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RESEARCH AND EXPERIMENTAL DEVELOPMENT

AUSTRALIA

GOVERNMENT AND PRIVATE NON-PROFIT ORGANISATIONS

EMBARGO: 11.30AM (CANBERRA TIME) FRI 6 OCT 2006

CONTENTS

INQUIRIES

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

NOTES

CHANGES IN THIS ISSUE

Changes have been made to the format and content of this publication. Cross-classifications of data included in previous issues may be available on request.

COMPARISONS TO PREVIOUS STATISTICS

A range of quality improvements was implemented for the 2004–05 Government and Private non-profit R&D survey. These improvements have impacted on comparability to previously published estimates. See paragraph 9 of the Explanatory notes for further detail.

No revisions were made to 2002–03 data in this issue. However, 2004–05 data presented in this publication may subsequently be revised.

DATA QUALITY

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

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Australian Statistician

LIST OF TABLES

ABBREVIATIONS

$'000	thousand dollars
$m	million dollars
ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
Aust.	Australia
GDP	gross domestic product
GOVERD	government expenditure on R&D
GSP	gross state product
NPIs	non-profit institutions
NSW	New South Wales
NT	Northern Territory
OECD	Organisation for Economic Co-operation and Development
PYE	person years of effort
Qld	Queensland
R&D	research and experimental development
RFCD	research fields, courses and disciplines
SA	South Australia
SEO	socio-economic objective
Tas.	Tasmania
Vic.	Victoria
WA	Western Australia

CHAPTER 1 GOVERNMENT R&D

EXPENDITURE ON R&D

Expenditure by Government organisations on R&D (GOVERD) in 2004–05 was $2,550.7 million. This represented an increase of 2.8% in current price terms over 2002–03, but a decrease of 4.3% in chain volume terms.

GOVERNMENT RESOURCES DEVOTED TO R&D

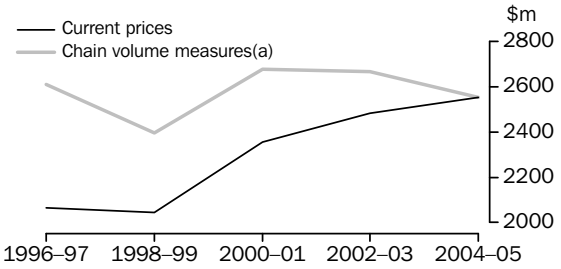
		1996–97	*1998–99*	*2000–01*	*2002–03*	*2004–05*
Expenditure on R&D - Current prices						
Commonwealth	$m	1 266.6	1 179.4	1 404.8	1 531.3	1 573.4
State/territory	$m	797.7	863.6	951.0	950.9	977.3
Total	$m	*2 064.3*	*2 043.1*	*2 355.8*	*2 482.2*	*2 550.7*
Expenditure on R&D - Chain volume measures(a)						
Commonwealth	$m	1 599.4	1 378.9	1 592.9	1 644.7	1 573.4
State/territory	$m	1 008.4	1 015.4	1 081.6	1 021.9	977.3
Total(b)	$m	*2 607.6*	*2 393.9*	*2 674.3*	*2 666.5*	*2 550.7*
Human resources devoted to R&D						
Commonwealth	PYE	10 377	9 353	9 565	10 185	9 335
State/territory	PYE	8 813	9 069	8 587	8 357	7 654
Total	PYE	*19 190*	*18 422*	*18 152*	*18 542*	*16 989*

(a) The reference year for chain volume measures is 2004–05. See paragraph 18 of the Explanatory notes for details.

(b) Chain volume measures are not additive for most periods; the component measures do not sum to a total in the same way as the corresponding current price components do.

Since 1996–97, GOVERD increased by an average of 2.9% per year in current price terms but decreased by an average of 0.3% in chain volume terms.

GOVERNMENT EXPENDITURE ON R&D



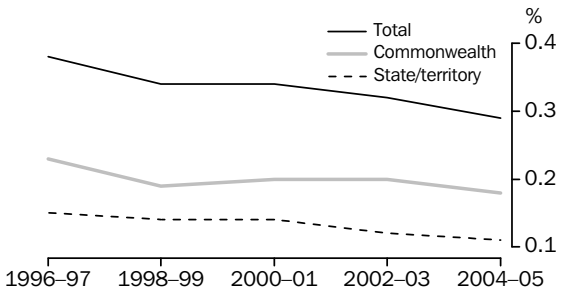
(a) The reference year for chain volume measures in 2004–05. See paragraph 18 of the Explanatory notes.

Proportion of GDP

In 2004–05, GOVERD represented 0.29% of GDP, down from 0.32% in 2002–03. Australia's GOVERD/GDP ratio remained above the OECD average of 0.28%.

Proportion of GDP continued

GOVERD AS A PROPORTION OF GDP(a)



(a) See paragraph 2 of the Explanatory notes.

The following table shows GOVERD/GDP ratios for selected OECD countries.

GOVERD/GDP RATIOS OF OECD COUNTRIES

	2000–01	*2001–02*	*2002–03*	*2003–04*	*2004–05*
	%	%	%	%	%
Iceland	0.70	0.61	0.76	0.73	na
France	0.37	0.36	0.37	0.36	0.36
Korea	0.32	0.32	0.34	0.33	0.34
United States of America	0.28	0.31	0.32	0.33	0.33
Germany	0.33	0.34	0.34	0.34	0.33
Finland	0.36	0.35	0.36	0.34	0.33
New Zealand	na	0.37	na	0.33	na
Japan	0.30	0.29	0.30	0.29	0.30
Australia	**0.34**	**na**	**0.32**	**na**	**0.29**
Czech Republic	0.31	0.29	0.28	0.29	0.27
Hungary	0.21	0.24	0.33	0.30	0.26
Netherlands	0.23	0.25	0.24	0.25	0.26
Norway	na	0.23	0.26	0.26	0.25
Poland	0.21	0.20	0.26	0.23	0.23
Canada	0.22	0.22	0.22	0.20	0.21
United Kingdom	0.23	0.18	0.17	0.18	na
Italy	0.20	0.20	0.20	0.19	0.17
Denmark	0.28	0.28	0.18	0.18	0.17
Spain	0.14	0.15	0.15	0.16	0.17
Slovak Republic	0.16	0.15	0.15	0.18	0.16
Belgium	0.12	0.13	0.14	0.13	0.14
Sweden	na	0.12	na	0.14	na
Portugal	0.19	0.18	0.15	0.13	na
Greece	na	0.14	na	0.13	na
Mexico	0.16	0.15	0.11	0.11	na
Ireland	0.09	0.09	0.10	0.09	0.09
Turkey	0.04	0.05	0.05	na	na
Total OECD	**0.26**	**0.27**	**0.27**	**0.28**	**0.28**

na not available

Source: Main Science and Technology Indicators, 2006/1, OECD, Paris, 2006

Level of government

Expenditure on R&D by Commonwealth government organisations increased by 2.7% to $1,573.4 million in 2004–05. Over the same period, expenditure by State and territory government organisations increased by 2.8% to $977.3 million.

