



2008-09

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RESEARCH AND EXPERIMENTAL DEVELOPMENT

AUSTRALIA

ALL SECTOR SUMMARY

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INQUIRIES

For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070 or Fiona Manson on Perth (08) 9360 5382.

INTRODUCTION

This release presents summary statistics on Research and Experimental Development (R&D) undertaken by Australian organisations within the Business, Government, Higher education and Private non-profit sectors for the 2008–09 reference period. These statistics, as well as time series data, are also available in spreadsheet format (data cubes); see the Downloads page for this issue (cat. no. 8112.0) on the ABS website <www.abs.gov.au>.

Users should refer to the Explanatory and Technical Notes for further contextual information when interpreting these results.

Data in this issue have been released previously on an individual sector basis and at more detailed levels. See Explanatory Note 2 for further detail.

CHANGES IN THIS ISSUE

For the first time, field of research and socio-economic objective data presented in this issue have been collected and compiled based on the *Australian and New Zealand Standard Research Classification (ANZSRC), 2008* (cat. no. 1297.0). Previous issues used the Australian Standard Research Classification (ASRC).

Previous cycle estimates have not been recompiled using the new classification. As such, field of research and socio-economic objective tables present current cycle data only and on an ANZSRC basis. However, previous cycle data are available in the data cubes on an ASRC basis.

DATA QUALITY

When interpreting the results in this release, it is important to take into account factors that may affect the reliability of estimates. These factors are described in the Non-sampling error section of the Technical Note.

This release includes revised data for the 2006–07 reference period. Refer to the Revisions section of the Technical Note for further detail.

Brian Pink
Australian Statistician

ABBREVIATIONS

\$'000	thousand dollars
\$b	billion (thousand million) dollars
\$m	million dollars
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
ANZSIC06	<i>Australian and New Zealand Standard Industrial Classification, 2006 Edition</i>
ANZSRC	Australian and New Zealand Standard Research Classification
ASRC	Australian Standard Research Classification
Aust.	Australia
excl.	excluding
FOR	Fields of Research
GDP	gross domestic product
GERD	gross expenditure on R&D
GSP	gross state product
n.e.c.	not elsewhere classified
NSW	New South Wales
NT	Northern Territory
OECD	Organisation for Economic Co-operation and Development
PYE	person years of effort
Qld	Queensland
R&D	research and experimental development
SA	South Australia
SEO	socio-economic objective
Tas.	Tasmania
Vic.	Victoria
WA	Western Australia

MAIN FEATURES

GROSS RESOURCES DEVOTED TO RESEARCH AND EXPERIMENTAL DEVELOPMENT (R&D)

Gross expenditure on R&D (GERD) and Gross human resources devoted to R&D represent the total expenditure and human resources devoted to R&D by the Business, Government, Higher education and Private non-profit sectors. For information on sector classification, see Explanatory Note 7. All figures in this release are in current prices.

GERD

In 2008–09, Australian GERD was \$27.7 billion, an increase of \$6.0 billion (or 27%) over 2006–07.

GERD, by sector

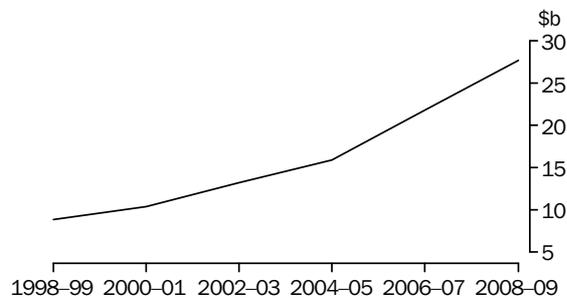
	1998–99	2000–01	2002–03	2004–05	2006–07(a)	2008–09
	\$m	\$m	\$m	\$m	\$m	\$m
Business	4 095	4 983	6 940	8 676	r12 639	16 858
Government						
Commonwealth	1 179	1 405	1 531	1 544	r2 046	2 252
State/territory	864	951	951	942	r1 049	1 169
Total	2 043	2 356	2 482	2 486	r3 095	3 420
Higher education	2 555	2 790	3 430	4 327	r5 434	6 717
Private non-profit	225	289	360	479	r609	744
Total	8 918	10 417	13 212	15 969	r21 777	27 740

r revised

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

Over the ten years to 2008–09, GERD has more than tripled from \$8.9 billion in 1998–99.

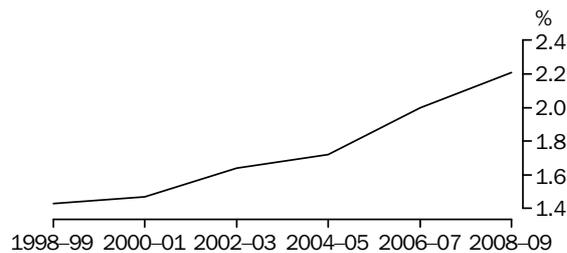
GROSS EXPENDITURE ON R&D



GERD and gross domestic product (GDP)

GERD as a proportion of GDP increased from 2.00% in 2006–07 to 2.21% in 2008–09.

GERD, as a proportion of GDP(a)



(a) See Explanatory Notes 15 and 16 for details.

MAIN FEATURES *continued*

GERD and gross domestic product (GDP) *continued*

The following table shows GERD/GDP ratios for Organisation for Economic Co-operation and Development (OECD) countries. Although Australia's GERD/GDP ratio for 2008–09 remained below the Total OECD ratio of 2.33%, its growth from 2006–07 (0.21 percentage points) was greater than the growth in the Total OECD ratio (0.09 percentage points).

GERD/GDP RATIOS OF OECD COUNTRIES (a) (b) (c)

	2004-05	2005-06	2006-07	2007-08	2008-09
	%	%	%	%	%
Sweden	3.62	3.60	3.74	3.61	3.75
Finland	3.45	3.48	3.48	3.48	3.73
Japan	3.17	3.32	3.41	3.44	3.42
Korea	2.68	2.79	3.01	3.21	3.37
Switzerland	2.90	na	na	na	3.01
United States of America	2.54	2.57	2.61	2.66	2.77
Denmark	2.49	2.46	2.48	2.55	2.72
Austria	2.26	2.45	2.47	2.54	2.68
Iceland	na	2.77	2.99	2.69	2.65
Germany	2.49	2.49	2.53	2.53	2.64
Australia	1.73	na	2.00	na	2.21
France	2.15	2.10	2.10	2.04	2.02
Belgium	1.86	1.83	1.86	1.90	1.92
Canada	2.08	2.05	1.97	1.90	1.84
United Kingdom	1.68	1.73	1.75	1.79	1.77
Netherlands	1.81	1.79	1.78	1.82	1.75
Norway	1.59	1.52	1.52	1.65	1.62
Luxembourg	1.63	1.56	1.65	1.58	1.62
Portugal	0.77	0.81	1.02	1.21	1.51
Czech Republic	1.25	1.41	1.55	1.54	1.47
Ireland	1.23	1.25	1.25	1.28	1.43
Spain	1.06	1.12	1.20	1.27	1.35
New Zealand	na	1.16	na	1.21	na
Italy	1.10	1.09	1.13	1.18	1.19
Hungary	0.87	0.95	1.00	0.97	1.00
Turkey	0.52	0.59	0.58	0.72	0.73
Greece	0.55	0.59	0.58	0.58	na
Poland	0.56	0.57	0.56	0.57	0.61
Slovak Republic	0.51	0.51	0.49	0.46	0.47
Mexico	0.40	0.41	0.39	0.38	na
Total OECD	2.17	2.21	2.24	2.28	2.33

na not available

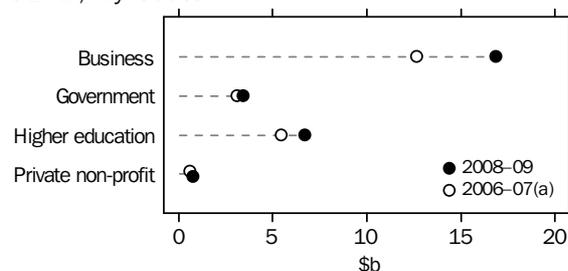
- (a) Except for Australia, the GERD/GDP ratios shown for OECD countries are sourced from *Main Science and Technology Indicators, 2010/1*, OECD. Ratios for Australia have been calculated using the most recent ABS values for GERD and GDP. See Explanatory Notes 15 and 16.
- (b) GERD/GDP ratios for some countries are projected or estimated as per the OECD source table.
- (c) Countries are ranked by the most recent available GERD/GDP ratio.

MAIN FEATURES *continued*

Sector

In 2008–09, the Business and Higher education sectors remained the largest contributors to GERD (at \$16.9 billion and \$6.7 billion, respectively). These two sectors also recorded the strongest growth in both dollar and percentage terms between 2006–07 and 2008–09: Business up \$4.2 billion or 33%; and Higher education up \$1.3 billion or 24%. The weakest growth in percentage terms was recorded by the Government sector, up 11% from 2006–07.

GERD, by sector



(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

The Business sector was the only sector to increase its share of GERD, accounting for 61% of GERD in 2008–09, up 3 percentage points from 58% in 2006–07.

