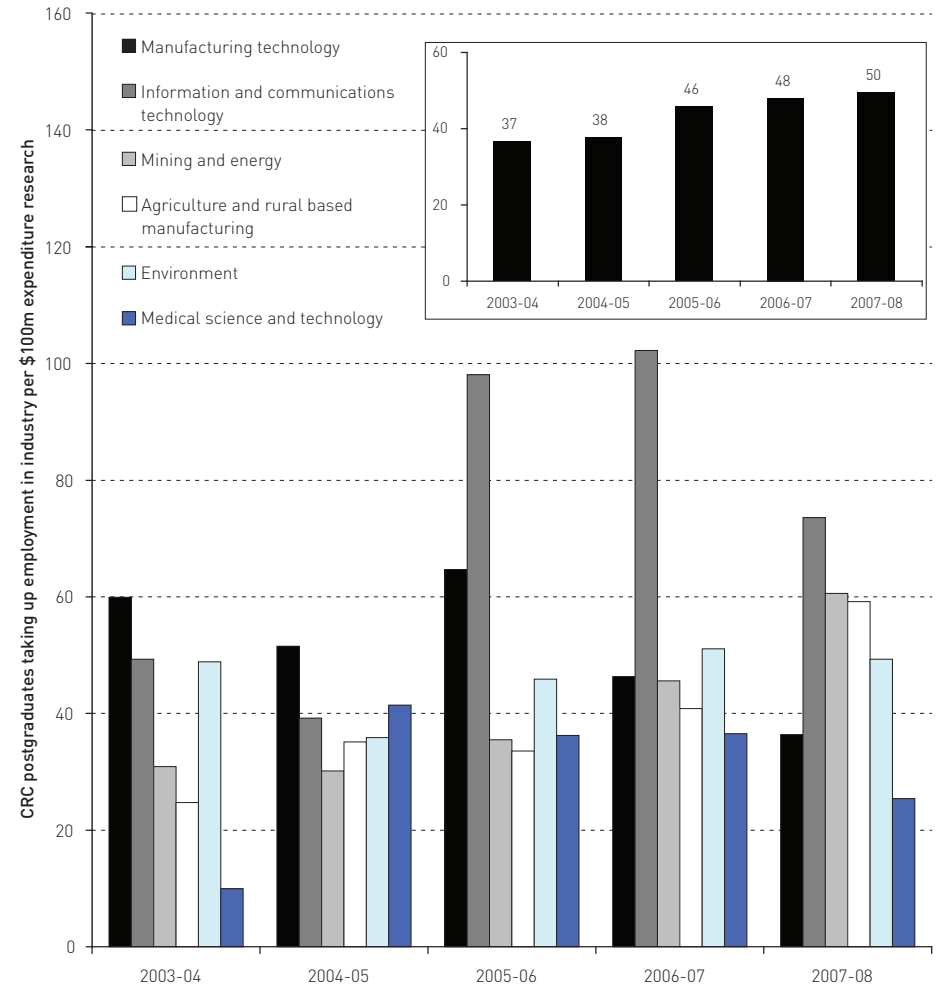


Figure 33: Number of CRC postgraduates to take up employment in industry per \$100m research expenditure for each CRC sector, 2003-04 to 2007-08. Inset figure: Number of CRC postgraduates to take up employment in industry per \$100m research expenditure for all CRCs over the same period



5. METHODOLOGY

This report involves four different data sets: NSRC data for the years 2005 to 2007 using all respondent data (77); NSRC time series data covering 2000 to 2007 using time series cohort (57); international comparisons data for Canada, US and UK covering 2000 to 2007; and data for all Cooperative Research Centres (CRCs) covering 2003 to 2007.

NSRC DATA FOR 2005 TO 2007

The NSRC for 2005 to 2007 aims to achieve a balance between collecting relevant data, including data that will be useful to institutions, and minimising reporting burden. A total of 77 institutions responded to some questions for at least one of the three years from 2005 to 2007 (see Appendix 1).

In total, 99 institutions were approached to take part:

- 4 Publicly Funded Research Agencies — 100% response;
- 39 universities — 100% response; and
- 56 Medical Research Institutes — 32 to 33⁷³ responded depending on the year, a 58%–60% response rate.

Thirty questions were included 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 for 2005 to 2007 is provided at Appendix 4.

The Department initially surveyed 69 organisations, in addition to the 30 organisations that Knowledge Commercialisation Australasia (KCA) surveyed (principally its own membership). Surveying consistency was possible because KCA used the NSRC survey instrument developed for the previous survey iteration.⁷⁴ Although data presented has not been audited and is presented as provided, in several instances, additional and updated data was requested from some of the KCA respondents.

⁷³ A total of 34 different MRIs responded to the survey. However for any one of the survey years, at least one MRI did not respond.

⁷⁴ The report by KCA can be found at <http://www.kca.asn.au/images/pdf/kca%20commercialisation%20data%20collection%20report%2016%20sep%202008.pdf>

All responses were checked for internal consistency and where possible with external sources of related information and institutions invited to clarify or amend their responses. Where this was not possible, for questions requesting subtotals and totals the following rules were applied:

- If the subtotals resulted in less than the reported total, and one and only one subtotal figure was missing, then the missing subtotal was derived from the difference between total and summed subtotals;
- If no total was provided by the respondent but one or more of the subtotal figures were available, the total was calculated from the subtotals;
- If no total was provided by the respondent in one question but provided in a related question this total was accepted as correct;
- If the total was available, but not the subtotals, the total was accepted as correct.

The reporting period covers the calendar years 2005 to 2007 or the financial years 2004/05 to 2007/08, 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 in this data are as reported for the relevant year unless otherwise indicated.

NSRC TIME SERIES 2000 TO 2007

To identify trends and cycles in commercialisation activity it was necessary to construct a consistent dataset covering the years from 2000 to 2007. The following methodology was used to construct the time series.

All dollar values presented are expressed in constant 2007 prices using the chain-volume price index applied to the Gross Domestic Product in the Australian System of National Accounts.⁷⁵

Only metrics for which the survey questions have remained consistent over the period were included. These 16 core metrics, which are listed in Table 26, allow derived metrics to be calculated. For each of these metrics, the unit record files from previous surveys as well as the data provided by KCA were scrutinised and any inconsistencies or errors corrected where possible.

⁷⁵ 5206.0 Australian National Accounts: National Income, Expenditure and Product. Table 32. Expenditure on Gross Domestic Product (GDP), Chain volume measures and Current prices, Annual. Gross domestic product: Implicit price deflators. [http://www.ausstats.abs.gov.au/ausstats/ABS@Archive.nsf/0/6A0EE46E436DBB8FCA2574B800162692/\\$File/5206032_expenditure_on_gdp_annual.xls#A2304755F](http://www.ausstats.abs.gov.au/ausstats/ABS@Archive.nsf/0/6A0EE46E436DBB8FCA2574B800162692/$File/5206032_expenditure_on_gdp_annual.xls#A2304755F)

Table 26: List of metrics covered in the NSRC consistent time series dataset for 2000–2007

Commercialisation staff (FTE)
Invention disclosures
New US patent applications
New Australian patent applications
New Patent Cooperation Treaty patent applications
Australian patent issues
US patent issues
Patents issued worldwide
LOAs executed
Number of LOAs yielding income
LOA gross income in constant 2007 prices (\$ million)
LOA income paid to others (\$ million)
Number of start-ups formed during the year
Number of start-ups operational at year end dependent on assignment of technology
Number of start-ups operational at year end with institutional equity stakes
Value of equity holdings in constant 2007 prices (\$ million)

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 2007. Data coverage 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 counted. The response count for each institution was then expressed as a percentage of the maximum possible count of 128 (that is, eight 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 2001–2007 to a sufficient number of questions to make the 2000–2007 overall response rate greater than 70%, then the institution was included in the time series.

