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# RESEARCH AND EXPERIMENTAL DEVELOPMENT, BUSINESSES AUSTRALIA

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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 Amanda Baile on Perth (08) 9360 5357.

# NOTES

## INTRODUCTION

This release presents summary statistics on Research and Experimental Development (R&D) undertaken by Australian businesses during 2011–12.

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

## DATA QUALITY

When interpreting the results in this release, it is important to take into account factors that may affect the reliability of estimates and comparability over time. These factors are described in the Technical Note.

This release includes revised data for the 2009–10 and 2010–11 reference periods. Refer to the Revisions section of the Technical Note for details.

## ADDITIONAL DATA

More detailed data, including time series data, are available in spreadsheet format (data cubes) on the ABS website [www.abs.gov.au](http://www.abs.gov.au). See the Downloads page for this issue (cat. no. 8104.0).

## CHANGES IN THIS ISSUE

The estimates in this release are based on information provided from a sample of businesses within the Australian business sector with intramural expenditure on R&D of \$100,000 or more during the reference period. This is a change from previous publications which were based on a census of Australian businesses with intramural expenditure on R&D of \$100,000 or more during the reference period. Users should refer to the Explanatory Notes, Technical Note and Appendix – Survey Changes for further information.

This issue does not include information for Gross Expenditure on Research and Experimental Development (GERD). The ABS is continuing investigations into how GERD will be released in the future.

Fields of research and socio-economic objective data presented in this issue have been collected using the Australian and New Zealand Standard Research Classification (ANZSRC) at the division level (2 digit) only, rather than group level (4 digit). Production of outputs at the 4 digit level, previously available upon request, is no longer possible.

## FUTURE CHANGES

The frequency of the *Survey of Research and Experimental Development (R&D), Businesses* will change from annual to biennial following this 2011–12 cycle. The next survey will be conducted for the 2013–14 financial year.

Brian Pink  
Australian Statistician

## ABBREVIATIONS

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<b>\$'000</b>	thousand dollars
<b>\$m</b>	million dollars
<b>ABN</b>	Australian Business Number
<b>ABR</b>	Australian Business Register
<b>ABS</b>	Australian Bureau of Statistics
<b>ABSBR</b>	Australian Bureau of Statistics Business Register
<b>ABSMP</b>	Australian Bureau of Statistics maintained population
<b>ACT</b>	Australian Capital Territory
<b>ANZSIC</b>	Australian and New Zealand Standard Industrial Classification
<b>ANZSRC</b>	Australian and New Zealand Standard Research Classification
<b>ATO</b>	Australian Taxation Office
<b>ATOMP</b>	Australian Taxation Office maintained population
<b>BERD</b>	business expenditure on R&D
<b>excl.</b>	excluding
<b>FOR</b>	Fields of Research
<b>GDP</b>	gross domestic product
<b>GERD</b>	gross expenditure on R&D
<b>GSP</b>	gross state product
<b>NSW</b>	New South Wales
<b>NT</b>	Northern Territory
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>PYE</b>	person years of effort
<b>Qld</b>	Queensland
<b>R&amp;D</b>	research and experimental development
<b>SA</b>	South Australia
<b>SEO</b>	socio-economic objective
<b>Tas.</b>	Tasmania
<b>TAU</b>	type of activity unit
<b>Vic.</b>	Victoria
<b>WA</b>	Western Australia

## MAIN FEATURES

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

During 2011–12, expenditure on R&D by Australian businesses was \$18,321 million. Business expenditure on R&D (BERD) increased by 2% in current price terms and decreased by 1% in chain volume terms in 2011–12. This followed an increase of 7% in current price terms in 2010–11.

Business human resources devoted to R&D in 2011–12 totalled 64,906 person years of effort (PYE), an increase of 15% from 2010–11.

### BUSINESS RESOURCES DEVOTED TO R&D

		2007–08	2008–09	2009–10(a)	2010–11(a)	2011–12
<b>Expenditure on R&amp;D</b>						
Current prices	\$m	15 047	17 291	16 760	18 007	18 321
Chain volume measures(b)	\$m	16 654	18 275	17 203	18 533	18 321
<b>Human resources devoted to R&amp;D</b>	PYE	50 896	53 886	57 936	56 511	64 906

(a) Some 2009–10 and 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

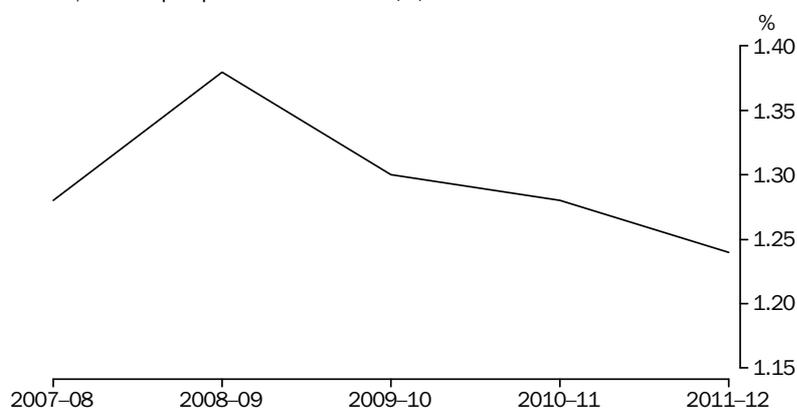
(b) The reference year for chain volume measures is 2011–12. See Explanatory Notes 31 and 32 for details.

Subsequent expenditure figures and supporting commentary relate to current price terms.

### *BERD and Gross Domestic Product (GDP)*

BERD as a proportion of GDP decreased, down from 1.28% in 2010–11 to 1.24% in 2011–12.

BERD, as a proportion of GDP(a)



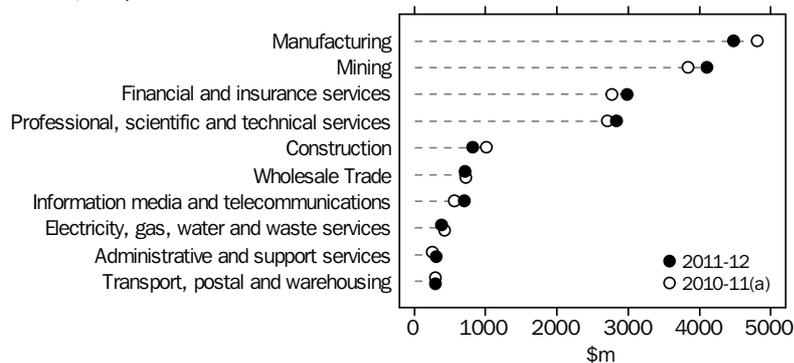
(a) See Explanatory Notes 29 and 30 for details.

## BUSINESS EXPENDITURE ON R&D (BERD)

### INDUSTRY

Manufacturing and Mining remained the largest contributors to total BERD in 2011–12, contributing \$4,474 million (24%) and \$4,104 million (22%) respectively. Financial and insurance services (\$2,985 million or 16%) and Professional, scientific and technical services (\$2,832 million or 16%) were the next largest contributors. Together, these four industries accounted for more than three quarters (79%) of total BERD in 2011–12.

BERD, Top 10 industries (a)



(a) Ranked by 2011-12 BERD.

(b) Some 2010-11 data have been revised. See the Revisions section of the Technical Note for details.

Three of the four largest contributing industries recorded increases in total BERD in 2011–12. Mining recorded the largest dollar increase in BERD from 2010–11 (up \$265 million or 7%), followed by Financial and insurance services (up \$217 million or 8%). Professional, scientific and technical services recorded the fourth largest increase (up \$125 million or 5%). The exception was Manufacturing, which recorded a decrease of \$331 million or 7%, the largest decrease for any industry.

In terms of share of total BERD and ranking order, the top ten contributing industries remained almost unchanged in 2011–12. Manufacturing showed the largest change in proportional share of total BERD from 2010–11, down three percentage points to 24%.

### EMPLOYMENT SIZE

In 2011–12, the contribution to total BERD increased with each successive employment size group. Businesses with 200 or more employees contributed \$12,079 million (66%) to total BERD, followed by businesses with 20-199 employees (\$3,817 million or 21%). The employment size groups of 5–19 employees and 0–4 employees contributed \$1,457 million (8%) and \$969 million (5%) respectively to total BERD in 2011–12.

Businesses with 0–4 employees and businesses with 20–199 employees recorded increases in BERD for 2011–12, while businesses with 5–19 employees and businesses with 200 or more employees both recorded decreases. Businesses with 20–199 employees recorded the largest dollar increase (up \$378 million or 11%), followed by businesses with 0–4 employees (up \$147 million or 18%). Conversely, businesses with 200 or more employees recorded the largest dollar decrease (down \$187 million or 2%), followed by businesses with 5–19 employees (down \$23 million or 2%).

The comparability over time of estimates by employment size group may be affected by moves in classification between reference periods. See the Comparability of Estimates Over Time section of the Technical Note for more information.

## BUSINESS EXPENDITURE ON R&D (BERD) *continued*

### TYPE OF EXPENDITURE

As in previous years, Current expenditure was the largest type of expenditure in 2011–12, accounting for \$17,067 million or 93% of total BERD. Capital expenditure accounted for the remaining \$1,254 million or 7% of total BERD. Capital expenditure increased in 2011–12 (up \$333 million or 36%), while Current expenditure was almost unchanged (down \$19 million or less than 1%).

The small decrease (less than 1%) in Current expenditure was the result of a decrease in Other current expenditure (down \$1,083 million or 10%), which was mostly offset by an increase in Labour costs (up \$1,064 million or 17%). Compared to 2010–11, Labour costs recorded an increase in its proportional share of total BERD (up five percentage points to 40% in 2011–12). Conversely, Other current expenditure recorded a decrease in its proportional share of total BERD (down six percentage points to 54%).

The shift in type of expenditure from Other current expenditure to Labour costs observed in 2011–12 can be partially attributed to businesses moving from contractor work to using persons employed by the business for R&D work. Payments to contractors who are not on the payroll of the business are excluded from Labour costs, instead being included in Other current expenditure (see the definitions for Labour Costs and Other Current Expenditure in the Glossary for more information). The increased reliance on businesses own employees rather than contractors contributed to the increase in human resources devoted to R&D in 2011–12, as described in the Industry section of Business Human Resources Devoted to R&D.

Increases for both Other capital expenditure (up \$262 million or 33%) and Land, buildings and other structures (up \$71 million or 56%), resulted in the overall increase in Capital expenditure in 2011–12. Other capital expenditure accounted for 6% of total BERD in 2011–12, while Land, buildings and other structures contributed 1%.

### SOURCE OF FUNDS

The Business sector remained the principal source of funds for BERD in 2011–12, with \$17,532 million (96% of total BERD) coming from Own funds and \$184 million (1% of total BERD) from Other business funds. Commonwealth government and Overseas sources were the next largest funders of BERD, at \$288 million (2% of total BERD) and \$212 million (1% of total BERD) respectively. Other business (down \$44 million or 19%) recorded the largest decrease among sources of funds in 2011–12.

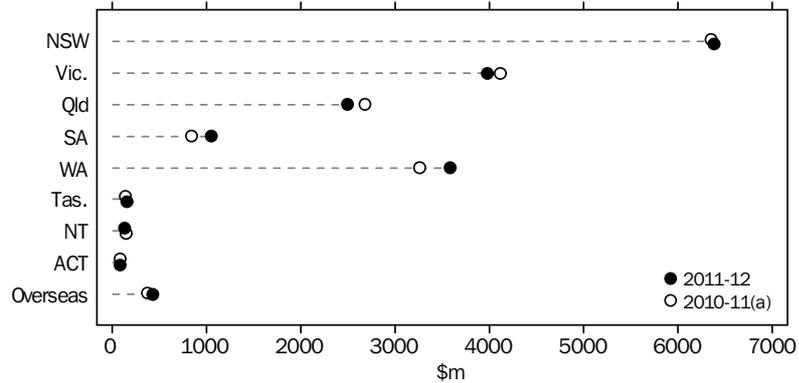
### LOCATION OF EXPENDITURE

Location of expenditure relates to the region in which the R&D activity was performed; see also Explanatory Note 26. New South Wales (NSW) and Victoria continued to have the highest levels of BERD in 2011–12, with \$6,383 million (35% of total BERD) and \$3,978 million (22% of total BERD) respectively.

# BUSINESS EXPENDITURE ON R&D (BERD) *continued*

## LOCATION OF EXPENDITURE *continued*

BERD, by location of expenditure



(a) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

In 2011–12, Western Australia (WA) recorded the largest growth in dollar terms (up by \$320 million or 10%) followed by South Australia (SA) (up \$215 million or 26%). Queensland (down \$180 million or 7%) and Victoria (down \$141 million or 3%) recorded the largest decreases in BERD in 2011–12.

## BERD and Gross State Product (GSP)

In 2011–12, the state or territory with the highest level of BERD as a proportion of GSP was WA (1.50%). SA recorded the largest increase in BERD/GSP ratio (up 0.21 percentage points to 1.15% in 2011–12), while Northern Territory (NT) recorded the largest decrease (down 0.12 percentage points from 0.86% in 2010–11). BERD as a proportion of GSP decreased for all states and territories in 2011–12, with the exceptions of South Australia, Western Australia and Tasmania.

BERD, by location of expenditure—proportion of GSP(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT
	%	%	%	%	%	%	%	%
2011–12	1.40	1.21	0.88	1.15	1.50	0.68	0.74	0.27
2010–11	1.46	1.31	0.99	0.94	1.47	0.60	0.86	0.29

(a) See Explanatory Note 29 for details.

