



2002-03

8109.0

RESEARCH AND EXPERIMENTAL DEVELOPMENT

**GOVERNMENT AND PRIVATE  
NON-PROFIT ORGANISATIONS AUSTRALIA**

EMBARGO: 11.30AM (CANBERRA TIME) WED 8 SEP 2004

**C O N T E N T S**

	<i>page</i>
Notes .....	2
List of tables .....	3
 <b>CHAPTERS</b>	
1 Summary .....	4
2 Government research and experimental development .....	5
3 Private non-profit research and experimental development .....	22
 <b>ADDITIONAL INFORMATION</b>	
Explanatory Notes .....	32
Glossary .....	35

**I N Q U I R I E S**

- For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070 or Derek Byars on Canberra (02) 6252 5627.

# NOTES

## RESEARCH AND EXPERIMENTAL DEVELOPMENT (R&D) GUIDELINES

Australian Bureau of Statistics (ABS) surveys of R&D are conducted in accordance with standard guidelines promulgated by the Organisation for Economic Co-operation and Development (OECD). It should be noted that R&D performed overseas by Australian government and private non-profit organisations is included in the data in this publication. The extent to which this impacts on international comparisons is being investigated.

The government sector includes all federal, state and local government departments and authorities. However, for the purpose of this survey local government organisations have been excluded as research has indicated that their contribution to total R&D activity would be minimal.

## REVISIONS

It should be noted that data presented in this publication may subsequently be revised. These revisions are generally small and do not impact significantly on the period to period movements. Where revisions have been applied, the estimate is annotated with an 'r'.

## 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
NSW	New South Wales
NT	Northern Territory
OECD	Organisation for Economic Co-operation and Development
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

Dennis Trewin  
Australian Statistician

## LIST OF TABLES .....

page

### GOVERNMENT R&D

<b>2.1</b>	Resources devoted to R&D .....	9
<b>2.2</b>	Expenditure, by socioeconomic objective, by type of expenditure .....	10
<b>2.3</b>	Expenditure, by research field, by type of expenditure .....	11
<b>2.4</b>	Expenditure, by socioeconomic objective, by type of activity .....	12
<b>2.5</b>	Expenditure, by research field, by type of activity .....	13
<b>2.6</b>	Expenditure, by socioeconomic objective, by source of funds .....	14
<b>2.7</b>	Expenditure, by research field, by source of funds .....	16
<b>2.8</b>	Expenditure, by socioeconomic objective, by location .....	18
<b>2.9</b>	Expenditure, by research field, by location .....	19
<b>2.10</b>	Human resources, by socioeconomic objective, by type of employee .....	20
<b>2.11</b>	Human resources, by research field, by type of employee .....	21

### PRIVATE NON-PROFIT R&D

<b>3.1</b>	Expenditure, by socioeconomic objective, by type of expenditure .....	24
<b>3.2</b>	Expenditure, by research field, by type of expenditure .....	25
<b>3.3</b>	Expenditure, by socioeconomic objective, by type of activity .....	25
<b>3.4</b>	Expenditure, by research field, by type of activity .....	26
<b>3.5</b>	Expenditure, by socioeconomic objective, by source of funds .....	27
<b>3.6</b>	Expenditure, by research field, by source of funds .....	28
<b>3.7</b>	Expenditure, by socioeconomic objective, by location .....	29
<b>3.8</b>	Expenditure, by research field, by location .....	29
<b>3.9</b>	Human resources, by socioeconomic objective, by type of employee .....	30
<b>3.10</b>	Human resources, by research field, by type of employee .....	31

## EXPENDITURE ON R&amp;D

Expenditure on R&D carried out by Government organisations (GOVERD) in Australia in 2002-03 was estimated to be \$2,482m at current prices. This represented a 5.4% increase over the two years since 2000-01. In volume terms, with the effect of changes in prices and wages and salaries removed, R&D expenditure decreased by 0.2% compared with 2000-01. GOVERD represented 0.33% of Gross Domestic Product (GDP), down from 0.35% in 2000-01.

Expenditure on R&D carried out by Private non-profit organisations in Australia in 2002-03 was estimated to be \$360m at current prices. This represented a 24.4% increase over the two years since 2000-01. In volume terms, R&D expenditure increased by 17.2% compared with 2000-01.

HUMAN RESOURCES  
DEVOTED TO R&D

Human resources devoted to R&D in Australia by Government organisations in 2002-03 was estimated to be 18,542 person years. This was 2.2% higher than in 2000-01.

Human resources devoted to R&D in Australia by Private non-profit organisations in 2002-03 was estimated to be 3,117 person years, up 11.7% on 2000-01.

## PURPOSE OF RESEARCH

Most expenditure on R&D by Government organisations was directed towards Economic development (\$1,341m or 54.0%). Expenditure on the Environment accounted for a further \$509m or 20.5% in 2002-03.

Private non-profit organisations directed their R&D mainly towards Society (\$346m or 96.2%). Within Society, the main objective was Health (\$324m).

