



2008

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# RESEARCH AND EXPERIMENTAL DEVELOPMENT

AUSTRALIA

## HIGHER EDUCATION ORGANISATIONS

EMBARGO: 11.30AM (CANBERRA TIME) WED 26 MAY 2010

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### INQUIRIES

For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070 or Fiona Manson on Perth (08) 9360 5213.

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## NOTES

### INTRODUCTION

This release presents statistics on Research and Experimental Development (R&D) undertaken by Australian higher education institutions in respect of the calendar year ended 31 December 2008. These statistics, as well as time series data, are also available in spreadsheet format (data cubes); see the Downloads page for this issue (cat. no. 8111.0) on the ABS website <[www.abs.gov.au](http://www.abs.gov.au)>.

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

### CHANGES IN THIS ISSUE

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

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

### DATA QUALITY

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

Users are also advised to exercise caution if comparing estimates over time. Factors impacting comparability of estimates include:

- improved record keeping by higher education institutions in 2008;
- changes in the research classification used; and
- revisions to 2006 estimates.

Refer to the Revisions and Comparability of Estimates Over Time sections of the Technical Note for further details.

### ACKNOWLEDGEMENT

The ABS acknowledges the continued effort and contribution of higher education institutions in providing data for the compilation of statistics presented in this and previous issues.

Brian Pink  
Australian Statistician

## ABBREVIATIONS

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<b>\$'000</b>	thousand dollars
<b>\$m</b>	million dollars
<b>ABS</b>	Australian Bureau of Statistics
<b>ACT</b>	Australian Capital Territory
<b>ANZSRC</b>	Australian and New Zealand Standard Research Classification
<b>ASRC</b>	Australian Standard Research Classification
<b>Aust.</b>	Australia
<b>excl.</b>	excluding
<b>FOR</b>	Fields of Research
<b>GDP</b>	gross domestic product
<b>GSP</b>	gross state product
<b>HERD</b>	higher education expenditure on R&D
<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>Vic.</b>	Victoria
<b>WA</b>	Western Australia

## MAIN FEATURES

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

During the 2008 calendar year, expenditure on R&D by Australian higher education institutions was \$6,717 million. Over the same period, human resources devoted to R&D by these institutions represented 61,310 person years of effort (PYE).

### HIGHER EDUCATION RESOURCES DEVOTED TO R&D

		1998	2000	2002	2004	2006	2008
Expenditure on R&D							
Current prices	\$m	2 555	2 790	3 430	4 327	r5 434	6 717
Chain volume measures(a)	\$m	3 433	3 626	4 177	4 901	5 709	6 717
Human resources devoted to R&D	PYE	45 502	46 287	49 612	55 204	r58 905	61 310

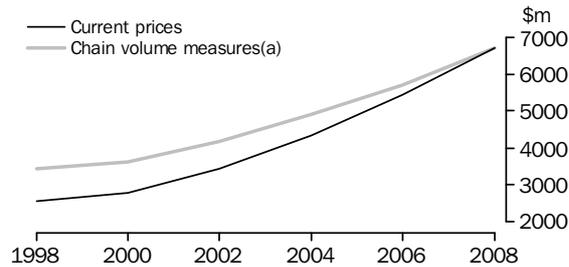
r revised

(a) The reference year for chain volume measures is 2008. See Explanatory Notes 18 and 19 for details.

### EXPENDITURE ON R&D

In 2008, higher education expenditure on R&D (HERD) showed an increase of 24% in current price terms over 2006 and 18% in chain volume terms. This compares to average increases of 21% and 14% respectively, since the 1998 reference period.

### HIGHER EDUCATION EXPENDITURE ON R&D



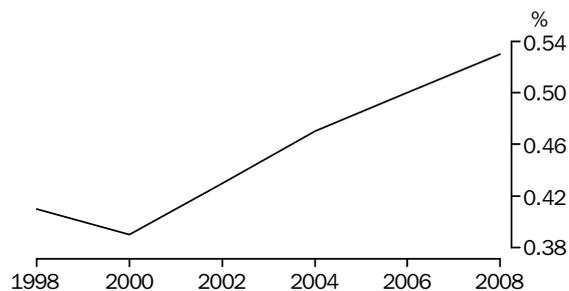
(a) The reference year for chain volume measures is 2008. See Explanatory Notes 18 and 19 for details.

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

### HERD and gross domestic product (GDP)

HERD as a proportion of GDP increased from 0.50% in 2006 to 0.53% in 2008.

### HERD, as a proportion of GDP(a)



(a) See Explanatory Notes 15 to 17 for details.

## MAIN FEATURES *continued*

*HERD and gross domestic product (GDP) continued*

The following table shows HERD/GDP ratios for Organisation for Economic Co-operation and Development (OECD) countries.

### HERD/GDP RATIOS OF OECD COUNTRIES (a)(b)(c)

	2004	2005	2006	2007	2008
	%	%	%	%	%
Sweden	0.83	0.79	0.77	0.77	0.80
Denmark	0.61	0.61	0.64	0.68	0.71
Iceland	na	0.61	0.71	0.68	0.67
Finland	0.68	0.66	0.65	0.65	0.66
Canada	0.70	0.69	0.66	0.67	0.64
Switzerland	0.67	na	0.66	na	na
Austria	0.60	0.61	0.60	0.61	na
Netherlands	0.52	0.54	0.53	0.52	na
<b>Australia</b>	<b>0.47</b>	na	<b>0.50</b>	na	<b>0.53</b>
Norway	0.47	0.47	0.46	0.52	0.51
Portugal	0.28	0.29	0.33	0.36	0.51
United Kingdom	0.42	0.45	0.46	0.47	0.47
Japan	0.43	0.45	0.43	0.43	na
Germany	0.41	0.41	0.41	0.41	na
Belgium	0.40	0.41	0.40	0.40	0.41
France	0.40	0.40	0.40	0.40	0.40
New Zealand	na	0.38	na	0.36	na
Italy	0.36	0.33	0.34	0.36	0.39
Ireland	0.33	0.34	0.34	0.35	0.39
United States of America	0.37	0.36	0.35	0.35	0.36
Turkey	0.35	0.32	0.30	0.35	na
Korea	0.27	0.28	0.30	0.34	na
Spain	0.31	0.33	0.33	0.33	0.36
Greece	0.27	0.28	0.28	0.29	na
Czech Republic	0.18	0.23	0.25	0.26	0.25
Hungary	0.21	0.24	0.24	0.23	na
Poland	0.18	0.18	0.17	0.19	0.20
Slovak Republic	0.10	0.10	0.12	0.12	0.11
Mexico	0.12	0.12	0.10	0.10	na
Luxembourg	0.02	0.02	0.04	0.05	0.05
<b>Total OECD</b>	<b>0.39</b>	<b>0.39</b>	<b>0.38</b>	<b>0.39</b>	na