Industry

In 2008–09, at the industry level, the largest values of GERD were reported for Education and training (over \$6.8 billion), Professional, scientific and technical services (\$5.0 billion), Manufacturing (\$4.3 billion) and Mining (\$4.2 billion). These four industries combined contributed over 73% of GERD.

Almost all GERD for Education and training was attributable to the Higher education sector; all expenditure on R&D by the Higher education sector contributes to this industry. The Business sector contributed most of GERD for Manufacturing and all of GERD for Mining. In contrast, three of the four sectors made notable contributions to GERD for Professional, scientific and technical services.

Of all industries, Mining showed the largest dollar increase in expenditure on R&D from 2006–07 (up \$1.5 billion), accounting for 25% of the increase in GERD. The next largest increases were reported by Professional, scientific and technical services (up \$1.0 billion) and Financial and insurance services (up \$0.9 billion).

Type of expenditure

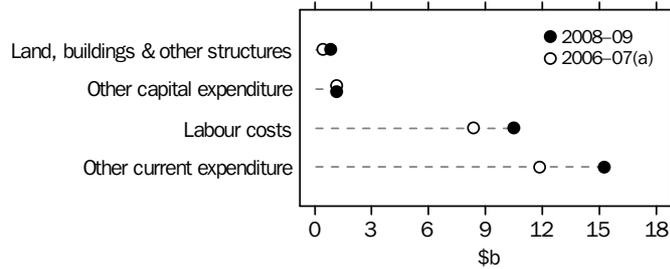
In 2008–09, Current expenditure accounted for 93% or \$25.7 billion of GERD which, in turn, was comprised of \$10.5 billion in Labour costs and \$15.2 billion in Other current expenditure. Capital expenditure totalled \$2.0 billion over the period.

Growth in GERD from 2006–07 was driven by a \$5.5 billion increase in Current expenditure (93% of the overall growth), primarily due to the contribution of the Business sector (up \$4.2 billion). Total Capital expenditure increased by \$0.4 billion.

MAIN FEATURES *continued*

Type of expenditure *continued*

GERD, by type of expenditure

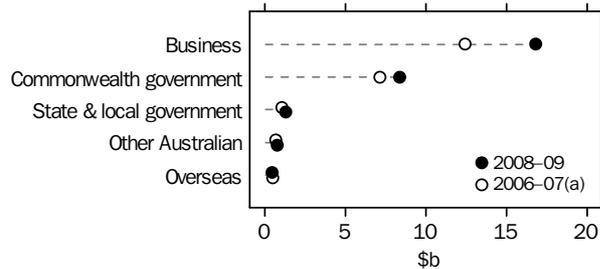


(a) 2006-07 data have been revised. See the Revisions section of the Technical note for details.

Source of funds

The major sources of funds for R&D in 2008-09 were Business (\$16.8 billion) and Commonwealth government (\$8.4 billion). These two sources also recorded the largest dollar increases from 2006-07 (up \$4.4 billion and \$1.3 billion, respectively). While the Business sector was the primary recipient of Business funding across the sectors (at 97%), the Higher education sector received the most Commonwealth funding for R&D (at 67%).

GERD, by source of funds

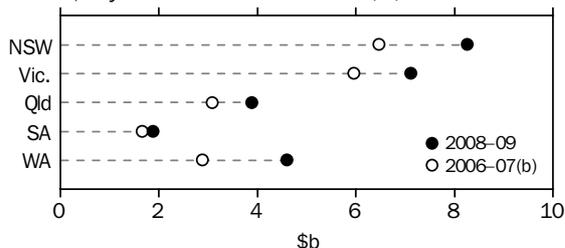


(a) 2006-07 data have been revised. See the Revisions section of the Technical Note for details.

Location

For the definition of location, see Explanatory Note 10. New South Wales (NSW) and Victoria accounted for over half (55%) of GERD in 2008-09 (at \$8.3 billion and \$7.1 billion, respectively). NSW and Western Australia (WA) recorded the greatest dollar growth in GERD from 2006-07, with increases of \$1.8 billion and \$1.7 billion, respectively. WA also recorded the largest increase in its share of GERD (up 4 percentage points from 13% in 2006-07) and showed strong percentage growth in R&D expenditure (up 59% from 2006-07).

GERD, by selected locations(a)



(a) See Explanatory Note 10 for details.
(b) 2006-07 data have been revised. See the Revisions section of the Technical Note for details.

MAIN FEATURES *continued*

GERD and gross state product (GSP)

In 2008–09, GERD as a proportion of GSP was highest for the Australian Capital Territory (4.11%) and WA (2.70%). WA reported the largest growth in its GERD/GSP ratio, up 0.62 percentage points from 2.08% in 2006–07.

GERD, by location(a)—proportion of GSP(b)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT
	%	%	%	%	%	%	%	%
2006–07	1.84	2.28	1.48	2.31	2.08	np	np	np
2008–09	2.05	2.44	1.59	2.38	2.70	np	np	4.11

np not available for publication but included in totals where applicable, unless otherwise indicated

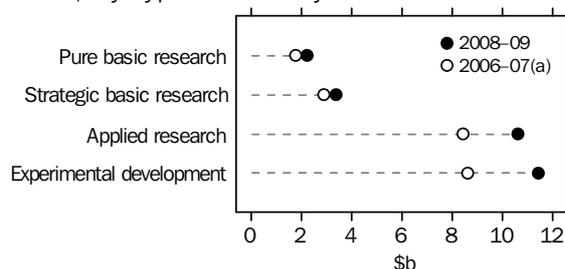
(a) See Explanatory Note 10 for details.

(b) See Explanatory Note 15 for details.

Type of activity

In 2008–09, 80% of GERD was directed into Experimental development (\$11.5 billion) and Applied research (\$10.6 billion). These two types of activity also recorded the strongest dollar growth from 2006–07, with Experimental development increasing by \$2.8 billion and Applied research increasing by \$2.2 billion. Pure basic research and Strategic basic research each increased by \$0.5 billion.

GERD, by type of activity



(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

Field of research

In 2008–09, Engineering accounted for the largest share of GERD (over 37% or \$10.3 billion), followed by Information and computing sciences (over 17% or \$4.9 billion) and Medical and health sciences (14% or \$4.0 billion).

While the Business sector was the largest contributor to both Engineering and Information and computing sciences in 2008–09, its spending on Medical and health sciences was less than half that of the Higher education sector.

Socio-economic objective (SEO)

In 2008–09, just over two thirds of GERD was directed into the SEO sector of Economic development (67% or \$18.7 billion). The next most prevalent SEO sector was Society (19% or \$5.3 billion).

At the SEO division level, over half of GERD was directed into the four largest divisions: Manufacturing (\$5.0 billion); Health (\$4.0 billion); Energy (over \$2.8 billion); and Mineral resources (\$2.8 billion).

MAIN FEATURES *continued*

GROSS HUMAN RESOURCES DEVOTED TO R&D

Gross human resources devoted to R&D in 2008–09 totalled 136,696 person years of effort (PYE), an increase of 9,994 PYE (or 8%) from 2006–07.

GROSS HUMAN RESOURCES DEVOTED TO R&D, by sector

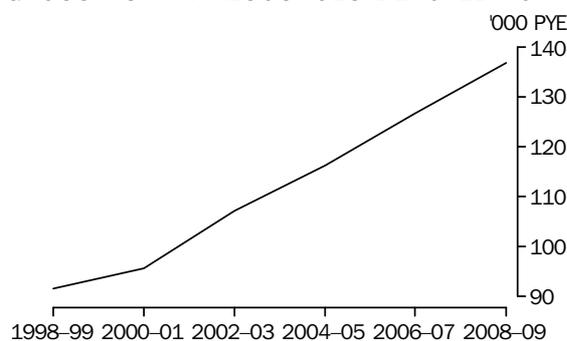
	1998–99	2000–01	2002–03	2004–05	2006–07(a)	2008–09
	PYE	PYE	PYE	PYE	PYE	PYE
Business	25 109	28 391	35 939	40 458	r46 462	53 556
Government						
Commonwealth	9 353	9 565	10 185	9 368	r9 481	9 209
State/territory	9 069	8 587	8 357	7 320	r7 279	7 834
Total	18 422	18 152	18 541	16 687	r16 760	17 042
Higher education	45 502	46 287	49 612	55 204	r58 905	61 310
Private non-profit	2 551	2 791	3 117	3 845	r4 575	4 788
Total	91 583	95 621	107 209	116 194	r126 702	136 696

r revised

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

Over the ten years to 2008–09, Gross human resources devoted to R&D has shown steady growth.

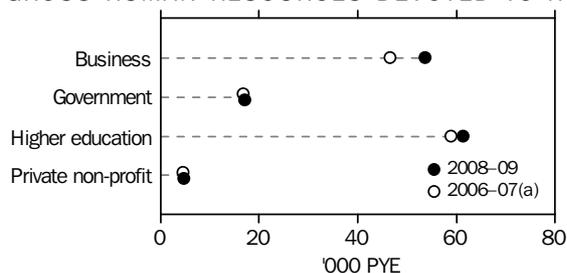
GROSS HUMAN RESOURCES DEVOTED TO R&D



Sector

The majority of Human resources devoted to R&D in 2008–09 came from the Higher education (45%) and Business (39%) sectors. Together, these sectors accounted for 95% (or 9,499 PYE) of the increase in Gross human resources devoted to R&D, between 2006–07 and 2008–09.