## CHAPTER 2

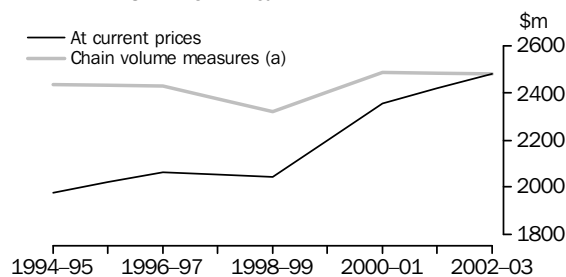
## GOVERNMENT RESEARCH AND EXPERIMENTAL DEVELOPMENT

### EXPENDITURE ON R&D

GOVERD has increased 5.4% since 2000-01. R&D expenditure by Commonwealth government organisations rose by \$126m or 9.0%, while R&D expenditure by state government organisations remained steady at \$951m.

In volume terms, with the effect of changes in prices and wages and salaries removed, R&D expenditure fell by 0.2% compared with 2000-01.

### EXPENDITURE ON R&D



(a) Reference year for chain volume measures is 2002-03. See paragraph 15 of the Explanatory Notes for details.

### EXPENDITURE ON R&D

	1994-95	1996-97	1998-99	2000-01	2002-03
	\$m	\$m	\$m	\$m	\$m
AT CURRENT PRICES					
Commonwealth	1 193.3	1 266.6	r1 179.4	r1 404.8	1 531.3
State	782.8	797.7	r863.6	r951.0	950.9
<b>Total</b>	<b>1 976.1</b>	<b>2 064.3</b>	<b>r2 043.0</b>	<b>r2 355.8</b>	<b>2 482.2</b>
CHAIN VOLUME MEASURES (a)					
Commonwealth	1 470.7	1 490.5	r1 336.8	r1 482.3	1 531.3
State	967.0	940.1	r982.2	r1 006.1	950.9
<b>Total</b>	<b>2 437.7</b>	<b>2 430.6</b>	<b>r2 319.0</b>	<b>r2 488.4</b>	<b>2 482.2</b>

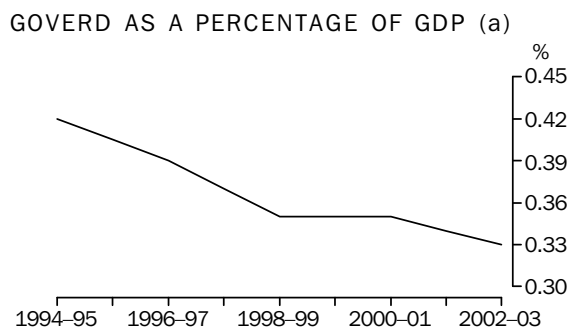
r revised

(a) Reference year for chain volume measures is 2002-03. See paragraph 15 of the Explanatory Notes for details.

### GOVERD AS A PERCENTAGE OF GDP

GOVERD as a percentage of GDP was 0.42% in 1994-95 before falling to 0.39% in 1996-97 and 0.35% in 1998-99. It remained steady at 0.35% in 2000-01 before decreasing further to 0.33% in 2002-03.

GOVERNMENT AS A  
PERCENTAGE OF GDP  
*continued*



(a) At current prices. See paragraph 4 of the Explanatory Notes.

Although the GOVERNMENT/GDP ratio has been falling, Australia still has a high ratio when compared with other Organisation for Economic Co-operation and Development (OECD) countries for which comparable data are available.

GOVERNMENT/GDP RATIOS OF OECD COUNTRIES

Country	2000-01	2002-03
	%	%
Iceland	0.70	0.76
Korea	0.35	0.39
France	0.38	0.37
Finland	0.36	0.36
Germany	0.34	0.35
Hungary	0.21	0.34
<b>Australia</b>	<b>0.35</b>	<b>0.33</b>
Czech Republic	0.34	0.30
Japan	0.30	0.30
Netherlands	0.25	0.26
Poland	0.21	0.26
United States of America	0.19	0.24
Italy	0.20	0.23
Canada	0.22	0.22
Denmark	0.29	0.18
Portugal	0.19	0.18
United Kingdom	0.22	0.17
Spain	0.15	0.16
Slovak Republic	0.16	0.15
Ireland	0.09	0.09
Switzerland	0.03	0.03

HUMAN RESOURCES  
DEVOTED TO R&D

Human resources devoted to research by Government organisations in person years steadily decreased between 1994-95 and 2000-01. In 2002-03 it rose to 18,542 person years, up 2.2% from 18,151 in 2000-01.

HUMAN RESOURCES  
DEVOTED TO R&D  
*continued*

HUMAN RESOURCES DEVOTED TO R&D

	1994-95	1996-97	1998-99	2000-01	2002-03
	person years	person years	person years	person years	person years
Commonwealth	10 660	10 377	r9 353	r9 565	10 185
State	8 649	8 813	r9 069	r8 587	8 357
<b>Total</b>	<b>19 309</b>	<b>19 190</b>	<b>r18 422</b>	<b>r18 151</b>	<b>18 542</b>

r revised

TYPE OF EXPENDITURE

Labour costs continued to be the main component of government R&D expenditure (51.9%), up from 50.6% in 2000-01. Capital expenditure decreased from 9.0% of total R&D expenditure in 2000-01 to 8.8% in 2002-03.