## TYPE OF ACTIVITY

In 2011–12, businesses continued to direct the majority of BERD into Experimental development (\$11,403 million or 62% of total BERD) and Applied research (\$5,823 million or 32% of total BERD). These types of activity recorded the largest dollar movements in BERD between 2010–11 and 2011–12, with Experimental development up \$349 million (3%) and Applied research down \$103 million (2%). Pure basic research remained the smallest type of activity in 2011–12, accounting for 1% of total BERD. Experimental development and Applied research were the only types of activity to show changes in their proportional share of total BERD (up one percentage point to 62% and down one percentage point to 32% respectively) from 2010–11.

## BUSINESS EXPENDITURE ON R&D (BERD) *continued*

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### FIELDS OF RESEARCH

As in previous years, the research fields of Engineering (\$8,686 million or 47% of total BERD) and Information and computing sciences (\$5,496 million or 30% of total BERD) together accounted for the majority (77%) of total BERD in 2011–12. Engineering had the largest decrease in proportional share of total BERD, down five percentage points from 52% in 2010–11. This research field also recorded the largest decrease in dollar terms (down \$597 million or 6%). Conversely, Information and computing sciences, and Technology experienced the largest increases in proportional share of BERD, both up two percentage points, to 30% and 7% respectively in 2011–12. Information and computing services also recorded the largest increase in dollar terms (up \$495 million or 10%).

### SOCIO-ECONOMIC OBJECTIVE

The majority of BERD in 2011–12 was directed towards the socio-economic objective (SEO) divisions of Manufacturing (\$4,563 million or 25% of total BERD), Commercial services and tourism (\$3,809 million or 21% of total BERD) and Mineral resources (excluding energy resources) (\$2,742 million or 15% of total BERD), which together accounted for more than half (61%) of total BERD.

Mineral resources (excluding energy resources) (up \$530 million or 24%) and Commercial services and tourism (up \$407 million or 12%) recorded the largest dollar increases in BERD compared to 2010–11. Mineral resources (excluding energy resources) also recorded the largest increase in proportional share of total BERD, up three percentage points to 15% in 2011–12.

Construction (down \$265 million or 22%) and Energy (down \$208 million or 8%) recorded the largest dollar decreases in BERD in 2011–12. Construction also recorded the largest decrease in proportional share of total BERD in 2011–12, down two percentage points from 7% in 2010–11.

### FOREIGN OWNERSHIP

Wholly Australian owned businesses again made the largest contribution to total BERD in 2011–12, accounting for \$10,367 million or 57% of total BERD, followed by businesses with greater than 50% foreign ownership (\$5,588 million or 31%). Compared to 2010–11, wholly Australian owned businesses were the only group to record a decrease in BERD (down \$142 million or 1%) and a decrease in proportional share of total BERD (down one percentage point).

Businesses with greater than 50% foreign ownership had the largest increase in BERD from 2010–11 (up \$285 million or 5%).

## BUSINESS EXPENDITURE ON R&D (BERD) *continued*

BERD, by level of foreign ownership(a)

	EXPENDITURE ON R&D			PROPORTION OF TOTAL EXPENDITURE ON R&D		
	2009-10(b)	2010-11(b)	2011-12	2009-10(b)	2010-11(b)	2011-12
	\$m	\$m	\$m	%	%	%
Wholly Australian owned (0%)	8 712	10 509	10 367	52	58	57
Greater than 0% and less than 10%	1 240	793	923	7	4	5
10% to 50%	1 425	1 402	1 443	9	8	8
Greater than 50%	5 382	5 303	5 588	32	29	31
<b>Total(c)</b>	<b>16 760</b>	<b>18 007</b>	<b>18 321</b>	<b>100</b>	<b>100</b>	<b>100</b>

(a) A definition of foreign ownership was not provided in the survey and data were accepted as reported.

(b) Some 2009-10 and 2010-11 data have been revised. See the Revisions section of the Technical Note for details.

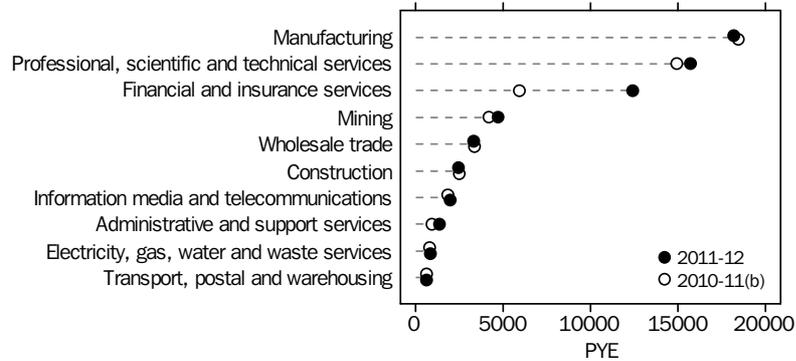
(c) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

## BUSINESS HUMAN RESOURCES DEVOTED TO R&D

### INDUSTRY

In 2011–12, the industry divisions of Manufacturing and Professional, scientific and technical services were the main contributors to total human resources devoted to R&D, at 18,196 (28%) and 15,686 (24%) person years of effort (PYE) respectively.

### BUSINESS HUMAN RESOURCES DEVOTED TO R&D, Top 10 industries (a)



(a) Ranked by 2011–12 total human resources devoted to R&D.

(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

Financial and insurance services (up 6,467 PYE or 109%) was the largest contributor to the overall increase in human resources devoted to R&D in 2011–12. This industry also showed the largest increase in proportional share of total PYE (up eight percentage points to 19%).

In contrast, Manufacturing (down 240 PYE or 1%) recorded the largest decrease in human resources devoted to R&D, and showed the largest decrease in proportional share of total PYE (down five percentage points to 28%).

As described in the Type of Expenditure section of Business Expenditure on R&D (BERD), a portion of the overall increase in human resources devoted to R&D in 2011–12 can be attributed to businesses moving to utilising persons employed by the business, rather than using contractors for R&D work. The provision of contract services to a business does not involve the supply of staff, but rather the delivery of a product, and therefore does not contribute to the businesses own person years of effort estimate.

### EMPLOYMENT SIZE

For 2011–12, person years of effort increased with each successive employment size group. Businesses with 200 or more employees and businesses with 20–199 employees accounted for more than three quarters (84%) of total human resources devoted to R&D in 2011–12 (37,737 PYE or 58% and 16,957 PYE or 26% respectively). An increase in human resources was recorded across all four employment size groups, with the largest increase recorded for businesses with 200 or more employees (up 6,318 PYE or 20%). This employment size group also had the largest increase in proportional share of total PYE, up two percentage points from 56% in 2010–11.

Conversely, businesses with 5–19 employees recorded the largest decrease in proportional share of total PYE, down two percentage points from 14% in 2010–11.

The comparability over time of estimates by employment size group may be affected by moves in classification between reference periods. See the Comparability of Estimates Over Time section of the Technical Note for more information.

## BUSINESS HUMAN RESOURCES DEVOTED TO R&D *continued*

### TYPE OF RESOURCE

Researchers were again the most dominant type of human resource devoted to R&D in 2011–12, accounting for 32,439 PYE or 50% of total PYE. Compared to 2010–11, Researchers recorded the largest increase in PYE (up 4,449 PYE or 16%), and their proportional share of total PYE remained the same.

Technicians were the only type of resource to record a decrease in proportional share of PYE, down one percentage point from 34% in 2010–11.

### FOREIGN OWNERSHIP

In 2011–12, wholly Australian owned businesses made the largest contribution to total human resources devoted to R&D, at 40,429 PYE or 62% of total PYE; an increase of 7,573 PYE (23%) from 2010–11. Wholly Australian owned businesses also recorded the largest increase in proportional share of total PYE, up four percentage points to 62% in 2011–12.

Businesses with greater than 50% foreign ownership were the only group to record a decrease in PYE from 2010–11 (down 406 PYE or 2%) and a decrease in proportional share of total PYE (down five percentage points from 31%).

### BUSINESS HUMAN RESOURCES DEVOTED TO R&D, by level of foreign ownership(a)

	HUMAN RESOURCES DEVOTED TO R&D			PROPORTION OF TOTAL HUMAN RESOURCES DEVOTED TO R&D		
	2009–10(b)	2010–11(b)	2011–12	2009–10(b)	2010–11(b)	2011–12
	PYE	PYE	PYE	%	%	%
Wholly Australian owned (0%)	33 714	32 856	40 429	58	58	62
Greater than 0% and less than 10%	3 075	2 658	3 308	5	5	5
10% to 50%	4 192	3 646	4 225	7	6	7
Greater than 50%	16 955	17 350	16 944	29	31	26
<b>Total(c)</b>	<b>57 936</b>	<b>56 511</b>	<b>64 906</b>	<b>100</b>	<b>100</b>	<b>100</b>

(a) A definition of foreign ownership was not provided in the survey and data were accepted as reported.

(b) Some 2009–10 and 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

(c) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

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	EXPENDITURE ON R&D			PROPORTION OF TOTAL EXPENDITURE ON R&D		
	2009-10(a)	2010-11(a)	2011-12	2009-10(a)	2010-11(a)	2011-12
	\$'000	\$'000	\$'000	%	%	%
<b>Employment size</b>						
0-4 persons	645 013	822 645	969 131	3.8	4.6	5.3
5-19 persons	1 420 295	1 480 348	1 456 937	8.5	8.2	8.0
20-199 persons	3 184 220	3 438 741	3 816 689	19.0	19.1	20.8
200 or more persons	11 510 113	12 265 153	12 078 564	68.7	68.1	65.9
<b>Type of expenditure</b>						
<b>Capital expenditure</b>						
Land, buildings and other structures	124 270	126 671	198 041	0.7	0.7	1.1
Other capital expenditure	584 584	794 128	1 056 115	3.5	4.4	5.8
<i>Total(b)</i>	<i>708 854</i>	<i>920 799</i>	<i>1 254 156</i>	<i>4.2</i>	<i>5.1</i>	<i>6.8</i>
<b>Current expenditure</b>						
Labour costs	6 474 775	6 204 882	7 269 090	38.6	34.5	39.7
Other current expenditure	9 576 012	10 881 206	9 798 076	57.1	60.4	53.5
<i>Total(b)</i>	<i>16 050 787</i>	<i>17 086 088</i>	<i>17 067 166</i>	<i>95.8</i>	<i>94.9</i>	<i>93.2</i>
<b>Source of funds</b>						
Own funds	16 025 857	17 252 856	17 532 454	95.6	95.8	95.7
Other business	199 100	228 540	184 257	1.2	1.3	1.0
Commonwealth government	298 010	259 995	287 783	1.8	1.4	1.6
State and local government	35 264	53 955	53 925	0.2	0.3	0.3
Other Australian(c)	36 987	44 033	50 956	0.2	0.2	0.3
Overseas	164 423	167 508	211 946	1.0	0.9	1.2
<b>Location of expenditure</b>						
New South Wales	6 078 528	6 345 582	6 382 654	36.3	35.2	34.8
Victoria	3 880 043	4 119 228	3 978 110	23.2	22.9	21.7
Queensland	2 364 103	2 679 011	2 498 696	14.1	14.9	13.6
South Australia	791 806	842 556	1 057 670	4.7	4.7	5.8
Western Australia	2 968 856	3 265 326	3 584 876	17.7	18.1	19.6
Tasmania	115 614	145 066	164 118	0.7	0.8	0.9
Northern Territory	122 574	149 414	137 668	0.7	0.8	0.8
Australian Capital Territory	86 136	87 034	86 872	0.5	0.5	0.5
Overseas	351 981	373 670	430 658	2.1	2.1	2.4
<b>Type of activity</b>						
Pure basic research	85 248	98 419	120 146	0.5	0.5	0.7
Strategic basic research	830 864	929 308	976 141	5.0	5.2	5.3
Applied research	5 632 701	5 925 326	5 822 468	33.6	32.9	31.8
Experimental development	10 210 828	11 053 834	11 402 566	60.9	61.4	62.2
<b>Total expenditure on R&amp;D(b)</b>	<b>16 759 641</b>	<b>18 006 887</b>	<b>18 321 322</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

(a) Some 2009-10 and 2010-11 data have been revised. See the Revisions section of the Technical Note for details.

(b) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(c) Includes funding from Joint business/government, Higher education and Private non-profit organisations.