Institutional data coverage can be found in Table 27. This table details the number of years for which usable data are available for each metric and on that basis calculates the percentage data coverage for each institution. The first column in the table lists the 57 institutions that are covered in the consistent time series cohort.

An examination of the full set of available data for 2000 to 2007 indicated that most of the institutions with incomplete data coverage in previous years were not very active in research commercialisation during those periods. Similar to the findings of the last NSRC report, the 57 institutions included in this report’s time series cohort account for almost all of the commercialisation activity reported by all institutions between 2005 and 2007.

Table 28 details the behaviour of each of these 16 metrics by year. Table 29 contains measurements of the difference between the full sample and the sample provided by the consistent time series dataset for 2000 to 2007. This difference is not large. The average percentage coverage of the consistent time series dataset and the full dataset for all 16 metrics is 97% and for most metrics the coverage is greater than 97%.

Detailed tables can be found on the Department of Innovation, Industry, Science and Research website.

In these metric-specific tables all financial values are in their ‘as reported’ current price form. This is to allow easy comparisons with previously published data. N/A is used to indicate that a data point is not available for a particular year (due to non-participation in the survey, a N/A, blank or unknown response). Each table allows the difference between the full data set and the consistent time series dataset to be judged. The final column specifies whether or not a particular institution is included in the consistent time series dataset.

All reported time series financial data has been adjusted using a 2007 constant price multiplier. Tables reporting on financial data collected during the current survey have been displayed in reported, or unadjusted terms – with the exception of the Summary Table (Table 1), where financial data is expressed in 2007 constant prices.

Table 27: Details of the data coverage for 16 key commercialisation metrics, 2000–2007

	Included in the consistent time series data set	Complete overall time series coverage (each key metric for each year)	Percentage coverage of metrics and years (%)	Key data coverage count (metrics and years)	Commercialisation Staff FTEs	Invention Disclosures	New US Patent applications	New Australian patent applications	New PCT patent applications	Australian patent issues	US Patent issues	Worldwide patent issues	LOAs executed	Active LOAs yielding income	LOAs and income totals	How much of the LOA and other income was paid to other institutions	Start-up companies formed	Start-up companies operational dependent upon LOAs for initiation	Operational start-up companies in which they hold equity	Value of all equity holdings
Australian Institute of Marine Studies	Y		88%	112	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Australian Nuclear Science and Technology Organisation	Y		83%	106	7	7	7	7	7	7	7	7	7	7	5	5	7	7	5	7
ANZAC Research Institute	N		49%	63	5	4	4	4	4	4	4	4	4	4	4	4	5	2	3	4
Australian Catholic University	Y		75%	96	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Australian National University	Y		99%	127	8	8	8	8	8	7	8	8	8	8	8	8	8	8	8	8
Baker IDI Heart and Diabetes Institute	Y		84%	107	7	7	7	7	7	7	7	7	7	7	7	6	7	7	3	7
Bionic Ear Institute	N		63%	80	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Bond University	N		63%	80	4	4	5	5	5	5	5	5	5	5	5	5	5	5	7	5
Brain Research Institute	N		51%	65	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Cancer Council Victoria	N		60%	77	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5
Centenary Institute of Cancer Medicine and Cell Biology	Y		87%	111	8	8	6	7	6	5	6	6	8	8	8	8	8	7	7	5
Central Queensland University	Y		74%	95	6	6	6	6	6	6	6	6	6	6	5	6	6	6	6	6
Centre for Eye Research	N		45%	57	3	3	7	3	3	3	3	3	3	3	3	3	3	7	7	0
Charles Darwin University	Y		94%	120	8	8	8	8	8	8	8	8	8	8	6	8	8	5	5	8
Charles Sturt University	Y		98%	126	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	8
Children's Cancer Institute Australia for Medical Research	N		38%	48	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Commonwealth Scientific and Industrial Research Organisation	Y		98%	126	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	8
Curtin University	N		56%	72	2	6	5	5	5	5	4	3	6	2	2	6	6	2	7	6
Deakin University	Y		96%	123	8	8	8	8	8	8	8	8	8	8	8	8	8	6	5	8

	Included in the consistent time series data set	Complete overall time series coverage (each key metric for each year)	Percentage coverage of metrics and years (%)	Key data coverage count (metrics and years)	Commercialisation Staff FTEs	Invention Disclosures	New US Patent applications	New Australian patent applications	New PCT patent applications	Australian patent issues	US Patent Issues	Worldwide patent issues	LOAs executed	Active LOAs yielding income	LOAs and income totals	How much of the LOA and other income was paid to other institutions	Start-up companies formed	Start-up companies operational dependent upon LOAs for initiation	Operational start-up companies in which they hold equity	Value of all equity holdings
Defence Science and Technology Organisation	Y		88%	112	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Edith Cowan University	Y		99%	127	8	8	7	8	8	8	8	8	8	8	8	8	8	8	8	8
Flinders University	Y		98%	125	8	8	8	8	8	8	8	8	8	8	8	5	8	8	8	8
Garvan Institute of Medical Research	N		35%	45	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Griffith University	Y		78%	100	8	8	6	8	7	0	0	8	7	8	8	0	8	8	8	8
Howard Florey Institute	Y		89%	114	8	8	8	8	8	8	8	0	8	8	5	8	5	8	8	8
James Cook University	Y		85%	109	8	8	6	7	7	5	6	8	6	8	8	0	8	8	8	8
LaTrobe	Y		82%	105	8	8	5	5	6	5	5	8	5	5	8	5	8	8	8	8
Lions Eye Institute	N		47%	60	5	5	5	5	5	5	5	5	6	5	3	3	5	0	0	3
Ludwig Institute for Cancer Research	Y		88%	113	8	7	7	7	7	7	7	7	7	8	7	7	7	7	5	8
Macquarie University	Y		95%	122	7	8	7	7	8	8	8	8	8	8	8	8	7	7	8	7
Melbourne University	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Mental Health Research Institute of Victoria	Y		83%	106	7	6	7	7	7	6	7	6	6	6	6	6	7	8	7	7
Monash University	Y		95%	121	7	8	8	8	8	8	8	8	8	8	8	5	8	5	8	8
Murdoch Children's Research Institute	Y		99%	127	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Murdoch University	Y		92%	118	8	8	7	7	8	8	7	8	8	7	5	6	8	8	8	7
National Stroke Research Institute	Y		86%	110	7	7	7	7	7	7	7	7	7	7	7	5	7	7	7	7
Newcastle University	Y		98%	125	8	8	8	8	8	8	8	8	8	5	8	8	8	8	8	8
Peter MacCallum Cancer Centre	N		35%	45	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Prince Henry's Institute of Medical Research	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Prince of Wales Medical Research Institute	Y		84%	107	7	7	7	8	7	7	7	7	7	5	7	5	7	6	6	7
Queensland Cancer Fund	N		38%	48	3	3	3	3	3	3	3	4	3	3	3	3	3	4	4	3