na not available

- (a) Except for Australia, the HERD/GDP ratios shown for OECD countries are sourced from *Main Science and Technology Indicators, 2009/2*, OECD. Ratios for Australia have been calculated using the most recent ABS values for HERD and GDP. See Explanatory Notes 15 to 17.
- (b) HERD/GDP ratios for some countries are projected or estimated as per the OECD source table.
- (c) Countries are ranked by the most recent available HERD/GDP ratio.

*Type of expenditure*

In 2008, HERD was comprised of \$6,051 million in Current expenditure and \$666 million in Capital expenditure. The largest component of HERD in 2008 was Other current expenditure, which totalled \$2,930 million (44% of HERD).

*Source of funds*

The main source of funds for HERD in 2008 was General university funds (\$3,523 million or 52% of HERD) and Australian competitive research grants (\$1,181 million or 18%). These were also the major sources of funds in 2006.

State and local government was the only source of funds with a change in its relative share of HERD of more than two percentage points; this resulted from a 91% increase in funds from this source directed to R&D, compared to 2006.

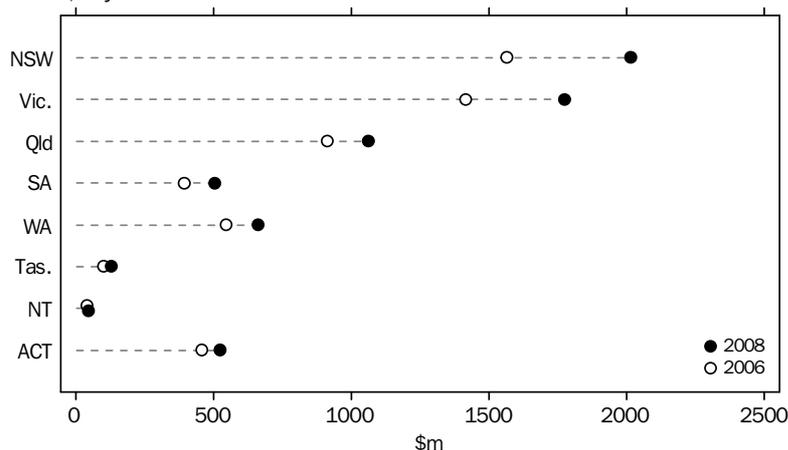
## MAIN FEATURES *continued*

### Location

In 2008, higher education institutions based in New South Wales, Victoria and Queensland combined, contributed almost three quarters (72%) of HERD (at \$2,015 million, \$1,775 million and \$1,062 million, respectively). Refer to Explanatory Note 9 for further information regarding the location of R&D.

Between 2006 and 2008, New South Wales recorded the largest growth in HERD in both absolute and percentage terms, rising \$450 million or 29%.

HERD, by location



South Australia had the highest increase in HERD as a proportion of gross state product (GSP) from 2006. The Northern Territory was the only location to experience a decrease in its HERD/GSP ratio, while ratios for Queensland and Western Australia remained the same.

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

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT
	%	%	%	%	%	%	%	%
2008	0.50	0.61	0.44	0.64	0.39	0.56	0.27	2.02
2006	0.44	0.54	0.44	0.55	0.39	0.48	0.29	2.01

(a) See Explanatory Notes 15 to 17 for details

### Type of activity

In 2008, 41% of HERD (\$2,772 million) was directed towards Applied research, 29% (\$1,941 million) to Pure basic research, and 21% (\$1,389 million) to Strategic basic research. The remaining 9% of HERD (\$615 million) was directed towards Experimental development.

### Field of research (FOR)

Expenditure devoted to Medical and health sciences FOR (\$2,064 million) represented 31% of HERD in 2008, and was almost triple the value of the next highest FOR, Biological sciences (\$689 million). In total, Medical and health sciences, Biological sciences and Engineering FORs made up approximately half of total HERD.

### Socio-economic objective (SEO)

Over a third (35% or \$2,347) of HERD in 2008 was directed to the SEO of Health, which includes R&D related to the understanding and treatment of clinical diseases and conditions; and the provision of public health services.

## MAIN FEATURES *continued*

*Socio-economic objective (SEO) continued*

At \$1,203 million, HERD directed to the next most prevalent SEO of Expanding knowledge was approximately half that directed to Health. This SEO includes R&D that contributes to the general advancement of knowledge without having a specific application.

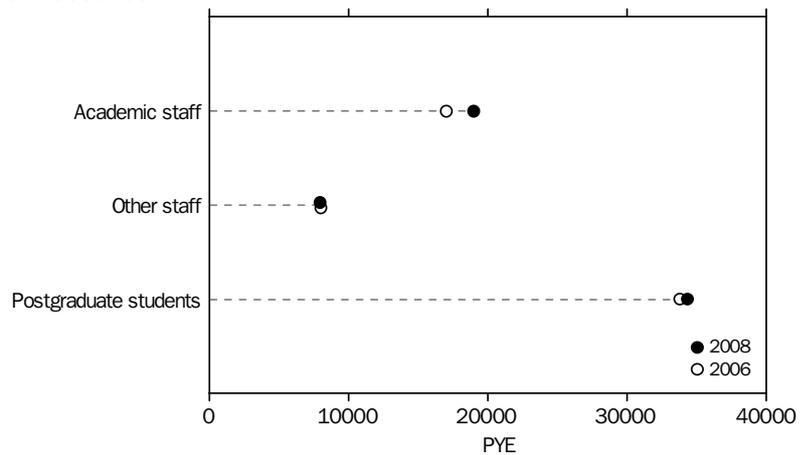
### HUMAN RESOURCES DEVOTED TO R&D

Most higher education human resources devoted to R&D in 2008 were Postgraduate students and Academic staff, accounting for 56% (34,359 PYE) and 31% (18,981 PYE) of total PYE, respectively. The remaining 13% was attributable to Other staff directly supporting R&D.