Type of expenditure

Growth in GOVERD between 2002–03 and 2004–05 was mainly due to a 4.7% ($106.3 million) increase in Current expenditure. This in turn was driven by a 12.6% ($161.6 million) increase in Labour costs. In contrast, Capital expenditure on R&D decreased during the period by 17.3% ($37.8 million).

Source of funds

As in previous years, the majority of GOVERD in 2004–05 (66.7% or $1,701.0 million) was sourced from Own funds. The next largest source of R&D funds was Other Commonwealth government ($287.2 million or 11.3%).

Type of activity

In 2004–05, the majority of GOVERD was directed into Applied research (51.8% or $1321.9 million) and Strategic basic research (29.6% or $754.2 million). However, of all types of R&D activity, only expenditure on Strategic basic research increased between 2002–03 and 2004–05 (up 25.2% or $151.7 million).

Location

Locations in Victoria and New South Wales recorded the highest levels of GOVERD in 2004–05 ($608.1 million and $560.6 million respectively). Victoria also recorded the highest growth since 2002–03 (up $62.8 million), followed by South Australia (up $24.7 million).

Between 2002–03 and 2004–05, GOVERD as a proportion of Gross State Product (GSP) decreased for all states and territories. The largest decreases were recorded for the Australian Capital Territory (down from 1.85% to 1.42%) and Tasmania (down from 0.88% to 0.70%).

GOVERD AS A PROPORTION OF GSP(a), by location

	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*
	%	%	%	%	%	%	%	%
2002–03								
Commonwealth	0.10	0.19	0.11	0.42	0.10	0.81	0.23	1.81
State/territory	0.10	0.09	0.19	0.18	0.13	0.07	0.33	0.04
Total	*0.20*	*0.28*	*0.30*	*0.60*	*0.23*	*0.88*	*0.55*	*1.85*
2004–05								
Commonwealth	0.09	0.18	0.10	0.40	0.10	0.68	0.27	1.41
State/territory	0.10	0.09	0.15	0.17	0.10	0.02	0.24	0.02
Total	*0.18*	*0.27*	*0.25*	*0.58*	*0.20*	*0.70*	*0.51*	*1.42*

(a) See paragraph 2 of the Explanatory notes.

Socio-economic objectives

The majority of GOVERD in 2004–05, as in previous years, was directed into Economic development (48.9% or $1,248.2 million). The largest components of expenditure within Economic development were: Plant production and plant primary products ($337.5 million); and Animal production and animal primary products ($286.5 million). Accounting for the next largest share of GOVERD, were the Environment (20.3% or $517.1 million) and Society (16.6% or $423.4 million) SEO divisions.

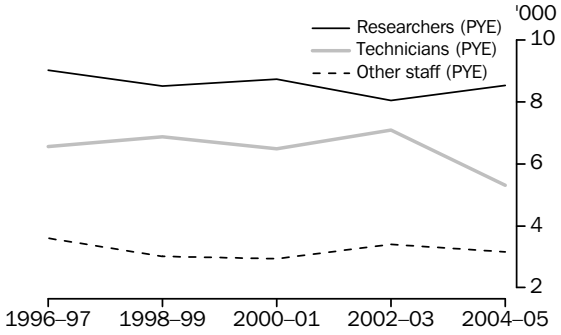
Research fields

In 2004–05, the Research fields accounting for the largest share of GOVERD were Agricultural, veterinary and environmental sciences (29.9% or $761.8 million) and Engineering and technology (16.7% or $426.0 million). Since 2002–03, Medical and health sciences recorded the largest increase in expenditure by Government, rising by $91.2 million (46.0%).

HUMAN RESOURCES DEVOTED TO R&D

Human resources devoted to R&D in 2004–05 totalled 16,989 person years of effort (PYE), down 8.4% from 2002–03. Researchers accounted for 8,530 PYE devoted to R&D in 2004–05 (50.2% of total PYE), up 6.1% from 2002–03. In contrast, Technicians and Other staff PYE devoted to R&D dropped over the period (by 25.2% and 7.5% respectively). Part of the decrease in Technicians over this period was, however, a result of their reclassification by some government departments since 2002–03.

GOVERNMENT HUMAN RESOURCES DEVOTED TO R&D



1.1 RESOURCES DEVOTED TO R&D, summary statistics

		COMMONWEALTH		STATE/TERRITORY		TOTAL	
		2002–03	*2004–05*	*2002–03*	*2004–05*	*2002–03*	*2004–05*
Type of expenditure							
Capital expenditure							
Land, buildings & other structures	$'000	88 206	43 704	11 934	28 563	100 140	72 267
Other	$'000	92 531	67 440	24 983	40 184	117 514	107 624
Total	$'000	*180 737*	*111 144*	*36 916*	*68 747*	*217 653*	*179 891*
Current expenditure							
Labour costs	$'000	785 516	916 384	501 811	532 557	1 287 327	1 448 941
Other	$'000	565 057	545 859	412 124	376 022	977 181	921 881
Total	$'000	*1 350 572*	*1 462 243*	*913 935*	*908 579*	*2 264 508*	*2 370 822*
Source of funds							
Own funds	$'000	1 206 261	1 203 354	594 245	497 691	1 800 506	1 701 045
Other Commonwealth government	$'000	49 624	130 692	67 373	156 487	116 997	287 179
Other state & local government	$'000	39 624	43 416	36 026	72 954	75 650	116 370
Private & non-profit organisations	$'000	1 592	1 651	24 088	25 476	25 680	27 127
Business	$'000	78 044	79 076	50 256	64 221	128 300	143 297
Joint government/business	$'000	3 848	49 551	138 865	111 267	142 713	160 818
Universities	$'000	553	27 365	6 481	8 837	7 034	36 202
Donations & bequests	$'000	—	597	5 321	12 820	5 321	13 417
Other Australian(a)	$'000	117 716	765	14 510	829	132 226	1 594
Overseas	$'000	34 048	36 920	13 686	26 744	47 734	63 664
Type of activity							
Pure basic research	$'000	99 014	82 222	53 213	54 930	152 227	137 153
Strategic basic research	$'000	471 025	541 136	131 482	213 056	602 507	754 192
Applied research	$'000	689 375	736 066	648 877	585 832	1 338 252	1 321 897
Experimental development	$'000	271 895	213 963	117 280	123 508	389 176	337 471
Location of expenditure							
NSW	$'000	267 382	261 648	270 693	298 996	538 075	560 644
Vic.	$'000	374 968	406 158	170 277	201 924	545 246	608 082
Qld	$'000	147 701	159 426	255 288	234 938	402 989	394 364
SA	$'000	225 466	242 266	96 617	104 552	322 082	346 818
WA	$'000	89 099	105 607	108 114	100 974	197 213	206 580
Tas.	$'000	109 668	109 453	8 801	3 564	118 469	113 017
NT	$'000	20 622	28 205	29 439	24 671	50 061	52 876
ACT	$'000	290 553	257 319	6 528	2 851	297 081	260 170
AET	$'000	4 379	545	564	—	4 943	545
Overseas	$'000	1 472	2 761	4 531	4 856	6 003	7 616
Total expenditure on R&D	$'000	**1 531 309**	**1 573 387**	**950 852**	**977 326**	**2 482 161**	**2 550 713**
Human resources devoted to R&D							
Researchers	PYE	3 739	4 203	4 297	4 327	8 036	8 530
Technicians	PYE	4 235	2 863	2 863	2 446	7 098	5 309
Other staff	PYE	2 210	2 270	1 196	881	3 407	3 150
Total human resources devoted to R&D	PYE	**10 185**	**9 335**	**8 357**	**7 654**	**18 541**	**16 989**

— nil or rounded to zero (including null cells)

(a) The treatment of Other Australian sources of funds has changed for 2004–05. See paragraph 16 of the Explanatory notes for further detail.