## BUSINESS EXPENDITURE ON R&amp;D, by industry: values and proportions

	EXPENDITURE ON R&D			PROPORTION OF TOTAL EXPENDITURE ON R&D		
	2009-10(a)	2010-11(a)	2011-12	2009-10(a)	2010-11(a)	2011-12
	\$'000	\$'000	\$'000	%	%	%
Agriculture, Forestry and Fishing	183 848	184 111	189 747	1.1	1.0	1.0
Mining	3 713 104	3 838 721	4 104 123	22.2	21.3	22.4
Manufacturing	4 260 316	4 804 956	4 473 890	25.4	26.7	24.4
Electricity, Gas, Water and Waste Services	406 254	421 943	378 133	2.4	2.3	2.1
Construction	868 176	1 006 458	819 529	5.2	5.6	4.5
Wholesale Trade	769 866	720 927	715 822	4.6	4.0	3.9
Retail Trade	111 815	100 850	146 045	0.7	0.6	0.8
Accommodation and Food Services	22 203	15 571	21 451	0.1	0.1	0.1
Transport, Postal and Warehousing	258 255	292 169	292 850	1.5	1.6	1.6
Information Media and Telecommunications	487 999	566 503	701 202	2.9	3.1	3.8
Financial and Insurance Services	2 614 799	2 768 414	2 985 215	15.6	15.4	16.3
Rental, Hiring and Real Estate Services	154 372	119 688	92 086	0.9	0.7	0.5
Professional, Scientific and Technical Services	2 548 111	2 706 790	2 831 737	15.2	15.0	15.5
Administrative and Support Services	170 424	253 371	308 668	1.0	1.4	1.7
Public Administration and Safety	9 447	11 699	15 807	0.1	0.1	0.1
Education and Training	10 261	12 984	14 948	0.1	0.1	0.1
Health Care and Social Assistance	77 226	79 763	94 424	0.5	0.4	0.5
Arts and Recreation Services	33 754	40 978	72 431	0.2	0.2	0.4
Other Services	59 411	60 991	63 215	0.4	0.3	0.3
<b>Total(b)</b>	<b>16 759 641</b>	<b>18 006 887</b>	<b>18 321 322</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

(a) Some 2009–10 and 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

(b) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

## BUSINESS EXPENDITURE ON R&amp;D, by industry—by employment size

	0-4 persons	5-19 persons	20-199 persons	200 or more persons	Total expenditure on R&D(a)
	\$'000	\$'000	\$'000	\$'000	\$'000
2011-12					
Agriculture, Forestry and Fishing	20 850	19 311	93 116	56 469	189 747
Mining	324 932	190 165	746 050	2 842 977	4 104 123
Manufacturing	122 825	267 624	1 002 688	3 080 752	4 473 890
Electricity, Gas, Water and Waste Services	11 066	17 046	71 138	278 882	378 133
Construction	21 695	38 405	162 016	597 413	819 529
Wholesale Trade	35 547	80 333	274 770	325 172	715 822
Retail Trade	*9 239	23 390	30 502	82 914	146 045
Accommodation and Food Services	np	4 256	np	14 728	21 451
Transport, Postal and Warehousing	6 913	5 285	29 162	251 490	292 850
Information Media and Telecommunications	27 824	42 166	73 575	557 637	701 202
Financial and Insurance Services	16 904	33 547	87 212	2 847 552	2 985 215
Rental, Hiring and Real Estate Services	15 358	15 868	30 065	30 795	92 086
Professional, Scientific and Technical Services	312 806	641 834	1 122 072	755 026	2 831 737
Administrative and Support Services	11 535	15 463	36 891	244 779	308 668
Public Administration and Safety	1 016	8 744	np	np	15 807
Education and Training	np	5 683	4 977	np	14 948
Health Care and Social Assistance	8 672	31 626	16 689	37 437	94 424
Arts and Recreation Services	3 608	3 096	8 174	57 553	72 431
Other Services	14 529	13 094	25 504	10 088	63 215
<b>Total(a)</b>	<b>969 131</b>	<b>1 456 937</b>	<b>3 816 689</b>	<b>12 078 564</b>	<b>18 321 322</b>

2010-11 (b)					
Agriculture, Forestry and Fishing	17 483	25 029	86 720	54 879	184 111
Mining	215 827	159 684	524 219	2 938 991	3 838 721
Manufacturing	149 211	289 276	991 850	3 374 619	4 804 956
Electricity, Gas, Water and Waste Services	13 176	27 173	51 274	330 320	421 943
Construction	12 412	43 433	186 625	763 988	1 006 458
Wholesale Trade	21 565	82 673	249 988	366 701	720 927
Retail Trade	6 304	16 761	19 510	58 275	100 850
Accommodation and Food Services	1 167	np	np	12 502	15 571
Transport, Postal and Warehousing	3 708	11 501	37 510	239 450	292 169
Information Media and Telecommunications	10 267	35 007	67 447	453 782	566 503
Financial and Insurance Services	65 158	53 331	91 735	2 558 190	2 768 414
Rental, Hiring and Real Estate Services	8 339	15 022	25 509	70 818	119 688
Professional, Scientific and Technical Services	277 740	666 218	997 391	765 441	2 706 790
Administrative and Support Services	2 903	16 029	52 316	182 123	253 371
Public Administration and Safety	1 635	np	np	np	11 699
Education and Training	2 804	4 916	5 264	—	12 984
Health Care and Social Assistance	5 449	17 935	12 294	44 085	79 763
Arts and Recreation Services	np	np	6 410	31 563	40 978
Other Services	np	12 482	28 083	np	60 991
<b>Total(a)</b>	<b>822 645</b>	<b>1 480 348</b>	<b>3 438 741</b>	<b>12 265 153</b>	<b>18 006 887</b>

\* estimate has a relative standard error of 25% to 50% and should be used with caution

— nil or rounded to zero (including null cells)

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

(a) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(b) Some 2010-11 data have been revised. See the Revisions section of the Technical Note for details.

## BUSINESS EXPENDITURE ON R&amp;D, by industry—by employment size: proportions

	0–4 persons	5–19 persons	20–199 persons	200 or more persons	Total expenditure on R&D(a)
	%	%	%	%	%
2011–12					
Agriculture, Forestry and Fishing	11.0	10.2	49.1	29.8	100.0
Mining	7.9	4.6	18.2	69.3	100.0
Manufacturing	2.7	6.0	22.4	68.9	100.0
Electricity, Gas, Water and Waste Services	2.9	4.5	18.8	73.8	100.0
Construction	2.6	4.7	19.8	72.9	100.0
Wholesale Trade	5.0	11.2	38.4	45.4	100.0
Retail Trade	*6.3	16.0	20.9	56.8	100.0
Accommodation and Food Services	np	19.8	np	68.7	100.0
Transport, Postal and Warehousing	2.4	1.8	10.0	85.9	100.0
Information Media and Telecommunications	4.0	6.0	10.5	79.5	100.0
Financial and Insurance Services	0.6	1.1	2.9	95.4	100.0
Rental, Hiring and Real Estate Services	16.7	17.2	32.6	33.4	100.0
Professional, Scientific and Technical Services	11.0	22.7	39.6	26.7	100.0
Administrative and Support Services	3.7	5.0	12.0	79.3	100.0
Public Administration and Safety	6.4	55.3	np	np	100.0
Education and Training	np	38.0	33.3	np	100.0
Health Care and Social Assistance	9.2	33.5	17.7	39.6	100.0
Arts and Recreation Services	5.0	4.3	11.3	79.5	100.0
Other Services	23.0	20.7	40.3	16.0	100.0
<b>Total(a)</b>	<b>5.3</b>	<b>8.0</b>	<b>20.8</b>	<b>65.9</b>	<b>100.0</b>

2010–11 (b)					
Agriculture, Forestry and Fishing	9.5	13.6	47.1	29.8	100.0
Mining	5.6	4.2	13.7	76.6	100.0
Manufacturing	3.1	6.0	20.6	70.2	100.0
Electricity, Gas, Water and Waste Services	3.1	6.4	12.2	78.3	100.0
Construction	1.2	4.3	18.5	75.9	100.0
Wholesale Trade	3.0	11.5	34.7	50.9	100.0
Retail Trade	6.3	16.6	19.3	57.8	100.0
Accommodation and Food Services	7.5	np	np	80.3	100.0
Transport, Postal and Warehousing	1.3	3.9	12.8	82.0	100.0
Information Media and Telecommunications	1.8	6.2	11.9	80.1	100.0
Financial and Insurance Services	2.4	1.9	3.3	92.4	100.0
Rental, Hiring and Real Estate Services	7.0	12.6	21.3	59.2	100.0
Professional, Scientific and Technical Services	10.3	24.6	36.8	28.3	100.0
Administrative and Support Services	1.1	6.3	20.6	71.9	100.0
Public Administration and Safety	14.0	np	np	np	100.0
Education and Training	21.6	37.9	40.5	—	100.0
Health Care and Social Assistance	6.8	22.5	15.4	55.3	100.0
Arts and Recreation Services	np	np	15.6	77.0	100.0
Other Services	np	20.5	46.0	np	100.0
<b>Total(a)</b>	<b>4.6</b>	<b>8.2</b>	<b>19.1</b>	<b>68.1</b>	<b>100.0</b>

\* estimate has a relative standard error of 25% to 50% and should be used with caution

— nil or rounded to zero (including null cells)

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

(a) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

## BUSINESS EXPENDITURE ON R&amp;D, by industry—by type of expenditure

	CAPITAL EXPENDITURE			CURRENT EXPENDITURE			Total expenditure on R&D(a)
	Land, buildings and other structures	Other capital expenditure	Total(a)	Labour costs	Other current expenditure	Total(a)	
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	
2011–12							
Agriculture, Forestry and Fishing	11 029	6 383	17 413	43 336	128 998	172 334	189 747
Mining	12 909	551 057	563 966	597 357	2 942 799	3 540 157	4 104 123
Manufacturing	89 191	186 102	275 293	1 881 218	2 317 379	4 198 597	4 473 890
Electricity, Gas, Water and Waste Services	17 139	57 282	74 421	88 712	215 000	303 712	378 133
Construction	876	12 617	13 494	233 470	572 564	806 035	819 529
Wholesale Trade	7 824	16 701	24 525	333 468	357 829	691 297	715 822
Retail Trade	**3 529	24 704	28 233	53 703	64 109	117 812	146 045
Accommodation and Food Services	np	np	np	np	np	np	21 451
Transport, Postal and Warehousing	5 858	6 621	12 479	74 756	205 614	280 371	292 850
Information Media and Telecommunications	*2 372	13 981	16 353	216 276	468 573	684 849	701 202
Financial and Insurance Services	1 893	61 162	63 055	1 878 962	1 043 198	2 922 160	2 985 215
Rental, Hiring and Real Estate Services	336	11 877	12 213	42 216	37 657	79 874	92 086
Professional, Scientific and Technical Services	38 678	71 765	110 443	1 529 632	1 191 662	2 721 294	2 831 737
Administrative and Support Services	2 357	17 524	19 881	173 113	115 674	288 787	308 668
Public Administration and Safety	np	np	np	np	np	np	15 807
Education and Training	371	242	613	7 953	6 382	14 335	14 948
Health Care and Social Assistance	1 491	3 060	4 551	44 327	45 546	89 873	94 424
Arts and Recreation Services	np	np	*8 133	25 561	38 737	64 298	72 431
Other Services	*1 255	2 639	3 894	30 632	28 689	59 321	63 215
<b>Total(a)</b>	<b>198 041</b>	<b>1 056 115</b>	<b>1 254 156</b>	<b>7 269 090</b>	<b>9 798 076</b>	<b>17 067 166</b>	<b>18 321 322</b>
2010–11 (b)							
Agriculture, Forestry and Fishing	5 205	8 415	13 620	42 420	128 071	170 491	184 111
Mining	11 634	238 179	249 813	592 945	2 995 963	3 588 908	3 838 721
Manufacturing	59 681	236 705	296 386	1 953 531	2 555 039	4 508 570	4 804 956
Electricity, Gas, Water and Waste Services	8 891	43 651	52 542	82 955	286 446	369 401	421 943
Construction	1 769	22 460	24 229	289 791	692 438	982 229	1 006 458
Wholesale Trade	7 988	25 387	33 375	336 110	351 442	687 552	720 927
Retail Trade	1 008	3 598	4 606	41 213	55 031	96 244	100 850
Accommodation and Food Services	np	np	225	5 579	9 767	15 346	15 571
Transport, Postal and Warehousing	1 006	29 776	30 782	61 447	199 940	261 387	292 169
Information Media and Telecommunications	2 560	14 463	17 023	187 377	362 103	549 480	566 503
Financial and Insurance Services	1 517	33 827	35 344	841 744	1 891 326	2 733 070	2 768 414
Rental, Hiring and Real Estate Services	1 499	12 798	14 297	43 713	61 678	105 391	119 688
Professional, Scientific and Technical Services	20 941	88 768	109 709	1 512 117	1 084 964	2 597 081	2 706 790
Administrative and Support Services	1 848	15 588	17 436	111 292	124 643	235 935	253 371
Public Administration and Safety	128	3 513	3 641	4 777	3 281	8 058	11 699
Education and Training	np	np	100	7 869	5 015	12 884	12 984
Health Care and Social Assistance	378	2 601	2 979	41 457	35 327	76 784	79 763
Arts and Recreation Services	7	2 316	2 323	18 584	20 071	38 655	40 978
Other Services	532	11 837	12 369	29 961	18 661	48 622	60 991
<b>Total(a)</b>	<b>126 671</b>	<b>794 128</b>	<b>920 799</b>	<b>6 204 882</b>	<b>10 881 206</b>	<b>17 086 088</b>	<b>18 006 887</b>

\* estimate has a relative standard error of 25% to 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