	Included in the consistent time series data set	Complete overall time series coverage (each key metric for each year)	Percentage coverage of metrics and years (%)	Key data coverage count (metrics and years)	Commercialisation Staff FTEs	Invention Disclosures	New US Patent applications	New Australian patent applications	New PCT patent applications	Australian patent issues	US Patent issues	Worldwide patent issues	LOAs executed	Active LOAs yielding income	LOAs and income totals	How much of the LOA and other income was paid to other institutions	Start-up companies formed	Start-up companies operational dependent upon LOAs for initiation	Operational start-up companies in which they hold equity	Value of all equity holdings
Queensland Institute of Medical Research	Y		85%	109	6	7	4	5	7	8	7	7	7	7	7	8	7	7	7	8
Queensland University of Technology	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Royal Melbourne Institute of Technology	Y		98%	126	8	8	8	8	8	8	8	8	8	8	8	8	8	6	8	8
Royal Brisbane & Women's Hospital Foundation	Y		84%	107	7	7	7	7	7	7	7	7	7	7	7	7	7	6	7	3
Schizophrenia Research Institute	N		38%	48	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Southern Cross University	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Swinburne University	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Telethon Institute for Child Health Research	Y		93%	119	8	8	5	8	6	6	6	8	8	8	8	8	8	8	8	8
The Heart Research Institute	N		65%	83	4	7	4	4	4	4	4	4	7	4	4	7	7	7	5	7
The Kerry Packer Institute of Child Health Research	N		36%	46	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3
The Macfarlane Burnet Institute for Medical Research and Public Health Ltd	Y		98%	126	8	8	8	8	8	8	8	8	8	8	8	8	8	7	7	8
The Walter and Eliza Hall Institute of Medical Research	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
University of Adelaide	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
University of Ballarat	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
University of Canberra	Y		88%	112	7	7	7	7	8	7	8	7	7	7	6	6	7	7	7	7
University of New England	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
University of New South Wales	Y		98%	126	8	8	8	8	8	8	8	8	8	8	8	7	8	8	8	7
University of Notre Dame Australia	Y		89%	114	6	8	6	8	8	8	6	8	6	6	8	6	8	8	8	6
University of Queensland	Y		98%	125	8	8	8	8	8	8	8	8	8	8	5	8	8	8	8	8
University of South Australia	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
University of Southern Queensland	Y		89%	114	8	7	7	7	7	7	7	7	7	7	7	7	7	7	8	7
University of Sydney	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
University of Tasmania	Y		88%	113	8	8	8	7	6	7	7	7	7	7	5	5	8	8	7	8

	Included in the consistent time series data set	Complete overall time series coverage (each key metric for each year)	Percentage coverage of metrics and years (%)	Key data coverage count (metrics and years)	Commercialisation Staff FTEs	Invention Disclosures	New US Patent applications	New Australian patent applications	New PCT patent applications	Australian patent issues	US Patent Issues	Worldwide patent issues	LOAs executed	Active LOAs yielding income	LOAs and income totals	How much of the LOA and other income was paid to other institutions	Start-up companies formed	Start-up companies operational dependent upon LOAs for initiation	Operational start-up companies in which they hold equity	Value of all equity holdings	
University of Technology Sydney	Y		96%	123	8	8	8	8	8	7	7	8	8	8	8	5	8	8	8	8	
University of the Sunshine Coast	Y		89%	114	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8	7
University of Western Australia	Y		98%	125	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	5	8
University of Western Sydney	Y		94%	120	8	7	8	7	7	8	8	8	8	8	8	8	7	7	7	5	8
University of Wollongong	Y		83%	106	5	8	6	6	7	6	5	7	8	8	8	6	8	6	6	6	6
Victor Chang Cardiac Research Institute	Y	Y	100%	128	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Victoria University	Y		92%	118	7	8	6	7	7	6	6	7	8	8	8	8	8	8	8	8	8
Women's and Children's Health Research Institute (formerly Child Health Research Institute)	Y		90%	115	8	7	7	5	8	7	7	7	7	8	7	8	7	7	7	7	8
Woolcock Institute of Medical Research	N		47%	60	5	3	3	3	3	5	3	3	3	5	3	3	5	5	5	5	3

Note: "Nil" respondents (institutions responding, but not signifying any outcomes) to this iteration of the survey, which did not participate in previous iterations of the survey have not been included in this table.

Table 28: Total metric values in the consistent time series dataset 2000–2007⁷⁶

		2000	2001	2002	2003	2004	2005	2006	2007
Dedicated commercialisation staff	FTE	190	231	281	296	282	294	298	288
Invention disclosures	No.	528	709	702	812	956	922	1084	1193
New US patent applications	No.	176	125	108	80	118	104	97	112
New Australian patent applications	No.	398	339	393	459	469	411	447	413
New Patent Cooperation Treaty patent applications	No.	206	217	216	162	167	193	190	212
Australian patent issues	No.	143	82	106	150	188	91	103	84
US patent issues	No.	115	64	54	134	203	92	105	79
Patents issued worldwide	No.	524	273	315	841	879	539	582	508
LOAs executed	No.	414	354	437	432	381	448	510	546
Number of LOAs yielding income	No.	489	602	627	629	665	649	700	737
LOA gross income in constant 2007 prices ⁷⁷	\$m	130.152	91.334	92.254	89.057	75.304	73.567	123.130	220.250
LOA income paid to others in constant 2007 prices ⁷⁷	\$m	5.435	7.051	8.671	12.854	8.203	7.213	8.961	7.033
Number of start-ups formed during the year	No.	47	61	58	50	30	38	40	33
Number of start-ups operational at year end dependent on assignment of technology	No.	86	109	119	228	251	219	235	240
Number of start-ups operational at year end with institutional equity stakes	No.	69	79	96	182	203	170	193	201
Value of equity holdings in constant 2007 prices ⁷⁷	\$m	153.417	154.713	132.364	178.358	208.889	166.552	183.380	185.216

⁷⁶ As described in the Methodology (NSRC time series 2000 to 2007), in order to maintain a time series set of data, an institution is included if it provided $\geq 70\%$ data coverage. The 2003–04 NSRC time series consisted of 59 institutions. The current report has one additional institution included, whilst three institutions have not been considered by virtue of the “70% rule”. This necessarily means that Table 28 has some minor data changes from those published in the 2003–04 NSRC Report.

⁷⁷ All financial data has been updated to reflect 2007 dollars, which also necessitates changed figures from those published in the 2003–04 NSRC Report.

Table 29: Differences between totals in the full sample and the consistent time series dataset in 2007

	Unit	Consistent time series sample total as a percentage of overall sample total in 2007	Value of difference between full sample and consistent dataset sample in 2007
Dedicated commercialisation staff	FTE	96.8%	9.60
Invention disclosures	No.	98.9%	13.00
New US patent applications	No.	94.1%	7.00
New Australian patent applications	No.	94.3%	24.75
New Patent Cooperation Treaty patent applications	No.	95.3%	10.50
Australian patent issues	No.	100.0%	0.00
US patent issues	No.	100.0%	0.00
Patents issued worldwide	No.	97.3%	14.00
LOAs executed	No.	98.7%	7.00
Number of LOAs yielding income	No.	98.1%	14.00
LOA gross income	\$	99.4%	1,258,000.00
LOA income paid to others	\$	100.0%	0.00
Number of start-ups formed during the year	No.	89.2%	4.00
Number of start-ups operational at year end	No.	97.2%	7.00
Number of start-ups operational at year end with institutional equity stakes	No.	98.0%	4.00
Value of equity holdings	\$	94.7%	10,397,000.00

INTERNATIONAL COMPARISONS

The report compares the commercialisation activity of Australian, United States, Canadian and United Kingdom research institutions against a small number of indicators over the period 2000 to 2007. Comparative data is drawn from:

- The data in the National Surveys of Research Commercialisation (NSRC) in Australia in the years 2000 to 2007 – covering publicly funded research institutions, universities and medical research institutes⁷⁸.
- The US Association of University Technology Managers (AUTM) Licensing Survey for the financial years 2005, 2006 and 2007.
- The Canadian AUTM Licensing Survey for 2005, 2006 and 2007.