GROSS HUMAN RESOURCES DEVOTED TO R&D, by sector



(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

MAIN FEATURES *continued*

Industry

The largest industry contributors to Gross human resources devoted to R&D were Education and training (over 61,418 PYE), Professional, scientific and technical services (26,395 PYE) and Manufacturing (17,182 PYE).

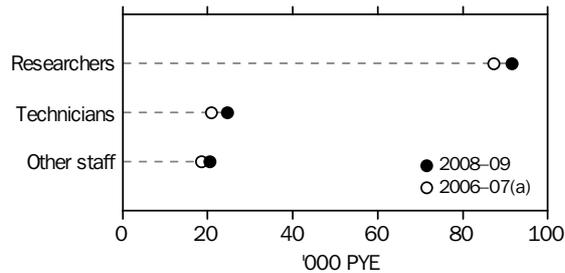
Of all industries, Financial and insurance services showed the largest absolute growth in Human resources devoted to R&D between 2006–07 and 2008–09, up 2,612 PYE.

Type of resource

At 91,617 PYE, Researchers accounted for over two thirds (67%) of the Gross human resources devoted to R&D in 2008–09 and showed the largest growth in absolute terms from 2006–07 (up 4,416 PYE). Technicians showed the largest percentage increase in effort devoted to R&D (up 18% or 3,712 PYE) from 2006–07, followed by Other staff (up 10% or 1,867 PYE).

The growth in Technician effort was dominated by the Business sector (up 2,740 PYE), as was the growth in Other staff effort (up 2,185 PYE). The majority of growth in Researcher effort was attributable to the Higher education sector (up 2,473 PYE), however the Business sector also made a notable contribution (up 2,170 PYE).

GROSS HUMAN RESOURCES DEVOTED TO R&D, by type of resource



(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

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GROSS EXPENDITURE ON R&D, by sector—by industry—2006–07 and 2008–09(a)

GOVERNMENT

	BUSINESS	GOVERNMENT			HIGHER	PRIVATE	TOTAL
		Commonwealth	State/territory	Total	EDUCATION	NON-PROFIT	
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2008–09							
Agriculture, forestry & fishing	146 319	—	—	—	—	np	np
Mining	4 242 774	—	—	—	—	—	4 242 774
Manufacturing	4 348 440	71	—	71	—	—	4 348 511
Electricity, gas, water & waste services	344 398	—	—	—	—	—	344 398
Construction	881 998	—	—	—	—	—	881 998
Wholesale trade	841 935	—	—	—	—	—	841 935
Retail trade	88 356	—	—	—	—	—	88 356
Accommodation & food services	26 782	—	—	—	—	—	26 782
Transport, postal & warehousing	234 178	—	—	—	—	—	234 178
Information media & telecommunications	828 865	1 783	280	2 063	—	—	830 928
Financial & insurance services	2 040 093	—	—	—	—	—	2 040 093
Rental, hiring & real estate services	79 691	—	—	—	—	—	79 691
Professional, scientific & technical services	2 510 330	1 524 035	254 027	1 778 062	—	695 681	4 984 073
Administrative & support services	58 600	3 100	2 871	5 971	—	np	np
Public administration & safety	9 135	720 347	531 727	1 252 074	—	—	1 261 209
Education & training	9 956	77	5 483	5 560	6 717 113	np	np
Health care & social assistance	74 908	140	339 153	339 293	—	28 460	442 661
Arts & recreation services	32 826	2 388	34 470	36 858	—	3 788	73 472
Other services	58 893	—	516	516	—	np	np
Total expenditure on R&D	16 858 477	2 251 941	1 168 527	3 420 468	6 717 113	743 907	27 739 965

2006–07 (a)

Agriculture, forestry & fishing	124 132	—	—	—	—	—	124 132
Mining	2 772 885	—	—	—	—	—	2 772 885
Manufacturing	3 835 696	229	—	229	—	—	3 835 925
Electricity, gas, water & waste services	148 976	—	101	101	—	—	149 077
Construction	485 088	—	170	170	—	—	485 258
Wholesale trade	840 918	—	—	—	—	—	840 918
Retail trade	93 486	—	—	—	—	—	93 486
Accommodation & food services	np	—	—	—	—	—	np
Transport, postal & warehousing	179 975	—	—	—	—	—	179 975
Information media & telecommunications	797 693	1 281	72	1 353	—	—	799 046
Financial & insurance services	1 109 327	—	—	—	—	—	1 109 327
Rental, hiring & real estate services	39 722	—	—	—	—	—	39 722
Professional, scientific & technical services	2 015 334	1 324 084	121 473	1 445 557	—	556 301	4 017 192
Administrative & support services	70 301	2 530	—	2 530	—	—	72 831
Public administration & safety	np	714 516	594 211	1 308 727	—	—	np
Education & training	7 780	186	4 452	4 638	5 433 529	np	np
Health care & social assistance	42 046	1 017	285 502	286 519	—	38 084	366 649
Arts & recreation services	12 181	2 111	40 495	42 606	—	np	np
Other services	44 687	—	3 001	3 001	—	13 432	61 120
Total expenditure on R&D	12 639 284	2 045 954	1 049 477	3 095 431	5 433 529	608 916	21 777 160

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

GOVERNMENT

	BUSINESS	GOVERNMENT			HIGHER EDUCATION	PRIVATE NON-PROFIT	TOTAL
		Commonwealth	State/territory	Total			
	%	%	%	%	%	%	%
2008–09							
Agriculture, forestry & fishing	0.9	—	—	—	—	np	np
Mining	25.2	—	—	—	—	—	15.3
Manufacturing	25.8	—	—	—	—	—	15.7
Electricity, gas, water & waste services	2.0	—	—	—	—	—	1.2
Construction	5.2	—	—	—	—	—	3.2
Wholesale trade	5.0	—	—	—	—	—	3.0
Retail trade	0.5	—	—	—	—	—	0.3
Accommodation & food services	0.2	—	—	—	—	—	0.1
Transport, postal & warehousing	1.4	—	—	—	—	—	0.8
Information media & telecommunications	4.9	0.1	—	0.1	—	—	3.0
Financial & insurance services	12.1	—	—	—	—	—	7.4
Rental, hiring & real estate services	0.5	—	—	—	—	—	0.3
Professional, scientific & technical services	14.9	67.7	21.7	52.0	—	93.5	18.0
Administrative & support services	0.3	0.1	0.2	0.2	—	np	np
Public administration & safety	0.1	32.0	45.5	36.6	—	—	4.5
Education & training	0.1	—	0.5	0.2	100.0	np	np
Health care & social assistance	0.4	—	29.0	9.9	—	3.8	1.6
Arts & recreation services	0.2	0.1	2.9	1.1	—	0.5	0.3
Other services	0.3	—	—	—	—	np	np
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0

2006–07 (a)

Agriculture, forestry & fishing	1.0	—	—	—	—	—	0.6
Mining	21.9	—	—	—	—	—	12.7
Manufacturing	30.3	—	—	—	—	—	17.6
Electricity, gas, water & waste services	1.2	—	—	—	—	—	0.7
Construction	3.8	—	—	—	—	—	2.2
Wholesale trade	6.7	—	—	—	—	—	3.9
Retail trade	0.7	—	—	—	—	—	0.4
Accommodation & food services	np	—	—	—	—	—	np
Transport, postal & warehousing	1.4	—	—	—	—	—	0.8
Information media & telecommunications	6.3	0.1	—	—	—	—	3.7
Financial & insurance services	8.8	—	—	—	—	—	5.1
Rental, hiring & real estate services	0.3	—	—	—	—	—	0.2
Professional, scientific & technical services	15.9	64.7	11.6	46.7	—	91.4	18.4
Administrative & support services	0.6	0.1	—	0.1	—	—	0.3
Public administration & safety	np	34.9	56.6	42.3	—	—	np
Education & training	0.1	—	0.4	0.1	100.0	np	np
Health care & social assistance	0.3	—	27.2	9.3	—	6.3	1.7
Arts & recreation services	0.1	0.1	3.9	1.4	—	np	np
Other services	0.4	—	0.3	0.1	—	2.2	0.3
Total expenditure on R&D	100.0						

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

GROSS EXPENDITURE ON R&D, by sector—by type of expenditure—2006–07 and 2008–09(a)