PURPOSE OF RESEARCH

Socioeconomic objectives on which most government R&D expenditure occurred were:

- Economic development (\$1,341m or 54.0%)
- Environment (\$509m or 20.5%)
- Society (\$300m or 12.1%)
- Defence (\$284m or 11.4%).

Within Economic development, the main objectives were:

- Plant production and primary products (\$377m or 15.2% of total expenditure)
- Animal production and primary products (\$278m or 11.2% of total expenditure)
- Manufacturing (\$233m or 9.4% of total expenditure).

RESEARCH FIELDS

The research fields in which most government R&D expenditure occurred were:

- Agricultural, veterinary and environmental sciences (\$761m or 30.7%)
- Engineering and technology (\$424m or 17.1%)
- Biological sciences (\$263m or 10.6%)
- Earth sciences (\$242m or 9.8%).

TYPE OF ACTIVITY

Applied research accounted for 53.9% of government R&D expenditure in 2002-03, down from 54.5% in 2000-01. Experimental development decreased to 15.7% in 2002-03, down from 17.5% in 2000-01. Pure basic research and Strategic basic research increased to 6.1% and 24.3% respectively in 2002-03, up from 4.6% and 23.4% in 2000-01.

SOURCE OF FUNDS FOR  
R&D

Most of the funding (\$1,993m or 80.3%) for government R&D came from the government sector itself. \$1,801m or 72.5% came from within the organisation performing the R&D (own funds), 4.7% from other Commonwealth organisations and 3.0% from other state and local government organisations. Other sources of funds included joint government/business (\$143m or 5.7%) and business (\$128m or 5.2%).

STATE COMPARISONS

The leading states in terms of location of government R&D expenditure were Victoria at \$545m and New South Wales at \$538m, accounting for 22.0% and 21.7% of total expenditure respectively. Next in order were Queensland (16.2%), South Australia (13.0%), the Australian Capital Territory (12.0%) and Western Australia (7.9%).

STATE COMPARISONS

*continued*

The R&D expenditure by Commonwealth government organisations was mainly located in Victoria (24.5%), the Australian Capital Territory (19.0%), New South Wales (17.5%) and South Australia (14.7%).

Of the \$951m state government R&D expenditure, most was carried out in New South Wales (28.5%), Queensland (26.8%) and Victoria (17.9%).

TYPE OF R&D STAFF

Total human resource effort devoted to R&D by Government organisations has increased by 2.2% since 2000-01. While the research effort of Researchers decreased by 7.9% or 688 person years to 8,036 person years, that of Technicians and Other supporting staff increased by 9.5% and 15.7% respectively.

Researchers accounted for 48.1% of the total research effort in 2000-01 and only 43.3% in 2002-03.



## 2.1 RESOURCES DEVOTED TO R&D

	TOTAL		COMMONWEALTH		STATE	
	2000-01	2002-03	2000-01	2002-03	2000-01	2002-03
<b>Type of expenditure</b>						
Land and buildings (\$'000)	128 311	100 140	75 059	88 206	53 253	11 934
Other capital expenditure (\$'000)	r83 826	117 514	58 150	92 531	r25 676	24 983
Labour costs(a) (\$'000)	r1 191 721	1 287 327	r717 641	785 516	r474 081	501 811
Other current expenditure (\$'000)	r951 939	977 181	r553 982	565 057	r397 957	412 124
<b>Type of R&amp;D activity</b>						
Pure basic research (\$'000)	r109 330	152 227	r71 166	99 014	r38 164	53 213
Strategic basic research (\$'000)	r550 897	602 507	r429 039	471 025	r121 858	131 482
Applied research (\$'000)	r1 283 365	1 338 252	r604 288	689 375	r679 077	648 877
Experimental development (\$'000)	r412 206	389 176	r300 340	271 895	r111 866	117 281
<b>Source of funds</b>						
Own funds (\$'000)	r1 752 627	1 800 506	r1 139 658	1 206 261	r612 969	594 245
Other Commonwealth Government (\$'000)	r126 495	116 997	r53 557	49 624	r72 938	67 373
Other State and local government (\$'000)	r71 961	75 650	27 491	39 624	r44 470	36 026
Business (\$'000)	r131 465	128 300	76 922	78 044	r54 543	50 256
Joint government/business(b) (\$'000)	r158 678	142 713	44 231	3 848	r114 447	138 865
Universities (\$'000)	r6 190	7 034	845	553	r5 345	6 481
Other Australian (\$'000)	r66 850	163 228	27 935	119 308	r38 915	43 920
Overseas (\$'000)	r41 533	47 734	34 194	34 048	r7 339	13 686
<b>Location of expenditure</b>						
NSW (\$'000)	r520 457	538 075	r246 466	267 382	r273 992	270 693
Vic. (\$'000)	r536 301	545 246	r345 925	374 969	r190 375	170 277
Qld (\$'000)	r360 787	402 989	r119 741	147 701	r241 046	255 288
SA (\$'000)	r287 940	322 082	r192 401	225 466	95 538	96 617
WA (\$'000)	r180 076	197 213	r74 596	89 099	105 480	108 114
Tas. (\$'000)	98 284	118 469	91 813	109 668	6 471	8 801
NT (\$'000)	r46 515	50 061	r13 558	20 622	r32 957	29 439
ACT (\$'000)	r315 613	297 081	r313 345	290 553	2 269	6 528
Other(c) (\$'000)	r9 824	10 946	r6 986	5 851	r2 837	5 095
<b>Total R&amp;D expenditure (\$'000)</b>	<b>r2 355 797</b>	<b>2 482 161</b>	<b>r1 404 831</b>	<b>1 531 310</b>	<b>r950 966</b>	<b>950 852</b>
<b>Human resources</b>						
Researchers ( <i>person years</i> )	r8 724	8 036	r4 418	3 739	r4 306	4 297
Technicians ( <i>person years</i> )	r6 482	7 098	r3 299	4 235	r3 183	2 863
Other supporting staff ( <i>person years</i> )	r2 945	3 407	r1 847	2 210	r1 097	1 197
<b>Total human resources (<i>person years</i>)</b>	<b>r18 151</b>	<b>18 542</b>	<b>r9 565</b>	<b>10 185</b>	<b>r8 587</b>	<b>8 357</b>