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

(a) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

	CAPITAL EXPENDITURE			CURRENT EXPENDITURE			Total expenditure on R&D(a)
	Land, buildings and other structures	Other capital expenditure	Total(a)	Labour costs	Other current expenditure	Total(a)	
	%	%	%	%	%	%	
2011–12							
Agriculture, Forestry and Fishing	5.8	3.4	9.2	22.8	68.0	90.8	100.0
Mining	0.3	13.4	13.7	14.6	71.7	86.3	100.0
Manufacturing	2.0	4.2	6.2	42.0	51.8	93.8	100.0
Electricity, Gas, Water and Waste Services	4.5	15.1	19.7	23.5	56.9	80.3	100.0
Construction	0.1	1.5	1.6	28.5	69.9	98.4	100.0
Wholesale Trade	1.1	2.3	3.4	46.6	50.0	96.6	100.0
Retail Trade	**2.4	16.9	19.3	36.8	43.9	80.7	100.0
Accommodation and Food Services	np	np	np	np	np	np	100.0
Transport, Postal and Warehousing	2.0	2.3	4.3	25.5	70.2	95.7	100.0
Information Media and Telecommunications	*0.3	2.0	2.3	30.8	66.8	97.7	100.0
Financial and Insurance Services	0.1	2.0	2.1	62.9	34.9	97.9	100.0
Rental, Hiring and Real Estate Services	0.4	12.9	13.3	45.8	40.9	86.7	100.0
Professional, Scientific and Technical Services	1.4	2.5	3.9	54.0	42.1	96.1	100.0
Administrative and Support Services	0.8	5.7	6.4	56.1	37.5	93.6	100.0
Public Administration and Safety	np	np	np	np	np	np	100.0
Education and Training	2.5	1.6	4.1	53.2	42.7	95.9	100.0
Health Care and Social Assistance	1.6	3.2	4.8	46.9	48.2	95.2	100.0
Arts and Recreation Services	np	np	*11.2	35.3	53.5	88.8	100.0
Other Services	*2.0	4.2	6.2	48.5	45.4	93.8	100.0
<b>Total(a)</b>	<b>1.1</b>	<b>5.8</b>	<b>6.8</b>	<b>39.7</b>	<b>53.5</b>	<b>93.2</b>	<b>100.0</b>
2010–11 (b)							
Agriculture, Forestry and Fishing	2.8	4.6	7.4	23.0	69.6	92.6	100.0
Mining	0.3	6.2	6.5	15.4	78.0	93.5	100.0
Manufacturing	1.2	4.9	6.2	40.7	53.2	93.8	100.0
Electricity, Gas, Water and Waste Services	2.1	10.3	12.5	19.7	67.9	87.5	100.0
Construction	0.2	2.2	2.4	28.8	68.8	97.6	100.0
Wholesale Trade	1.1	3.5	4.6	46.6	48.7	95.4	100.0
Retail Trade	1.0	3.6	4.6	40.9	54.6	95.4	100.0
Accommodation and Food Services	np	np	1.4	35.8	62.7	98.6	100.0
Transport, Postal and Warehousing	0.3	10.2	10.5	21.0	68.4	89.5	100.0
Information Media and Telecommunications	0.5	2.6	3.0	33.1	63.9	97.0	100.0
Financial and Insurance Services	0.1	1.2	1.3	30.4	68.3	98.7	100.0
Rental, Hiring and Real Estate Services	1.3	10.7	11.9	36.5	51.5	88.1	100.0
Professional, Scientific and Technical Services	0.8	3.3	4.1	55.9	40.1	95.9	100.0
Administrative and Support Services	0.7	6.2	6.9	43.9	49.2	93.1	100.0
Public Administration and Safety	1.1	30.0	31.1	40.8	28.0	68.9	100.0
Education and Training	np	np	0.8	60.6	38.6	99.2	100.0
Health Care and Social Assistance	0.5	3.3	3.7	52.0	44.3	96.3	100.0
Arts and Recreation Services	—	5.7	5.7	45.4	49.0	94.3	100.0
Other Services	0.9	19.4	20.3	49.1	30.6	79.7	100.0
<b>Total(a)</b>	<b>0.7</b>	<b>4.4</b>	<b>5.1</b>	<b>34.5</b>	<b>60.4</b>	<b>94.9</b>	<b>100.0</b>
* estimate has a relative standard error of 25% to 50% and should be used with caution			np	not available for publication but included in totals where applicable, unless otherwise indicated			
** estimate has a relative standard error greater than 50% and is considered too unreliable for general use			(a)	Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.			
— nil or rounded to zero (including null cells)			(b)	Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.			

## BUSINESS EXPENDITURE ON R&amp;D, by industry—by source of funds

	Own funds	Other business	Commonwealth government	State and local government	Other Australian (a)	Overseas	Total expenditure on R&D (b)
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2011–12							
Agriculture, Forestry and Fishing	185 526	919	2 503	*798	—	—	189 747
Mining	4 095 081	**1 230	*3 248	*516	np	np	4 104 123
Manufacturing	4 279 302	38 271	135 774	np	1 803	np	4 473 890
Electricity, Gas, Water and Waste Services	340 487	13 417	np	np	np	598	378 133
Construction	802 635	*10 679	np	np	—	np	819 529
Wholesale Trade	684 771	8 048	*8 997	np	np	*11 731	715 822
Retail Trade	141 857	*2 556	np	np	—	—	146 045
Accommodation and Food Services	np	—	—	—	np	—	21 451
Transport, Postal and Warehousing	290 388	np	—	np	—	np	292 850
Information Media and Telecommunications	695 241	np	np	np	np	np	701 202
Financial and Insurance Services	2 972 584	np	np	—	np	—	2 985 215
Rental, Hiring and Real Estate Services	90 154	np	991	np	—	np	92 086
Professional, Scientific and Technical Services	2 414 183	95 176	89 887	15 772	37 388	179 330	2 831 737
Administrative and Support Services	306 109	*1 019	*1 357	np	—	np	308 668
Public Administration and Safety	15 376	—	np	np	—	—	15 807
Education and Training	np	np	np	—	—	—	14 948
Health Care and Social Assistance	55 817	4 662	16 017	np	np	np	94 424
Arts and Recreation Services	68 303	np	np	—	—	—	72 431
Other Services	58 992	np	2 791	np	np	np	63 215
<b>Total (b)</b>	<b>17 532 454</b>	<b>184 257</b>	<b>287 783</b>	<b>53 925</b>	<b>50 956</b>	<b>211 946</b>	<b>18 321 322</b>

2010–11 (c)							
Agriculture, Forestry and Fishing	174 029	176	6 841	np	684	np	184 111
Mining	3 823 984	1 705	1 060	np	np	np	3 838 721
Manufacturing	4 590 676	53 894	119 776	10 809	2 824	26 977	4 804 956
Electricity, Gas, Water and Waste Services	402 670	np	12 371	1 308	np	832	421 943
Construction	990 100	8 485	2 488	np	np	np	1 006 458
Wholesale Trade	688 314	13 721	4 451	880	543	13 018	720 927
Retail Trade	99 699	760	212	np	np	—	100 850
Accommodation and Food Services	np	np	—	—	—	—	15 571
Transport, Postal and Warehousing	290 747	np	—	np	—	np	292 169
Information Media and Telecommunications	563 827	2 588	np	np	—	—	566 503
Financial and Insurance Services	2 758 044	8 570	np	np	—	—	2 768 414
Rental, Hiring and Real Estate Services	114 704	2 430	1 818	np	np	—	119 688
Professional, Scientific and Technical Services	2 330 202	123 445	92 777	12 539	33 595	114 232	2 706 790
Administrative and Support Services	252 384	122	np	np	np	np	253 371
Public Administration and Safety	np	np	507	np	—	—	11 699
Education and Training	11 703	np	np	np	np	—	12 984
Health Care and Social Assistance	41 900	4 923	13 324	np	np	np	79 763
Arts and Recreation Services	37 348	np	np	—	—	—	40 978
Other Services	57 387	1 169	1 643	np	np	np	60 991
<b>Total (b)</b>	<b>17 252 856</b>	<b>228 540</b>	<b>259 995</b>	<b>53 955</b>	<b>44 033</b>	<b>167 508</b>	<b>18 006 887</b>

\* estimate has a relative standard error of 25% to 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

— nil or rounded to zero (including null cells)

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

(a) Includes funding from Joint business/government, Higher education and Private non-profit organisations.

(b) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(c) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

## BUSINESS EXPENDITURE ON R&amp;D, by industry—by source of funds: proportions

	<i>Own funds</i>	<i>Other business</i>	<i>Commonwealth government</i>	<i>State and local government</i>	<i>Other Australian (a)</i>	<i>Overseas</i>	<i>Total expenditure on R&amp;D (b)</i>
	%	%	%	%	%	%	%
2011–12							
Agriculture, Forestry and Fishing	97.8	0.5	1.3	*0.4	—	—	100.0
Mining	99.8	**—	*0.1	*—	np	np	100.0
Manufacturing	95.7	0.9	3.0	np	—	np	100.0
Electricity, Gas, Water and Waste Services	90.0	3.5	np	np	np	0.2	100.0
Construction	97.9	*1.3	np	np	—	np	100.0
Wholesale Trade	95.7	1.1	*1.3	np	np	*1.6	100.0
Retail Trade	97.1	*1.8	np	np	—	—	100.0
Accommodation and Food Services	np	—	—	—	np	—	100.0
Transport, Postal and Warehousing	99.2	np	—	np	—	np	100.0
Information Media and Telecommunications	99.1	np	np	np	np	np	100.0
Financial and Insurance Services	99.6	np	np	—	np	—	100.0
Rental, Hiring and Real Estate Services	97.9	np	1.1	np	—	np	100.0
Professional, Scientific and Technical Services	85.3	3.4	3.2	0.6	1.3	6.3	100.0
Administrative and Support Services	99.2	*0.3	*0.4	np	—	np	100.0
Public Administration and Safety	97.3	—	np	np	—	—	100.0
Education and Training	np	np	np	—	—	—	100.0
Health Care and Social Assistance	59.1	4.9	17.0	np	np	np	100.0
Arts and Recreation Services	94.3	np	np	—	—	—	100.0
Other Services	93.3	np	4.4	np	np	np	100.0
<b>Total (b)</b>	<b>95.7</b>	<b>1.0</b>	<b>1.6</b>	<b>0.3</b>	<b>0.3</b>	<b>1.2</b>	<b>100.0</b>

2010–11 (c)							
Agriculture, Forestry and Fishing	94.5	0.1	3.7	np	0.4	np	100.0
Mining	99.6	—	—	np	np	np	100.0
Manufacturing	95.5	1.1	2.5	0.2	0.1	0.6	100.0
Electricity, Gas, Water and Waste Services	95.4	np	2.9	0.3	np	0.2	100.0
Construction	98.4	0.8	0.2	np	np	np	100.0
Wholesale Trade	95.5	1.9	0.6	0.1	0.1	1.8	100.0
Retail Trade	98.9	0.8	0.2	np	np	—	100.0
Accommodation and Food Services	np	np	—	—	—	—	100.0
Transport, Postal and Warehousing	99.5	np	—	np	—	np	100.0
Information Media and Telecommunications	99.5	0.5	np	np	—	—	100.0
Financial and Insurance Services	99.6	0.3	np	np	—	—	100.0
Rental, Hiring and Real Estate Services	95.8	2.0	1.5	np	np	—	100.0
Professional, Scientific and Technical Services	86.1	4.6	3.4	0.5	1.2	4.2	100.0
Administrative and Support Services	99.6	—	np	np	np	np	100.0
Public Administration and Safety	np	np	4.3	np	—	—	100.0
Education and Training	90.1	np	np	np	np	—	100.0
Health Care and Social Assistance	52.5	6.2	16.7	np	np	np	100.0
Arts and Recreation Services	91.1	np	np	—	—	—	100.0
Other Services	94.1	1.9	2.7	np	np	np	100.0
<b>Total (b)</b>	<b>95.8</b>	<b>1.3</b>	<b>1.4</b>	<b>0.3</b>	<b>0.2</b>	<b>0.9</b>	<b>100.0</b>

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(a) Includes funding from Joint business/government, Higher education and Private non-profit organisations.

(b) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(c) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

## BUSINESS EXPENDITURE ON R&amp;D, by industry—by location of expenditure

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Overseas	Total expenditure on R&D(a)
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2011–12										
Agriculture, Forestry and Fishing	34 842	19 098	33 209	np	64 603	19 864	12 714	—	np	189 747
Mining	354 337	61 935	892 298	226 353	2 428 481	np	101 329	np	*27 206	4 104 123
Manufacturing	1 286 810	1 664 528	519 012	343 349	348 435	76 852	np	np	199 545	4 473 890
Electricity, Gas, Water and Waste Services	64 881	108 490	115 880	38 195	38 198	np	—	np	696	378 133
Construction	214 643	129 013	216 129	46 760	207 473	2 052	np	2 381	np	819 529
Wholesale Trade	412 503	116 511	75 834	42 034	54 380	*7 630	np	np	6 147	715 822
Retail Trade	45 460	73 006	17 196	*5 060	*3 433	**250	np	np	*286	146 045
Accommodation and Food Services	6 787	np	np	np	1 550	np	np	—	np	21 451
Transport, Postal and Warehousing	56 167	134 864	46 772	20 067	26 935	np	np	np	np	292 850
Information Media and Telecommunications	364 033	278 944	*28 265	*20 046	np	np	—	np	np	701 202
Financial and Insurance Services	2 260 251	458 525	47 331	np	69 149	np	—	—	np	2 985 215
Rental, Hiring and Real Estate Services	48 683	26 227	8 602	2 111	5 440	np	—	np	np	92 086
Professional, Scientific and Technical Services	1 012 000	689 757	421 371	211 296	294 959	*25 854	*3 496	52 043	120 961	2 831 737
Administrative and Support Services	123 801	121 937	35 374	3 964	21 725	—	—	np	np	308 668
Public Administration and Safety	9 286	np	np	np	669	np	np	np	np	15 807
Education and Training	5 733	2 536	2 852	np	np	np	—	—	np	14 948
Health Care and Social Assistance	47 320	30 354	8 965	np	7 260	—	—	—	np	94 424
Arts and Recreation Services	14 644	44 822	7 287	np	np	—	—	np	np	72 431
Other Services	20 472	14 594	10 308	9 534	7 055	np	—	np	*1 034	63 215
<b>Total(a)</b>	<b>6 382 654</b>	<b>3 978 110</b>	<b>2 498 696</b>	<b>1 057 670</b>	<b>3 584 876</b>	<b>164 118</b>	<b>137 668</b>	<b>86 872</b>	<b>430 658</b>	<b>18 321 322</b>