	GOVERNMENT				HIGHER EDUCATION	PRIVATE NON-PROFIT	TOTAL
	BUSINESS	Commonwealth	State/territory	Total			
	\$'000	\$'000	\$'000	\$'000			
2008–09							
Capital expenditure							
Land, buildings & other structures	206 224	91 693	71 412	163 105	407 305	51 203	827 837
Other capital expenditure	637 984	197 929	41 352	239 281	258 553	39 784	1 175 602
<i>Total</i>	844 208	289 622	112 764	402 386	665 858	90 987	2 003 439
Current expenditure							
Labour costs	5 749 099	1 098 115	592 364	1 690 479	2 678 028	372 151	10 489 757
Other current expenditure(b)	10 265 170	864 204	463 399	1 327 603	3 373 228	280 769	15 246 770
<i>Total</i>	16 014 269	1 962 319	1 055 763	3 018 082	6 051 256	652 920	25 736 527
Total expenditure on R&D	16 858 477	2 251 941	1 168 527	3 420 468	6 717 113	743 907	27 739 965
2006–07 (a)							
Capital expenditure							
Land, buildings & other structures	101 386	51 086	63 280	114 366	172 043	31 378	419 172
Other capital expenditure	690 520	181 672	36 638	218 310	187 598	43 733	1 140 161
<i>Total</i>	791 906	232 758	99 918	332 676	359 640	75 111	1 559 333
Current expenditure							
Labour costs	4 359 803	1 034 413	535 768	1 570 181	2 131 078	311 078	8 372 140
Other current expenditure(b)	7 487 575	778 783	413 791	1 192 574	2 942 812	222 727	11 845 688
<i>Total</i>	11 847 378	1 813 196	949 559	2 762 755	5 073 890	533 805	20 217 828
Total expenditure on R&D	12 639 284	2 045 954	1 049 477	3 095 431	5 433 529	608 916	21 777 160

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

(b) For the Higher education sector, this includes scholarships.

	GOVERNMENT						
	<i>BUSINESS</i>	<i>Commonwealth State/territory Total</i>			<i>HIGHER EDUCATION</i>	<i>PRIVATE NON-PROFIT</i>	<i>TOTAL</i>
	%	%	%	%	%	%	%
2008–09							
Capital expenditure							
Land, buildings & other structures	1.2	4.1	6.1	4.8	6.1	6.9	3.0
Other capital expenditure	3.8	8.8	3.5	7.0	3.8	5.3	4.2
<i>Total</i>	5.0	12.9	9.7	11.8	9.9	12.2	7.2
Current expenditure							
Labour costs	34.1	48.8	50.7	49.4	39.9	50.0	37.8
Other current expenditure(b)	60.9	38.4	39.7	38.8	50.2	37.7	55.0
<i>Total</i>	95.0	87.1	90.3	88.2	90.1	87.8	92.8
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2006–07 (a)							
Capital expenditure							
Land, buildings & other structures	0.8	2.5	6.0	3.7	3.2	5.2	1.9
Other capital expenditure	5.5	8.9	3.5	7.1	3.5	7.2	5.2
<i>Total</i>	6.3	11.4	9.5	10.7	6.6	12.3	7.2
Current expenditure							
Labour costs	34.5	50.6	51.1	50.7	39.2	51.1	38.4
Other current expenditure(b)	59.2	38.1	39.4	38.5	54.2	36.6	54.4
<i>Total</i>	93.7	88.6	90.5	89.3	93.4	87.7	92.8
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

(b) For the Higher education sector, this includes scholarships.

GROSS EXPENDITURE ON R&D, by sector—by source of funds—2006–07 and 2008–09(a)

	GOVERNMENT							
	BUSINESS	Commonwealth			Total	HIGHER	PRIVATE	TOTAL
		State/territory	EDUCATION	NON-PROFIT				
\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	
2008–09								
Source of funds								
Business	16 256 957	107 616	65 877	173 493	332 484	27 250	16 790 184	
Commonwealth government(b)	344 630	1 955 944	151 597	2 107 541	5 647 873	284 612	8 384 656	
State & local government	27 696	67 439	728 346	795 785	400 636	85 063	1 309 180	
Other Australian	40 314	73 029	204 969	277 998	197 762	269 740	785 814	
Overseas	188 880	47 913	17 738	65 651	138 357	77 242	470 130	
Total expenditure on R&D	16 858 477	2 251 941	1 168 527	3 420 468	6 717 113	743 907	27 739 965	
2006–07 (a)								
Source of funds								
Business	11 866 454	105 863	59 501	165 364	332 844	27 505	12 392 167	
Commonwealth government(b)	416 148	1 784 697	123 498	1 908 195	4 605 142	195 683	7 125 168	
State & local government	71 511	47 875	655 682	703 557	209 862	76 943	1 061 873	
Other Australian	43 783	71 058	190 299	261 357	128 718	246 279	680 136	
Overseas	241 388	36 461	20 497	56 958	156 964	62 506	517 816	
Total expenditure on R&D	12 639 284	2 045 954	1 049 477	3 095 431	5 433 529	608 916	21 777 160	
(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.	(b) For the Higher education sector, this includes General university funds as these are mainly sourced from the Commonwealth government.							

GROSS EXPENDITURE ON R&D, by sector—by source of funds: **proportions**—2006–07 and 2008–09(a)

	<i>BUSINESS</i>	<i>GOVERNMENT</i>			<i>HIGHER EDUCATION</i>	<i>PRIVATE NON-PROFIT</i>	<i>TOTAL</i>
		<i>Commonwealth</i>	<i>State/territory</i>	<i>Total</i>			
	%	%	%	%	%	%	%
2008–09							
Source of funds							
Business	96.4	4.8	5.6	5.1	4.9	3.7	60.5
Commonwealth government(b)	2.0	86.9	13.0	61.6	84.1	38.3	30.2
State & local government	0.2	3.0	62.3	23.3	6.0	11.4	4.7
Other Australian	0.2	3.2	17.5	8.1	2.9	36.3	2.8
Overseas	1.1	2.1	1.5	1.9	2.1	10.4	1.7
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2006–07 (a)							
Source of funds							
Business	93.9	5.2	5.7	5.3	6.1	4.5	56.9
Commonwealth government(b)	3.3	87.2	11.8	61.6	84.8	32.1	32.7
State & local government	0.6	2.3	62.5	22.7	3.9	12.6	4.9
Other Australian	0.3	3.5	18.1	8.4	2.4	40.4	3.1
Overseas	1.9	1.8	2.0	1.8	2.9	10.3	2.4
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details

(b) For the Higher education sector, this includes General university funds as these are mainly sourced from the Commonwealth government.

GROSS EXPENDITURE ON R&D, by sector—by location(a)—2006–07 and 2008–09(b)

	GOVERNMENT				HIGHER EDUCATION	PRIVATE NON-PROFIT	TOTAL
	BUSINESS	Commonwealth	State/territory	Total			
	\$'000	\$'000	\$'000	\$'000			
2008–09							
New South Wales	5 204 198	469 506	310 897	780 403	2 015 432	259 287	8 259 320
Victoria	4 121 902	554 501	256 856	811 357	1 774 909	402 305	7 110 473
Queensland	2 323 031	192 762	288 010	480 771	1 061 473	22 218	3 887 494
South Australia	932 488	308 136	132 621	440 758	505 080	2 887	1 881 213
Western Australia	3 616 593	136 649	137 955	274 605	662 123	42 595	4 595 916
Tasmania	135 795	118 523	6 759	125 282	128 652	np	np
Northern Territory	101 476	32 748	16 243	48 990	46 073	np	np
Australian Capital Territory	93 327	435 524	13 469	448 993	523 370	1 129	1 066 819
Overseas	329 667	3 592	5 717	9 309	—	np	np
Total expenditure on R&D	16 858 477	2 251 941	1 168 527	3 420 468	6 717 113	743 907	27 739 965
2006–07 (b)							
New South Wales	4 025 614	368 474	308 742	677 216	1 565 337	194 730	6 462 897
Victoria	3 458 242	527 560	218 605	746 166	1 414 520	335 273	5 954 200
Queensland	1 718 509	189 677	237 171	426 848	911 949	32 627	3 089 932
South Australia	844 573	301 960	115 224	417 183	395 085	3 131	1 659 972
Western Australia	2 080 780	98 285	126 174	224 459	544 816	34 487	2 884 542
Tasmania	105 078	113 052	9 842	122 894	101 372	np	np
Northern Territory	108 760	18 360	27 542	45 902	41 873	np	np
Australian Capital Territory	94 020	423 100	3 653	426 753	458 578	np	np
Overseas	203 708	5 486	2 525	8 011	—	np	np
Total expenditure on R&D	12 639 284	2 045 954	1 049 477	3 095 431	5 433 529	608 916	21 777 160

— nil or rounded to zero (including null cells)

(a) See Explanatory Note 10 for details.

np not available for publication but included in totals where applicable, unless otherwise indicated

(b) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

GROSS EXPENDITURE ON R&D, by sector—by location(a): **proportions**—2006–07 and 2008–09(b)