As with HERD, New South Wales, Victoria and Queensland accounted for almost three quarters (74%) of total human resources devoted to R&D in 2008.

Compared to 2006, human resources devoted to R&D in 2008 was up 4% (from 58,905 PYE). The largest absolute growth was reported for Academic staff (up 1,944 PYE), which was also the only type of human resource to show an increase in its relative share of total PYE (up two percentage points) from 2006.

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



# HIGHER EDUCATION EXPENDITURE ON R&D, by location—by type of expenditure—2006 and 2008(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2008									
Capital expenditure									
Land, buildings & other structures	145 109	87 129	48 070	19 183	31 116	21 149	15	55 533	407 305
Other capital expenditure	68 771	52 412	52 476	7 619	23 766	5 288	256	47 965	258 553
Total	213 881	139 541	100 546	26 802	54 882	26 437	271	103 498	665 858
Current expenditure									
Labour costs	835 741	698 545	440 183	196 163	264 107	46 168	19 005	178 116	2 678 028
Scholarships	120 842	130 022	67 228	34 362	37 595	10 145	1 293	41 404	442 892
Other current expenditure	844 968	806 802	453 517	247 754	305 539	45 902	25 503	200 352	2 930 336
Total	1 801 551	1 635 369	960 927	478 279	607 241	102 215	45 801	419 872	6 051 256
<b>Total</b>	<b>2 015 432</b>	<b>1 774 909</b>	<b>1 061 473</b>	<b>505 080</b>	<b>662 123</b>	<b>128 652</b>	<b>46 073</b>	<b>523 370</b>	<b>6 717 113</b>
2006 (a)									
Capital expenditure									
Land, buildings & other structures	5 245	14 983	84 738	4 416	29 692	4 612	—	28 357	172 043
Other capital expenditure	58 431	39 533	31 991	6 925	22 585	5 774	823	21 535	187 598
Total	63 676	54 516	116 729	11 341	52 277	10 386	823	49 892	359 640
Current expenditure									
Labour costs	653 784	558 435	342 251	151 794	204 863	39 664	18 090	162 196	2 131 078
Scholarships	114 805	100 230	58 571	31 110	27 108	10 329	1 332	42 906	386 391
Other current expenditure	733 073	701 338	394 398	200 839	260 568	40 993	21 628	203 584	2 556 421
Total	1 501 661	1 360 004	795 221	383 743	492 539	90 986	41 049	408 686	5 073 890
<b>Total</b>	<b>1 565 337</b>	<b>1 414 520</b>	<b>911 949</b>	<b>395 085</b>	<b>544 816</b>	<b>101 372</b>	<b>41 873</b>	<b>458 578</b>	<b>5 433 529</b>

— nil or rounded to zero (including null cells)

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

## HIGHER EDUCATION EXPENDITURE ON R&D, by location—by type of expenditure: proportions—2006 and 2008(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	%	%	%	%	%	%	%	%	%
2008									
Capital expenditure									
Land, buildings & other structures	7.2	4.9	4.5	3.8	4.7	16.4	—	10.6	6.1
Other capital expenditure	3.4	3.0	4.9	1.5	3.6	4.1	0.6	9.2	3.8
<i>Total</i>	10.6	7.9	9.5	5.3	8.3	20.5	0.6	19.8	9.9
Current expenditure									
Labour costs	41.5	39.4	41.5	38.8	39.9	35.9	41.3	34.0	39.9
Scholarships	6.0	7.3	6.3	6.8	5.7	7.9	2.8	7.9	6.6
Other current expenditure	41.9	45.5	42.7	49.1	46.1	35.7	55.4	38.3	43.6
<i>Total</i>	89.4	92.1	90.5	94.7	91.7	79.5	99.4	80.2	90.1
<b>Total</b>	<b>100.0</b>								
2006 (a)									
Capital expenditure									
Land, buildings & other structures	0.3	1.1	9.3	1.1	5.4	4.5	—	6.2	3.2
Other capital expenditure	3.7	2.8	3.5	1.8	4.1	5.7	2.0	4.7	3.5
<i>Total</i>	4.1	3.9	12.8	2.9	9.6	10.2	2.0	10.9	6.6
Current expenditure									
Labour costs	41.8	39.5	37.5	38.4	37.6	39.1	43.2	35.4	39.2
Scholarships	7.3	7.1	6.4	7.9	5.0	10.2	3.2	9.4	7.1
Other current expenditure	46.8	49.6	43.2	50.8	47.8	40.4	51.7	44.4	47.0
<i>Total</i>	95.9	96.1	87.2	97.1	90.4	89.8	98.0	89.1	93.4
<b>Total</b>	<b>100.0</b>								

— nil or rounded to zero (including null cells)