1.2 RESOURCES DEVOTED TO R&D, summary statistics—proportions

	COMMONWEALTH		STATE/TERRITORY		TOTAL	
	2002–03	*2004–05*	*2002–03*	*2004–05*	*2002–03*	*2004–05*
	%	%	%	%	%	%
Type of expenditure						
Capital expenditure						
Land, buildings & other structures	5.8	2.8	1.3	2.9	4.0	2.8
Other	6.0	4.3	2.6	4.1	4.7	4.2
Total	*11.8*	*7.1*	*3.9*	*7.0*	*8.8*	*7.1*
Current expenditure						
Labour costs	51.3	58.2	52.8	54.5	51.9	56.8
Other	36.9	34.7	43.3	38.5	39.4	36.1
Total	*88.2*	*92.9*	*96.1*	*93.0*	*91.2*	*92.9*
Source of funds						
Own funds	78.8	76.5	62.5	50.9	72.5	66.7
Other Commonwealth government	3.2	8.3	7.1	16.0	4.7	11.3
Other state & local government	2.6	2.8	3.8	7.5	3.0	4.6
Private & non-profit organisations	0.1	0.1	2.5	2.6	1.0	1.1
Business	5.1	5.0	5.3	6.6	5.2	5.6
Joint government/business	0.3	3.1	14.6	11.4	5.7	6.3
Universities	—	1.7	0.7	0.9	0.3	1.4
Donations & bequests	—	—	0.6	1.3	0.2	0.5
Other Australian(a)	7.7	—	1.5	0.1	5.3	0.1
Overseas	2.2	2.3	1.4	2.7	1.9	2.5
Type of activity						
Pure basic research	6.5	5.2	5.6	5.6	6.1	5.4
Strategic basic research	30.8	34.4	13.8	21.8	24.3	29.6
Applied research	45.0	46.8	68.2	59.9	53.9	51.8
Experimental development	17.8	13.6	12.3	12.6	15.7	13.2
Location of expenditure						
NSW	17.5	16.6	28.5	30.6	21.7	22.0
Vic.	24.5	25.8	17.9	20.7	22.0	23.8
Qld	9.6	10.1	26.8	24.0	16.2	15.5
SA	14.7	15.4	10.2	10.7	13.0	13.6
WA	5.8	6.7	11.4	10.3	7.9	8.1
Tas.	7.2	7.0	0.9	0.4	4.8	4.4
NT	1.3	1.8	3.1	2.5	2.0	2.1
ACT	19.0	16.4	0.7	0.3	12.0	10.2
AET	0.3	—	0.1	—	0.2	—
Overseas	0.1	0.2	0.5	0.5	0.2	0.3
Total expenditure on R&D	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Human resources devoted to R&D						
Researchers	36.7	45.0	51.4	56.5	43.3	50.2
Technicians	41.6	30.7	34.3	32.0	38.3	31.2
Other staff	21.7	24.3	14.3	11.5	18.4	18.5
Total human resources devoted to R&D	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

— nil or rounded to zero (including null cells)

(a) The treatment of Other Australian sources of funds has changed for 2004–05. See paragraph 16 of the Explanatory notes for further detail.

1.3 EXPENDITURE ON R&D, by socio-economic objective

	COMMONWEALTH		STATE/TERRITORY		TOTAL	
	2002–03	*2004–05*	*2002–03*	*2004–05*	*2002–03*	*2004–05*
	$'000	$'000	$'000	$'000	$'000	$'000
DEFENCE	283 854	309 367	—	—	283 854	309 367
ECONOMIC DEVELOPMENT						
Plant production & plant primary products	125 260	131 385	252 100	206 154	377 360	337 539
Animal production & animal primary products	96 072	99 692	181 488	186 855	277 560	286 547
Mineral resources (excl. energy)	90 091	91 103	7 561	6 331	97 652	97 434
Energy resources	56 506	59 251	2 468	6 526	58 973	65 777
Energy supply	26 345	32 505	37	2 072	26 382	34 577
Manufacturing	209 542	217 025	23 899	15 725	233 441	232 750
Construction	34 554	41 872	3 894	4 012	38 448	45 884
Transport	3 759	8 604	11 527	4 224	15 286	12 828
Information & communication services	49 750	66 808	3 140	2 112	52 890	68 920
Commercial services & tourism	12 987	6 464	14 072	1 199	27 059	7 663
Economic framework	131 286	55 123	4 372	3 114	135 658	58 237
Total	*836 152*	*809 830*	*504 557*	*438 325*	*1 340 710*	*1 248 156*
SOCIETY						
Health	24 943	46 824	203 046	302 275	227 989	349 098
Education & training	1 946	1 315	9 775	3 761	11 721	5 076
Social development & community services	30 939	36 629	28 981	32 581	59 919	69 210
Total	*57 828*	*84 767*	*241 801*	*338 617*	*299 629*	*423 384*
ENVIRONMENT						
Environmental policy frameworks & other aspects	17 592	24 959	18 060	19 637	35 652	44 596
Environmental management	302 997	306 679	170 082	165 803	473 079	472 482
Total	*320 589*	*331 638*	*188 142*	*185 440*	*508 731*	*517 078*
NON-ORIENTED RESEARCH	32 886	37 784	16 351	14 944	49 237	52 728
Total	**1 531 309**	**1 573 387**	**950 852**	**977 326**	**2 482 161**	**2 550 713**

— nil or rounded to zero (including null cells)

1.4 EXPENDITURE ON R&D, by socio-economic objective—proportions

	COMMONWEALTH		STATE/TERRITORY		TOTAL	
	2002–03	*2004–05*	*2002–03*	*2004–05*	*2002–03*	*2004–05*
	%	%	%	%	%	%
DEFENCE	18.5	19.7	—	—	11.4	12.1
ECONOMIC DEVELOPMENT						
Plant production & plant primary products	8.2	8.4	26.5	21.1	15.2	13.2
Animal production & animal primary products	6.3	6.3	19.1	19.1	11.2	11.2
Mineral resources (excl. energy)	5.9	5.8	0.8	0.6	3.9	3.8
Energy resources	3.7	3.8	0.3	0.7	2.4	2.6
Energy supply	1.7	2.1	—	0.2	1.1	1.4
Manufacturing	13.7	13.8	2.5	1.6	9.4	9.1
Construction	2.3	2.7	0.4	0.4	1.5	1.8
Transport	0.2	0.5	1.2	0.4	0.6	0.5
Information & communication services	3.2	4.2	0.3	0.2	2.1	2.7
Commercial services & tourism	0.8	0.4	1.5	0.1	1.1	0.3
Economic framework	8.6	3.5	0.5	0.3	5.5	2.3
Total	*54.6*	*51.5*	*53.1*	*44.8*	*54.0*	*48.9*
SOCIETY						
Health	1.6	3.0	21.4	30.9	9.2	13.7
Education & training	0.1	0.1	1.0	0.4	0.5	0.2
Social development & community services	2.0	2.3	3.0	3.3	2.4	2.7
Total	*3.8*	*5.4*	*25.4*	*34.6*	*12.1*	*16.6*
ENVIRONMENT						
Environmental policy frameworks & other aspects	1.1	1.6	1.9	2.0	1.4	1.7
Environmental management	19.8	19.5	17.9	17.0	19.1	18.5
Total	*20.9*	*21.1*	*19.8*	*19.0*	*20.5*	*20.3*
NON-ORIENTED RESEARCH	2.1	2.4	1.7	1.5	2.0	2.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