	GOVERNMENT						
	<i>BUSINESS</i>	<i>Commonwealth State/territory Total</i>			<i>HIGHER EDUCATION</i>	<i>PRIVATE NON-PROFIT</i>	<i>TOTAL</i>
	%	%	%	%	%	%	%
2008–09							
New South Wales	30.9	20.8	26.6	22.8	30.0	34.9	29.8
Victoria	24.5	24.6	22.0	23.7	26.4	54.1	25.6
Queensland	13.8	8.6	24.6	14.1	15.8	3.0	14.0
South Australia	5.5	13.7	11.3	12.9	7.5	0.4	6.8
Western Australia	21.5	6.1	11.8	8.0	9.9	5.7	16.6
Tasmania	0.8	5.3	0.6	3.7	1.9	np	np
Northern Territory	0.6	1.5	1.4	1.4	0.7	np	np
Australian Capital Territory	0.6	19.3	1.2	13.1	7.8	0.2	3.8
Overseas	2.0	0.2	0.5	0.3	—	np	np
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2006–07 (b)							
New South Wales	31.9	18.0	29.4	21.9	28.8	32.0	29.7
Victoria	27.4	25.8	20.8	24.1	26.0	55.1	27.3
Queensland	13.6	9.3	22.6	13.8	16.8	5.4	14.2
South Australia	6.7	14.8	11.0	13.5	7.3	0.5	7.6
Western Australia	16.5	4.8	12.0	7.3	10.0	5.7	13.2
Tasmania	0.8	5.5	0.9	4.0	1.9	np	np
Northern Territory	0.9	0.9	2.6	1.5	0.8	np	np
Australian Capital Territory	0.7	20.7	0.3	13.8	8.4	np	np
Overseas	1.6	0.3	0.2	0.3	—	np	np
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0
—	nil or rounded to zero (including null cells)			(a) See Explanatory Note 10 for details.			
np	not available for publication but included in totals where applicable, unless otherwise indicated			(b) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.			

GROSS EXPENDITURE ON R&D, by sector—by type of activity—2006–07 and 2008–09(a)

	GOVERNMENT						
	<i>BUSINESS</i>	<i>Commonwealth State/territory Total</i>			<i>HIGHER EDUCATION</i>	<i>PRIVATE NON-PROFIT</i>	<i>TOTAL</i>
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2008–09							
Pure basic research	87 908	94 682	49 080	143 762	1 941 298	73 182	2 246 150
Strategic basic research	872 290	577 684	314 484	892 168	1 389 047	245 620	3 399 125
Applied research	5 692 165	1 241 936	671 534	1 913 470	2 771 506	261 407	10 638 548
Experimental development	10 206 114	337 639	133 429	471 068	615 263	163 698	11 456 143
Total expenditure on R&D	16 858 477	2 251 941	1 168 527	3 420 468	6 717 113	743 907	27 739 965
2006–07 (a)							
Pure basic research	73 550	91 505	51 325	142 830	1 494 331	68 260	1 778 972
Strategic basic research	653 190	581 286	241 811	823 097	1 202 509	239 852	2 918 648
Applied research	4 149 496	1 086 637	627 939	1 714 576	2 346 919	225 728	8 436 719
Experimental development	7 763 048	286 526	128 402	414 927	389 772	75 076	8 642 823
Total expenditure on R&D	12 639 284	2 045 954	1 049 477	3 095 431	5 433 529	608 916	21 777 160

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

	GOVERNMENT						
	BUSINESS			HIGHER	PRIVATE	TOTAL
		Commonwealth	State/territory	Total	EDUCATION	NON-PROFIT	
%	%	%	%	%	%	%	
2008–09							
Pure basic research	0.5	4.2	4.2	4.2	28.9	9.8	8.1
Strategic basic research	5.2	25.7	26.9	26.1	20.7	33.0	12.3
Applied research	33.8	55.1	57.5	55.9	41.3	35.1	38.4
Experimental development	60.5	15.0	11.4	13.8	9.2	22.0	41.3
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2006–07 (a)							
Pure basic research	0.6	4.5	4.9	4.6	27.5	11.2	8.2
Strategic basic research	5.2	28.4	23.0	26.6	22.1	39.4	13.4
Applied research	32.8	53.1	59.8	55.4	43.2	37.1	38.7
Experimental development	61.4	14.0	12.2	13.4	7.2	12.3	39.7
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

	GOVERNMENT				HIGHER EDUCATION	PRIVATE NON-PROFIT	TOTAL
	BUSINESS	Commonwealth	State/territory	Total			
	\$'000	\$'000	\$'000	\$'000			
Mathematical sciences	24 327	54 749	1 068	55 817	132 378	np	np
Physical sciences	19 221	211 087	129	211 215	224 415	—	454 851
Chemical sciences	273 379	129 067	2 959	132 025	252 727	np	np
Earth sciences	196 425	193 650	45 772	239 422	194 548	np	np
Environmental sciences	171 767	138 253	139 453	277 706	191 111	6 578	647 161
Biological sciences	73 342	210 299	100 837	311 136	688 892	117 259	1 190 628
Agricultural & veterinary sciences	361 604	131 095	413 896	544 992	278 811	961	1 186 368
Information & computing sciences	4 407 485	260 948	29 570	290 518	218 206	np	np
Engineering	9 118 212	597 031	13 731	610 762	577 160	np	np
Technology	807 491	112 979	14 128	127 107	170 261	6 214	1 111 073
Medical & health sciences	938 374	82 818	368 731	451 549	2 064 348	559 338	4 013 610
Built environment & design	319 252	13 864	1 575	15 439	68 925	np	np
Education	12 768	3 373	10 563	13 935	210 112	np	np
Economics	12 229	36 076	2 506	38 582	162 719	np	np
Commerce, management, tourism & services	100 862	1 958	3 143	5 101	253 793	np	np
Studies in human society	np	38 905	10 812	49 716	326 775	5 462	np
Psychology & cognitive sciences	4 088	19 035	3 389	22 424	199 480	6 700	232 692
Law & legal studies	5 199	12 474	9	12 483	85 502	np	np
Studies in creative arts & writing	9 448	124	1 558	1 682	82 681	np	np
Language, communication & culture	1 627	32	2 263	2 295	161 510	np	np
History & archaeology	np	4 124	2 240	6 364	118 763	—	np
Philosophy & religious studies	—	—	196	196	53 994	np	np
Total expenditure on R&D	16 858 477	2 251 941	1 168 527	3 420 468	6 717 113	743 907	27 739 965

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Based on the 2008 edition of the ANZSRC. Previous cycle estimates are available on an ASRC basis only. See Explanatory Notes 11 to 13 for details.

	GOVERNMENT							
	BUSINESS	Commonwealth			Total	HIGHER	PRIVATE	TOTAL
		State/territory	EDUCATION	NON-PROFIT				
%	%	%	%	%	%	%	%	
Mathematical sciences	0.1	2.4	0.1	1.6	2.0	np	np	
Physical sciences	0.1	9.4	—	6.2	3.3	—	1.6	
Chemical sciences	1.6	5.7	0.3	3.9	3.8	np	np	
Earth sciences	1.2	8.6	3.9	7.0	2.9	np	np	
Environmental sciences	1.0	6.1	11.9	8.1	2.8	0.9	2.3	
Biological sciences	0.4	9.3	8.6	9.1	10.3	15.8	4.3	
Agricultural & veterinary sciences	2.1	5.8	35.4	15.9	4.2	0.1	4.3	
Information & computing sciences	26.1	11.6	2.5	8.5	3.2	np	np	
Engineering	54.1	26.5	1.2	17.9	8.6	np	np	
Technology	4.8	5.0	1.2	3.7	2.5	0.8	4.0	
Medical & health sciences	5.6	3.7	31.6	13.2	30.7	75.2	14.5	
Built environment & design	1.9	0.6	0.1	0.5	1.0	np	np	
Education	0.1	0.1	0.9	0.4	3.1	np	np	
Economics	0.1	1.6	0.2	1.1	2.4	np	np	
Commerce, management, tourism & services	0.6	0.1	0.3	0.1	3.8	np	np	
Studies in human society	np	1.7	0.9	1.5	4.9	0.7	np	
Psychology & cognitive sciences	—	0.8	0.3	0.7	3.0	0.9	0.8	
Law & legal studies	—	0.6	—	0.4	1.3	np	np	
Studies in creative arts & writing	0.1	—	0.1	—	1.2	np	np	
Language, communication & culture	—	—	0.2	0.1	2.4	np	np	
History & archaeology	np	0.2	0.2	0.2	1.8	—	np	
Philosophy & religious studies	—	—	—	—	0.8	np	np	
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Based on the 2008 edition of the ANZSRC. Previous cycle estimates are available on an ASRC basis only. See Explanatory Notes 11 to 13 for details.