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

# HIGHER EDUCATION EXPENDITURE ON R&D, by location—by source of funds—2006 and 2008(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2008									
Australian competitive grants									
Commonwealth schemes	301 805	304 244	197 592	95 509	98 305	24 715	4 549	93 063	1 119 782
Other schemes	24 558	15 780	9 624	5 233	3 546	2 527	8	167	61 442
Total	326 363	320 024	207 216	100 742	101 850	27 242	4 556	93 230	1 181 224
General university funds	1 108 924	865 507	541 048	214 441	319 328	64 141	29 172	380 353	3 522 914
Other commonwealth government	351 755	296 120	97 928	106 537	113 587	10 257	4 315	24 679	1 005 178
State & local government	71 688	127 313	77 596	37 330	63 201	12 972	5 383	5 154	400 636
Business	75 758	100 549	70 060	25 221	41 254	9 896	1 563	8 183	332 484
Donations, bequests & foundations	29 831	15 759	27 269	11 565	6 760	3 557	80	972	95 791
Other Australian	1 123	25 104	11 865	124	2 021	—	292	—	40 529
Overseas	49 990	24 535	28 491	9 120	14 122	587	712	10 801	138 357
<b>Total</b>	<b>2 015 432</b>	<b>1 774 909</b>	<b>1 061 473</b>	<b>505 080</b>	<b>662 123</b>	<b>128 652</b>	<b>46 073</b>	<b>523 370</b>	<b>6 717 113</b>
2006 (a)									
Australian competitive grants									
Commonwealth schemes	307 376	245 298	110 694	82 755	92 351	28 586	1 469	84 858	953 387
Other schemes	10 716	15 749	923	4 687	2 306	33	—	104	34 518
Total	318 092	261 047	111 617	87 441	94 657	28 619	1 469	84 962	987 905
General university funds	788 987	711 018	516 069	172 502	297 238	41 868	30 054	330 574	2 888 310
Other commonwealth government	267 685	254 018	60 097	82 603	57 794	8 406	5 994	26 847	763 445
State & local government	33 500	61 428	46 852	18 344	38 171	6 478	2 066	3 023	209 862
Business	73 752	64 063	123 394	19 371	31 508	14 821	2 015	3 921	332 844
Donations, bequests & foundations	21 305	16 868	17 259	5 508	2 349	976	89	295	64 649
Other Australian	764	14 911	3 879	108	9 375	—	88	426	29 551
Overseas	61 251	31 167	32 781	9 207	13 724	203	99	8 530	156 964
<b>Total</b>	<b>1 565 337</b>	<b>1 414 520</b>	<b>911 949</b>	<b>395 085</b>	<b>544 816</b>	<b>101 372</b>	<b>41 873</b>	<b>458 578</b>	<b>5 433 529</b>

— nil or rounded to zero (including null cells)

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

# HIGHER EDUCATION EXPENDITURE ON R&D, by location—by source of funds: proportions—2006 and 2008(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	%	%	%	%	%	%	%	%	%
2008									
Australian competitive grants									
Commonwealth schemes	15.0	17.1	18.6	18.9	14.8	19.2	9.9	17.8	16.7
Other schemes	1.2	0.9	0.9	1.0	0.5	2.0	—	—	0.9
Total	16.2	18.0	19.5	19.9	15.4	21.2	9.9	17.8	17.6
General university funds	55.0	48.8	51.0	42.5	48.2	49.9	63.3	72.7	52.4
Other commonwealth government	17.5	16.7	9.2	21.1	17.2	8.0	9.4	4.7	15.0
State & local government	3.6	7.2	7.3	7.4	9.5	10.1	11.7	1.0	6.0
Business	3.8	5.7	6.6	5.0	6.2	7.7	3.4	1.6	4.9
Donations, bequests & foundations	1.5	0.9	2.6	2.3	1.0	2.8	0.2	0.2	1.4
Other Australian	0.1	1.4	1.1	—	0.3	—	0.6	—	0.6
Overseas	2.5	1.4	2.7	1.8	2.1	0.5	1.5	2.1	2.1
<b>Total</b>	<b>100.0</b>								
2006 (a)									
Australian competitive grants									
Commonwealth schemes	19.6	17.3	12.1	20.9	17.0	28.2	3.5	18.5	17.5
Other schemes	0.7	1.1	0.1	1.2	0.4	—	—	—	0.6
Total	20.3	18.5	12.2	22.1	17.4	28.2	3.5	18.5	18.2
General university funds	50.4	50.3	56.6	43.7	54.6	41.3	71.8	72.1	53.2
Other commonwealth government	17.1	18.0	6.6	20.9	10.6	8.3	14.3	5.9	14.1
State & local government	2.1	4.3	5.1	4.6	7.0	6.4	4.9	0.7	3.9
Business	4.7	4.5	13.5	4.9	5.8	14.6	4.8	0.9	6.1
Donations, bequests & foundations	1.4	1.2	1.9	1.4	0.4	1.0	0.2	0.1	1.2
Other Australian	—	1.1	0.4	—	1.7	—	0.2	0.1	0.5
Overseas	3.9	2.2	3.6	2.3	2.5	0.2	0.2	1.9	2.9
<b>Total</b>	<b>100.0</b>								

— nil or rounded to zero (including null cells)

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

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## HIGHER EDUCATION EXPENDITURE ON R&D, by location—by type of activity—2006 and 2008(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
2008									
Pure basic research	620 596	658 893	150 461	136 677	134 314	24 321	620	215 415	1 941 298
Strategic basic research	420 594	287 726	270 465	111 749	129 958	32 614	1 856	134 086	1 389 047
Applied research	736 760	722 403	523 893	202 382	336 511	65 603	43 597	140 357	2 771 506
Experimental development	237 482	105 887	116 654	54 272	61 340	6 115	—	33 512	615 263
<b>Total</b>	<b>2 015 432</b>	<b>1 774 909</b>	<b>1 061 473</b>	<b>505 080</b>	<b>662 123</b>	<b>128 652</b>	<b>46 073</b>	<b>523 370</b>	<b>6 717 113</b>
2006 (a)									
Pure basic research	503 392	437 348	165 755	88 556	89 565	17 536	428	191 752	1 494 331
Strategic basic research	285 268	306 375	229 010	96 927	134 952	22 879	1 786	125 312	1 202 509
Applied research	638 240	590 289	443 464	174 854	288 159	55 489	39 658	116 766	2 346 919
Experimental development	138 438	80 511	73 721	34 746	32 140	5 467	—	24 749	389 772
<b>Total</b>	<b>1 565 337</b>	<b>1 414 520</b>	<b>911 949</b>	<b>395 085</b>	<b>544 816</b>	<b>101 372</b>	<b>41 873</b>	<b>458 578</b>	<b>5 433 529</b>