2010–11 (b)										
Agriculture, Forestry and Fishing	32 844	12 719	26 601	7 810	80 188	16 854	np	—	np	184 111
Mining	388 950	56 121	1 008 769	109 355	2 151 155	6 914	111 808	np	np	3 838 721
Manufacturing	1 464 432	1 783 529	521 975	314 992	426 734	76 546	np	np	176 674	4 804 956
Electricity, Gas, Water and Waste Services	102 764	144 057	107 343	27 485	32 826	np	—	np	1 456	421 943
Construction	305 583	238 654	260 603	26 724	161 571	2 634	np	7 652	np	1 006 458
Wholesale Trade	406 371	145 575	73 226	39 946	39 824	987	np	np	12 555	720 927
Retail Trade	28 486	49 720	13 279	2 629	5 031	np	np	np	384	100 850
Accommodation and Food Services	2 115	np	8 826	np	843	np	np	—	np	15 571
Transport, Postal and Warehousing	66 200	121 798	42 731	np	24 162	np	np	np	np	292 169
Information Media and Telecommunications	324 842	194 909	19 266	8 006	12 324	np	—	np	1 083	566 503
Financial and Insurance Services	2 058 571	482 751	45 155	np	55 612	np	—	—	np	2 768 414
Rental, Hiring and Real Estate Services	48 375	51 071	8 820	np	6 043	np	—	—	320	119 688
Professional, Scientific and Technical Services	944 377	647 275	502 153	189 295	231 625	27 869	3 370	49 463	111 363	2 706 790
Administrative and Support Services	98 834	99 378	21 658	3 653	28 201	np	—	np	np	253 371
Public Administration and Safety	8 682	np	np	np	474	np	np	np	np	11 699
Education and Training	6 097	2 342	3 197	np	np	np	—	—	np	12 984
Health Care and Social Assistance	42 025	29 728	4 545	np	3 097	np	—	np	np	79 763
Arts and Recreation Services	2 711	31 807	np	np	np	—	—	np	np	40 978
Other Services	13 323	24 802	7 825	9 355	5 091	np	—	—	np	60 991
<b>Total(a)</b>	<b>6 345 582</b>	<b>4 119 228</b>	<b>2 679 011</b>	<b>842 556</b>	<b>3 265 326</b>	<b>145 066</b>	<b>149 414</b>	<b>87 034</b>	<b>373 670</b>	<b>18 006 887</b>

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(a) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Overseas	Total expenditure on R&D(a)
	%	%	%	%	%	%	%	%	%	%
2011–12										
Agriculture, Forestry and Fishing	18.4	10.1	17.5	np	34.0	10.5	6.7	—	np	100.0
Mining	8.6	1.5	21.7	5.5	59.2	np	2.5	np	*0.7	100.0
Manufacturing	28.8	37.2	11.6	7.7	7.8	1.7	np	np	4.5	100.0
Electricity, Gas, Water and Waste Services	17.2	28.7	30.6	10.1	10.1	np	—	np	0.2	100.0
Construction	26.2	15.7	26.4	5.7	25.3	0.3	np	0.3	np	100.0
Wholesale Trade	57.6	16.3	10.6	5.9	7.6	*1.1	np	np	0.9	100.0
Retail Trade	31.1	50.0	11.8	*3.5	*2.4	**0.2	np	np	*0.2	100.0
Accommodation and Food Services	31.6	np	np	np	7.2	np	np	—	np	100.0
Transport, Postal and Warehousing	19.2	46.1	16.0	6.9	9.2	np	np	np	np	100.0
Information Media and Telecommunications	51.9	39.8	*4.0	*2.9	np	np	—	np	np	100.0
Financial and Insurance Services	75.7	15.4	1.6	np	2.3	np	—	—	np	100.0
Rental, Hiring and Real Estate Services	52.9	28.5	9.3	2.3	5.9	np	—	np	np	100.0
Professional, Scientific and Technical Services	35.7	24.4	14.9	7.5	10.4	*0.9	*0.1	1.8	4.3	100.0
Administrative and Support Services	40.1	39.5	11.5	1.3	7.0	—	—	np	np	100.0
Public Administration and Safety	58.7	np	np	np	4.2	np	np	np	np	100.0
Education and Training	38.4	17.0	19.1	np	np	np	—	—	np	100.0
Health Care and Social Assistance	50.1	32.1	9.5	np	7.7	—	—	—	np	100.0
Arts and Recreation Services	20.2	61.9	10.1	np	np	—	—	np	np	100.0
Other Services	32.4	23.1	16.3	15.1	11.2	np	—	np	*1.6	100.0
<b>Total(a)</b>	<b>34.8</b>	<b>21.7</b>	<b>13.6</b>	<b>5.8</b>	<b>19.6</b>	<b>0.9</b>	<b>0.8</b>	<b>0.5</b>	<b>2.4</b>	<b>100.0</b>

2010–11 (b)										
Agriculture, Forestry and Fishing	17.8	6.9	14.4	4.2	43.6	9.2	np	—	np	100.0
Mining	10.1	1.5	26.3	2.8	56.0	0.2	2.9	np	np	100.0
Manufacturing	30.5	37.1	10.9	6.6	8.9	1.6	np	np	3.7	100.0
Electricity, Gas, Water and Waste Services	24.4	34.1	25.4	6.5	7.8	np	—	np	0.3	100.0
Construction	30.4	23.7	25.9	2.7	16.1	0.3	np	0.8	np	100.0
Wholesale Trade	56.4	20.2	10.2	5.5	5.5	0.1	np	np	1.7	100.0
Retail Trade	28.2	49.3	13.2	2.6	5.0	np	np	np	0.4	100.0
Accommodation and Food Services	13.6	np	56.7	np	5.4	np	np	—	np	100.0
Transport, Postal and Warehousing	22.7	41.7	14.6	np	8.3	np	np	np	np	100.0
Information Media and Telecommunications	57.3	34.4	3.4	1.4	2.2	np	—	np	0.2	100.0
Financial and Insurance Services	74.4	17.4	1.6	np	2.0	np	—	—	np	100.0
Rental, Hiring and Real Estate Services	40.4	42.7	7.4	np	5.0	np	—	—	0.3	100.0
Professional, Scientific and Technical Services	34.9	23.9	18.6	7.0	8.6	1.0	0.1	1.8	4.1	100.0
Administrative and Support Services	39.0	39.2	8.5	1.4	11.1	np	—	np	np	100.0
Public Administration and Safety	74.2	np	np	np	4.1	np	np	np	np	100.0
Education and Training	47.0	18.0	24.6	np	np	np	np	—	np	100.0
Health Care and Social Assistance	52.7	37.3	5.7	np	3.9	np	—	np	np	100.0
Arts and Recreation Services	6.6	77.6	np	np	np	—	—	np	np	100.0
Other Services	21.8	40.7	12.8	15.3	8.3	np	—	—	np	100.0
<b>Total(a)</b>	<b>35.2</b>	<b>22.9</b>	<b>14.9</b>	<b>4.7</b>	<b>18.1</b>	<b>0.8</b>	<b>0.8</b>	<b>0.5</b>	<b>2.1</b>	<b>100.0</b>

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## BUSINESS EXPENDITURE ON R&amp;D, by industry—by type of activity

	<i>Pure basic research</i>	<i>Strategic basic research</i>	<i>Applied research</i>	<i>Experimental development</i>	<i>Total expenditure on R&amp;D(a)</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
2011–12					
Agriculture, Forestry and Fishing	3 752	25 478	70 544	89 973	189 747
Mining	6 144	201 624	1 559 534	2 336 821	4 104 123
Manufacturing	32 267	292 212	1 286 286	2 863 125	4 473 890
Electricity, Gas, Water and Waste Services	815	34 406	143 870	199 041	378 133
Construction	7 629	20 058	254 138	537 704	819 529
Wholesale Trade	7 260	37 822	248 709	422 031	715 822
Retail Trade	*2 985	16 165	28 204	98 691	146 045
Accommodation and Food Services	np	np	3 752	16 905	21 451
Transport, Postal and Warehousing	1 607	9 426	109 533	172 284	292 850
Information Media and Telecommunications	*1 611	34 931	294 625	370 035	701 202
Financial and Insurance Services	6 381	31 697	530 908	2 416 228	2 985 215
Rental, Hiring and Real Estate Services	*2 617	9 359	25 398	54 712	92 086
Professional, Scientific and Technical Services	33 829	210 439	1 091 674	1 495 796	2 831 737
Administrative and Support Services	*3 213	23 285	85 692	196 478	308 668
Public Administration and Safety	750	1 290	5 445	8 321	15 807
Education and Training	141	1 723	5 162	7 922	14 948
Health Care and Social Assistance	5 389	10 952	39 357	38 725	94 424
Arts and Recreation Services	np	np	14 143	49 038	72 431
Other Services	2 850	6 136	25 494	28 735	63 215
<b>Total(a)</b>	<b>120 146</b>	<b>976 141</b>	<b>5 822 468</b>	<b>11 402 566</b>	<b>18 321 322</b>
2010–11 (b)					
Agriculture, Forestry and Fishing	1 773	16 975	89 925	75 438	184 111
Mining	11 997	140 174	1 526 109	2 160 441	3 838 721
Manufacturing	29 958	311 362	1 442 784	3 020 852	4 804 956
Electricity, Gas, Water and Waste Services	1 731	47 907	159 393	212 912	421 943
Construction	4 300	28 312	358 425	615 421	1 006 458
Wholesale Trade	4 904	36 530	235 352	444 141	720 927
Retail Trade	782	8 483	15 352	76 233	100 850
Accommodation and Food Services	np	np	2 784	11 272	15 571
Transport, Postal and Warehousing	497	15 345	67 544	208 783	292 169
Information Media and Telecommunications	2 165	36 819	210 325	317 194	566 503
Financial and Insurance Services	5 008	25 595	519 959	2 217 852	2 768 414
Rental, Hiring and Real Estate Services	2 866	8 338	30 399	78 085	119 688
Professional, Scientific and Technical Services	25 967	204 411	1 124 909	1 351 503	2 706 790
Administrative and Support Services	446	20 981	74 286	157 658	253 371
Public Administration and Safety	165	1 504	6 865	3 165	11 699
Education and Training	np	np	3 743	8 175	12 984
Health Care and Social Assistance	3 209	12 377	35 902	28 275	79 763
Arts and Recreation Services	np	np	6 719	30 238	40 978
Other Services	1 892	8 352	14 551	36 196	60 991
<b>Total(a)</b>	<b>98 419</b>	<b>929 308</b>	<b>5 925 326</b>	<b>11 053 834</b>	<b>18 006 887</b>

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(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

## BUSINESS EXPENDITURE ON R&amp;D, by industry—by type of activity: proportions

	<i>Pure basic research</i>	<i>Strategic basic research</i>	<i>Applied research</i>	<i>Experimental development</i>	<i>Total expenditure on R&amp;D(a)</i>
	%	%	%	%	%
2011–12					
Agriculture, Forestry and Fishing	2.0	13.4	37.2	47.4	100.0
Mining	0.1	4.9	38.0	56.9	100.0
Manufacturing	0.7	6.5	28.8	64.0	100.0
Electricity, Gas, Water and Waste Services	0.2	9.1	38.0	52.6	100.0
Construction	0.9	2.4	31.0	65.6	100.0
Wholesale Trade	1.0	5.3	34.7	59.0	100.0
Retail Trade	*2.0	11.1	19.3	67.6	100.0
Accommodation and Food Services	np	np	17.5	78.8	100.0
Transport, Postal and Warehousing	0.5	3.2	37.4	58.8	100.0
Information Media and Telecommunications	*0.2	5.0	42.0	52.8	100.0
Financial and Insurance Services	0.2	1.1	17.8	80.9	100.0
Rental, Hiring and Real Estate Services	*2.8	10.2	27.6	59.4	100.0
Professional, Scientific and Technical Services	1.2	7.4	38.6	52.8	100.0
Administrative and Support Services	*1.0	7.5	27.8	63.7	100.0
Public Administration and Safety	4.7	8.2	34.4	52.6	100.0
Education and Training	0.9	11.5	34.5	53.0	100.0
Health Care and Social Assistance	5.7	11.6	41.7	41.0	100.0
Arts and Recreation Services	np	np	19.5	67.7	100.0
Other Services	4.5	9.7	40.3	45.5	100.0
<b>Total(a)</b>	<b>0.7</b>	<b>5.3</b>	<b>31.8</b>	<b>62.2</b>	<b>100.0</b>

2010–11 (b)					
Agriculture, Forestry and Fishing	1.0	9.2	48.8	41.0	100.0
Mining	0.3	3.7	39.8	56.3	100.0
Manufacturing	0.6	6.5	30.0	62.9	100.0
Electricity, Gas, Water and Waste Services	0.4	11.4	37.8	50.5	100.0
Construction	0.4	2.8	35.6	61.1	100.0
Wholesale Trade	0.7	5.1	32.6	61.6	100.0
Retail Trade	0.8	8.4	15.2	75.6	100.0
Accommodation and Food Services	np	np	17.9	72.4	100.0
Transport, Postal and Warehousing	0.2	5.3	23.1	71.5	100.0
Information Media and Telecommunications	0.4	6.5	37.1	56.0	100.0
Financial and Insurance Services	0.2	0.9	18.8	80.1	100.0
Rental, Hiring and Real Estate Services	2.4	7.0	25.4	65.2	100.0
Professional, Scientific and Technical Services	1.0	7.6	41.6	49.9	100.0
Administrative and Support Services	0.2	8.3	29.3	62.2	100.0
Public Administration and Safety	1.4	12.9	58.7	27.1	100.0
Education and Training	np	np	28.8	63.0	100.0
Health Care and Social Assistance	4.0	15.5	45.0	35.4	100.0
Arts and Recreation Services	np	np	16.4	73.8	100.0
Other Services	3.1	13.7	23.9	59.3	100.0
<b>Total(a)</b>	<b>0.5</b>	<b>5.2</b>	<b>32.9</b>	<b>61.4</b>	<b>100.0</b>