— nil or rounded to zero (including null cells)

1.5 EXPENDITURE ON R&D, by research field

	COMMONWEALTH		STATE/TERRITORY		TOTAL	
	2002–03	*2004–05*	*2002–03*	*2004–05*	*2002–03*	*2004–05*
	$'000	$'000	$'000	$'000	$'000	$'000
Mathematical sciences	27 233	29 142	8 864	9 301	36 097	38 443
Physical sciences	119 212	127 307	424	231	119 636	127 537
Chemical sciences	104 910	99 439	16 867	13 305	121 777	112 745
Earth sciences	203 871	207 288	38 588	22 695	242 459	229 982
Biological sciences	161 720	165 308	101 699	140 295	263 418	305 603
Information, computing & comm. sciences	165 024	123 845	16 663	9 447	181 687	133 292
Engineering & technology	393 069	409 565	31 374	16 422	424 444	425 986
Agricultural, veterinary & environmental sciences	243 508	281 700	517 798	480 118	761 306	761 818
Architecture, urban environment & building	2 384	2 693	881	1 816	3 266	4 509
Medical & health sciences	25 964	49 714	172 448	239 874	198 411	289 588
Education	831	866	8 307	3 598	9 138	4 465
Economics	49 982	37 108	7 736	10 401	57 717	47 509
Commerce, management, tourism & services	3 051	3 615	3 538	2 948	6 588	6 563
Policy & political science	523	104	3 089	425	3 611	529
Studies in human society	8 733	12 940	5 375	5 077	14 109	18 017
Behavioural & cognitive sciences	9 105	7 446	2 302	1 132	11 407	8 577
Law, justice & law enforcement	7 116	11 780	8 956	18 630	16 071	30 411
Journalism, librarianship & curatorial studies	926	1 047	519	559	1 444	1 606
The arts	40	185	898	559	938	744
Language & culture	—	305	886	—	886	305
History & archaeology	2 204	959	3 641	494	5 845	1 453
Philosophy & religion	1 906	1 032	—	—	1 906	1 032
Total	**1 531 309**	**1 573 387**	**950 852**	**977 326**	**2 482 161**	**2 550 713**

— nil or rounded to zero (including null cells)

1.6 EXPENDITURE ON R&D, by research field—proportions

	COMMONWEALTH		STATE/TERRITORY		TOTAL	
	2002–03	*2004–05*	*2002–03*	*2004–05*	*2002–03*	*2004–05*
	%	%	%	%	%	%
Mathematical sciences	1.8	1.9	0.9	1.0	1.5	1.5
Physical sciences	7.8	8.1	—	—	4.8	5.0
Chemical sciences	6.9	6.3	1.8	1.4	4.9	4.4
Earth sciences	13.3	13.2	4.1	2.3	9.8	9.0
Biological sciences	10.6	10.5	10.7	14.4	10.6	12.0
Information, computing & comm. sciences	10.8	7.9	1.8	1.0	7.3	5.2
Engineering & technology	25.7	26.0	3.3	1.7	17.1	16.7
Agricultural, veterinary & environmental sciences	15.9	17.9	54.5	49.1	30.7	29.9
Architecture, urban environment & building	0.2	0.2	0.1	0.2	0.1	0.2
Medical & health sciences	1.7	3.2	18.1	24.5	8.0	11.4
Education	0.1	0.1	0.9	0.4	0.4	0.2
Economics	3.3	2.4	0.8	1.1	2.3	1.9
Commerce, management, tourism & services	0.2	0.2	0.4	0.3	0.3	0.3
Policy & political science	—	—	0.3	—	0.1	—
Studies in human society	0.6	0.8	0.6	0.5	0.6	0.7
Behavioural & cognitive sciences	0.6	0.5	0.2	0.1	0.5	0.3
Law, justice & law enforcement	0.5	0.7	0.9	1.9	0.6	1.2
Journalism, librarianship & curatorial studies	0.1	0.1	0.1	0.1	0.1	0.1
The arts	—	—	0.1	0.1	—	—
Language & culture	—	—	0.1	—	—	—
History & archaeology	0.1	0.1	0.4	0.1	0.2	0.1
Philosophy & religion	0.1	0.1	—	—	0.1	—
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

— nil or rounded to zero (including null cells)

CHAPTER 2 PRIVATE NON-PROFIT R&D

EXPENDITURE ON R&D

Private non-profit organisation expenditure on R&D (PNPERD) in Australia in 2004–05 was $493.2 million. This represented an increase of 37.2% in current price terms over 2002–03 and 28.0% in chain volume terms.

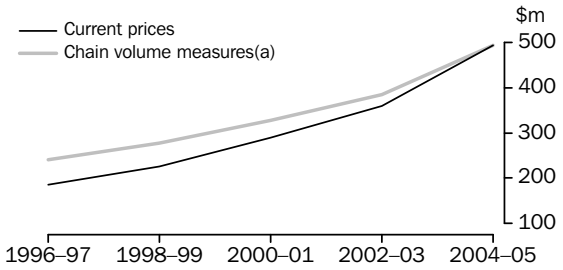
PNP RESOURCES DEVOTED TO R&D

		1996–97	*1998–99*	*2000–01*	*2002–03*	*2004–05*
Expenditure on R&D						
Current prices	$m	185.8	225.3	289.0	359.5	493.2
Chain volume measures(a)	$m	240.3	276.9	327.5	385.4	493.2
Human resources devoted to R&D	PYE	2 351	2 551	2 791	3 117	3 930

(a) The reference year for chain volume measures is 2004–05. See paragraph 18 of the Explanatory notes.

Since 1996–97, PNPERD increased by an average of 20.7% per year in current price terms and 13.2% in chain volume terms.

PNP EXPENDITURE ON R&D

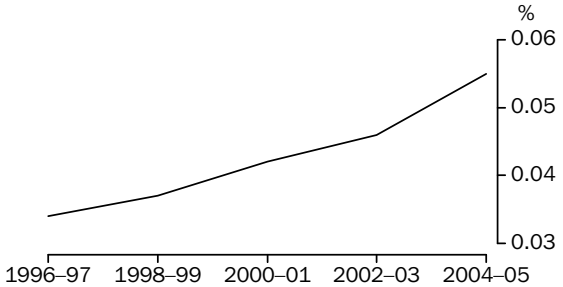


(a) The reference year for chain volume measures in 2004–05. See paragraph 18 of the Explanatory notes.

Proportion of GDP

PNPERD as a proportion of GDP increased from 0.05% in 2002–03 to 0.06% in 2004–05.