— nil or rounded to zero (including null cells)

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

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## HIGHER EDUCATION EXPENDITURE ON R&D, by location—by type of activity: proportions—2006 and 2008(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	%	%	%	%	%	%	%	%	%
2008									
Pure basic research	30.8	37.1	14.2	27.1	20.3	18.9	1.3	41.2	28.9
Strategic basic research	20.9	16.2	25.5	22.1	19.6	25.4	4.0	25.6	20.7
Applied research	36.6	40.7	49.4	40.1	50.8	51.0	94.6	26.8	41.3
Experimental development	11.8	6.0	11.0	10.7	9.3	4.8	—	6.4	9.2
<b>Total</b>	<b>100.0</b>								
2006 (a)									
Pure basic research	32.2	30.9	18.2	22.4	16.4	17.3	1.0	41.8	27.5
Strategic basic research	18.2	21.7	25.1	24.5	24.8	22.6	4.3	27.3	22.1
Applied research	40.8	41.7	48.6	44.3	52.9	54.7	94.7	25.5	43.2
Experimental development	8.8	5.7	8.1	8.8	5.9	5.4	—	5.4	7.2
<b>Total</b>	<b>100.0</b>								

— nil or rounded to zero (including null cells)

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

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	46 447	30 197	16 682	7 124	11 453	979	—	19 497	132 378
Physical sciences	79 111	42 895	19 786	7 416	17 833	851	461	56 064	224 415
Chemical sciences	74 760	61 725	48 247	23 661	18 452	4 602	833	20 447	252 727
Earth sciences	42 317	32 620	26 452	16 791	29 653	12 923	278	33 514	194 548
Environmental sciences	37 660	31 909	46 544	18 201	24 843	10 503	10 695	10 758	191 111
Biological sciences	141 479	250 796	130 252	34 673	63 004	19 186	4 162	45 340	688 892
Agricultural & veterinary sciences	87 896	37 938	45 191	31 356	48 118	20 649	1 122	6 542	278 811
Information & computing sciences	62 221	60 550	34 352	14 995	28 712	1 182	107	16 087	218 206
Engineering	186 766	157 027	120 417	34 452	54 175	3 252	1 701	19 370	577 160
Technology	44 913	27 767	42 363	21 515	22 176	367	117	11 044	170 261
Medical & health sciences	656 109	588 071	289 659	185 418	213 369	30 185	6 737	94 799	2 064 348
Built environment & design	22 341	21 335	9 749	5 199	8 276	997	44	983	68 925
Education	64 519	49 271	34 316	16 974	26 283	2 589	8 310	7 851	210 112
Economics	34 714	55 921	13 626	8 362	13 516	3 234	1 361	31 985	162 719
Commerce, management, tourism & services	80 905	73 981	49 780	14 898	19 362	4 385	1 633	8 848	253 793
Studies in human society	77 373	72 651	49 519	24 517	23 977	5 967	5 261	67 512	326 775
Psychology & cognitive sciences	101 418	39 174	25 611	9 672	14 451	1 699	257	7 198	199 480
Law & legal studies	27 324	25 965	14 529	5 907	3 189	884	128	7 577	85 502
Studies in creative arts & writing	26 452	16 572	13 837	8 671	2 388	1 393	741	12 626	82 681
Language, communication & culture	56 722	50 052	18 612	8 744	10 146	832	1 428	14 974	161 510
History & archaeology	38 445	33 654	7 723	4 626	7 096	1 351	614	25 254	118 763
Philosophy & religious studies	25 541	14 841	4 227	1 907	1 651	644	83	5 101	53 994
<b>Total</b>	<b>2 015 432</b>	<b>1 774 909</b>	<b>1 061 473</b>	<b>505 080</b>	<b>662 123</b>	<b>128 652</b>	<b>46 073</b>	<b>523 370</b>	<b>6 717 113</b>

— nil or rounded to zero (including null cells)

(a) Based on the 2008 edition of the ANZSRC. Previous cycle estimates are available on an ASRC basis only. See Explanatory Notes 10 and 11 for details.

# HIGHER EDUCATION EXPENDITURE ON R&D, by location—by field of research(a): proportions—2008

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	%	%	%	%	%	%	%	%	%
Mathematical sciences	2.3	1.7	1.6	1.4	1.7	0.8	—	3.7	2.0
Physical sciences	3.9	2.4	1.9	1.5	2.7	0.7	1.0	10.7	3.3
Chemical sciences	3.7	3.5	4.5	4.7	2.8	3.6	1.8	3.9	3.8
Earth sciences	2.1	1.8	2.5	3.3	4.5	10.0	0.6	6.4	2.9
Environmental sciences	1.9	1.8	4.4	3.6	3.8	8.2	23.2	2.1	2.8
Biological sciences	7.0	14.1	12.3	6.9	9.5	14.9	9.0	8.7	10.3
Agricultural & veterinary sciences	4.4	2.1	4.3	6.2	7.3	16.1	2.4	1.3	4.2
Information & computing sciences	3.1	3.4	3.2	3.0	4.3	0.9	0.2	3.1	3.2
Engineering	9.3	8.8	11.3	6.8	8.2	2.5	3.7	3.7	8.6
Technology	2.2	1.6	4.0	4.3	3.3	0.3	0.3	2.1	2.5
Medical & health sciences	32.6	33.1	27.3	36.7	32.2	23.5	14.6	18.1	30.7
Built environment & design	1.1	1.2	0.9	1.0	1.2	0.8	0.1	0.2	1.0
Education	3.2	2.8	3.2	3.4	4.0	2.0	18.0	1.5	3.1
Economics	1.7	3.2	1.3	1.7	2.0	2.5	3.0	6.1	2.4
Commerce, management, tourism & services	4.0	4.2	4.7	2.9	2.9	3.4	3.5	1.7	3.8
Studies in human society	3.8	4.1	4.7	4.9	3.6	4.6	11.4	12.9	4.9
Psychology & cognitive sciences	5.0	2.2	2.4	1.9	2.2	1.3	0.6	1.4	3.0
Law & legal studies	1.4	1.5	1.4	1.2	0.5	0.7	0.3	1.4	1.3
Studies in creative arts & writing	1.3	0.9	1.3	1.7	0.4	1.1	1.6	2.4	1.2
Language, communication & culture	2.8	2.8	1.8	1.7	1.5	0.6	3.1	2.9	2.4
History & archaeology	1.9	1.9	0.7	0.9	1.1	1.1	1.3	4.8	1.8
Philosophy & religious studies	1.3	0.8	0.4	0.4	0.2	0.5	0.2	1.0	0.8
<b>Total</b>	<b>100.0</b>								

— nil or rounded to zero (including null cells)

(a) Based on the 2008 edition of the ANZSRC. Previous cycle estimates are available on an ASRC basis only. See Explanatory Notes 10 and 11 for details.