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	EXPENDITURE ON R&D			PROPORTION OF TOTAL EXPENDITURE ON R&D		
	2009-10(a)	2010-11(a)	2011-12	2009-10(a)	2010-11(a)	2011-12
	\$'000	\$'000	\$'000	%	%	%
Mathematical Sciences	13 478	20 587	29 200	0.1	0.1	0.2
Physical Sciences	21 414	27 618	46 620	0.1	0.2	0.3
Chemical Sciences	250 242	275 030	425 941	1.5	1.5	2.3
Earth Sciences	153 063	200 390	122 476	0.9	1.1	0.7
Environmental Sciences	154 503	192 797	281 155	0.9	1.1	1.5
Biological Sciences	75 230	87 487	112 724	0.4	0.5	0.6
Agricultural and Veterinary Sciences	417 759	492 921	455 372	2.5	2.7	2.5
Information and Computing Sciences	4 760 255	5 001 174	5 496 165	28.4	27.8	30.0
Engineering	8 798 300	9 283 280	8 686 256	52.5	51.6	47.4
Technology	768 909	917 109	1 235 487	4.6	5.1	6.7
Medical and Health Sciences	920 658	928 398	941 159	5.5	5.2	5.1
Built Environment and Design	201 860	309 244	231 743	1.2	1.7	1.3
Education	19 369	15 301	13 760	0.1	0.1	0.1
Economics	8 006	10 990	12 114	—	0.1	0.1
Commerce, Management, Tourism and Services	99 316	152 605	144 273	0.6	0.8	0.8
Studies in Human Society	2 232	1 364	np	—	—	np
Psychology and Cognitive Sciences	1 780	2 162	*2 702	—	—	*—
Law and Legal Studies	4 204	1 803	1 179	—	—	—
Studies in Creative Arts and Writing	np	np	np	np	np	np
Language, Communication and Culture	np	np	**1 104	np	np	**—
History and Archaeology	np	np	—	np	np	—
<b>Total(b)</b>	<b>16 759 641</b>	<b>18 006 887</b>	<b>18 321 322</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

\* estimate has a relative standard error of 25% to 50% and should be used with caution

\*\* estimate has a relative standard error greater than 50% and is considered too unreliable for general use

— nil or rounded to zero (including null cells)

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

(a) Some 2009–10 and 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

(b) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

	EXPENDITURE ON R&D			PROPORTION OF TOTAL EXPENDITURE ON R&D		
	2009-10(a)	2010-11(a)	2011-12	2009-10(a)	2010-11(a)	2011-12
	\$'000	\$'000	\$'000	%	%	%
<b>Defence</b>	221 345	230 598	197 124	1.3	1.3	1.1
<b>Economic Development</b>						
Plant Production and Plant Primary Products	243 602	284 051	302 487	1.5	1.6	1.7
Animal Production and Animal Primary Products	156 239	209 140	165 619	0.9	1.2	0.9
Mineral Resources (Excl. Energy Resources)	1 874 788	2 212 644	2 742 403	11.2	12.3	15.0
Energy	2 715 914	2 569 125	2 361 179	16.2	14.3	12.9
Manufacturing	4 394 431	4 694 216	4 562 845	26.2	26.1	24.9
Construction	1 026 222	1 199 092	933 773	6.1	6.7	5.1
Transport	451 650	441 543	438 193	2.7	2.5	2.4
Information and Communication Services	1 621 017	1 862 925	1 835 591	9.7	10.3	10.0
Commercial Services and Tourism	3 282 243	3 402 509	3 809 373	19.6	18.9	20.8
Economic Framework	23 505	26 447	21 499	0.1	0.1	0.1
<i>Total(b)</i>	<i>15 789 611</i>	<i>16 901 693</i>	<i>17 172 962</i>	<i>94.2</i>	<i>93.9</i>	<i>93.7</i>
<b>Society</b>						
Health	434 310	500 463	563 605	2.6	2.8	3.1
Education and Training	44 697	45 537	57 031	0.3	0.3	0.3
Law, Politics and Community Services	13 585	39 294	56 377	0.1	0.2	0.3
Cultural Understanding	14 115	11 749	1 969	0.1	0.1	—
<i>Total(b)</i>	<i>506 707</i>	<i>597 043</i>	<i>678 982</i>	<i>3.0</i>	<i>3.3</i>	<i>3.7</i>
<b>Environment</b>	227 102	258 980	228 504	1.4	1.4	1.2
<b>Expanding Knowledge</b>	14 876	18 574	43 750	0.1	0.1	0.2
<b>Total(b)</b>	<b>16 759 641</b>	<b>18 006 887</b>	<b>18 321 322</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

— nil or rounded to zero (including null cells)

(a) Some 2009–10 and 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

(b) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

	HUMAN RESOURCES DEVOTED TO R&D			PROPORTION OF TOTAL HUMAN RESOURCES DEVOTED TO R&D		
	2009-10(a)	2010-11(a)	2011-12	2009-10(a)	2010-11(a)	2011-12
	PYE	PYE	PYE	%	%	%
<b>Employment size</b>						
0-4 persons	1 770	1 960	2 279	3.1	3.5	3.5
5-19 persons	7 254	7 804	7 933	12.5	13.8	12.2
20-199 persons	14 671	15 328	16 957	25.3	27.1	26.1
200 or more persons	34 242	31 419	37 737	59.1	55.6	58.1
<b>Type of resource</b>						
Researchers	29 509	27 990	32 439	50.9	49.5	50.0
Technicians	18 766	19 088	21 514	32.4	33.8	33.1
Other staff	9 661	9 433	10 953	16.7	16.7	16.9
<b>Total human resources devoted to R&amp;D<sup>(b)</sup></b>	<b>57 936</b>	<b>56 511</b>	<b>64 906</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

(a) Some 2009-10 and 2010-11 data have been revised. See the Revisions section of the Technical Note for details.

(b) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

	HUMAN RESOURCES DEVOTED TO R&D			PROPORTION OF TOTAL HUMAN RESOURCES DEVOTED TO R&D		
	2009-10(a)	2010-11(a)	2011-12	2009-10(a)	2010-11(a)	2011-12
	PYE	PYE	PYE	%	%	%
Agriculture, Forestry and Fishing	658	591	614	1.1	1.0	0.9
Mining	4 020	4 212	4 729	6.9	7.5	7.3
Manufacturing	17 462	18 436	18 196	30.1	32.6	28.0
Electricity, Gas, Water and Waste Services	756	825	848	1.3	1.5	1.3
Construction	2 175	2 504	2 475	3.8	4.4	3.8
Wholesale Trade	3 558	3 374	3 320	6.1	6.0	5.1
Retail Trade	475	451	632	0.8	0.8	1.0
Accommodation and Food Services	115	81	93	0.2	0.1	0.1
Transport, Postal and Warehousing	708	644	644	1.2	1.1	1.0
Information Media and Telecommunications	1 712	1 870	1 991	3.0	3.3	3.1
Financial and Insurance Services	9 556	5 937	12 404	16.5	10.5	19.1
Rental, Hiring and Real Estate Services	546	549	497	0.9	1.0	0.8
Professional, Scientific and Technical Services	14 379	14 906	15 686	24.8	26.4	24.2
Administrative and Support Services	696	968	1 397	1.2	1.7	2.2
Public Administration and Safety	52	76	75	0.1	0.1	0.1
Education and Training	101	96	109	0.2	0.2	0.2
Health Care and Social Assistance	447	432	503	0.8	0.8	0.8
Arts and Recreation Services	195	193	342	0.3	0.3	0.5
Other Services	325	366	351	0.6	0.6	0.5
<b>Total(b)</b>	<b>57 936</b>	<b>56 511</b>	<b>64 906</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

(a) Some 2009–10 and 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

(b) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

	0–4 persons	5–19 persons	20–199 persons	200 or more persons	Total human resources devoted to R&D(a)
	PYE	PYE	PYE	PYE	PYE
2011–12					
Agriculture, Forestry and Fishing	79	127	286	123	614
Mining	144	239	749	3 598	4 729
Manufacturing	255	1 441	5 329	11 171	18 196
Electricity, Gas, Water and Waste Services	19	63	108	658	848
Construction	*46	262	632	1 535	2 475
Wholesale Trade	*138	468	1 418	1 296	3 320
Retail Trade	66	176	213	177	632
Accommodation and Food Services	np	24	np	54	93
Transport, Postal and Warehousing	14	*46	131	454	644
Information Media and Telecommunications	*129	312	544	1 007	1 991
Financial and Insurance Services	*40	*155	442	11 767	12 404
Rental, Hiring and Real Estate Services	51	90	174	183	497
Professional, Scientific and Technical Services	1 107	4 059	6 296	4 225	15 686
Administrative and Support Services	62	135	234	965	1 397
Public Administration and Safety	7	56	np	np	75
Education and Training	np	39	51	np	109
Health Care and Social Assistance	40	132	109	222	503
Arts and Recreation Services	10	18	50	264	342
Other Services	53	93	180	25	351
<b>Total(a)</b>	<b>2 279</b>	<b>7 933</b>	<b>16 957</b>	<b>37 737</b>	<b>64 906</b>

2010–11 (b)					
Agriculture, Forestry and Fishing	46	115	273	157	591
Mining	54	190	472	3 496	4 212
Manufacturing	361	1 548	5 045	11 482	18 436
Electricity, Gas, Water and Waste Services	22	94	142	567	825
Construction	67	213	449	1 776	2 504
Wholesale Trade	98	528	1 229	1 519	3 374
Retail Trade	44	159	119	130	451
Accommodation and Food Services	7	16	np	np	81
Transport, Postal and Warehousing	3	50	113	479	644
Information Media and Telecommunications	59	273	463	1 075	1 870
Financial and Insurance Services	73	195	318	5 351	5 937
Rental, Hiring and Real Estate Services	30	97	166	256	549
Professional, Scientific and Technical Services	984	3 973	5 740	4 210	14 906
Administrative and Support Services	20	134	359	454	968
Public Administration and Safety	9	12	np	np	76
Education and Training	22	30	44	—	96
Health Care and Social Assistance	26	81	73	251	432
Arts and Recreation Services	10	8	37	138	193
Other Services	26	88	237	16	366
<b>Total(a)</b>	<b>1 960</b>	<b>7 804</b>	<b>15 328</b>	<b>31 419</b>	<b>56 511</b>

\* estimate has a relative standard error of 25% to 50% and should be used with caution

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(a) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

	0–4 persons	5–19 persons	20–199 persons	200 or more persons	Total human resources devoted to R&D(a)
	%	%	%	%	%
2011–12					
Agriculture, Forestry and Fishing	12.9	20.6	46.5	20.0	100.0
Mining	3.0	5.1	15.8	76.1	100.0
Manufacturing	1.4	7.9	29.3	61.4	100.0
Electricity, Gas, Water and Waste Services	2.2	7.5	12.8	77.6	100.0
Construction	*1.8	10.6	25.5	62.0	100.0
Wholesale Trade	*4.2	14.1	42.7	39.0	100.0
Retail Trade	10.4	27.9	33.7	28.0	100.0
Accommodation and Food Services	np	26.3	np	58.1	100.0
Transport, Postal and Warehousing	2.2	*7.1	20.3	70.4	100.0
Information Media and Telecommunications	*6.5	15.6	27.3	50.6	100.0
Financial and Insurance Services	*0.3	*1.2	3.6	94.9	100.0
Rental, Hiring and Real Estate Services	*10.2	18.0	34.9	36.8	100.0
Professional, Scientific and Technical Services	7.1	25.9	40.1	26.9	100.0
Administrative and Support Services	4.5	9.7	16.8	69.1	100.0
Public Administration and Safety	8.9	74.1	np	np	100.0
Education and Training	np	35.5	47.2	np	100.0
Health Care and Social Assistance	8.0	26.3	21.6	44.2	100.0
Arts and Recreation Services	2.9	5.4	14.5	77.2	100.0
Other Services	15.0	26.6	51.3	7.1	100.0
<b>Total(a)</b>	<b>3.5</b>	<b>12.2</b>	<b>26.1</b>	<b>58.1</b>	<b>100.0</b>

	2010–11 (b)				
Agriculture, Forestry and Fishing	7.7	19.5	46.2	26.6	100.0
Mining	1.3	4.5	11.2	83.0	100.0
Manufacturing	2.0	8.4	27.4	62.3	100.0
Electricity, Gas, Water and Waste Services	2.7	11.4	17.2	68.7	100.0
Construction	2.7	8.5	17.9	70.9	100.0
Wholesale Trade	2.9	15.7	36.4	45.0	100.0
Retail Trade	9.7	35.1	26.3	28.9	100.0
Accommodation and Food Services	8.2	19.9	np	np	100.0
Transport, Postal and Warehousing	0.5	7.7	17.5	74.3	100.0
Information Media and Telecommunications	3.1	14.6	24.8	57.5	100.0
Financial and Insurance Services	1.2	3.3	5.4	90.1	100.0
Rental, Hiring and Real Estate Services	5.4	17.6	30.2	46.7	100.0
Professional, Scientific and Technical Services	6.6	26.7	38.5	28.2	100.0
Administrative and Support Services	2.1	13.9	37.1	46.9	100.0
Public Administration and Safety	11.2	16.1	np	np	100.0
Education and Training	22.8	31.4	45.8	—	100.0
Health Care and Social Assistance	6.1	18.8	16.8	58.2	100.0
Arts and Recreation Services	5.2	3.9	19.4	71.5	100.0
Other Services	7.0	24.1	64.7	4.2	100.0
<b>Total(a)</b>	<b>3.5</b>	<b>13.8</b>	<b>27.1</b>	<b>55.6</b>	<b>100.0</b>