⁷⁸ The data reported each year was used rather than time series data presented elsewhere in this report.

- The *UK University Commercialisation Survey* undertaken by the University Companies Association (UNICO)⁷⁹.
- The *Higher Education Business and Community Interaction Surveys* (HE-BCIS) (2000 to 2006), Higher Education Funding Council for England (HEFCE).

The current NSRC report departs from previous reports in that the HE-BCIS, which has a greater coverage of institutions than that of UNICO, was principally used to compare Australian and UK data.

The comparisons have been prepared within the following parameters:

- Not all questions asked in the surveys in each country are directly comparable. For example, it was necessary to source the dedicated commercialisation staff

⁷⁹ The University Companies Association, UNICO. 2005. UNICO Survey of University Commercialisation. London.

metric from the UNICO data, rather than the HE-BCIS survey, since only the UNICO definition of commercialisation staff matched the NSRC and AUTM surveys.

- The data has been adjusted to calendar years to increase the ease of comparison.
- 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)⁸⁰ for each year respectively. (Not necessary for “Average number of licensing FTEs 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 2007, 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 ABS survey). This corresponds to the years 2000, 2002, 2004 and 2006. Following the method adopted in the NSRC 2002 report, the 2001, 2003 and 2005 research expenditure data are taken to be the average of the preceding and following years.
- For 2007, 29 institutions reported research expenditures corresponding to 29% of the total number of respondents in 2006. To obtain the 2007 total research expenditure, the following method was used: (i) the median year on year percentage change was calculated for the responding institutions; and (ii) the calculated percentage change was applied to the total research expenditure of 2006 to derive the 2007 total research expenditure.⁸¹
- To correct for the institutions that did not respond in 2006 it was assumed that the relative value of their contribution to the total research expenditure in 2006 would have been the same as what it had been in 2004. Employing this assumption,

⁸⁰ For a full list of the purchasing power parity factors used, refer to http://www.oecd.org/about/0,2337,en_2649_34357_1_1_1_1_1,00.html

⁸¹ A certain number of institutions did not report any research expenditures for the period of the survey (2005 to 2007). Based on the last available research expenditure data for these institutions in 2004, these institutions comprise 17% of the total reported research expenditure across all institutions in 2004.

an adjusted total research expenditure for 2006 was derived from the 2006 total research expenditure.

COOPERATIVE RESEARCH CENTRES (CRCs)

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 performance monitoring and evaluation instrument used by the Department of Innovation, Industry, Science and Research 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 year 2003–04 to 2007–08. 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 2003–04. For this reason the time series includes data from 2003–04 to 2007–08. As for the NSRC time series data, all dollar values presented are expressed in constant 2007 prices using the chain-volume price index applied to the Gross Domestic Product in the Australian System of National Accounts.⁸²

- 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 PhD students who undertake significant amounts of research.

The MDQ information is provided by CRCs and has not been verified or independently assessed by DIISR⁸³. 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. Where found, inaccurate MDQ information was also revised.

⁸² 5206.0 Australian National Accounts: National Income, Expenditure and Product. Table 32. Expenditure on Gross Domestic Product (GDP). Chain volume measures and Current prices, Annual. Gross domestic product: Implicit price deflators. [http://www.ausstats.abs.gov.au/ausstats/ABS@Archive.nsf/0/6A0EE46E436DBB8FCA2574B800162692/\\$File/5206032_expenditure_on_gdp_annual.xls#A2304755F](http://www.ausstats.abs.gov.au/ausstats/ABS@Archive.nsf/0/6A0EE46E436DBB8FCA2574B800162692/$File/5206032_expenditure_on_gdp_annual.xls#A2304755F)

⁸³ DIISR 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 2005, 2006 AND 2007

Institution	Responded for 2005? Responded for 2006? Responded in 2007?		
	Universities		
The University of Adelaide	Y	Y	Y
Australian Catholic University	N	Y	N
The Australian National University	Y	Y	Y
Bond University	Y	Y	Y
Central Queensland University	N	N	Y
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
LaTrobe University	Y	Y	Y
Macquarie University	Y	Y	Y
The University of Melbourne	Y	Y	Y
Monash University	Y	Y	Y
Murdoch University	Y	Y	Y
The University of Newcastle	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 University of New England	Y	Y	Y
University of Ballarat	Y	Y	Y
University of Canberra	Y	Y	Y
The University of New South Wales	Y	Y	Y
University of Notre Dame Australia	Y	Y	Y
The University of Queensland	Y	Y	Y
University of South Australia	Y	Y	Y
University of Southern Queensland	Y	Y	Y
The University of Sydney	Y		Y
University of Tasmania	Y	Y	Y
University of Technology Sydney	Y	Y	Y
University of the Sunshine Coast	Y	Y	Y
The University of Western Australia	Y	Y	Y
University of Western Sydney	Y	Y	Y
Victoria University	Y	Y	Y
University of Wollongong	Y	Y	Y

Publicly Funded Research Agencies			
Commonwealth Scientific and Industrial Research Organisation	Y	Y	Y
Australian Institute of Marine Science	Y	Y	Y
Australian Nuclear Science and Technology Organisation	Y	Y	Y
Defence Science & Technology Organisation	Y	Y	Y
Medical Research Institutes			
ANZAC Research Institute	N	N	Y
Baker IDI Heart and Diabetes Institute	Y	Y	Y
Bionic Ear Institute	Y	Y	Y
Brain Research Institute	Y	Y	Y
Cancer Council of NSW	Y	Y	Y
Cancer Council Victoria	Y	Y	Y
Centenary Institute of Cancer Medicine and Cell Biology	Y	Y	Y
Centre for Eye Research	Y	Y	Y
Children's Cancer Institute Australia for Medical Research	Y	Y	Y
Garvan Institute of Medical Research	Y	Y	Y
Howard Florey Institute	Y	Y	Y
Keogh Institute for Medical Research	Y	Y	Y
Lions Eye Institute	Y	Y	Y
Ludwig Institute for Cancer Research	Y	Y	Y
Mental Health Research Institute of Victoria	Y	Y	Y
Murdoch Children's Research Institute	Y	Y	Y
National Heart Foundation	Y	Y	Y
National Stroke Research Institute	Y	Y	Y
Peter MacCallum Cancer Centre	Y	Y	Y
Prince Henry's Institute of Medical Research	Y	Y	Y
Prince of Wales Medical Research Institute	Y	Y	Y
Queensland Cancer Fund	N	N	Y
Queensland Institute of Medical Research	Y	Y	Y
Royal Brisbane & Women's Hospital Foundation	Y	Y	Y
Schizophrenia Research Institute	Y	Y	Y
Telethon Institute for Child Health Research	Y	Y	Y
The Heart Research Institute	Y	Y	Y
The Kerry Packer Institute of Child Health Research	N	Y	N
The Macfarlane Burnet Institute for Medical Research and Public Health Ltd	Y	Y	Y
The Walter and Eliza Hall Institute of Medical Research	Y	Y	Y
The Wesley Research Institute	Y	Y	Y
Victor Chang Cardiac Research Institute	Y	Y	Y
Women's and Children's Health Research Institute	Y	Y	Y
Woolcock Institute of Medical Research	Y	Y	Y

Note: Institutions that did not respond at all have not been listed in this table. There were 22 institutions that did not respond for at least one year of the survey period. Also note that a number of the respondents were "nil response" respondents, that is, they provided data for survey years, but all the supplied values were "0".