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Defence	17 663	8 148	1 707	10 149	3 609	279	—	13 848	55 402
Economic development									
Plant prod'n & plant primary products	48 853	16 348	36 539	33 173	27 370	19 834	1 259	8 706	192 082
Animal prod'n & animal primary products	40 674	17 701	18 592	8 486	13 778	9 347	20	1 166	109 762
Mineral resources (excl. energy)	11 346	10 439	27 028	13 035	14 378	8 963	159	2 732	88 081
Energy	38 822	30 728	31 908	7 341	16 027	1 144	298	7 048	133 317
Manufacturing	87 957	127 837	56 366	20 107	21 161	2 541	166	14 389	330 524
Construction	56 589	32 066	18 020	4 965	2 841	921	21	2 746	118 169
Transport	12 904	25 540	13 557	7 031	4 023	1 247	—	2 501	66 805
Information & communication services	76 034	57 292	36 769	15 966	19 870	923	445	12 966	220 263
Commercial services & tourism	31 845	26 739	16 948	5 018	16 940	396	1 676	2 276	101 839
Economic framework	64 136	76 013	30 135	17 199	7 701	5 240	2 569	33 622	236 614
<i>Total</i>	469 160	420 703	285 861	132 321	144 089	50 555	6 614	88 152	1 597 455
Society									
Health	760 390	699 043	308 505	201 165	219 913	34 006	6 732	117 618	2 347 372
Education & training	85 255	72 402	43 008	17 913	30 777	3 535	8 154	20 437	281 481
Law, politics & community services	95 708	97 940	44 463	22 080	23 675	3 250	2 583	48 213	337 912
Cultural understanding	139 905	90 566	40 022	25 942	18 171	5 751	3 004	48 555	371 916
<i>Total</i>	1 081 257	959 950	435 999	267 100	292 535	46 543	20 474	234 822	3 338 681
Environment	119 601	102 068	116 145	33 847	78 374	19 064	18 450	35 475	523 023
Expanding knowledge	327 751	284 040	221 762	61 664	143 516	12 211	534	151 074	1 202 552
<b>Total</b>	<b>2 015 432</b>	<b>1 774 909</b>	<b>1 061 473</b>	<b>505 080</b>	<b>662 123</b>	<b>128 652</b>	<b>46 073</b>	<b>523 370</b>	<b>6 717 113</b>

— nil or rounded to zero (including null cells)

(a) Based on the 2008 edition of the ANZSRC. Previous cycle estimates are available on an ASRC basis only. See Explanatory Notes 10 and 11 for details.

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	%	%	%	%	%	%	%	%	%
Defence	0.9	0.5	0.2	2.0	0.5	0.2	—	2.6	0.8
Economic development									
Plant prod'n & plant primary products	2.4	0.9	3.4	6.6	4.1	15.4	2.7	1.7	2.9
Animal prod'n & animal primary products	2.0	1.0	1.8	1.7	2.1	7.3	—	0.2	1.6
Mineral resources (excl. energy)	0.6	0.6	2.5	2.6	2.2	7.0	0.3	0.5	1.3
Energy	1.9	1.7	3.0	1.5	2.4	0.9	0.6	1.3	2.0
Manufacturing	4.4	7.2	5.3	4.0	3.2	2.0	0.4	2.7	4.9
Construction	2.8	1.8	1.7	1.0	0.4	0.7	—	0.5	1.8
Transport	0.6	1.4	1.3	1.4	0.6	1.0	—	0.5	1.0
Information & communication services	3.8	3.2	3.5	3.2	3.0	0.7	1.0	2.5	3.3
Commercial services & tourism	1.6	1.5	1.6	1.0	2.6	0.3	3.6	0.4	1.5
Economic framework	3.2	4.3	2.8	3.4	1.2	4.1	5.6	6.4	3.5
Total	23.3	23.7	26.9	26.2	21.8	39.3	14.4	16.8	23.8
Society									
Health	37.7	39.4	29.1	39.8	33.2	26.4	14.6	22.5	34.9
Education & training	4.2	4.1	4.1	3.5	4.6	2.7	17.7	3.9	4.2
Law, politics & community services	4.7	5.5	4.2	4.4	3.6	2.5	5.6	9.2	5.0
Cultural understanding	6.9	5.1	3.8	5.1	2.7	4.5	6.5	9.3	5.5
Total	53.6	54.1	41.1	52.9	44.2	36.2	44.4	44.9	49.7
Environment	5.9	5.8	10.9	6.7	11.8	14.8	40.0	6.8	7.8
Expanding knowledge	16.3	16.0	20.9	12.2	21.7	9.5	1.2	28.9	17.9
<b>Total</b>	<b>100.0</b>								

— nil or rounded to zero (including null cells)

(a) Based on the 2008 edition of the ANZSRC. Previous cycle estimates are available on an ASRC basis only. See Explanatory Notes 10 and 11 for details.