\* estimate has a relative standard error of 25% to 50% and should be used with caution

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(a) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

	Researchers	Technicians	Other staff	Total human resources devoted to R&D (a)
	PYE	PYE	PYE	PYE
2011–12				
Agriculture, Forestry and Fishing	186	239	189	614
Mining	1 500	2 128	1 101	4 729
Manufacturing	8 246	6 476	3 474	18 196
Electricity, Gas, Water and Waste Services	229	380	238	848
Construction	1 205	775	495	2 475
Wholesale Trade	1 482	1 110	727	3 320
Retail Trade	310	203	119	632
Accommodation and Food Services	58	21	14	93
Transport, Postal and Warehousing	253	321	70	644
Information Media and Telecommunications	1 264	508	220	1 991
Financial and Insurance Services	7 148	3 402	1 854	12 404
Rental, Hiring and Real Estate Services	289	157	52	497
Professional, Scientific and Technical Services	8 857	4 978	1 851	15 686
Administrative and Support Services	818	340	239	1 397
Public Administration and Safety	40	22	13	75
Education and Training	56	36	16	109
Health Care and Social Assistance	232	198	73	503
Arts and Recreation Services	99	103	140	342
Other Services	166	116	68	351
<b>Total(a)</b>	<b>32 439</b>	<b>21 514</b>	<b>10 953</b>	<b>64 906</b>

2010–11 (b)				
Agriculture, Forestry and Fishing	160	250	180	591
Mining	1 384	1 910	918	4 212
Manufacturing	8 839	6 185	3 412	18 436
Electricity, Gas, Water and Waste Services	285	334	206	825
Construction	1 252	761	491	2 504
Wholesale Trade	1 568	1 173	632	3 374
Retail Trade	195	193	63	451
Accommodation and Food Services	41	21	20	81
Transport, Postal and Warehousing	311	261	72	644
Information Media and Telecommunications	1 061	659	150	1 870
Financial and Insurance Services	2 976	1 560	1 400	5 937
Rental, Hiring and Real Estate Services	238	131	180	549
Professional, Scientific and Technical Services	8 587	4 881	1 439	14 906
Administrative and Support Services	534	319	115	968
Public Administration and Safety	33	32	11	76
Education and Training	40	44	12	96
Health Care and Social Assistance	195	196	40	432
Arts and Recreation Services	81	65	47	193
Other Services	210	112	44	366
<b>Total(a)</b>	<b>27 990</b>	<b>19 088</b>	<b>9 433</b>	<b>56 511</b>

(a) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

	Researchers	Technicians	Other staff	Total human resources devoted to R&D(a)
	%	%	%	%
2011–12				
Agriculture, Forestry and Fishing	30.3	38.9	30.8	100.0
Mining	31.7	45.0	23.3	100.0
Manufacturing	45.3	35.6	19.1	100.0
Electricity, Gas, Water and Waste Services	27.1	44.8	28.1	100.0
Construction	48.7	31.3	20.0	100.0
Wholesale Trade	44.7	33.4	21.9	100.0
Retail Trade	49.1	32.2	18.8	100.0
Accommodation and Food Services	62.4	22.5	15.1	100.0
Transport, Postal and Warehousing	39.3	49.8	10.9	100.0
Information Media and Telecommunications	63.5	25.5	11.0	100.0
Financial and Insurance Services	57.6	27.4	14.9	100.0
Rental, Hiring and Real Estate Services	58.1	31.5	10.4	100.0
Professional, Scientific and Technical Services	56.5	31.7	11.8	100.0
Administrative and Support Services	58.5	24.4	17.1	100.0
Public Administration and Safety	53.4	29.9	16.7	100.0
Education and Training	51.6	33.5	15.0	100.0
Health Care and Social Assistance	46.1	39.3	14.6	100.0
Arts and Recreation Services	28.9	30.2	41.0	100.0
Other Services	47.4	33.1	19.5	100.0
<b>Total(a)</b>	<b>50.0</b>	<b>33.1</b>	<b>16.9</b>	<b>100.0</b>

	Researchers	Technicians	Other staff	Total human resources devoted to R&D(a)
	%	%	%	%
2010–11 (b)				
Agriculture, Forestry and Fishing	27.1	42.4	30.5	100.0
Mining	32.9	45.4	21.8	100.0
Manufacturing	47.9	33.5	18.5	100.0
Electricity, Gas, Water and Waste Services	34.6	40.5	24.9	100.0
Construction	50.0	30.4	19.6	100.0
Wholesale Trade	46.5	34.8	18.7	100.0
Retail Trade	43.1	42.9	14.0	100.0
Accommodation and Food Services	49.9	25.2	24.8	100.0
Transport, Postal and Warehousing	48.3	40.5	11.2	100.0
Information Media and Telecommunications	56.7	35.2	8.0	100.0
Financial and Insurance Services	50.1	26.3	23.6	100.0
Rental, Hiring and Real Estate Services	43.4	23.8	32.8	100.0
Professional, Scientific and Technical Services	57.6	32.7	9.7	100.0
Administrative and Support Services	55.2	32.9	11.9	100.0
Public Administration and Safety	43.3	41.9	14.8	100.0
Education and Training	42.0	45.6	12.4	100.0
Health Care and Social Assistance	45.2	45.5	9.3	100.0
Arts and Recreation Services	42.0	33.5	24.5	100.0
Other Services	57.3	30.7	11.9	100.0
<b>Total(a)</b>	<b>49.5</b>	<b>33.8</b>	<b>16.7</b>	<b>100.0</b>

(a) Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

(b) Some 2010–11 data have been revised. See the Revisions section of the Technical Note for details.

## EXPLANATORY NOTES

### INTRODUCTION

**1** The statistics presented in this release have been compiled from data collected from businesses in the *Survey of Research and Experimental Development (R&D), Businesses* for 2011–12.

**2** The survey was conducted by the Australian Bureau of Statistics (ABS) via mail questionnaire and achieved a response rate of 95%.

### REFERENCE PERIOD

**3** The period covered by the survey is, in general, the 12 months ended 30 June. Where businesses were unable to supply information on this basis, an accounting period for which data could be provided was used. Such businesses make a substantial contribution to some of the estimates presented in this release. As a result, some estimates may reflect economic conditions that existed in periods outside the 12 months ended June in the relevant year.

### 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'.

**5** For a more comprehensive interpretation of the definition of R&D, see the *Australian and New Zealand Standard Research Classification (ANZSRC), 2008* (cat. no. 1297.0) or refer to the OECD publication *The Measurement of Scientific and Technological Activities: Proposed Standard Practice for Surveys of Research and Experimental Development - Frascati Manual 2002*.

**6** Data providers report and self-classify R&D survey information based on their interpretation of OECD and ABS definitions and classifications. The ABS makes every effort to ensure correct and consistent interpretation and reporting of these data by applying consistent processing methodologies. See also the Non-Sampling Error and Revisions sections of the Technical Note.

### FRAME

**7** The source of the frame for the *Survey of R&D, Businesses* is the ABS Business Register (ABSBR). The ABSBR records information about statistical units and is used to create the frames for most ABS economic collections.

*Statistical units defined on the ABSBR*

**8** Statistical units are those entities from which statistics are collected, or about which statistics are compiled. In ABS economic statistics, the statistical unit is generally the business.

**9** The ABS uses an economic statistics units model on the ABSBR to describe the characteristics of businesses, and the structural relationships between related businesses. Within large, complex and diverse businesses, the units model is also used to define reporting units that can provide data to the ABS at suitable levels of detail.

**10** The units model allocates businesses to one of two sub-populations. The vast majority of businesses are in what is called the Australian Taxation Office (ATO) Maintained Population (ATOMP), while the remaining businesses are in the ABS Maintained Population (ABSMP). Together these two sub-populations make up the ABSBR population.

**11** Most businesses and organisations in Australia need to obtain an Australian Business Number (ABN) and are then included on the whole-of-government register of businesses, the Australian Business Register (ABR), which is maintained by the ATO. Most of these businesses have simple structures; therefore, the unit registered for an ABN will satisfy ABS statistical requirements. For these businesses, the ABS has aligned its statistical units structure with the ABN unit. The businesses with simple structures constitute the ATOMP, and the ABN unit is used as the statistical unit for ABS economic collections.

## EXPLANATORY NOTES *continued*

Statistical units defined on the ABSBR *continued*

**12** For the population of businesses where the ABN is not suitable for ABS statistical requirements, the ABS maintains its own units structure through direct contact with each business. These businesses constitute the ABSMP. This population consists typically of large, complex and diverse businesses. For businesses in the ABSMP, statistical units comprise the Enterprise Group, the Enterprise and the Type of Activity Unit (TAU). The range of activities across the Enterprise Group can be very diverse. The TAU represents a grouping of one or more business entities within the Enterprise that cover all of the operations within an industry subdivision and for which a basic set of financial production and employment data can be reported.

**13** The current economic statistics units model was introduced into the ABS in mid 2002, to better use the information available as a result of The New Tax System (TNTS). For more information please refer to the *Information Paper: Improvements in ABS Economic Statistics [Arising from The New Tax System], 2002* (cat. no. 1372.0).

**14** Statistical units for the *Survey of R&D, Businesses* consist of ABN units for the ATOMP and TAUs from the ABSMP, except for a small number of cases where unit splitting occurs.

Unit splitting

**15** In cases where a TAU is deemed to have significant activities applying to more than one industry subdivision, the TAU is split for statistical purposes and the 'TAU splits' become the statistical units. TAU splits were implemented in the R&D survey for the first time in the 2005–06 cycle, and were applied for previous cycles according to the revision rules outlined in the Technical Note.

SCOPE AND COVERAGE

**16** The *Survey of R&D, Businesses* is a stratified random sample survey of businesses within the Australian business sector (i.e. all businesses and the private non-profit institutions mainly serving them) with intramural expenditure on R&D of \$100,000 or more during the reference period.

**17** Intramural expenditure is defined as expenditure for R&D performed by the statistical unit regardless of the source of funds. Expenditures made outside the statistical unit but in support of intramural R&D are included; for example, payments for analytical work, engineering or specialised services which form part of an R&D project performed by the statistical unit. R&D funded by the statistical unit but performed wholly by another on their behalf (extramural R&D) is excluded. R&D performed overseas by Australian businesses is included. For further information, refer to the OECD *Frascati Manual 2002*.

**18** The ABS identifies businesses for inclusion in the survey if the business:

- reported expenditure on R&D in previous surveys;
- applied for an AusIndustry administered R&D Tax Concession and/or grant for industry R&D;
- were identified through other sources such as newspapers, journals, research compendia, etc. as likely to have expenditure on R&D.

Changes to survey scope

**19** Prior to the 2005–06 cycle, the *Survey of R&D, Businesses* included all Australian businesses performing R&D (regardless of the expenditure value) with the exception of businesses mainly engaged in agriculture, forestry and fishing activities. From 2005–06, the survey scope was adjusted to:

- include businesses classified to Division A (Agriculture, forestry and fishing) of the Australian and New Zealand Standard Industrial Classification (ANZSIC); and
- exclude businesses with expenditure on R&D of less than \$100,000 in the reference period (i.e. introduction of an expenditure based scope cut-off).

**20** Strong growth in the number of businesses performing R&D and the inclusion of Division A resulted in the implementation of the scope cut-off. This approach was taken to enable continued release of detailed R&D statistics within available resources.

## EXPLANATORY NOTES *continued*

*Changes to survey scope  
continued*

**21** The impact of the two scope changes on key survey estimates was relatively minor due to the changes largely 'offsetting' each other; as such, estimates for previous reference periods were not recalculated (or backcast) based on the new scope.

**22** It is estimated the scope cut-off has resulted in total business expenditure on R&D being understated by less than 1%. Users should, however, exercise caution when comparing estimates for businesses with 0–4 employees prior to 2005–06, as the majority of units with expenditure below \$100,000 fell into this employment size range. Most affected were estimates for human resources devoted to R&D.

INDUSTRY CLASSIFICATION

**23** 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).

**24** Each ABN unit/TAU is classified by the ABS to the industry in which it mainly operates. For the purposes of the *Survey of R&D, Businesses*, in accordance with standards set out in the *OECD Frascati Manual 2002*, for cases where an Enterprise Group sets up a dedicated research unit, that unit is classified to the predominant industry of the group rather than to Scientific research services (ANZSIC 6910).

EMPLOYMENT SIZE

**25** For output purposes, businesses are classified to employment size groups based on data reported in the survey. Businesses were asked to report the number of persons working for the business during the last pay period in June 2012.

LOCATION OF EXPENDITURE

**26** Location of expenditure relates to the region(s) in which the business reported having performed R&D during the reference period. This may not be the head office location of the business.

AUSTRALIAN AND NEW  
ZEALAND STANDARD  
RESEARCH CLASSIFICATION  
(ANZSRC)

**27** Type of activity, fields of research and socio-economic objective 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).

**28** Some businesses may have experienced difficulty in classifying their R&D projects to type of activity, fields of research and socio-economic objective. See also the Non-Sampling Error and Revisions sections of the Technical Note.

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

**29** 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 and have been revised from those used to calculate ratios in previous issues.