PNPERD AS A PROPORTION OF GDP(a)



(a) See paragraph 2 of the Explanatory notes.

Type of expenditure

In 2004–05, Current expenditure accounted for 92.0% ($453.5 million) of total PNPERD. Between 2002–03 and 2004–05, Current expenditure on R&D by PNP organisations increased by $135.2 million or 42.5%. Over the same period, Capital expenditure on R&D dropped by $1.6 million or 3.8%.

Source of funds

The main sources of R&D funds for PNP organisations in 2004–05 were Commonwealth government ($149.1 million or 30.2% of PNPERD) and Own funds ($106.7 million or 21.6%). Of all sources of R&D funds, Commonwealth government showed the largest increase since 2002–03 (up $45.2 million) followed by Overseas organisations (up $24.6 million).

Type of activity

In 2004–05, PNP expenditure on R&D was mainly directed into Applied research ($198.2 million or 40.2%) and Strategic basic research ($186.1 million or 37.7%). Between 2002–03 and 2004–05, expenditure on Applied research increased by $88.7 million. The next largest increase occurred for expenditure on Strategic basic research (up $36.0 million).

Location

Accounting for the highest levels of PNPERD in 2004–05 were locations in Victoria ($272.0 million), New South Wales ($137.1 million) and Western Australia ($37.9 million). Locations in New South Wales recorded the highest increase in PNPERD between 2002–03 and 2004–05 (up $60.9 million) followed by Victoria (up $40.5 million).

Victoria reported the highest PNPERD as a proportion of Gross State Product (GSP) at 0.12% in 2004–05, followed by New South Wales and Western Australia (both 0.04%). Since 2002–03, PNPERD/GSP ratios have remained relatively stable for all states and territories.

PNPERD AS A PROPORTION OF GSP(a), by location

	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*
	%	%	%	%	%	%	%	%
2002–03	0.03	0.12	0.01	0.01	0.03	—	np	np
2004–05	0.04	0.12	0.01	0.01	0.04	—	np	0.02

— nil or rounded to zero (including null cells)
np not available for publication but included in totals where applicable, unless otherwise indicated
(a) See paragraph 2 of the Explanatory notes.

Socio-economic objectives

The Society socio-economic objective (SEO) continued to account for the largest share of PNPERD (98.2%). Within the Society SEO, Health accounted for the majority of expenditure, at 93.0% or $458.7 million of total PNPERD.

Research fields

In 2004–05, Medical and health sciences and Biological sciences were the major fields of research expenditure, at $356.7 million and $95.9 million.

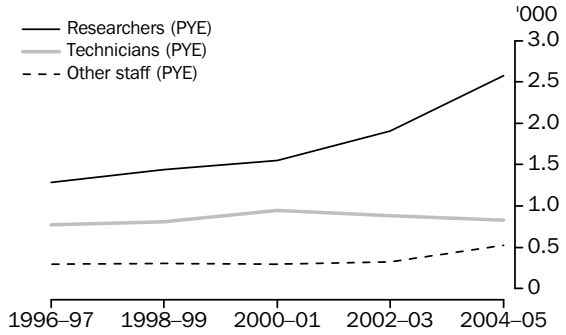
HUMAN RESOURCES DEVOTED TO R&D

A total of 3,930 person years of effort (PYE) was devoted to R&D by PNP organisations in 2004–05. This represented an increase of 26.1% since 2002–03.

Type of resource

Researchers accounted for the majority (65.6%) of human resource effort devoted to R&D in 2004–05 (2,577 PYE). PYE devoted to R&D by Researchers has increased by 35.2%. In contrast, effort by Technicians over the same period decreased by 7.0%.

PNP HUMAN RESOURCES DEVOTED TO R&D



2.1 RESOURCES DEVOTED TO R&D, summary statistics

		2002–03	2004–05
Type of expenditure			
Capital expenditure			
Land, buildings & other structures	$'000	13 738	9 783
Other	$'000	27 480	29 849
Total	$'000	*41 218*	*39 632*
Current expenditure			
Labour costs	$'000	178 757	245 134
Other	$'000	139 572	208 394
Total	$'000	*318 329*	*453 528*
Source of funds			
Own funds	$'000	86 328	106 717
Commonwealth government	$'000	103 939	149 099
State and local government	$'000	39 821	49 194
Other private & non-profit organisations	$'000	25 538	34 258
Business	$'000	31 594	41 190
Joint government/business	$'000	3 019	np
Universities	$'000	3 947	8 384
Donations & bequests	$'000	16 694	36 779
Other Australian(a)	$'000	11 773	np
Overseas	$'000	36 894	61 478
Type of activity			
Pure basic research	$'000	62 692	47 320
Strategic basic research	$'000	150 155	186 141
Applied research	$'000	109 485	198 234
Experimental development	$'000	37 216	61 465
Location of expenditure			
NSW	$'000	76 168	137 072
Vic.	$'000	231 474	271 987
Qld	$'000	9 647	13 052
SA	$'000	6 135	7 028
WA	$'000	22 388	37 866
Tas.	$'000	235	199
NT	$'000	np	np
ACT	$'000	np	3 199
AET	$'000	—	—
Overseas	$'000	3 528	np
Total expenditure on R&D	$'000	**359 548**	**493 160**
Human resources devoted to R&D			
Researchers	PYE	1 906	2 577
Technicians	PYE	885	823
Other staff	PYE	325	530
Total human resources devoted to R&D	PYE	**3 117**	**3 930**

— nil or rounded to zero (including null cells)

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

(a) The treatment of Other Australian sources of funds has changed for 2004–05. See paragraph 16 of the Explanatory notes for further detail.

2.2 RESOURCES DEVOTED TO R&D, summary statistics—proportions

	2002–03	*2004–05*
	%	%
Type of expenditure		
Capital expenditure		
Land, buildings & other structures	3.8	2.0
Other	7.6	6.1
Total	*11.5*	*8.0*
Current expenditure		
Labour costs	49.7	49.7
Other	38.8	42.3
Total	*88.5*	*92.0*
Source of funds		
Own funds	24.0	21.6
Commonwealth government	28.9	30.2
State & local government	11.1	10.0
Other private & non-profit organisations	7.1	6.9
Business	8.8	8.4
Joint government/business	0.8	np
Universities	1.1	1.7
Donations & bequests	4.6	7.5
Other Australian(a)	3.3	np
Overseas	10.3	12.5
Type of activity		
Pure basic research	17.4	9.6
Strategic basic research	41.8	37.7
Applied research	30.5	40.2
Experimental development	10.4	12.5
Location of expenditure		
NSW	21.2	27.8
Vic.	64.4	55.2
Qld	2.7	2.6
SA	1.7	1.4
WA	6.2	7.7
Tas.	0.1	—
NT	np	np
ACT	np	0.6
AET	—	—
Overseas	1.0	np
Total expenditure on R&D	**100.0**	**100.0**
Human resources devoted to R&D		
Researchers	61.2	65.6
Technicians	28.4	20.9
Other staff	10.4	13.5
Total human resources devoted to R&D	**100.0**	**100.0**

— nil or rounded to zero (including null cells)

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

(a) The treatment of Other Australian sources of funds has changed for 2004–05. See paragraph 16 of the Explanatory notes for further detail.