# 11

## HIGHER EDUCATION HUMAN RESOURCES DEVOTED TO R&D, by location—by type of resource—2006 and 2008(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	PYE	PYE	PYE	PYE	PYE	PYE	PYE	PYE	PYE
2008									
Academic staff	5 071	5 513	3 324	1 688	1 553	516	146	1 171	18 981
Other staff	2 917	1 525	1 890	299	648	94	30	569	7 970
Postgraduate students	10 365	9 174	5 886	2 536	3 601	807	136	1 853	34 359
<b>Total</b>	<b>18 353</b>	<b>16 211</b>	<b>11 099</b>	<b>4 522</b>	<b>5 802</b>	<b>1 417</b>	<b>312</b>	<b>3 593</b>	<b>61 310</b>
2006 (a)									
Academic staff	4 774	4 933	2 749	1 200	1 460	508	187	1 227	17 037
Other staff	2 686	1 358	1 982	516	798	95	25	578	8 038
Postgraduate students	10 454	8 813	5 866	2 495	3 401	849	155	1 797	33 830
<b>Total</b>	<b>17 915</b>	<b>15 103</b>	<b>10 597</b>	<b>4 211</b>	<b>5 658</b>	<b>1 453</b>	<b>367</b>	<b>3 602</b>	<b>58 905</b>

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

# 12

## HIGHER EDUCATION HUMAN RESOURCES DEVOTED TO R&D, by location—by type of resource: proportions—2006 and 2008(a)

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	%	%	%	%	%	%	%	%	%
2008									
Academic staff	27.6	34.0	29.9	37.3	26.8	36.4	46.7	32.6	31.0
Other staff	15.9	9.4	17.0	6.6	11.2	6.6	9.7	15.8	13.0
Postgraduate students	56.5	56.6	53.0	56.1	62.1	57.0	43.7	51.6	56.0
<b>Total</b>	<b>100.0</b>								
2006 (a)									
Academic staff	26.6	32.7	25.9	28.5	25.8	35.0	50.9	34.1	28.9
Other staff	15.0	9.0	18.7	12.3	14.1	6.5	6.9	16.0	13.6
Postgraduate students	58.4	58.4	55.4	59.2	60.1	58.5	42.2	49.9	57.4
<b>Total</b>	<b>100.0</b>								

(a) 2006 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 by the Australian Bureau of Statistics (ABS) from Australian higher education institutions in the Survey of Research and Experimental Development (R&D). For the higher education sector, the survey is conducted biennially and based on a single calendar year reference period.

**2** The reference period for statistics presented in this issue is the year ended 31 December 2008.

### DEFINITIONS

**3** 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'.

**4** For a more comprehensive interpretation of the definition of R&D activity, 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*.

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

### SCOPE AND COVERAGE

**6** The OECD definition of the higher education sector encompasses universities and other institutions of post-secondary education regardless of their source of finance or legal status. The scope of the ABS R&D survey is based on the OECD definition, but excludes colleges of Technical and Further Education. (For the 2008 survey, 40 Australian higher education institutions were in scope and data collected from each.)

**7** All research activity performed by in-scope institutions during the reference period, irrespective of the source of funds, is included in the survey. This includes research performed by institutions:

- as a participant in unincorporated Cooperative Research Centres (CRCs); and
- on contract for other legal entities (such as private business or incorporated CRCs).

**8** R&D performed on an institution's campus by other legal entities (such as incorporated CRCs or university controlled entities) or employees of other organisations, is excluded from the survey. The R&D performed by these entities and their employees will be in scope of the relevant R&D sector (Business, Government or Private non-profit).

### LOCATION OF R&D

**9** Data shown in this release represent the main campus or head office location of the reporting institution, with the exception of the Australian Defence Force Academy (ADFA) which is shown against the Australian Capital Territory.

### AUSTRALIAN AND NEW ZEALAND STANDARD RESEARCH CLASSIFICATION

**10** Field of research, Socio-economic objective and Type of activity statistics presented in this release have been collected and compiled based on the *Australian and New Zealand Standard Research Classification (ANZSRC), 2008* (cat. no. 1297.0). Earlier issues of this release used the Australian Standard Research Classification (ASRC).

**11** The ABS has not compiled previous cycle estimates on an ANZSRC basis or 2008 estimates on an ASRC basis. Previous cycle data compiled on an ASRC basis (including revised data for 2006) are available in the data cubes accompanying this release. See also the Comparability of Estimates Over Time section of the Technical Note.

## EXPLANATORY NOTES *continued*

### DERIVED EXPENDITURE ESTIMATES

**12** Total cost of R&D undertaken is equivalent to direct expenditure plus indirect (overhead) expenditure.

**13** In compiling R&D statistics, institutions were asked to provide data on:

- direct staff inputs (i.e. staff directly performing R&D);
- direct expenditure (i.e. expenses directly attributable to R&D); and
- other staff and resources supporting, but not directly performing, R&D.

**14** Institutions were also required to indicate whether overheads had been included in reported data. In cases where data did not include overheads, an estimate was calculated by either:

- the institution identifying the value of R&D related overhead costs to be apportioned across relevant projects/schools; or
- the ABS, using a methodology agreed to by institutions and Universities Australia.

### GROSS DOMESTIC AND GROSS STATE PRODUCT

**15** In calculating HERD/Gross Domestic Product (GDP) and HERD/Gross State Product (GSP) ratios presented in this issue, the most recent GDP and GSP values available were used. These values are referenced in the tables below.

#### GROSS DOMESTIC PRODUCT, current prices

	1998-99	2000-01	2002-03	2004-05	2006-07	2008-09
	\$m	\$m	\$m	\$m	\$m	\$m
GDP	622 695	708 889	804 361	925 864	1 091 327	1 258 870

Source: *Australian National Accounts: National Income, Expenditure and Product, Dec 2009* (cat. no. 5206.0), released 3 March 2010

#### GROSS STATE PRODUCT, current prices

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

Source: *Australian National Accounts, State Accounts, 2008-09* (cat. no. 5220.0), Reissue released 22 December 2009

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

**17** While statistics presented in this issue relate to the 2008 calendar year, financial year GDP and GSP data are used to ensure consistency with ratios to be published in *Research and Experimental Development, All Sector Summary, Australia, 2008-09* (cat. no. 8112.0).

### CHAIN VOLUME MEASURES

**18** 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 2008). 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).