	GOVERNMENT				HIGHER EDUCATION	PRIVATE NON-PROFIT	TOTAL
	BUSINESS	Commonwealth	State/territory	Total			
	\$'000	\$'000	\$'000	\$'000			
Defence	259 388	485 783	221	486 004	55 402	—	800 793
Economic development							
Plant prod'n & plant primary products	168 542	106 919	156 920	263 838	192 082	np	np
Animal prod'n & animal primary products	126 310	52 217	163 652	215 869	109 762	np	np
Mineral resources (excl. energy resources)	2 640 399	74 656	29 343	103 999	88 081	—	2 832 479
Energy	2 582 057	139 954	9 269	149 222	133 317	np	np
Manufacturing	4 495 071	147 372	17 527	164 899	330 524	9 417	4 999 911
Construction	1 066 697	16 752	647	17 399	118 169	—	1 202 265
Transport	423 477	17 730	5 677	23 407	66 805	—	513 688
Information & communication services	2 035 500	146 958	9 935	156 894	220 263	—	2 412 657
Commercial services & tourism	2 341 944	7 730	4 982	12 712	101 839	—	2 456 495
Economic framework	32 687	47 293	3 271	50 564	236 614	318	320 182
<i>Total</i>	15 912 682	757 581	401 223	1 158 804	1 597 455	10 741	18 679 683
Society							
Health	436 844	138 199	405 469	543 668	2 347 372	685 258	4 013 141
Education & training	37 855	4 557	11 568	16 125	281 481	np	np
Law, politics & community services	12 076	163 698	16 300	179 998	337 912	5 979	535 964
Cultural understanding	15 111	5 618	9 682	15 300	371 916	np	np
<i>Total</i>	501 885	312 071	443 020	755 091	3 338 681	725 826	5 321 483
Environment	174 920	489 933	304 155	794 088	523 023	6 713	1 498 744
Expanding knowledge	9 602	206 574	19 907	226 481	1 202 552	627	1 439 262
Total expenditure on R&D	16 858 477	2 251 941	1 168 527	3 420 468	6 717 113	743 907	27 739 965

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Based on the 2008 edition of the ANZSRC. Previous cycle estimates are available on an ASRC basis only. See Explanatory Notes 11 to 13 for details.

	GOVERNMENT						
	BUSINESS	Commonwealth			HIGHER EDUCATION	PRIVATE NON-PROFIT	TOTAL
		State/territory	Total	TOTAL			
%	%	%	%	%	%	%	
Defence	1.5	21.6	—	14.2	0.8	—	2.9
Economic development							
Plant prod'n & plant primary products	1.0	4.7	13.4	7.7	2.9	np	np
Animal prod'n & animal primary products	0.7	2.3	14.0	6.3	1.6	np	np
Mineral resources (excl. energy resources)	15.7	3.3	2.5	3.0	1.3	—	10.2
Energy	15.3	6.2	0.8	4.4	2.0	np	np
Manufacturing	26.7	6.5	1.5	4.8	4.9	1.3	18.0
Construction	6.3	0.7	0.1	0.5	1.8	—	4.3
Transport	2.5	0.8	0.5	0.7	1.0	—	1.9
Information & communication services	12.1	6.5	0.9	4.6	3.3	—	8.7
Commercial services & tourism	13.9	0.3	0.4	0.4	1.5	—	8.9
Economic framework	0.2	2.1	0.3	1.5	3.5	—	1.2
<i>Total</i>	94.4	33.6	34.3	33.9	23.8	1.4	67.3
Society							
Health	2.6	6.1	34.7	15.9	34.9	92.1	14.5
Education & training	0.2	0.2	1.0	0.5	4.2	np	np
Law, politics & community services	0.1	7.3	1.4	5.3	5.0	0.8	1.9
Cultural understanding	0.1	0.2	0.8	0.4	5.5	np	np
<i>Total</i>	3.0	13.9	37.9	22.1	49.7	97.6	19.2
Environment	1.0	21.8	26.0	23.2	7.8	0.9	5.4
Expanding knowledge	0.1	9.2	1.7	6.6	17.9	0.1	5.2
Total expenditure on R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0

— nil or rounded to zero (including null cells)
np not available for publication but included in totals where applicable, unless otherwise indicated

(a) Based on the 2008 edition of the ANZSRC. Previous cycle estimates are available on an ASRC basis only. See Explanatory Notes 11 to 13 for details.

GOVERNMENT

	BUSINESS	GOVERNMENT			HIGHER	PRIVATE	TOTAL
	PYE	Commonwealth PYE	State/territory PYE	Total PYE	EDUCATION PYE	NON-PROFIT PYE	
2008–09							
Agriculture, forestry & fishing	615	—	—	—	—	np	np
Mining	4 625	—	—	—	—	—	4 625
Manufacturing	17 181	1	—	1	—	—	17 182
Electricity, gas, water & waste services	643	—	—	—	—	—	643
Construction	2 421	—	—	—	—	—	2 421
Wholesale trade	3 637	—	—	—	—	—	3 637
Retail trade	423	—	—	—	—	—	423
Accommodation & food services	139	—	—	—	—	—	139
Transport, postal & warehousing	575	—	—	—	—	—	575
Information media & telecommunications	1 736	9	2	11	—	—	1 747
Financial & insurance services	5 525	—	—	—	—	—	5 525
Rental, hiring & real estate services	284	—	—	—	—	—	284
Professional, scientific & technical services	14 155	6 238	1 598	7 837	—	4 404	26 395
Administrative & support services	358	18	8	26	—	np	np
Public administration & safety	47	2 917	3 374	6 290	—	—	6 337
Education & training	80	1	27	28	61 310	np	np
Health care & social assistance	620	3	2 576	2 579	—	217	3 416
Arts & recreation services	166	22	247	269	—	27	462
Other services	328	—	2	2	—	np	np
Total human resources devoted to R&D	53 556	9 209	7 834	17 042	61 310	4 788	136 696

2006–07 (a)

Agriculture, forestry & fishing	516	—	—	—	—	—	516
Mining	2 897	—	—	—	—	—	2 897
Manufacturing	17 527	3	—	3	—	—	17 530
Electricity, gas, water & waste services	472	—	—	—	—	—	472
Construction	1 174	—	1	1	—	—	1 175
Wholesale trade	3 556	—	—	—	—	—	3 556
Retail trade	508	—	—	—	—	—	508
Accommodation & food services	np	—	—	—	—	—	np
Transport, postal & warehousing	603	—	—	—	—	—	603
Information media & telecommunications	1 846	6	—	6	—	—	1 852
Financial & insurance services	2 913	—	—	—	—	—	2 913
Rental, hiring & real estate services	183	—	—	—	—	—	183
Professional, scientific & technical services	13 154	6 174	871	7 046	—	3 950	24 150
Administrative & support services	377	16	—	16	—	—	393
Public administration & safety	np	3 257	3 964	7 221	—	—	np
Education & training	66	2	20	22	58 905	np	np
Health care & social assistance	273	—	2 160	2 161	—	497	2 930
Arts & recreation services	48	24	233	257	—	np	np
Other services	278	—	28	28	—	112	419
Total human resources devoted to R&D	46 462	9 481	7 279	16 760	58 905	4 575	126 702

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

GROSS HUMAN RESOURCES DEVOTED TO R&D, by sector—by industry:
proportions—2006–07 and 2008–09(a)

	GOVERNMENT							TOTAL
	BUSINESS	Commonwealth	State/territory	Total	HIGHER EDUCATION	PRIVATE NON-PROFIT		
	%	%	%	%	%	%		
2008–09								
Agriculture, forestry & fishing	1.1	—	—	—	—	np	np	
Mining	8.6	—	—	—	—	—	3.4	
Manufacturing	32.1	—	—	—	—	—	12.6	
Electricity, gas, water & waste services	1.2	—	—	—	—	—	0.5	
Construction	4.5	—	—	—	—	—	1.8	
Wholesale trade	6.8	—	—	—	—	—	2.7	
Retail trade	0.8	—	—	—	—	—	0.3	
Accommodation & food services	0.3	—	—	—	—	—	0.1	
Transport, postal & warehousing	1.1	—	—	—	—	—	0.4	
Information media & telecommunications	3.2	0.1	—	0.1	—	—	1.3	
Financial & insurance services	10.3	—	—	—	—	—	4.0	
Rental, hiring & real estate services	0.5	—	—	—	—	—	0.2	
Professional, scientific & technical services	26.4	67.7	20.4	46.0	—	92.0	19.3	
Administrative & support services	0.7	0.2	0.1	0.2	—	np	np	
Public administration & safety	0.1	31.7	43.1	36.9	—	—	4.6	
Education & training	0.1	—	0.3	0.2	100.0	np	np	
Health care & social assistance	1.2	—	32.9	15.1	—	4.5	2.5	
Arts & recreation services	0.3	0.2	3.2	1.6	—	0.6	0.3	
Other services	0.6	—	—	—	—	np	np	
Total human resources devoted to R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

2006–07 (a)

Agriculture, forestry & fishing	1.1	—	—	—	—	—	0.4
Mining	6.2	—	—	—	—	—	2.3
Manufacturing	37.7	—	—	—	—	—	13.8
Electricity, gas, water & waste services	1.0	—	—	—	—	—	0.4
Construction	2.5	—	—	—	—	—	0.9
Wholesale trade	7.7	—	—	—	—	—	2.8
Retail trade	1.1	—	—	—	—	—	0.4
Accommodation & food services	np	—	—	—	—	—	np
Transport, postal & warehousing	1.3	—	—	—	—	—	0.5
Information media & telecommunications	4.0	0.1	—	—	—	—	1.5
Financial & insurance services	6.3	—	—	—	—	—	2.3
Rental, hiring & real estate services	0.4	—	—	—	—	—	0.1
Professional, scientific & technical services	28.3	65.1	12.0	42.0	—	86.3	19.1
Administrative & support services	0.8	0.2	—	0.1	—	—	0.3
Public administration & safety	np	34.3	54.5	43.1	—	—	np
Education & training	0.1	—	0.3	0.1	100.0	np	np
Health care & social assistance	0.6	—	29.7	12.9	—	10.9	2.3
Arts & recreation services	0.1	0.3	3.2	1.5	—	np	np
Other services	0.6	—	0.4	0.2	—	2.5	0.3
Total human resources devoted to R&D	100.0						