2.3 EXPENDITURE ON R&D, by socio-economic objective—values and proportions ...

	2002–03	*2004–05*	*2002–03*	*2004–05*
	$'000	$'000	%	%
DEFENCE	—	—	—	—
ECONOMIC DEVELOPMENT				
Plant production & plant primary products	np	np	np	np
Animal production & animal primary products	np	—	np	—
Mineral resources (excl. energy)	—	—	—	—
Energy resources	—	—	—	—
Energy supply	np	—	np	—
Manufacturing	5 155	np	1.4	np
Construction	53	—	—	—
Transport	np	—	np	—
Information & communication services	np	45	np	—
Commercial services & tourism	4	np	—	np
Economic framework	155	86	—	—
Total	*11 211*	*6 728*	*3.1*	*1.4*
SOCIETY				
Health	323 956	458 738	90.1	93.0
Education & training	20 094	np	5.6	np
Social development & community services	1 855	np	0.5	np
Total	*345 905*	*484 195*	*96.2*	*98.2*
ENVIRONMENT				
Environmental policy frameworks & other aspects	np	np	np	np
Environmental management	np	np	np	np
Total	*1 676*	*2 237*	*0.5*	*0.5*
NON-ORIENTED RESEARCH	756	—	0.2	—
Total	**359 548**	**493 160**	**100.0**	**100.0**

— nil or rounded to zero (including null cells)

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

2.4 EXPENDITURE ON R&D, by research field—values and proportions

	2002–03	*2004–05*	*2002–03*	*2004–05*
	$'000	$'000	%	%
Mathematical sciences	np	np	np	np
Physical sciences	np	—	np	—
Chemical sciences	4 045	np	1.1	np
Earth sciences	—	np	—	np
Biological sciences	104 560	95 887	29.1	19.4
Information, computing & communication sciences	4 844	1 730	1.3	0.4
Engineering & technology	1 465	np	0.4	np
Agricultural, veterinary & environmental sciences	2 087	np	0.6	np
Architecture, urban environment & building	np	—	np	—
Medical & health sciences	220 796	356 705	61.4	72.3
Education	np	np	np	np
Economics	101	np	—	np
Commerce, management, tourism & services	53	103	—	—
Policy & political science	632	np	0.2	np
Studies in human society	1 206	2 096	0.3	0.4
Behavioural & cognitive sciences	933	1 516	0.3	0.3
Law, justice & law enforcement	np	—	np	—
Journalism, librarianship & curatorial studies	—	—	—	—
The arts	—	—	—	—
Language & culture	—	—	—	—
History & archaeology	—	22	—	—
Philosophy & religion	129	240	—	—
Total	**359 548**	**493 160**	**100.0**	**100.0**

— nil or rounded to zero (including null cells)

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

CHAPTER 3 BIOTECHNOLOGY RELATED R&D

INTRODUCTION

Additional information on biotechnology related R&D was collected in the 2004–05 Government and Private Non-profit organisations R&D survey. Organisations that performed or paid others to perform biotechnology related R&D (extramural) were asked additional questions. Although out of scope of GOVERD and PNPERD, extramural expenditure on biotechnology related R&D has been separately included in this chapter.

GOVERNMENT EXPENDITURE ON BIOTECHNOLOGY RELATED R&D

Expenditure on biotechnology related R&D performed by Government organisations in 2004–05 totalled $299.4 million. Commonwealth government organisations performed 74.5% ($223.1 million) of total Government expenditure on biotechnology related R&D, with State and territory governments accounting for the remainder ($76.3 million).

The majority of biotechnology related R&D performed by Commonwealth government was for the organisation's own purposes (99.1% or $221.1 million). In contrast, over a quarter of all biotechnology related R&D carried out by State and territory government organisations in 2004–05 (27.5% or $21.0 million) was performed for another.

In 2004–05, Commonwealth and State and territory government organisations each paid $0.4 million to others located within Australia, to perform biotechnology related R&D on their behalf. There were no such payments to Overseas organisations.

PRIVATE NON-PROFIT EXPENDITURE ON BIOTECHNOLOGY RELATED R&D

Australian Private non-profit (PNP) organisations performed $138.0 million of expenditure on biotechnology related R&D in 2004–05, of which 96.2% ($132.8 million) was performed for their own purposes. Over this period, PNP organisations paid a total of $3.0 million to other organisations to perform R&D on their behalf.

BIOTECHNOLOGY RELATED R&D EXPENDITURE BY BIO-INDUSTRY

Almost three quarters of expenditure on biotechnology related R&D by Commonwealth government organisations was attributable to the Agricultural ($114.1 million) and Human health ($52.2 million) bio-industries. Similarly, the Human health and Agricultural bio-industries accounted for 91.7% of expenditure on biotechnology related R&D by State and territory government organisations (at $35.9 million and $34.1 million respectively).

In 2004–05, the Human health bio-industry accounted for 92.2% ($127.3 million) of total expenditure on biotechnology related R&D by PNP organisations.

3.1 EXPENDITURE ON BIOTECHNOLOGY RELATED R&D(a), by sector

	GOVERNMENT			
	Commonwealth	*State/territory*	*Total*	*PRIVATE NON-PROFIT*
	$'000	$'000	$'000	$'000
Performed by the organisation				
For own purposes	221 135	55 316	276 451	132 826
For another organisation	1 943	20 968	22 911	5 190
Total	**223 078**	**76 284**	**299 362**	**138 016**
Paid to another to perform				
Organisations located within Australia	373	354	727	np
Organisations located overseas	—	—	—	np
Total	**373**	**354**	**727**	**3 041**

— nil or rounded to zero (including null cells)

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

(a) Expenditure on R&D performed by the organisation and amounts paid to others to perform R&D are not additive. This is because amounts paid to other organisations to perform R&D may be reported by the performing organisation (as expenditure performed for another).

3.2 GOVERNMENT EXPENDITURE ON BIOTECHNOLOGY RELATED R&D, by bio-industry sector

	PERFORMED BY THE ORGANISATION			
	For own purposes	*For another organisation*	*Total*	*Paid to another to perform*
	$'000	$'000	$'000	$'000
COMMONWEALTH				
Human health				
Diagnostics	17 856	—	17 856	—
Therapeutics	33 613	682	34 294	—
Total	*51 468*	*682*	*52 150*	—
Bioinformatics	150	—	150	78
Agricultural biotechnology				
Plant	62 391	137	62 528	15
Animal	39 272	—	39 272	280
Aquaculture	11 168	1 124	12 292	—
Total	*112 832*	*1 261*	*114 093*	*295*
Industrial processing				
Food processing	10 131	—	10 131	—
Specialty chemicals	9 057	—	9 057	—
Total	*19 188*	—	*19 188*	—
Natural resource recovery				
Energy	1 567	—	1 567	—
Minerals	3 887	—	3 887	—
Total	*5 454*	—	*5 454*	—
Environment	32 043	—	32 043	—
Total	**221 135**	**1 943**	**223 078**	**373**
STATE/TERRITORY				
Human health				
Diagnostics	19 932	37	19 969	131
Therapeutics	12 985	2 901	15 886	54
Total	*32 916*	*2 938*	*35 855*	*185*
Bioinformatics	3 354	1 948	5 302	124
Agricultural biotechnology				
Plant	14 331	13 831	28 163	45
Animal	4 261	1 703	5 964	—
Total	*18 593*	*15 534*	*34 127*	*45*
Environment	453	548	1 001	—
Total	**55 316**	**20 968**	**76 284**	**354**