## EXPLANATORY NOTES *continued*

### CHAIN VOLUME MEASURES

*continued*

**19** Deflators used to calculate the chain volume measure of expenditure on R&D have been 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. This is the first issue of this release to present chain volume estimates calculated using the revised deflators.

### UPCOMING RELEASES

**20** Upcoming releases of R&D statistics include:  
*Research and Experimental Development, Government and Private Non-Profit Organisations, Australia, 2008–09* (cat. no. 8109.0), scheduled for release 15 July 2010  
*Research and Experimental Development, Businesses, Australia, 2008–09* (cat. no. 8104.0), scheduled for release 23 September 2010  
*Research and Experimental Development, All Sector Summary, Australia, 2008–09* (cat. no. 8112.0), scheduled for release 11 October 2010

### OTHER RELATED RELEASES

**21** Users may also wish to refer to the following ABS releases:  
*Australian and New Zealand Standard Research Classification (ANZSRC), 2008* (cat. no. 1297.0)  
*Innovation in Australian Business, 2006–07* (cat. no. 8158.0)  
*Microdata: Business Longitudinal Database, Expanded CURF, Australia, 2004–05, 2005–06 and 2006–07* (cat. no. 8168.0.55.001)  
*Selected Characteristics of Australian Businesses, 2007–08* (cat. no. 8167.0)  
*Summary of IT Use and Innovation in Australian Business, 2007–08* (cat. no. 8166.0)

**22** Relevant OECD publications include:  
*Main Science and Technology Indicators 2009/2*  
*The Measurement of Scientific and Technological Activities: Proposed Standard Practice for Surveys of Research and Experimental Development - Frascati Manual 2002*

### ABS WEBSITE

**23** Other information, including data cubes in spreadsheet format, relating to R&D and innovation 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

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

## TECHNICAL NOTE DATA QUALITY

### NON-SAMPLING ERROR

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

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

#### *Reliability of statistics*

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

- Many institutions provided estimates due to a lack of separately recorded data on R&D activity.
- Data were self-classified by institutions to Field of research (FOR), Socio-economic objective (SEO) and Type of activity at the time of reporting. Some institutions 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 institutions and reference periods. See Explanatory Notes 12 to 14.

### REVISIONS

**4** Revisions to previous cycle data occur on discovery of errors in the data, typically a result of the specific non-sampling errors outlined in the Reliability of statistics section above.

**5** Revisions are only applied where the impact on:

- R&D expenditure is equal to \$5 million or more; or
- Human resources devoted to R&D is equal to 25 PYE or more.

**6** In processing 2008 data, revisions were applied to 2006 estimates. Revisions impacted three states and territories for expenditure and/or human resource effort devoted to R&D. Most significantly, revisions were applied to source of funds estimates for General university funds and Other commonwealth government; these were primarily a result of data being re-categorised between these sources due to misreporting in the 2006 survey.

**7** Users are advised to refer to the most recently released data cubes, as revisions must be taken into consideration when interpreting results, particularly when comparing estimates over time.

### COMPARABILITY OF ESTIMATES OVER TIME

**8** In addition to the non-sampling errors outlined in the Reliability of statistics section, factors which may affect the comparability of 2008 estimates with those of previous cycles are described below:

- Implementation of the Australian and New Zealand Standard Research Classification. Differences which exist between this and the previously used Australian Standard Research Classification means the change in research classification represents a break in series. Users should familiarise themselves with those differences by referring to the *Australian and New Zealand Standard Research Classification (ANZSRC), 2008* (cat. no. 1297.0) if attempting to compare FOR and SEO data across reference periods.
- Additional reporting requirements for Excellence in Research for Australia initiative have led to improved record keeping within higher education institutions. This resulted in more accurate reporting of data by a number of institutions for some R&D items in the 2008 survey. Previously these institutions could only provide estimates.

## GLOSSARY

<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>Current expenditure</b>	Expenditure on direct labour costs, scholarships, 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>Donations, bequests and foundations</b>	Research specific donations and bequests from non-profit organisations and Australian individuals.
<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 and installed.
<b>Field 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>General university funds</b>	Funding from: <ul style="list-style-type: none"><li>■ the Commonwealth government (other than targeted research funding), including ANU Institute of Advanced Studies funds; and the portion of other revenue sourced from the Commonwealth spent on R&amp;D but not identified as 'Competitive Research Grants' or 'Other commonwealth government'; and</li><li>■ fees and charges, income relating to HECS liabilities, income from non-research specific donations, bequests and foundations, investment income, reversions from provisions accounts, loans drawn down, income from the institutions commercial operations and from sale of products or assets.</li></ul>
<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>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>Other commonwealth government</b>	All other targeted research funding from commonwealth agencies, including: R&D grants such as CRC and MNRF grants (but excluding Australian Competitive Grants Register schemes); and payments for R&D projects carried out on contract for commonwealth government. Other examples of funding included are: <ul style="list-style-type: none"><li>■ Australian Postgraduate Awards</li><li>■ Institutional Grants Scheme</li><li>■ International Postgraduate Research Scholarships</li><li>■ Research Infrastructure Block Grants</li><li>■ Regional Protection Fund</li><li>■ Research Training Scheme</li><li>■ Special Research Assistance (pre-BAF)</li><li>■ Systemic Infrastructure Initiative</li></ul>

## GLOSSARY *continued*

<b>Other current expenditure</b>	All other non-staff expenditures including materials, fuels, water, sewerage, rent and hiring expenses, repairs and maintenance, cleaning services, postage, freight, telephone, academic services purchased from outside and any other current expenses which are not captured by labour costs or scholarships. Payments for patent searches and for purchases of technical know-how are excluded.
<b>Other staff</b>	Technicians, skilled and unskilled craftpersons, secretarial and clerical staff directly associated with R&D activity.
<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>Scholarships</b>	Comprises expenditure by the university on scholarships for research higher degrees.
<b>Socio-economic objective (SEO)</b>	Reflects the purpose of the R&D as perceived by the data provider. The SEO classification consists of discrete economic, social, technological or scientific domains for identifying the principal purpose of the R&D.
<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>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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