— nil or rounded to zero (including null cells)

np not available for publication but included in totals where applicable, unless otherwise indicated

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

17

GROSS HUMAN RESOURCES DEVOTED TO R&D, by sector—by type of resource—2006–07 and 2008–09(a)

GOVERNMENT

	BUSINESS	GOVERNMENT			HIGHER	PRIVATE	TOTAL
	PYE	Commonwealth	State/territory	Total	EDUCATION	NON-PROFIT	
		PYE	PYE	PYE	PYE	PYE	PYE
2008–09							
Researchers(b)	26 941	4 549	3 736	8 285	53 340	3 051	91 617
Technicians(c)	17 561	3 166	2 939	6 105	—	938	24 603
Other staff	9 054	1 494	1 159	2 652	7 970	799	20 476
Total human resources devoted to R&D	53 556	9 209	7 834	17 042	61 310	4 788	136 696

2006–07 (a)

Researchers(b)	24 771	4 740	3 982	8 721	50 867	2 842	87 201
Technicians(c)	14 821	2 851	2 244	5 095	—	975	20 891
Other staff	6 869	1 891	1 053	2 944	8 038	758	18 609
Total human resources devoted to R&D	46 462	9 481	7 279	16 760	58 905	4 575	126 702

— nil or rounded to zero (including null cells)

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

(b) For the Higher education sector, Researchers include Academics and Postgraduate students.

(c) For the Higher education sector, Technicians are not separately identified and are included in Other staff.

18

GROSS HUMAN RESOURCES DEVOTED TO R&D, by sector—by type of resource: proportions—2006–07 and 2008–09(a)

GOVERNMENT

	BUSINESS	GOVERNMENT			HIGHER	PRIVATE	TOTAL
	%	Commonwealth	State/territory	Total	EDUCATION	NON-PROFIT	
		%	%	%	%	%	%
2008–09							
Researchers(b)	50.3	49.4	47.7	48.6	87.0	63.7	67.0
Technicians(c)	32.8	34.4	37.5	35.8	—	19.6	18.0
Other staff	16.9	16.2	14.8	15.6	13.0	16.7	15.0
Total human resources devoted to R&D	100.0	100.0	100.0	100.0	100.0	100.0	100.0

2006–07 (a)

Researchers(b)	53.3	50.0	54.7	52.0	86.4	62.1	68.8
Technicians(c)	31.9	30.1	30.8	30.4	—	21.3	16.5
Other staff	14.8	19.9	14.5	17.6	13.6	16.6	14.7
Total human resources devoted to R&D	100.0						

— nil or rounded to zero (including null cells)

(a) 2006–07 data have been revised. See the Revisions section of the Technical Note for details.

(b) For the Higher education sector, Researchers include Academics and Postgraduate students.

(c) For the Higher education sector, Technicians are not separately identified and are included in Other staff.

EXPLANATORY NOTES

INTRODUCTION

1 This release presents summary statistics on Research and Experimental Development (R&D) undertaken by Australian organisations within the Business, Government, Higher education and Private non-profit sectors for the 2008–09 reference period.

2 The data have been released previously on an individual sector basis and at more detailed levels; see Explanatory Note 17.

DATA SOURCES

3 Data for each sector were collected separately in the Australian Bureau of Statistics (ABS) surveys of R&D:

- Business – compiled from data collected from businesses in the *Survey of R&D, Businesses* in respect of the year ended 30 June 2009.
- Government and Private non-profit – compiled from data collected from organisations in the *Survey of R&D, Government and Private Non-Profit Organisations* in respect of the year ended 30 June 2009.
- Higher education – compiled from data collected from institutions in the *Survey of R&D, Higher Education* in respect of the year ended 31 December 2008.

DEFINITION OF R&D

4 R&D as collected by the ABS is defined in accordance with the Organisation for Economic Co-operation and Development (OECD) standard as 'creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications'. Although outside the economic boundary of R&D as defined by the OECD, R&D performed overseas by Australian organisations is included in the data presented.

5 For a more comprehensive interpretation of the definition of R&D, see the OECD publication *The Measurement of Scientific and Technological Activities: Proposed Standard Practice for Surveys on Research and Experimental Development - Frascati Manual 2002*.

6 Data providers report and self-classify R&D survey information based on their interpretation of OECD/ABS definitions. The ABS makes every effort to ensure correct and consistent interpretation and reporting of these data and applies consistent processing methodologies. See also the Reliability of statistics and Revisions sections of the Technical Note.

SECTOR CLASSIFICATION

7 The sector classification used in the compilation of these statistics is adapted from the guidelines specified by the OECD for use in the conduct of R&D surveys. There are four distinct sectors:

- Business – includes all businesses whose primary activity is the production of goods or services for sale to the general public at a price intended to cover at least the cost of production, and the private non-profit institutions mainly serving them.
- Government – includes all Commonwealth, state and local government departments and authorities.
 - The ABS Government R&D survey excludes: local government; universities (which are included in the Higher education sector); and public sector organisations mainly engaged in trading or financial activities (which are included in the Business sector).
- Higher education – includes all universities and other institutions of post-secondary education, whatever their source of finance or legal status.
 - The ABS Higher education R&D survey excludes other higher education institutions, such as colleges of Technical and Further Education.
- Private non-profit – includes private or semi-public incorporated organisations which are established with the intention of not making a profit.

SCOPE AND COVERAGE

8 Refer to the Explanatory Notes of the individual sector releases for scope and coverage details.

EXPLANATORY NOTES *continued*

INDUSTRY CLASSIFICATION

9 The statistics in this release are classified to industry in accordance with the *Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006* (cat. no. 1292.0).

LOCATION

10 With the exception of the Higher education sector, estimates for location relate to the region(s) in which the R&D was performed. For the Higher education sector, the estimates represent the main campus or head office location of the reporting institution, with the exception of the Australian Defence Force Academy (ADFA) which is shown against the Australian Capital Territory.

TYPE OF ACTIVITY (TOA), FIELD OF RESEARCH (FOR) AND SOCIO-ECONOMIC OBJECTIVE (SEO)

11 TOA, FOR and SEO statistics presented in this release have been collected and compiled based on the *Australian and New Zealand Standard Research Classification (ANZSRC), 2008* (cat. no. 1297.0). Earlier issues of this release used the Australian Standard Research Classification (ASRC).

12 Due to differences between the two classifications, implementation of the ANZSRC represents a break in series. Users should familiarise themselves with the differences if attempting to compare data across reference periods, particularly for FOR and SEO estimates.

13 The ABS has not compiled previous cycle estimates on an ANZSRC basis or 2008–09 estimates on an ASRC basis. Previous cycle data compiled on an ASRC basis (including revised data for 2006–07) are available in the data cubes accompanying this release.

14 Some organisations may have experienced difficulty in classifying their R&D projects to TOA, FOR and SEO. See also the Reliability of statistics and Revisions sections of the Technical Note.

GROSS DOMESTIC PRODUCT (GDP) AND GROSS STATE PRODUCT (GSP)

15 The most recent GDP and GSP values available were used to calculate the R&D expenditure/GDP and R&D expenditure/GSP ratios presented in this issue. These values are referenced in the tables below.

GROSS DOMESTIC PRODUCT, current prices

	1998–99	2000–01	2002–03	2004–05	2006–07	2008–09
	\$m	\$m	\$m	\$m	\$m	\$m
GDP	622 695	708 889	804 361	925 864	1 091 327	1 254 651

Source: *Australian National Accounts: National Income, Expenditure and Product, June 2010* (cat. no. 5206.0), released 1 September 2010.

GROSS STATE PRODUCT, current prices

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
2006–07	352 162	261 200	209 173	71 725	138 688	21 249	14 339	22 791
2008–09	402 334	291 637	243 901	78 986	169 950	23 176	17 168	25 969

Source: *Australian National Accounts, State Accounts, 2008–09* (cat. no. 5220.0), reissue released December 2009.

16 GDP is estimated by the ABS according to the recently updated international standards *System of National Accounts, 2008* (2008 SNA) and is not directly comparable to GDP for countries where these standards have not been applied.