APPENDIX 2. SURVEY QUESTIONNAIRE 2005, 2006 AND 2007

DIISR NATIONAL SURVEY OF RESEARCH COMMERCIALISATION

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

1. Name of institution: _____

Research Expenditure

2a. 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 2007 or 30 June 2008*)?

\$ _____

*Note that this reporting period is not identical to the reference period for this survey (2005–2007).

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

1 31 December 2007

2 30 June 2008

*Note that this reporting period is not identical to the reference period for this survey («Survey_Year»).

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 2007, how many full time equivalents (FTEs) were employed in or engaged by your institution in the following roles, and what was the full cost of these resources?

	FTE Number	Full Cost of all FTEs
a. Dedicated commercialisation staff		
b. Other commercialisation support staff		
c. Total		

4. What did your institution spend to secure statutory protection of intellectual property rights (e.g. patents, plant breeder's rights, copyright, trade marks and/or registered designs) in 2007?

	Cost in «Survey_Year»
a. External fees and legal costs	
b. Internal legal advice/services	

5. What amount was received by your institution from licensees as reimbursements of expenses reported in question 4a?

\$ _____

6. How many invention disclosures did your institution receive in 2007?

Patent and Plant Breeder's Rights Application

7. How many patent and/or plant breeder's rights applications were filed in 2007?

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

8. How many of the new patent and/or plant breeder's rights applications filed in 2007 (as reported in question 7) were for each of the following:

	Number
a. Provisional patents	
b. Patent Cooperation Treaty (PCT) patents	
c. Innovation patents	
d. Other	
e. Total	

Patents and Plant breeder's rights Issued (including Renewals)

9. How many patents and/or plant breeder's rights were issued to your institution in 2007?

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

Patent and Plant Breeder's Rights Holdings

10. How many patents and/or plant breeder's rights did your institution hold as of 31 December 2007?

	Number
a. Patents pending	
b. Patents issued	
c. Total	

11. How many patents and/or plant breeder's rights were culled or allowed to lapse from your institution's holdings in 2007?

Licences/Options/Assignments (LOAs)

This section refers to LOAs negotiated on full commercial terms only.

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

	Number
a. Execute during 2007	
b. Have active as of 31 December 2007 (regardless of when they were executed)	

13. How many active LOAs yielded income in 2007?

14. For those active LOAs that yielded income in 2007 (question 13), how many LOAs and how much income for your institution can be attributed to:

	Number	Income
a. Running royalties		\$
b. Cashed-in equity		\$
c. All other types		\$
d. Total		\$

15. Please identify the number of LOAs by income in 2007:

	Number
a. Between \$0 and \$10,000	
b. Between \$10,000 and \$50,000	
c. Between \$50,000 and \$200,000	
d. Between \$200,000 and \$500,000	
e. \$500,000 and over	
f. Total	

Note: The 'Total' figure should be the same as the Total figure calculated for Income in question 14d.

16. In 2007, how much of the income reported in question 14d was paid to other institutions or commercial entities?

\$ _____

17. Based on running royalties (question 14a), what was the estimated level of sales resulting from technologies your institution has licensed in 2007 or before?

\$ _____

Capital Raising, Initial Public Offerings and Equity

18. Did your institution participate in any capital raising for research commercialisation activities (including Initial Public Offerings – IPOs) in 2007?

	Number	Final Capital Raised
a. IPOs		\$ _____
b. Other capital raising activities		\$ _____
c. Total final capital raised	(N/A)	\$ _____

19. What was the value of all research commercialisation equity holdings as of 31 December 2007?

\$ _____

Start-up Companies

20. How many start-up companies that were operational as of 31 December 2007 were dependent upon the licensing/assignment of your institution’s technology for initiation?

21. In how many of the start-up companies operational at 31 December 2007 identified in question 20 did your institution hold equity?

Names and Contact Details of New Start-Up Companies

22. Please provide details for each of the start-up companies that were formed in 2007, to allow for survey follow-up if required. (You can use multiple copies of this page to collect information on more than one company.)

Name of company: _____

Address: _____

Suburb: _____

State: _____

Postcode: _____

Country: _____

Telephone: _____

Fax: _____

Email: _____

ABN: _____

ACN: _____

PART 3: RESEARCH CONTRACTS AND CONSULTANCIES

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

23. For research consultancies and contracts your institution entered into in 2007 please identify the:

a. Number: _____

b. Total gross contracted value: \$ _____

NB: ‘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.

24. Of those research consultancies and contracts shown in question 23, please identify the number of research consultancies and contracts according to total gross contracted

	Number
a. Between \$0 and \$10,000	
b. Between \$10,000 and \$50,000	
c. Between \$50,000 and \$200,000	
d. Between \$200,000 and \$500,000	
e. \$500,000 and over	
f. Total	

Note: The 'Total' figure should be the same as the Total number provided in question 23a.

25. of the research consultancies and contracts identified in question 23a, how many were with clients that had previously contracted with your institution for research (i.e. 'repeat business')?

Number: _____ [If not known, please write 'Unknown']

PART 4: SKILLS DEVELOPMENT & TRANSFER

26a. Does your institution offer training to its researchers and/or research students in commercialisation and entrepreneurship:

Yes

No [Please go to question 27a]

26b. Does this training include in-house training?

Yes [How many participants completed in-house training in 2007?] _____

No

26c. Does this training include delivery by an external provider?

Yes [How many participants completed external training in 2007?] _____

No

27a. Does your institution offer training to industry or other organisations to assist them in understanding research findings and/or their implications?

Yes

No [Please go to question 28]

27b. Please list the courses or programs available:

27c. How many participants completed these training programs in 2007? _____

28. With reference to the start-up companies in operation as of 31 December 2007 that were dependent upon the licensing/assignment of your institution's technology for initiation (i.e. those identified in response to question 20), how many research postgraduates were employed in those firms during 2007 (FTE)?

Number: _____ [If not known, please write 'Unknown']

PART 5: ADDITIONAL INFORMATION

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

PART 6: SURVEY PROCESS

30. Please provide an estimate of the time taken by all employees in your institution to complete this questionnaire. This should include time spent: reading the instructions; obtaining the required information; and recording answers to the questions.

_____ hours, _____ minutes

31. Please provide comments on:

a. Any questions which caused problems:

b. Suggested improvements to this questionnaire:

APPENDIX 3. EXPLANATORY NOTES TO THE SURVEY QUESTIONNAIRE 2005, 2006 AND 2007

EXPLANATORY NOTES

PART 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 (PFRAs) and medical research institutes (MRIs). As with previous years, the information gathered through the NSRC is used to inform the development and evaluation of policy relating to the innovation system, while 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 DIISR website. That report will include other information on research commercialisation activities, and is due to be released in late 2008.

The NSRC has previously been conducted for the years 2000 to 2004. The present survey extends the series by obtaining data for 2005, 2006 and 2007. Consistent with the recommendations of the CCST Working Group on Metrics of Commercialisation (available at: <http://www.DIISR.gov.au/NR/rdonlyres/E3170A75-79D5-4737-955E-BE41714948E8/5637/FinalMoCReport15April2005.pdf>), this survey is based on a broadened definition of 'research commercialisation', which includes but goes beyond a focus on commercialisation based on intellectual property rights in the form of patents to include research contracts & consultancies, and skills development and transfer.