r revised

(a) See Glossary for definition of labour costs

(b) Includes funds provided by government levies

(c) Includes Australian External Territories and overseas.

**2.2**

## EXPENDITURE, by socioeconomic objective, by type of expenditure(a) .....

	Total	Land and buildings	Other capital expenditure	Labour costs(b)	Other current expenditure
<i>Socioeconomic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000
.....					
<i>Defence</i>	283 854	265	12 209	194 207	77 173
<i>Economic development</i>					
Plant - production and primary products	377 361	11 057	9 380	185 238	171 686
Animal - production and primary products	277 560	9 140	7 330	133 055	128 035
Mineral resources (excl. energy)	97 652	5 359	5 492	44 890	41 912
Energy resources	58 973	2 909	1 908	27 609	26 547
Energy supply	26 382	2 064	978	13 911	9 430
Manufacturing	233 441	15 116	20 623	109 631	88 071
Construction	38 448	2 603	1 646	21 364	12 835
Transport	15 286	310	390	6 448	8 139
Information and communication services	52 890	4 937	2 544	31 010	14 398
Commercial services and tourism	27 059	678	2 113	17 124	7 145
Economic framework	135 658	1 397	1 707	57 856	74 699
<i>Total economic development</i>	<i>1 340 710</i>	<i>55 568</i>	<i>54 110</i>	<i>648 136</i>	<i>582 895</i>
<i>Society</i>					
Health	227 989	3 442	10 322	140 608	73 617
Education and training	11 721	169	147	8 440	2 966
Social development and community services	59 919	2 259	1 982	35 223	20 455
<i>Total society</i>	<i>299 629</i>	<i>5 870</i>	<i>12 451</i>	<i>184 271</i>	<i>97 038</i>
<i>Environment</i>					
Environmental policy frameworks and other aspects	35 652	1 343	1 210	19 237	13 863
Environmental management	473 079	34 438	32 467	217 678	188 496
<i>Total environment</i>	<i>508 731</i>	<i>35 780</i>	<i>33 677</i>	<i>236 915</i>	<i>202 359</i>
<i>Non-oriented research</i>	<i>49 237</i>	<i>2 657</i>	<i>5 067</i>	<i>23 798</i>	<i>17 716</i>
<b>Total</b>	<b>2 482 161</b>	<b>100 140</b>	<b>117 514</b>	<b>1 287 327</b>	<b>977 181</b>

(a) See paragraph 12 of the Explanatory Notes

(b) See Glossary for definition of labour costs.

**2.3**

## EXPENDITURE, by research field, by type of expenditure(a) .....

<i>Research field</i>	<i>Total</i>	<i>Land and buildings</i>	<i>Other capital expenditure</i>	<i>Labour costs(b)</i>	<i>Other current expenditure</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	36 097	1 445	1 155	21 991	11 507
Physical sciences	119 636	5 452	9 506	66 524	38 155
Chemical sciences	121 777	5 403	10 930	64 100	41 344
Earth sciences	242 459	13 676	16 490	102 097	110 196
Biological sciences	263 418	19 634	14 880	132 092	96 814
Information, computing and communication sciences	181 687	3 895	5 972	88 210	83 610
Engineering and technology	424 444	18 799	24 285	235 216	146 143
Agricultural, veterinary and environmental sciences	761 306	26 250	21 344	371 383	342 329
Medical and health sciences	198 412	3 166	9 088	125 924	60 233
Economics	57 718	393	951	33 718	22 656
Law, justice and law enforcement	16 071	336	267	9 616	5 852
Other research fields, courses and disciplines	59 138	1 691	2 646	36 457	18 344
<b>Total</b>	<b>2 482 161</b>	<b>100 140</b>	<b>117 514</b>	<b>1 287 327</b>	<b>977 181</b>

(a) See paragraph 12 of the Explanatory Notes

(b) See Glossary for definition of labour costs.