### GROSS DOMESTIC PRODUCT, current prices

	2007–08	2008–09	2009–10	2010–11	2011–12
	\$m	\$m	\$m	\$m	\$m
Gross Domestic Product	1 175 321	1 254 293	1 292 315	1 403 888	1 474 628

Source: *Australian National Accounts: National Income, Expenditure and Product, March 2012* (cat. no. 5206.0), released 5 June 2013.

## EXPLANATORY NOTES *continued*

### GROSS DOMESTIC PRODUCT (GDP) AND GROSS STATE PRODUCT (GSP) *continued*

### GROSS STATE PRODUCT, CURRENT PRICES

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT
	\$m	\$m	\$m	\$m	\$m	\$m	\$m	\$m
2011–12	455 275	328 595	283 604	91 928	238 870	24 175	18 583	32 197
2010–11	435 547	315 571	269 880	89 322	221 574	24 218	17 322	30 455

Source: *Australian National Accounts: State Accounts, 2011–12* (cat. no. 5220.0), released 21 November 2012.

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

### CHAIN VOLUME MEASURES

**31** The chain volume measures appearing in this release are annually reweighted chain Laspeyres indexes referenced to the current price values in a chosen reference year (currently 2011–12). They can be thought of as current price values re-expressed in (i.e. based on) the prices of the previous year and linked together to form continuous time series. They are formed in a multi-stage process of which the major steps are described in Section 15 of the *Information Paper: Australian National Accounts, Introduction of Chain Volume Measures and Price Indexes* (cat. no. 5248.0).

#### R&D deflators

**32** With the implementation of 2008 SNA, deflators used to calculate the chain volume measure of expenditure on R&D were revised to better capture changes in the unit value of labour used in the production of R&D services, and to increase and refine the number of products included in the deflators. The revised deflators have been used for Business R&D statistics from the 2007–08 survey cycle.

### UPCOMING RELEASES

**33** Upcoming releases of R&D statistics include:  
*Research and Experimental Development, Higher Education Organisations, Australia, 2012* (cat. no. 8111.0), scheduled for release in May 2014  
*Research and Experimental Development, Government and Private Non-Profit Organisations, Australia, 2011–12* (cat. no. 8109.0), scheduled for release in July 2014

### OTHER RELATED RELEASES

**34** Users may also wish to refer to the following releases:  
*Australian and New Zealand Standard Research Classification (ANZSRC), 2008* (cat.no. 1297.0)  
*Innovation in Australian Business, 2010–11* (cat. no. 8158.0)  
*Microdata: Business Longitudinal Database, Australia, 2006–07 to 2010–11* (cat.no. 8168.0.55.001)  
*Research and Experimental Development, All Sector Summary, Australia, 2008–09* (cat. no. 8112.0)  
*Research and Experimental Development, Government and Private Non-Profit Organisations, Australia, 2011–12* (cat. no. 8109.0)  
*Research and Experimental Development, Higher Education Organisations, Australia, 2010* (cat. no. 8111.0)  
*Selected Characteristics of Australian Business, 2010–11* (cat. no. 8167.0)  
*Summary of IT Use and Innovation in Australian Businesses, 2011–12* (cat. no. 8166.0)

## EXPLANATORY NOTES *continued*

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### OTHER RELATED RELEASES

*continued*

**35** Relevant OECD publications include:

*Main Science and Technology Indicators 2013/1*

*The Measurement of Scientific and Technological Activities: Proposed Standard*

*Practice for Surveys of Research and Experimental Development - Frascati*

*Manual 2002*

### ABS WEBSITE

**36** 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](http://www.abs.gov.au). See the Innovation, Science and Technology theme page under Topics @ a Glance/Industry.

### ROUNDING

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

## APPENDIX SURVEY CHANGES

### CHANGE FROM CENSUS TO SAMPLE SURVEY

The *Survey of R&D, Businesses* had shown a steady increase in the number of businesses each year undertaking research and experimental development. The cost of collecting data from the additional units each year, along with the additional burden on providers, is unsustainable. As part of a review of the suite of R&D surveys, the decision was made to change the *Survey of R&D, Businesses* from a reduced scope coverage census to a sampled survey. This means that rather than contact all businesses who undertake R&D with intramural expenditure of \$100,000 or more, data was collected from a sample of these businesses. The 2011–12 survey was based on a random sample of approximately 4,000 businesses which was stratified by industry and expenditure on R&D. Businesses with expected expenditure below \$100,000 have been excluded from the sample. Due to the nature of R&D activity, some industries have been completely enumerated, that is, all businesses have been included for these industries.

The change of the collection from a census to a sample will have some impact on the estimates.

#### *Sampling error*

The move to a survey introduces sampling error. Sampling error results from differences in estimates from those that would be produced if a census had been undertaken. For this publication, sampling variability is measured by the relative standard error (RSE). Please see the Sampling Error section of the Technical Note for more information.

#### *Estimates by industry (ANZSIC 2006)*

The level of detail that will be available for industry, as collected using the Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 will be affected. This may particularly be the case for special data requests. Information below the subdivision level (2 digit), and in some cases, division level, may not be available. This may be caused by limited information being collected at these levels making the estimates unreliable, or application of ABS confidentiality provisions to the data.

#### *Estimates by classification of R&D (ANZSRC 2008)*

The level of detail collected using the Australian and New Zealand Standard Research Classification (ANZSRC), 2008 for fields of research and socio-economic objective will also be affected. Outputs from 2011–12 are available at the division level (2 digit) where in the past they have been available at the group level (4 digit).

## 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.

**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 businesses provided estimates due to a lack of separately recorded data on R&D activity.
- Some businesses may not have reported data as per the definition of R&D used in this survey. This is potentially a result of slight differences in the survey definition of R&D and those used in industry R&D schemes for the allocation of grants, and the AusIndustry administered R&D Tax Concession scheme for tax deductibility for specific R&D activities.
- Data were self-classified by businesses to type of activity, fields of research and socio-economic objective at the time of reporting. Some businesses 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 businesses and reference periods.

### SAMPLING ERROR

**4** As the estimates in this publication are based on information relating to a sample of businesses, they are subject to sampling variability, that is, they may differ from the estimates that would have been produced if the information had been obtained from all businesses.

**5** The difference between estimates obtained from a sample of businesses, and the estimates that would have been produced if the information had been obtained from all businesses, is called sampling error. This should not be confused with inaccuracy that may occur because of imperfections in reporting by respondents or in processing by the ABS. Please see the section on Non-Sampling Error for more detail regarding these types of errors. The expected magnitude of the sampling error associated with any estimate can be estimated from the sample results. One measure of sampling error is given by the standard error (SE), which indicates the degree to which an estimate may vary from the value that would have been obtained from a full enumeration (the 'true' figure). There are about two chances in three that a sample estimate differs from the true value by less than one standard error, and about nineteen chances in twenty that the difference will be less than two standard errors.

**6** An example of the use of a standard error is as follows. From the publication, the estimated total expenditure on R&D was \$18,321,322, with a standard error of \$333,448. There would be about two chances in three that a full enumeration would have given an estimate in the range \$17,987,874 to \$18,654,770 and about nineteen chances in twenty that it would be in the range \$17,654,426 to \$18,988,218.

**7** In this publication, indications of sampling variability are measured by relative standard errors (RSEs). The relative standard error is a useful measure in that it provides an immediate indication of the percentage errors likely to have occurred due to sampling, and thus avoids the need to refer to the size of the estimate. RSEs are obtained using the formula:  $RSE = SE/estimate \times 100$ . RSEs are shown in the Relative Standard

## TECHNICAL NOTE DATA QUALITY *continued*

### SAMPLING ERROR *continued*

Error tables in this section. RSEs for all data included in this release (including data cube content) are available upon request.

**8** Estimates with RSEs between 25% and 50% are annotated to indicate they are subject to high sample variability and should be used with caution. In addition, estimates with RSEs greater than 50% have been included and annotated to indicate they are considered too unreliable for general use. In the publication, the symbol '\*' indicates an estimate has an RSE of between 25% and 50%, and estimates with the symbol '\*\*' have an RSE greater than 50%. All cells in the data cubes with RSEs greater than 25% contain a comment indicating the size of the RSE. These cells can be identified by a red indicator in the corner of the cell. The comment appears when the mouse pointer hovers over the cell.

### RELATIVE STANDARD ERROR, Business expenditure on R&D—Summary statistics, 2011—12

	2011-12
	%
Employment size	
0—4 persons	6.78
5—19 persons	3.51
20—199 persons	3.49
200 or more persons	2.30
Type of expenditure	
Capital expenditure	
Land, buildings and other structures	4.14
Other capital expenditure	5.44
<i>Total capital expenditure</i>	4.68
Current expenditure	
Labour costs	2.83
Other current expenditure	1.28
<i>Total current expenditure</i>	1.79
Source of funds	
Own funds	1.90
Other business	4.52
Commonwealth government	3.74
State and local government	3.16
Other Australian(a)	4.97
Overseas	11.90
Location of expenditure(b)	
New South Wales	3.64
Victoria	1.20
Queensland	1.79
South Australia	3.45
Western Australia	3.63
Tasmania	6.84
Northern Territory	5.58
Australian Capital Territory	11.96
Overseas	5.46
Type of activity	
Pure basic research	4.15
Strategic basic research	2.18
Applied research	2.29
Experimental development	2.30
<b>Total expenditure on R&amp;D</b>	<b>1.82</b>

- (a) Includes funding from Joint business/government, Higher education and Private non-profit organisations.
- (b) For the definition of location, see Explanatory Note 26.

## TECHNICAL NOTE DATA QUALITY *continued*

SAMPLING ERROR *continued*

RELATIVE STANDARD ERROR, Business expenditure on R&D—by industry, 2011–12

	2011-12
	%
Agriculture, Forestry and Fishing	2.19
Mining	3.34
Manufacturing	0.91
Electricity, Gas, Water and Waste Services	0.21
Construction	2.22
Wholesale Trade	3.17
Retail Trade	3.98
Accommodation and Food Services	—
Transport, Postal and Warehousing	1.02
Information Media and Telecommunications	2.41
Financial and Insurance Services	8.87
Rental, Hiring and Real Estate Services	4.39
Professional, Scientific and Technical Services	1.84
Administrative and Support Services	1.55
Public Administration and Safety	0.99
Education and Training	—
Health Care and Social Assistance	1.27
Arts and Recreation Services	9.13
Other Services	4.02
<b>Total</b>	<b>1.82</b>

— nil or rounded to zero (including null cells)

COMPARABILITY OF ESTIMATES OVER TIME

**9** The comparability of estimates over time may be affected by the following changes in classifications:

- Employment size classification groups are defined on data reported in the reference period, and as such businesses may be categorised to different employment size groups across different reference periods.
- Businesses can also be classified to different industry divisions across survey reference periods as a consequence of structural change. See paragraphs 23 and 24 of the Explanatory Notes for more information.

REVISIONS

**10** Revisions to previous cycle data occur on discovery of:

- errors in reported data, typically a result of the specific non-sampling errors outlined in the Non-Sampling Error section above; and
- newly identified R&D performers who indicated they had significant levels of R&D in earlier years (details are collected and used to revise previously released estimates).

**11** Revisions are applied up to two cycles prior to the current cycle, but only where the impact on:

- R&D expenditure is equal to \$5 million or more;
- Human resources devoted to R&D is equal to 25 PYE or more; or
- Published level data is of proportional significance.

**12** In processing 2011–12 data, revisions were applied to 2009–10 and 2010–11 estimates. Revisions must be taken into consideration when interpreting results, particularly when comparing estimates over time.

## GLOSSARY

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<b>Applied research</b>	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.
<b>Capital expenditure</b>	Expenditure on the acquisition of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment which is attributable to R&D activity.
<b>Commonwealth government funds</b>	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.
<b>Current expenditure</b>	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.
<b>Employees</b>	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.
<b>Experimental development</b>	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.
<b>Fields of research (FOR)</b>	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.
<b>Human resources devoted to R&amp;D</b>	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.
<b>Joint business/government funds</b>	As a source of R&D funding, this includes R&D funding raised via industry levies.
<b>Labour costs</b>	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.
<b>Location</b>	The region(s) in which the business performed the R&D. This may not be the head office location of the business.
<b>Other business funds</b>	As a source of R&D funding, this includes payments for R&D projects carried out on contract for other businesses located in Australia. Transfers from related entities are only included if they specifically relate to R&D being undertaken (by the reporting business) on behalf of the related entity.
<b>Other current expenditure</b>	All other non-staff expenditures including: 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 business; commission and consultant expenses for research projects carried out by the business (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.

## GLOSSARY *continued*

<b>Other staff</b>	Skilled and unskilled craftspersons, secretarial and clerical staff directly associated with R&D activity.
<b>Overseas funds</b>	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 business) on behalf of the related entity.
<b>Overseas location</b>	Includes R&D performed overseas, but controlled by the Australian business. 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 business.
<b>Own funds</b>	Includes all funding for R&D sourced from the business itself, including: equity; borrowings; retained earnings; and non-R&D specific transfers from related entities.
<b>Person years of effort</b>	One person year of effort is equal to a full-time employee whose time is wholly devoted to R&D for a whole year.
<b>Pure basic research</b>	Experimental and theoretical work undertaken to acquire new knowledge without looking for long term benefits other than the advancement of knowledge.
<b>R&amp;D activity</b>	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.
<b>Researchers</b>	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.
<b>Socio-economic objective (SEO)</b>	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.
<b>State and local government funds</b>	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.
<b>Strategic basic research</b>	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.
<b>Technicians</b>	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.
<b>Type of activity</b>	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.

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