Reports on previous surveys in this series are available at the following links:

- for the year 2000 (<http://www.arc.gov.au/pdf/AURC003.pdf>)
- for the years 2001 and 2002 (http://www.DIISR.gov.au/sectors/research_sector/policies_issues_reviews/key_issues/commercialisation/nsrc.htm)

- for the years 2003 and 2004 (http://www.dest.gov.au/sectors/research_sector/publications_resources/profiles/national_survey_of_research_commercialisation.htm)

You may wish to refer to these for responding to some questions, especially those in **Part 2: Intellectual Property.**

Using these Explanatory Notes

These Explanatory Notes are divided into two parts. This first part provides general guidance on the survey and matters that relate to all questions. The second part addresses each question, and incorporates definitional information on key terms.

Contact for assistance

Please contact your Institutional Contact Officer (ICO) in the first instance regarding:

- institution wide coordination of the survey response; and
- final submission of the data on behalf of your institution.

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

Mr Brett Still

Phone: (02) 6276 1045

Email: brett.still@innovation.gov.au

Facsimile: (02) 6276 1463

OR,

Dr Luke Hendrickson

Phone: (02) 6123 7342

Email: luke.hendrickson@innovation.gov.au

Facsimile: (02) 6276 1465

Postal Address:

Collaboration and Knowledge Diffusion

Innovation Analysis Branch

Innovation Division

Department of Innovation, Industry, Science and Research

GPO Box 9839

Canberra ACT 2601

If making contact by telephone, please call weekdays between 9am and 5pm AEST.

Please also use these contact details for submitting any additional information via email, facsimile or post.

Survey timing

The survey is being conducted over seven weeks, from 6 June 2008 to 25 July 2008.

Reporting year

All data collected via the survey will be reported on a calendar year basis and it is therefore requested that data be provided as per calendar years.

If your institution collects the majority or all of the data sought through the survey on a financial year basis, please contact one of the nominated contacts above to discuss how provision of your data will be managed.

'Nil' and 'Not applicable' responses

For questions where you have no activity, we seek a response of 'nil' so that it can be differentiated from a missing response. Also, as not all questions apply to all respondents, a 'not applicable' response is requested where appropriate.

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 against the relevant question.

'In-kind' contributions

In instances where you wish to report additional information such as in-kind payments/contributions, please provide your estimate of the value of such payments/contributions in the comments field against the relevant question.

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 information on this issue is provided in the notes to relevant questions.

Cooperative Research Centres

Data for Cooperative Research Centres (CRCs) will be obtained through the CRC Program and reported separately to this survey, to arrive at a total picture for the research system.

Under these arrangements, 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 or 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

Report in Australian dollars.

Comments cells against each question

A free text comment cell is provided for comments against each question in the response template version of the survey. For each question where necessary or desirable, please use the field to:

- provide comments and qualifications to your answer; and
- explain any difficulties you had with the relevant question.

PART 2: QUESTIONS & DEFINITIONS

Part 1: Preliminaries

Question 1.

Nil

R&D Expenditure (Q2)

Question 2a.

R&D EXPENDITURE: expenditure on research and experimental development, as defined by the Australian Bureau of Statistics (ABS) in its Surveys of Research & Experimental Development. The survey was conducted in 2006 and 2008 for the years 2004 and 2005, and 2006 and 2007 respectively.

Include: The same figure as that reported by your institution in response to the relevant ABS Survey of Research & Experimental Development, i.e.:

Government and Private Non-Profit Organisations, 2006–2007, cat. No. 8109.0, *or*
Higher Education Organisations, 2008, cat. No. 8111.0, *or*

Businesses, 2005–2006, cat. No. 8104.0.

If you are unable to identify the relevant figure provided to the ABS, please include in your response all expenditure made by your institution in support of its R&D activities that are funded by all sources, including the federal government, local government, industry, foundations, and other non-profit organisations. If your institution participates in a CRC, include research expenditure related to your institution's role as a CRC participant. If you responded to two surveys during the survey period, please report both figures in the relevant cells.

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: refers here to the end date for the year you answered for in question 2a, i.e. either 31 December 200x or 30 June 200x.

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.

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 (MTAs), 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 (Questions 3–6)

Question 3.

DEDICATED COMMERCIALISATION STAFF: person(s) employed in the institution in either full or fractional full time equivalent (FTE) allocation whose duties are specifically involved with commercialisation activities, such as: licensing and patenting processes: licensee solicitation; technology valuation; marketing of technology; licence agreement drafting and negotiation; and start-up activity efforts.

OTHER COMMERCIALISATION SUPPORT STAFF: person(s) employed either as full time or fractional FTEs 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; 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. 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: administrative assistance or in-house or external legal counsel, unless they are playing a direct commercialisation role. Do not include people working on contracts for research (other than as part of licensing), course delivery, consulting or other activities.

FULL COST: all the direct and indirect salary and related costs of the staff reported in questions 3a and 3b.

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

Question 4.

Asks for costs expended for statutory protection of intellectual property.

EXTERNAL FEES AND LEGAL COSTS: the amount spent by your institution in fees for patents, plant breeder's rights, copyright, trade marks, 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 including: 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 5 for patent fee reimbursements from licensees), and legal fees for contract drafting or advice.

INTERNAL LEGAL ADVICE/SERVICES: internal legal expertise applied to: patents; plant breeder's rights; copyright; trade marks and/or registered designs.

Include: internal legal costs in patent and copyright prosecution, including patent searches; maintenance; and interference costs; 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: legal costs for contract drafting or advice.

Question 5.

PATENT/LEGAL FEES REIMBURSEMENTS: the amount reimbursed by licensees to the institution for EXTERNAL FEES AND LEGAL COSTS (question 4a).

Include: patent fees recovery only, not other licence revenue.

Question 6.

INVENTION DISCLOSURES:

Include the number of disclosures of inventions or discoveries, no matter how comprehensive, that were made in the year requested and are counted by your institution. In instances where joint projects have/are being undertaken which are generating invention disclosures, please ensure that invention disclosures are only reported by the lead research partner.

Patent and Plant Breeder's Rights Applications

Question 7.

TOTAL APPLICATIONS: **include:** provisional applications; provisional applications that are converted to regular applications; new filings (such as PCT and National Phase applications); and, if applicable to Australia, the US or elsewhere, continuations-in-part (CIPs), continuations, divisionals, and reissues.

NEW APPLICATIONS: **do not include:** continuations; divisionals; reissues; or CIPs. 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 that corresponding regular application should not be counted as new.

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 to the patent application then report your institution's share as 0.33.

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

Exclude: all activity undertaken with Australian Universities if you are a Medical Research Institute, unless you establish that your partner institution/s will not be counting your joint activity in their survey return

Non-Patent Innovation: Where your institution has elected not to patent an invention or innovation (e.g. because of risks of reverse engineering from patent information), you may use the comments cells for questions 7–8 to report this activity/outcome.

Question 8.

PROVISIONAL PATENTS: a form of patent available through both the US Patent and Trademark Office (USPTO) and IP Australia as a lower cost first patent filing option.

PATENT COOPERATION TREATY (PCT) PATENTS: a form of patent that offers inventors and industry a simplified and cost-effective route for eventually obtaining national patent protection internationally in any of more than 125 countries. Both applicants and patent offices of PCT member States benefit from early assessments on the relevant state of the art and on the patentability of the inventions, as well as from a centralised international publication system and from simplified formality requirements.

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.

OTHER: All other types of patent applications not specified above including national phase applications.

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.

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

Patents and Plant breeder's rights Issued (including Renewals)

Question 9.