**2.4** EXPENDITURE, by socioeconomic objective, by type of activity(a) .....

	Total	Pure basic research	Strategic basic research	Applied research	Experimental development
<i>Socioeconomic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	283 854	28 118	85 222	85 881	84 633
<i>Economic development</i>					
Plant - production and primary products	377 361	19 525	49 957	254 279	53 600
Animal - production and primary products	277 560	7 152	45 676	192 674	32 058
Mineral resources (excl. energy)	97 652	970	20 209	72 874	3 599
Energy resources	58 973	7 100	24 332	26 779	763
Energy supply	26 382	14 693	4 989	5 658	1 042
Manufacturing	233 441	9 638	73 247	118 970	31 586
Construction	38 448	607	13 321	18 946	5 574
Transport	15 286	189	1 972	8 978	4 147
Information and communication services	52 890	1 475	13 119	28 448	9 848
Commercial services and tourism	27 059	194	6 988	17 074	2 804
Economic framework	135 658	596	4 706	53 219	77 137
<i>Total economic development</i>	<i>1 340 710</i>	<i>62 138</i>	<i>258 515</i>	<i>797 898</i>	<i>222 158</i>
<i>Society</i>					
Health	227 989	30 155	56 191	112 120	29 523
Education and training	11 721	319	3 786	5 862	1 753
Social development and community services	59 919	8 410	15 643	27 752	8 114
<i>Total society</i>	<i>299 629</i>	<i>38 884</i>	<i>75 620</i>	<i>145 734</i>	<i>39 390</i>
<i>Environment</i>					
Environmental policy frameworks and other aspects	35 652	1 625	7 011	24 761	2 256
Environmental management	473 079	19 770	157 452	258 679	37 178
<i>Total environment</i>	<i>508 731</i>	<i>21 394</i>	<i>164 463</i>	<i>283 440</i>	<i>39 434</i>
<i>Non-oriented research</i>	<i>49 237</i>	<i>1 692</i>	<i>18 687</i>	<i>25 299</i>	<i>3 560</i>
<b>Total</b>	<b>2 482 161</b>	<b>152 227</b>	<b>602 507</b>	<b>1 338 252</b>	<b>389 176</b>

(a) See paragraphs 6 and 12 of the Explanatory Notes.

**2.5**

## EXPENDITURE, by research field, by type of activity(a) .....

<i>Research field</i>	<i>Total</i>	<i>Pure basic research</i>	<i>Strategic basic research</i>	<i>Applied research</i>	<i>Experimental development</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	36 097	333	6 042	23 213	6 509
Physical sciences	119 636	6 768	38 076	51 008	23 784
Chemical sciences	121 777	14 448	32 120	59 605	15 604
Earth sciences	242 459	5 184	81 609	139 852	15 814
Biological sciences	263 418	29 828	83 858	127 641	22 091
Information, computing and communication sciences	181 687	6 668	28 608	51 593	94 818
Engineering and technology	424 444	36 258	129 477	179 570	79 138
Agricultural, veterinary and environmental sciences	761 306	22 983	125 144	523 169	90 010
Medical and health sciences	198 412	22 184	48 094	100 782	27 353
Economics	57 718	41	4 883	47 255	5 539
Law, justice and law enforcement	16 071	206	7 333	7 472	1 061
Other research fields, courses and disciplines	59 138	7 327	17 264	27 093	7 454
<b>Total</b>	<b>2 482 161</b>	<b>152 227</b>	<b>602 507</b>	<b>1 338 252</b>	<b>389 176</b>

(a) See paragraphs 6 and 12 of the Explanatory Notes.