— nil or rounded to zero (including null cells)

3.2 GOVERNMENT EXPENDITURE ON BIOTECHNOLOGY RELATED R&D, by bio-industry sector *continued*

	PERFORMED BY THE ORGANISATION			
	For own purposes	*For another organisation*	*Total*	*Paid to another to perform*
	$'000	$'000	$'000	$'000
	TOTAL GOVERNMENT			
Human health				
Diagnostics	37 787	37	37 825	131
Therapeutics	46 597	3 583	50 180	54
Total	*84 384*	*3 620*	*88 005*	*185*
Bioinformatics	3 504	1 948	5 452	202
Agricultural biotechnology				
Plant	76 723	13 968	90 691	60
Animal	43 534	1 703	45 236	280
Aquaculture	11 168	1 124	12 292	—
Total	*131 425*	*16 795*	*148 220*	*340*
Industrial processing				
Food processing	10 131	—	10 131	—
Specialty chemicals	9 057	—	9 057	—
Total	*19 188*	—	*19 188*	—
Natural resource recovery				
Energy	1 567	—	1 567	—
Minerals	3 887	—	3 887	—
Total	*5 454*	—	*5 454*	—
Environment	32 496	548	33 044	—
Total	**276 451**	**22 911**	**299 362**	**727**

— nil or rounded to zero (including null cells)

3.3 PRIVATE NON-PROFIT EXPENDITURE ON BIOTECHNOLOGY RELATED R&D, by bio-industry sector

	PERFORMED BY THE ORGANISATION			
	For own purposes	*For another organisation*	*Total*	*Paid to another to perform*
	$'000	$'000	$'000	$'000
Human health				
Diagnostics	np	np	46 716	np
Therapeutics	76 195	4 351	80 545	np
Total	np	np	*127 261*	np
Bioinformatics	8 346	np	np	np
Agricultural biotechnology	np	—	np	—
Total	**132 826**	**5 190**	**138 016**	**3 041**

— nil or rounded to zero (including null cells)

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

EXPLANATORY NOTES

DATA SOURCES

1 The statistics presented in this publication have been compiled from data collected from Government and Private non-profit organisations in the Survey of Research and Experimental Development in respect of the year ended 30 June 2005. The survey was conducted by mail questionnaire and a 96.8% response rate was obtained.

2 The GDP and GSP figures used to derive GOVERD and PNPERD/GDP and GSP ratios are current at the time of manuscript finalisation and are referenced in the tables below.

EXPENDITURE ON GROSS DOMESTIC PRODUCT, current prices

	1996–97	*1998–99*	*2000–01*	*2002–03*	*2004–05*
	$m	$m	$m	$m	$m
GDP	545 736	607 863	689 340	782 798	893 704

Source: National Income, Expenditure and Product, Australian National Accounts, March Quarter 2006 (cat. no. 5206.0)

GROSS STATE PRODUCT, current prices

	NSW	*Vic.*	*Qld*	*SA*	*WA*	*Tas.*	*NT*	*ACT*
	$m	$m	$m	$m	$m	$m	$m	$m
2002–03	275 358	197 266	132 432	53 635	85 470	13 502	9 042	16 091
2004–05	305 437	222 022	158 506	59 819	100 900	16 114	10 418	18 306

Source: Australian National Accounts, State Accounts (cat. no. 5220.0)

STATISTICAL UNIT

3 The statistical unit used to represent organisations and for which statistics are reported is, in most cases, the Australian Business Number (ABN) unit. The ABN unit is the organisational unit which has registered for an ABN and thus appears on the Australian Taxation Office (ATO) administered Australian Business Register (ABR). This unit is suitable for ABS statistical needs when the organisation is simple in structure. For more significant and diverse organisations where the ABN unit is not suitable for ABS statistical needs, the statistical unit used is the Type of Activity Unit (TAU). A TAU is comprised of one or more organisational entities, sub-entities or branches of an organisation entity within an Enterprise Group that can report production and employment data for similar economic activities. Further details about the ABS economic statistical units used in this survey and in other ABS economic surveys (both sample and census) can be found in Chapter 2 of the *Standard Economic Sector Classifications of Australia (SESCA) 2002* (cat.no. 1218.0).

DEFINITIONS

4 R&D as collected by the ABS is defined in accordance with the OECD standard as comprising 'creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications'. Although outside the economic boundary of R&D as defined by the OECD, R&D performed overseas by Australian organisations are included in this publication's data.

DEFINITIONS *continued*

5 For a more comprehensive interpretation of the definition of R&D activity, see the *Australian Standard Research Classification (ASRC), 1998* (cat. no. 1297.0) or refer to the OECD publication *Proposed Standard Practice for Surveys on Research and Experimental Development ('Frascati Manual' 2002)*, OECD, Paris, 2003.

SCOPE

6 In 2004–05, the sector scope for Government and Private non-profit organisations was determined using the guidelines of the Standard Institutional Sector Classification of Australia (SISCA). The Government and the Private non-profit sectors were defined by SISCA 3000 and SISCA 5000 respectively. Further details about the ABS sector classification can be found in the *Standard Economic Sector Classifications of Australia (SESCA) 2002* (cat.no. 1218.0).

COVERAGE

7 The Government and Private non-profit surveys comprise a complete enumeration of organisations identified by the ABS as likely to have carried out R&D activity.

8 Within the scope of the survey, organisations were included if they:

- reported R&D in the previous survey;
- were identified as likely to have R&D activity from other sources such as newspapers, journals, research compendia etc.; or
- indicated that R&D activity had been performed in the reference year via a coverage questionnaire.

9 For the 2004–05 survey, all Government and Private non-profit organisations which responded to the 2002–03 survey were reviewed to ensure they were collected in the correct sector, as determined by their SISCA classification. This resulted in the transfer of some organisations between the Government and Private and Non-profit sectors, and the Business sector. The movement of organisations between sectors has impacted on comparability of data with previously published estimates.

Government sector

10 The general government sector comprises all government units of the Commonwealth Government, state and territory governments and each local government authority, and all resident non-market Non-profit Institutes (NPIs) that are controlled and mainly financed by those governments.

11 The ABS R&D survey of the Government sector excludes local government organisations as they are considered to have low R&D activity. Additionally, higher education organisations (e.g. universities) are also excluded as they are collected separately in the Higher education sector.

12 Government entities mainly engaged in market production or financial activities are not classified as government units. These organisations are included in the Business sector.

Private non-profit sector

13 The Private non-profit sector comprises all resident non-market NPIs that are not controlled and not mainly financed by government. Such NPIs provide goods and services to households free or at prices that are not economically significant.