Include: the number of patents and plant breeder's rights issued to your institution in the reporting year or accepted/allowed by patent offices in the reporting year. Also include annuity payment renewals and Plant breeder's rights applications that have progressed to acceptance or allowance by patent offices.

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

Patent and Plant Breeder's Rights Holdings

Question 10.

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

PATENTS PENDING: **include:** all provisional patents; PCT patents; and national phase filings.

PATENTS ISSUED: **include** patents accepted and allowed by patent offices.

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.

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

Question 11.

Include: all provisional patent applications, PCT and national phase applications, and granted patents.

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.

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

Licenses / Options / Assignments (LOAs)

Question 12.

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

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.

Please note: This includes only LOAs negotiated on full commercial terms, granting access to institutional intellectual property (patented or otherwise) in return for royalties or licence fees.

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.

ACTIVE: The number of active licences and options, regardless of when they were executed, that had not terminated by the end of the Survey's reporting year.

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.

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.

Licences/assignments to software or biological material end-users of \$1,000 or more may be counted per licence, or as one licence, or one-each for each major software or biological material product (at manager's discretion) if the total number of end-user licences would unreasonably skew the institution's data. Licences/assignments for technology protected under or plant breeder's rights may be counted in a similar manner to software or biological material products as described above, at manager's discretion.

Licences and Assignments to other research institutions, including those provided as inputs to Cooperative Research Centres.

Granting of licences for the use of background intellectual property.

Exclude:

Material Transfer Agreements (MTAs).

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 Program).

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.

Question 13.

This question refers to LOAs identified in question 12b.

See notes for question 14 for details of types of income to be included.

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.

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

Question 14.

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.

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 are determined but a cash transaction does not take place through the sale of these holdings.

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

ALL OTHER TYPES: Any remaining types of LOA income not covered by RUNNING ROYALTIES or CASHED-IN EQUITY.

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 and biological material end-user licence fees equal to \$1,000 or more, but not research funding, patent expense reimbursement, a valuation of equity not cashed-in, software and biological material end-user licence fees less than \$1,000, 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.

Include: gross cash payments received by your institution.

Exclude: LOA income paid to other institutions or commercial entities (this is reported under question 16); and in-kind contributions. If you wish to identify

other forms of income, such as in-kind contributions, these can be reported in the free text field for questions 12–17.

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.

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

Question 15.

The total at question 15f should be the same as the figure at question 13 and 14di.

Please report cash payments only. If you wish to identify other forms of income (e.g. in kind contributions), these can be reported in the free text field for questions 12–17.

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 16.

LOA income paid to other institutions or commercial entities will be used to help identify the 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 4); and in kind payments. Please report cash payments only. If you wish to identify other forms of expenditure such as in kind contributions, these can be reported in the free text field for questions 12–17.

Question 17.

You are asked to use the running royalties identified in question 14a to estimate the level of sales resulting from your institution's licence income in the reporting year. This can be done by, for example:

- using the actual royalty rate applied to the running royalty income received under each royalty agreement, or

- calculating the average royalty rate for the total running royalty income received under all royalty agreements.

Note: In the comments field for questions 12–17, please indicate the method used to calculate the level of sales.

Capital Raising, Initial Public Offerings and Equity

Question 18.

INITIAL PUBLIC OFFERING: refers to when a company first sells its shares to the public.

OTHER CAPITAL RAISING ACTIVITIES: capital raised through activities other than IPO(s), including post-float share offers, private share offers, etc.

TOTAL FINAL CAPITAL RAISED: refers to the total amount of capital raised through the IPO(s) and/or other capital raising activities. Valuations used to arrive at this figure should comply with the International Financial Reporting Standards.

Include: All cases of participation in capital raising processes, including where your institution has driven the capital raising process but not invested in it.

Question 19.

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. Information on start-up companies is sought in questions 20 to 22.

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

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. The following guidelines may assist:

Value of all equity holdings refers to equity that is related to 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 2005 and they put in \$3m for 60 per cent of the company and there have been no more investments since, then your value for all three years (2005–2007) will be \$2m (i.e. the institution's 40 per cent share value). If there have been no transactions, treat value as zero.

Start-up Companies

Question 20.

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.

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 21.

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

Question 22.

You are asked to list and provide details for start-up companies that were formed in the reporting period.

PART 3: RESEARCH CONTRACTS AND CONSULTANCIES

This part seeks information relating to research contracts and research consultancy agreements.

RESEARCH CONTRACTS & CONSULTANCIES:

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.

RESEARCH includes:

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.

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. 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 field for questions 23–25.

Question 24.

The total at question 24f should be the same as the figure at question 23a.

Question 25.

Clients who have changed their name or company structure may be counted as previous clients.

PART 4: SKILLS DEVELOPMENT & TRANSFER

Question 26.

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.

Question 26a).

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 27.

TRAINING TO ASSIST IN UNDERSTANDING RESEARCH FINDINGS AND/OR IMPLICATIONS: your institution may run educational, training and/or professional development programs to help users of research to better understand research, research findings and/or the implications of research findings. If this is the case, please provide details.

Question 28.

The count of research postgraduates employed can include persons who graduated from institutions other than the respondent institution.

PART 5: ADDITIONAL INFORMATION

Question 29.

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
- 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 30.

Nil

Question 31.

Nil

APPENDIX 4. START-UP COMPANIES FORMED IN 2005, 2006 AND 2007

Table 30: Start-up companies formed in 2005⁸⁴

Institution	Name of company	ABN or ACN
Medical Research Institutes		
Baker IDI Heart and Diabetes Institute	ElaCor Pty Ltd	110517854
National Stroke Research Institute	V-Kardia Pty Ltd	112 463 386
Peter MacCallum Cancer Centre	Neuroscience Trails Australia	47100286486
Publicly Funded Research Agencies		
Commonwealth Scientific and Industrial Research Organisation	Advanced Polymerik Pty Ltd	099108755
	Ceram Polymerik Pty Ltd	099100240
	EpiTactix Pty Ltd	106160392
	Australian Synchrotron Holdings Company Pty Ltd	126506205
	VERnet Pty Ltd	112005302
	WLAN Service Pty Ltd	112099260
Universities		
Curtin University of Technology	Cool Energy Ltd	49097929461
	Scanalyse Pty Ltd	117523369
Flinders University	Re-Time Pty Ltd ⁸⁵	20116821295
Griffith University	Aqua Diagnostic Holdings Pty Ltd	29 113 070 134
	QS Semiconductor Australia Pty Ltd	50 116 565 470
Macquarie University	Bluglass Pty Ltd	111 0473 6870
	Heart Assist Technologies Pty Ltd	180 9182 1457
	Multilit Pty Ltd	371 1831 5816
	Lams International	331 0860 2419
	Lams Foundation	108 031 894
Monash University	CNSBio Pty Ltd	35110875584
Murdoch University	Cryptogen Pty Ltd	83114139641
Southern Cross University	Australian Plant DNA Bank Pty Ltd	95108486791
	Biobank Pty Ltd	27112877442
Swinburne University of Technology	Vroomco Pty Ltd	114762819
	Purple Panda Pty Ltd	115506342
The University of Adelaide	Re-Time Pty Ltd ⁸⁵	20116821295
The University of Melbourne	Austhink Software Pty Ltd	47 109 947 837
	Velacor Therapeutics Pty Ltd	27 116 461 244
	OPAL Therapeutics Pty Ltd	14 116 312 577
The University of Queensland	Lucia Publishing Pty Ltd	77113527254
	Leximancer Pty Ltd	86 116 218 109
	Activetorque Pty Ltd	69 117 646 090
	Spinifex Pharmaceuticals Pty Ltd	87 611 505 7826
The University of Sydney	Australian Grains Technology Pty Ltd	65100269930
The University of Western Australia	Ondek	113391263
	iCeutica	113244152
	Dimerix	112223417

⁸⁴ Details of three start up companies for 2005 have not been reported by two universities. These three reported start-up companies have been included in Table 13 but the companies have not been represented in this table.