## 2.6 EXPENDITURE, by socioeconomic objective, by source of funds(a) .....

	OWN FUNDS			OTHER GOVERNMENT	
	Total	Commonwealth	State	Commonwealth	State and local
<i>Socioeconomic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	283 854	281 399	—	117	244
<i>Economic development</i>					
Plant - production and primary products	377 361	60 264	153 066	9 032	12 446
Animal - production and primary products	277 560	67 622	128 122	14 399	2 951
Mineral resources (excl. energy)	97 652	65 189	7 538	1 356	2 570
Energy resources	58 973	42 350	2 468	1 143	829
Energy supply	26 382	19 133	37	403	1 006
Manufacturing	233 441	159 221	12 324	5 551	7 167
Construction	38 448	25 228	3 837	544	1 026
Transport	15 286	2 877	10 925	359	380
Information and communication services	52 890	36 507	2 968	1 635	4 049
Commercial services and tourism	27 059	10 560	11 966	1 098	519
Economic framework	135 658	121 766	3 904	4 114	479
<i>Total economic development</i>	<i>1 340 710</i>	<i>610 716</i>	<i>337 154</i>	<i>39 634</i>	<i>33 423</i>
<i>Society</i>					
Health	227 989	19 632	69 059	43 668	15 366
Education and training	11 721	1 519	8 852	573	399
Social development and community services	59 919	23 859	23 286	4 312	3 572
<i>Total society</i>	<i>299 629</i>	<i>45 010</i>	<i>101 197</i>	<i>48 553</i>	<i>19 336</i>
<i>Environment</i>					
Environmental policy frameworks and other aspects	35 652	14 137	15 798	1 289	899
Environmental management	473 079	229 624	127 282	23 453	21 007
<i>Total environment</i>	<i>508 731</i>	<i>243 760</i>	<i>143 080</i>	<i>24 743</i>	<i>21 906</i>
<i>Non-oriented research</i>	<i>49 237</i>	<i>25 376</i>	<i>12 814</i>	<i>3 950</i>	<i>742</i>
<b>Total</b>	<b>2 482 161</b>	<b>1 206 261</b>	<b>594 245</b>	<b>116 997</b>	<b>75 650</b>

— nil or rounded to zero (including null cells)

(a) See paragraph 12 of the Explanatory Notes.

## 2.6 EXPENDITURE, by socioeconomic objective, by source of funds(a) *continued* . . . . .

<i>Socioeconomic objective</i>	<i>Business</i>	<i>Joint government/ business(b)</i>	<i>Universities</i>	<i>Other Aust.</i>	<i>Overseas</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	231	—	—	1 723	141
<i>Economic development</i>					
Plant - production and primary products	12 696	74 364	39	51 691	3 763
Animal - production and primary products	11 751	37 375	184	13 839	1 318
Mineral resources (excl. energy)	10 852	—	103	6 202	3 842
Energy resources	4 438	—	—	4 226	3 519
Energy supply	3 618	—	—	1 510	675
Manufacturing	26 653	1 035	634	14 017	6 840
Construction	3 855	30	6	2 809	1 112
Transport	433	—	—	204	109
Information and communication services	2 806	—	4	2 358	2 564
Commercial services and tourism	823	1 315	58	428	292
Economic framework	1 955	2 387	8	195	850
<i>Total economic development</i>	79 880	116 505	1 036	97 477	24 884
<i>Society</i>					
Health	33 151	1 953	4 989	26 974	13 198
Education and training	113	62	42	117	45
Social development and community services	1 301	589	156	2 502	343
<i>Total society</i>	34 565	2 603	5 187	29 593	13 586
<i>Environment</i>					
Environmental policy frameworks and other aspects	967	791	68	1 436	268
Environmental management	11 838	20 910	671	31 860	6 435
<i>Total environment</i>	12 805	21 701	739	33 296	6 702
<i>Non-oriented research</i>	820	1 904	73	1 139	2 421
<b>Total</b>	<b>128 300</b>	<b>142 713</b>	<b>7 034</b>	<b>163 228</b>	<b>47 734</b>

— nil or rounded to zero (including null cells)

(a) See paragraph 12 of the Explanatory Notes.

(b) Includes funds provided by government levies.

## 2.7 EXPENDITURE, by research field, by source of funds(a) .....

<i>Research field</i>	<i>Total</i>	<u>OWN FUNDS</u>		<u>OTHER GOVERNMENT</u>	
		<i>Commonwealth</i>	<i>State</i>	<i>Commonwealth</i>	<i>State and local</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	36 097	22 051	6 592	1 805	1 357
Physical sciences	119 636	102 282	138	4 340	2 932
Chemical sciences	121 777	85 992	11 283	2 032	2 706
Earth sciences	242 459	163 449	33 239	11 619	6 474
Biological sciences	263 418	108 695	65 032	17 541	11 209
Information, computing and communication sciences	181 687	154 612	14 354	1 640	2 667
Engineering and technology	424 444	329 516	20 892	4 930	8 120
Agricultural, veterinary and environmental sciences	761 306	148 871	346 460	28 348	22 050
Medical and health sciences	198 412	19 914	55 768	36 988	14 681
Economics	57 718	42 159	5 939	3 559	488
Law, justice and law enforcement	16 071	4 786	8 113	1 275	1 284
Other research fields, courses and disciplines	59 138	23 935	26 435	2 920	1 684
<b>Total</b>	<b>2 482 161</b>	<b>1 206 261</b>	<b>594 245</b>	<b>116 997</b>	<b>75 650</b>

(a) See paragraph 12 of the Explanatory Notes.