14 Private non-profit organisations mainly serving business are included in the Business sector.

SOCIO-ECONOMIC OBJECTIVE (SEO) AND RESEARCH FIELDS, COURSES AND DISCIPLINES (RFCD) CLASSIFICATIONS

15 Statistics classified by SEO and RFCD have been collected and presented in this publication. Data were subjectively allocated by organisations at the time of reporting. See the Technical Note on Reliability of Statistics for further detail. For more information on these classifications see the *Australian Standard Research Classification (ASRC), 1998* (cat. no. 1297.0).

SOURCE OF FUNDS

16 The R&D performed by an organisation may be funded by more than one source. For example, funding provided to an organisation via an unincorporated Collaborative Research Centre may originally be sourced from the Government, Higher education and Business sectors. Prior to 2004–05, multi-source funding was classified in the R&D Government and Private Non-profit survey to 'Other Australian' sources of funds. For the 2004–05 survey, where possible this type of funding was reported separately against each of the original sources. An exception to this treatment being levies, which continued to be treated as Joint government/business funds. As a consequence of this change, the amount of funding attributed to Other Australian sources was significantly lower in 2004–05 than in previous cycles.

BIO-INDUSTRY SECTOR

17 The bio-industry sector classification is an unregistered classification assembled by the ABS in conjunction with government and industry groups. This classification was established specifically for the biotechnology portion of the R&D surveys, to enable areas within the biotechnology sector to be classified at a finer level.

CHAIN VOLUME MEASURES (CVM)

18 CVM in this publication are annually reweighted chain Laspeyres indexes referenced to the current price values in a chosen reference year (currently 2004–05). They are formed in a multi-stage process of which the major steps are described in Section 15 of the *Information Paper: Introduction of Chain Volume Measures in the Australian National Accounts* (cat. no. 5248.0).

RELATED PUBLICATIONS

19 Users may also wish to refer to the following publications:

Australian Bureau of Statistics 1998, *Australian Standard Research Classification (ASRC)*, cat. no. 1297.0, ABS, Canberra

Australian Bureau of Statistics 2004, *Research and Experimental Development, All Sector Summary, Australia, 2002–03*, cat. no. 8112.0, ABS, Canberra

Australian Bureau of Statistics 2006, *Research and Experimental Development, Businesses, Australia, 2004–05*, cat. no. 8104.0, ABS, Canberra

Australian Bureau of Statistics 2006, *Research and Experimental Development, Higher Education Organisations, Australia, 2004*, cat. no. 8111.0, ABS, Canberra

Organisation for Economic Co-operation and Development 2004, *Main Science and Technology Indicators 2006/1*, OECD, Paris

Organisation for Economic Co-operation and Development 2003, *Proposed Standard Practice for Surveys on Research and Experimental Development ('Frascati Manual' 2002)*, OECD, Paris

20 Current publications and other products released by the ABS are listed in the *Catalogue of Publications and Products* (cat. no. 1101.0). The catalogue is available from any ABS office or the ABS web site <http://www.abs.gov.au>. The ABS also issues a daily Release Advice on the web site which details products to be released in the week ahead.

ABS DATA AVAILABLE ON REQUEST

21 As well as the statistics included in this and related publications, the ABS may have other relevant data available on request. Inquiries should be made to the National Information and Referral Service on 1300 135 070.

ROUNDING

22 Where figures have been rounded, discrepancies may occur between sums 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 questionnaire, treatment of non-response, inaccurate reporting by 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 Some errors in reporting by providers for past reference periods were identified during processing of the 2004–05 survey. Because of extensive changes in organisation structures and personnel since 2002–03, particularly in the Government sector, it was not possible to obtain accurate past data from these providers. This has had some impact on the comparability between 2004–05 data and previously published estimates.

Reliability of Statistics

4 When interpreting the statistics in this publication, the reliability of the estimates may be affected by the following specific non-sampling errors:

- Many organisations provided estimates due to a lack of separately recorded data on R&D activity.
- Data were subjectively classified, by organisations, to research fields, socio-economic objectives and types of activity at the time of reporting. Some organisations may have experienced difficulty in classifying their R&D projects. The ABS makes every effort to ensure correct and consistent interpretation and reporting of these data by applying consistent processing methodologies.
- Estimation of overhead R&D expenditure varied across organisations.

GLOSSARY

Applied research	Original work undertaken in order 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 methods or ways of achieving some specific and predetermined objectives.
Bioinformatics	Computer based collection, organisation and analysis of biological information, especially genomics and molecular modelling (DNA/RNA/protein sequencing and databases for humans, plants etc.).
Biotechnology	The application of science and engineering principles to living organisms as well as parts, products or models thereof, to alter living or non-living materials for the production of knowledge, goods and services.
Capital expenditure	Expenditure on the acquisition of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment attributable to R&D activity.
Current expenditure	Expenditure on direct labour costs, materials, fuels, rent and hiring, repairs and maintenance, data processing etc. and the proportion of expenditure on general services and overheads which are attributable to R&D activity.
Experimental development	Systematic work, using existing knowledge gained from research or practical experience, for the purpose of creating new or improved products/processes.
Human resources devoted to R&D	The effort of researchers, technicians and other staff directly involved with R&D activity. Overhead staff (e.g. administrative and general service employees such as personnel officers, janitors, etc.) whose work indirectly supports R&D, are excluded.
Labour costs	Expenditure relating to: wages and salaries; overtime earnings; penalty payments; shift allowances; employer contributions into superannuation; fringe benefits and payroll taxes; severance, termination and redundancy payments; workers' compensation premiums/costs; provisions for employee entitlements; salaries and fees of directors and executives; retainers and commissions of persons who received a retainer; bonuses; annual and other types of paid leave.
Location	The region(s) in which the organisation performed the R&D. This may not be the head office location of the organisation.
Other current expenditure	Expenditure on: 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.
Other supporting staff	Skilled and unskilled craftpersons, secretarial and clerical staff directly associated with R&D activity.
Person years of effort	One person year of effort is equal to a full time employee whose time is wholly devoted to R&D for a whole year.
Pure basic research	Experimental and theoretical work undertaken to acquire new knowledge without looking for long-term benefits other than the advancement of knowledge.

R&D activity Systematic investigation or experimentation involving innovation or technical risk, the outcome of which is new knowledge, with or without a specific practical application, or new or improved products, processes, materials, devices or services. R&D activity extends to modifications to existing products/processes. R&D activity ceases and pre-production begins when work is no longer experimental.

Research field Field in which the R&D activity was performed. The RFCD classification is primarily structured around disciplines or activities. In short, it describes the nature of the research being performed.

Researchers Those involved with the conception and/or development of new products/processes (e.g. executives and directors involved in the planning or management of scientific and technical aspects of R&D projects, and software developers/programmers). They exclude executives and directors concerned primarily with budgets and human resources rather than project content.

Socio-economic objective The broad socio-economic areas of expected benefit rather than the immediate objectives of the researcher. The SEO classification defines the main areas of Australian economic and social activity to which the results of research programs are applied. In short, it describes the purpose of the research.

Strategic basic research Experimental and theoretical work undertaken to acquire new knowledge directed in specified broad areas in the expectation of useful discoveries. It provides the broad base of knowledge for the solution of recognised practical problems.

Technicians Those performing technical tasks in support of R&D activity, normally under the direction and supervision of a researcher. These tasks include preparation of experiments, taking records, preparation of charts and graphs and coding computer programs.

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