⁸⁵ Note that the University of Adelaide and Flinders University were co-founders of "Re-Time Pty Ltd".

Table 31 : Start-up companies formed in 2006⁸⁶

Institution	Name of company	ABN or ACN
Medical Research Institutes		
Ludwig Institute for Cancer Research	Life Science Pharmaceuticals Inc	49117801957
	Vegenices Limited	115922177
Peter MacCallum Cancer Centre	PerforX	
The Macfarlane Burnett Institute for Medical Research and Public Health Ltd ⁸⁷	Igavax Pty Ltd	106 265 098
	4G Vaccine Pty Ltd	121 748 436
Publicly Funded Research Agencies		
Australian Nuclear Science and Technology Organisation	CeriamiSphere Pty Ltd	87 119 244 290
	Australian Membrane Technologies Pty Ltd	41120875498
Commonwealth Scientific and Industrial Research Organisation	Phoslock Water Solutions Ltd	099555290
	Avipep Pty Ltd	115116008
	DataTrace DNA Pty Ltd	112861060
	Funnelback Pty Ltd	116105296
	Catapult Genetic Pty Ltd	085509284
	HySSIL Pty Ltd	105134030
	Intalysis Pty Ltd	116067951
Universities		
Curtin University of Technology ⁸⁸	TheBuzz Corp Pty Ltd	118397135
	Sensear Pty Ltd	118934259
	Glycan Biosciences	120583548
Deakin University	Power DX (Aust) Pty Ltd	21123158734
Macquarie University	AusUni Pty Ltd	40 121 393 824
	Applimex Systems Pty Ltd	94 107 926 634
	Image Connections Australia	881 0712
	Lighthouse Technologies	36 105 353 816
Monash University ⁸⁹	Advanced Polymerik Pty Ltd	38 099 108 755
Murdoch University	Biocodes Pty Ltd	53 122 983 108
	Nemgenix Pty Ltd	33 120 732 827
	DIVA Solutions Pty Ltd	48 122 983 091
The University of Melbourne ⁸⁷	Gelcast Pty Ltd	63 107 227 896
	Igavax Pty Ltd	45 106 265 098
	Intelliguard I.T. Pty Ltd	13 098 700 344
The University of Queensland	Ausonex Pty Ltd	64 123 246 391
	Polyvac	93 123 240 899
	Flouro Therapies Pty Ltd	21 123 240 906
	Imprezeeo Pty Ltd	82 125 558 287
	Pepfactants Pty Ld	49 121 927 660
	Rapisure Pty Ltd	15 119 368 302
	Impedance Cardiology Systems	20-5205486 ⁹⁰
The University of Sydney ⁸⁹	Advanced Polymerik	38 099 108 755
The University of Western Australia ⁸⁸	Orthocell	118397135
	Sensear Pty Ltd	118934259
	TheBuzz Corp Pty Ltd	120408166
University of Tasmania	Cellbourne Lipids Pty Ltd	119252827
	kmAgent Pty Ltd	118021113

⁸⁶ Details of five start up companies for 2006 have not been reported by two universities. These five reported start-up companies have been included in Table 13 but the companies have not been represented in this table.

⁸⁷ The MacFarlane Burnett Medical Research Institute and Melbourne University jointly launched Igavax Pty Ltd. Assigned to MacFarlane Burnett Medical Research Institute only in Table 13.

⁸⁸ Curtin University and the University of Western Australia jointly launched TheBuzz Corp Pty Ltd and Sensear Pty Ltd. Unit record file data attributes one of these companies to each institution.

⁸⁹ Monash and Sydney University jointly launched "Advanced Polymerik Pty Ltd" in 2006. This launch has been attributed to Monash University in the unit record file data.

⁹⁰ Note that this number is an Employer-Identification Number (EIN) as Impedance Cardiology Pty Ltd was launched in the United States.

Table 32: Start-up companies formed in 2007⁹¹

Institution	Name of company	ABN or ACN
Medical Research Institutes		
Baker IDI Heart and Diabetes Institute	Osprey Medical Inc	
Bionic Ear Institute	Bionic Assets Pty Ltd	33128780647
Publicly Funded Research Agencies		
Commonwealth Scientific and Industrial Research Organisation	Biota Holdings Ltd	006479081
	Prima Biomed Ltd	009237889
	Starpharma Holdings Ltd	078532180
	XRF Scientific Ltd	107908314
	Arista Cereal Technology Pty Ltd	122450962
	Carbon Energy Pty Ltd	105176967
	Hydropem Pty Ltd	123178165
	MDFRC Pty Ltd	120148245
	T-Mag Pty Ltd	121804626
Universities		
Bond University	Bond Innovation 1 Pty Ltd	92128891056
	Bond R&D 1 Pty Ltd	92128891083
Curtin University of Technology	Virtual Observer Pty Ltd	123120516
Flinders University	BIOX Pty Ltd	47117267348
Monash University	Ofidium Pty Ltd	54128762916
Murdoch University	Spirogene Pty Ltd	86-126-864-846
RMIT University	RMIT Drug Discovery and Technology Pty Ltd	96123380110
The Australian National University	Savine Therapeutics Pty Ltd	128 146 869
The University of Melbourne	CFaR Pty Ltd	87132 404 338
	Fibrotech Therapeutics Pty Ltd	47 119 745 970
The University of Queensland	Aussie Colours Pty Ltd	35125909131
	Bio Energy	18129018202
	Annotex Pty Ltd	128591177
	Dendrimed Pty Ltd	90127951820
	LanguageMap Pty Ltd	14125116043
	Tenasitech Pty Ltd	97126593977
	Xenimet Pty Ltd	67127951786
	Bilexys Pty Ltd	55128591131
The University of Western Australia	Histology On-line	127068464

91. Details of seven start-up companies for 2007 have not been reported by two universities. These seven reported start-up companies have been included in Table 13 but the companies have not been represented in this table.

APPENDIX 5. EXECUTIVE SUMMARY OF RESULTS FROM THE NSRC RESPONDENT QUESTIONNAIRE

A questionnaire was sent out to all respondents and stakeholders to the 2003–2004 NSRC on 5th December 2007. The purpose of the questionnaire was to obtain feedback on the NSRC and its report to ascertain the in-principle and practical support for the survey and particular views about its current format.

The list of respondents included all universities and publicly funded research organisations and 27 medical research institutes. A response rate of 49% was achieved.

Ninety four percent of respondents believed that the NSRC should be continued with 79% of respondents citing the NSRC as valuable or relevant to their institution.

Sixty five percent of respondents believed that the NSRC warranted the resources they had to commit to complete it.

Approximately half of all respondents believed that the NSRC was well structured and user-friendly.

The majority (94%) of respondents rejected a triennial reporting cycle with most respondents backing a biennial cycle (61%) over an annual cycle (35%).

In general the majority of respondents thought that the survey questions should remain stable (57%) and that it was important that the time series data continue (66%).

Comments made by the respondents generally supported additional questions proposed by DIISR in the questionnaire appendix. Several additional questions were proposed by the respondents that asked about commercialisation office budgets and their priorities/goals, the level of industry engagement and collaboration, patent and licensing additionality and societal impact.

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