## 2.7 EXPENDITURE, by research field, by source of funds(a) *continued* .....

<i>Research field</i>	<i>Business</i>	<i>Joint government/ business(b)</i>	<i>Universities</i>	<i>Other Aust.</i>	<i>Overseas</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	1 337	1 480	61	959	454
Physical sciences	3 743	—	40	1 516	4 645
Chemical sciences	10 090	2 166	184	5 231	2 092
Earth sciences	7 399	3 193	236	11 296	5 555
Biological sciences	13 922	5 742	1 011	32 572	7 696
Information, computing and communication sciences	2 933	1 326	93	2 484	1 578
Engineering and technology	31 062	1 206	447	18 484	9 787
Agricultural, veterinary and environmental sciences	23 241	123 447	335	62 957	5 597
Medical and health sciences	32 344	488	4 455	24 133	9 641
Economics	1 123	3 364	4	806	275
Law, justice and law enforcement	30	—	16	567	—
Other research fields, courses and disciplines	1 076	300	153	2 222	413
<b>Total</b>	<b>128 300</b>	<b>142 713</b>	<b>7 034</b>	<b>163 228</b>	<b>47 734</b>

— nil or rounded to zero (including null cells)

(a) See paragraph 12 of the Explanatory Notes.

(b) Includes funds provided by government levies.

## 2.8 EXPENDITURE, by socioeconomic objective, by location(a) .....

<i>Socioeconomic objective</i>	<i>Total</i>	<i>NSW</i>	<i>Vic.</i>	<i>Qld</i>	<i>SA</i>	<i>WA</i>	<i>Tas.</i>	<i>NT</i>	<i>ACT</i>	<i>Other(b)</i>
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	283 854	11 208	93 530	284	161 398	3 783	2 135	2	11 514	—
<i>Economic development</i>										
Plant - production and primary products	377 361	65 709	67 826	75 749	32 203	50 966	5 583	7 194	71 362	769
Animal - production and primary products	277 560	51 812	73 674	63 534	27 540	31 897	10 345	9 190	8 938	629
Mineral resources (excl. energy)	97 652	12 916	23 359	19 715	5 973	23 812	1 704	8 407	1 451	316
Energy resources	58 973	11 486	7 999	6 646	3 764	20 562	2 366	3 832	366	1 952
Energy supply	26 382	14 085	7 497	1 912	942	1 325	36	—	586	—
Manufacturing	233 441	73 687	105 748	24 803	16 650	4 159	447	122	7 679	147
Construction	38 448	3 732	23 460	3 002	4 513	752	346	232	2 342	70
Transport	15 286	3 667	2 024	7 158	1 681	606	53	2	75	20
Information and communication services	52 890	29 942	4 673	4 838	1 044	3 194	237	65	8 874	22
Commercial services and tourism	27 059	7 054	2 496	14 009	369	394	582	124	1 683	349
Economic framework	135 658	18 234	8 461	945	1 037	2 353	639	768	103 176	46
<i>Total economic development</i>	<i>1 340 710</i>	<i>292 323</i>	<i>327 216</i>	<i>222 310</i>	<i>95 717</i>	<i>140 018</i>	<i>22 338</i>	<i>29 937</i>	<i>206 531</i>	<i>4 320</i>
<i>Society</i>										
Health	227 989	68 548	42 620	50 762	40 098	8 762	3 045	1 628	11 577	949
Education and training	11 721	4 253	735	4 419	312	338	148	14	1 450	53
Social development and community services	59 919	15 814	15 841	3 830	3 794	4 093	1 222	599	12 610	2 116
<i>Total society</i>	<i>299 629</i>	<i>88 615</i>	<i>59 197</i>	<i>59 010</i>	<i>44 203</i>	<i>13 194</i>	<i>4 415</i>	<i>2 241</i>	<i>25 636</i>	<i>3 118</i>
<i>Environment</i>										
Environmental policy frameworks and other aspects	35 652	8 818	4 884	9 463	1 542	2 560	2 581	895	4 603	307
Environmental management	473 079	103 316	56 593	105 333	18 768	36 738	85 731	16 761	46 849	2 991
<i>Total environment</i>	<i>508 731</i>	<i>112 133</i>	<i>61 477</i>	<i>114 796</i>	<i>20 311</i>	<i>39 298</i>	<i>88 312</i>	<i>17 656</i>	<i>51 452</i>	<i>3 299</i>
<i>Non-oriented research</i>	<i>49 237</i>	<i>33 796</i>	<i>3 826</i>	<i>6 588</i>	<i>454</i>	<i>922</i>	<i>1 270</i>	<i>226</i>	<i>1 947</i>	<i>209</i>
<b>Total</b>	<b>2 482 161</b>	<b>538 075</b>	<b>545 246</b>	<b>402 989</b>	<b>322 082</b>	<b>197 213</b>	<b>118 469</b>	<b>50 061</b>	<b>297 081</b>	<b>10 946</b>

— nil or rounded to zero (including null cells)

(b) Includes Australian external territories and overseas.