EXPLANATORY NOTES *continued*

R&D RELEASES

- 17** ABS releases of R&D statistics for individual sectors:
Research and Experimental Development, Businesses, Australia, 2008–09 (cat. no. 8104.0)
Research and Experimental Development, Government and Private Non-Profit Organisations, Australia, 2008–09 (cat. no. 8109.0)
Research and Experimental Development, Higher Education Organisations, Australia, 2008 (cat. no. 8111.0)

RELATED RELEASES

- 18** Users may also wish to refer to the following ABS releases:
Australian and New Zealand Standard Research Classification (ANZSRC), 2008 (cat. no. 1297.0)
Innovation in Australian Business, 2008–09 (cat. no. 8158.0)
Microdata: Business Longitudinal Database, Expanded CURF, Australia, 2004–05, 2005–06 and 2006–07 (cat. no. 8168.0.55.001)
Selected Characteristics of Australian Business, 2008–09 (cat. no. 8167.0)
Summary of IT Use and Innovation in Australian Business, 2008–09 (cat. no. 8166.0)
- 19** Relevant OECD publications include:
Main Science and Technology Indicators 2010/1
The Measurement of Scientific and Technological Activities: Proposed Standard Practice for Surveys on Research and Experimental Development - Frascati Manual 2002

ABS WEBSITE

- 20** Other information relating to R&D and Innovation (including data cubes in spreadsheet format) can be found on the ABS website <www.abs.gov.au>. See the Innovation, Science and Technology Theme page under Topics @ a Glance/Industry.

ROUNDING

- 21** Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

TECHNICAL NOTE DATA QUALITY

NON-SAMPLING ERROR

1 Non-sampling errors may arise as a result of errors in the reporting, recording or processing of data. These errors can be introduced through inadequacies in the questionnaire, treatment of non-response, inaccurate reporting by data providers, errors in the application of survey procedures, incorrect recording of answers and errors in data capture and processing.

2 The extent to which non-sampling error affects the results is difficult to measure. Every effort is made to minimise non-sampling error by careful design and testing of the collection instrument, the use of efficient operating procedures and systems, and the use of appropriate methodologies.

Reliability of statistics

3 When interpreting the statistics in this release, the reliability and comparability of the estimates may be affected by the following specific non-sampling errors:

- Many organisations provided estimates due to a lack of separately recorded data on R&D activity.
- Data were self-classified by organisations to Type of activity, Field of research and Socio-economic objective at the time of reporting. Some organisations may have experienced difficulty in classifying their R&D projects. The ABS makes every effort to ensure correct and consistent interpretation and reporting of these data by applying consistent processing methodologies.
- The estimation method for R&D related overhead costs varied across organisations and reference periods.

REVISIONS

4 In processing 2008–09 data, revisions to 2006–07 data were applied across all sectors. For further information on Revisions for each sector, see the Technical Note in the respective sector releases:

Research and Experimental Development, Businesses, Australia, 2008–09 (cat. no. 8104.0)

Research and Experimental Development, Government and Private Non-Profit Organisations, Australia, 2008–09 (cat. no. 8109.0)

Research and Experimental Development, Higher Education Organisations, Australia, 2008–09 (cat. no. 8111.0)

GLOSSARY

Applied research	Original work undertaken primarily to acquire new knowledge with a specific application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives.
Business funds	As a source of R&D funding, this includes payments for R&D projects carried out on contract for businesses located within Australia. For the Business sector, it also includes all funding for R&D sourced from the business itself, including: equity; borrowings; retained earnings; and transfers from related entities.
Capital expenditure	Expenditure on the acquisition of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment which is attributable to R&D activity.
Commonwealth government funds	As a source of R&D funding, this includes: R&D grants; and payments for R&D projects carried out on contract for Commonwealth government organisations. For the Commonwealth government subsector, it also includes all funding for R&D sourced from within the reporting organisation (i.e. own funds). For the Higher education sector, general university funds reported by the higher education institutions are also included as these would be mainly sourced from the Commonwealth government.
Current expenditure	Expenditure on direct labour costs, materials, fuels, rent and hiring, repairs and maintenance, data processing, etc. and the proportion of expenditure on general services and overheads which is attributable to R&D activity.
Experimental development	Systematic work, using existing knowledge gained from research or practical experience, which is directed to producing new materials, products, devices, policies, behaviours or outlooks; to installing new processes, systems and services; or to improving substantially those already produced or installed.
Field of research (FOR)	The FOR classification allows R&D activity to be categorised according to the methodology used in the R&D, rather than the activity of the unit performing the R&D or the purpose of the R&D. The FOR reflects the field in which the research was undertaken and is based on the processes and techniques used.
Gross expenditure on R&D (GERD)	GERD is constructed by adding together the R&D expenditures of the four performing sectors: Business; Government; Higher education; and Private non-profit.
Gross human resources devoted to R&D	Gross human resources devoted to R&D is constructed by adding together the human resources devoted to R&D by the four performing sectors: Business; Government; Higher education; and Private non-profit.
Human resources devoted to R&D	The effort of researchers, technicians and other staff directly involved with R&D activity. Overhead staff (e.g. administrative and general service employees such as personnel officers, janitors, etc.) whose work indirectly supports R&D are excluded.
Labour costs	Expenditure relating to: wages and salaries; overtime earnings; penalty payments; shift allowances; employer contributions into superannuation; fringe benefits and payroll taxes; severance, termination and redundancy payments; workers' compensation premiums/costs; provisions for employee entitlements; salaries and fees of directors and executives; retainers and commissions of persons who received a retainer; bonuses; annual and other types of paid leave.
Location	With the exception of the Higher education sector, this represents the region(s) in which the organisations performed the R&D (which may not be the head office location of the organisation). For the Higher education sector, this represents the main campus or head office location of the reporting institution, with the exception of the Australian Defence Force Academy (ADFA) which is shown against the Australian Capital Territory.

GLOSSARY *continued*

Other Australian funds	As a source of R&D funding, this includes: donations and bequests; joint government/business funding; and payments for R&D projects carried out on contract for private non-profit organisations. For the Private non-profit sector, it also includes all funding for R&D sourced from within the reporting organisation (i.e. own funds). For all sectors other than the Higher education sector, it includes payments for R&D projects carried out on contract for universities.
Other current expenditure	All other non-staff expenditures including those for: materials, fuels and other inputs; rent, leasing and hiring expenses; repair and maintenance expenses; payments to outside organisations for use of specialised testing facilities or for analytical work, engineering or other specialised services in support of R&D projects carried out by the organisation; commission and consultant expenses for research projects carried out by the organisation (except direct labour costs); software for own account produced as part of R&D; and the proportion of expenditure on general services and overheads which is attributable to R&D activity. For the Higher education sector, it includes expenditure on scholarships.
Other staff	Skilled and unskilled craftpersons, secretarial and clerical staff working on, or directly associated with, R&D activity. For the Higher education sector, Other staff also includes Technicians.
Overseas funds	As a source of R&D funding, this includes grants and payments for R&D projects carried out on contract for overseas organisations. Transfers from related entities are only included if they specifically relate to R&D being undertaken (by the reporting organisation) on behalf of the related entity.
Overseas location	Includes R&D performed overseas, but controlled by the Australian organisation. This includes analytical work, engineering or other specialised services performed by another organisation which are part of an R&D project being performed by the Australian organisation.
Person years of effort	One person year of effort is equal to a full time employee whose time is wholly devoted to R&D for a whole year. Employees are defined as persons who worked for a private or public employer and received pay for the reference period in the form of wages or salaries, a commission while also receiving a retainer, tips, piece rates or payment in kind. Persons who operated their own incorporated business with or without hiring employees are also included as employees.
Pure basic research	Experimental and theoretical work undertaken to acquire new knowledge without looking for long term benefits other than the advancement of knowledge.
R&D activity	Systematic investigation or experimentation involving innovation or technical risk, the outcome of which is new knowledge, with or without a specific practical application, or new or improved products, processes, materials, devices or services. R&D activity extends to modifications to existing products/processes. R&D activity ceases and pre-production begins when work is no longer experimental.
Researchers	Those involved with the conception and/or development of new products/processes (e.g. executives and directors involved in the planning or management of scientific and technical aspects of R&D projects, and software developers/programmers). They exclude executives and directors concerned primarily with budgets and human resources rather than project content. For the Higher education sector, Researchers include Academics and Postgraduate students.
Socio-economic objective (SEO)	The SEO classification allows R&D activity to be categorised according to the intended purpose or outcome of the research, rather than the processes or techniques used in order to achieve this objective. The SEO reflects the dominant beneficiary or beneficiaries of the research output.

GLOSSARY *continued*

State and local government funds	As a source of R&D funding, this includes: R&D grants; and payments for R&D projects carried out on contract for state and local government organisations. For the State/territory government subsector, it also includes all funding for R&D sourced from within the reporting organisation (i.e. own funds).
Strategic basic research	Experimental and theoretical work undertaken to acquire new knowledge directed into specified broad areas in the expectation of practical discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems.
Technicians	Those performing technical tasks in support of R&D activity, normally under the direction and supervision of a researcher. These tasks include preparation of experiments, taking records, preparation of charts and graphs, etc.
Type of activity	This classification allows R&D activity to be categorised according to the type of research effort, namely, pure basic research, strategic basic research, applied research and experimental development.

FOR MORE INFORMATION . . .

INTERNET **www.abs.gov.au** the ABS website is the best place for data from our publications and information about the ABS.

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