(a) See paragraph 12 of the Explanatory Notes

## 2.9 EXPENDITURE, by research field, by location(a) .....

<i>Research field</i>	<i>Total</i>	<i>NSW</i>	<i>Vic.</i>	<i>Qld</i>	<i>SA</i>	<i>WA</i>	<i>Tas.</i>	<i>NT</i>	<i>ACT</i>	<i>Other(b)</i>
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	36 097	14 729	3 874	1 815	1 306	3 167	1 174	119	9 895	20
Physical sciences	119 636	60 784	25 561	931	26 166	1 292	1 914	15	2 966	7
Chemical sciences	121 777	44 451	36 559	7 616	18 174	4 627	4 041	1 464	4 531	315
Earth sciences	242 459	25 730	43 467	47 608	19 628	34 405	41 078	16 347	10 052	4 144
Biological sciences	263 418	57 172	38 140	59 487	16 618	13 411	22 621	10 463	44 131	1 377
Information, computing and communication sciences	181 687	23 668	24 542	13 081	31 333	7 297	1 257	216	80 090	204
Engineering and technology	424 444	83 928	162 567	37 167	99 614	26 363	3 502	337	10 871	97
Agricultural, veterinary and environmental sciences	761 306	140 277	139 550	185 928	63 211	91 712	38 424	17 940	81 914	2 350
Medical and health sciences	198 412	61 320	43 492	36 980	37 382	8 259	2 551	1 548	4 626	2 254
Economics	57 718	7 252	8 949	1 465	426	1 241	354	719	37 249	63
Law, justice and law enforcement	16 071	6 929	4 776	1 129	1 437	775	—	—	1 026	1
Other research fields, courses and disciplines	59 138	11 837	13 771	9 783	6 788	4 666	1 554	894	9 731	115
<b>Total</b>	<b>2 482 161</b>	<b>538 075</b>	<b>545 246</b>	<b>402 989</b>	<b>322 082</b>	<b>197 213</b>	<b>118 469</b>	<b>50 061</b>	<b>297 081</b>	<b>10 946</b>

— nil or rounded to zero (including null cells)

(b) Includes Australian external territories and overseas.

(a) See paragraph 12 of the Explanatory Notes

## 2.10 HUMAN RESOURCES, by socioeconomic objective, by type of employee(a) . . . . .

<i>Socioeconomic objective</i>	<i>Total</i>	<i>Researchers</i>	<i>Technicians</i>	<i>Other supporting staff</i>
	person years	person years	person years	person years
<i>Defence</i>	2 366	718	1 373	274
<i>Economic development</i>				
Plant - production and primary products	2 939	1 152	1 299	487
Animal - production and primary products	2 174	811	882	481
Mineral resources (excl. energy)	538	205	186	147
Energy resources	334	156	95	82
Energy supply	164	49	71	43
Manufacturing	1 623	501	710	411
Construction	240	93	92	55
Transport	85	48	14	23
Information and communication services	361	144	115	102
Commercial services and tourism	211	79	70	62
Economic framework	735	586	109	40
<i>Total economic development</i>	9 403	3 825	3 645	1 933
<i>Society</i>				
Health	2 506	1 473	672	360
Education and training	113	82	16	15
Social development and community services	496	345	83	68
<i>Total society</i>	3 115	1 901	772	443
<i>Environment</i>				
Environmental policy frameworks and other aspects	260	139	68	53
Environmental management	3 032	1 330	1 133	568
<i>Total environment</i>	3 292	1 470	1 201	621
<i>Non-oriented research</i>	365	122	107	136
<b>Total</b>	<b>18 542</b>	<b>8 036</b>	<b>7 098</b>	<b>3 407</b>

(a) See paragraph 12 of the Explanatory Notes.

**2.11** HUMAN RESOURCES, by research field, by type of employee(a) .....

<i>Research field</i>	<i>Total</i>	<i>Researchers</i>	<i>Technicians</i>	<i>Other supporting staff</i>
	person years	person years	person years	person years
Mathematical sciences	288	155	81	52
Physical sciences	847	242	390	214
Chemical sciences	811	295	370	145
Earth sciences	1 287	618	392	277
Biological sciences	1 984	908	728	348
Information, computing and communication sciences	1 076	532	384	160
Engineering and technology	3 089	965	1 501	622
Agricultural, veterinary and environmental sciences	5 852	2 330	2 406	1 116
Medical and health sciences	2 214	1 227	653	335
Economics	460	357	64	40
Law, justice and law enforcement	126	93	14	20
Other research fields, courses and disciplines	509	317	115	77
<b>Total</b>	<b>18 542</b>	<b>8 036</b>	<b>7 098</b>	<b>3 407</b>

(a) See paragraph 12 of the Explanatory Notes.

## CHAPTER 3

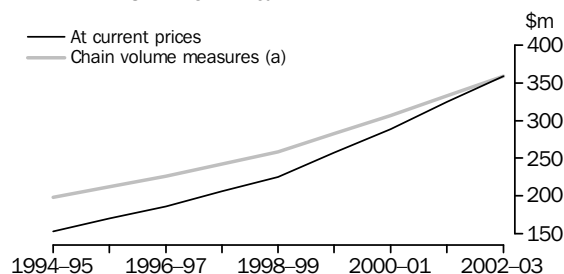
# PRIVATE NON-PROFIT RESEARCH AND EXPERIMENTAL DEVELOPMENT

### EXPENDITURE ON R&D

Private non-profit expenditure on R&D has steadily increased since 1994-95. Expenditure in current prices in 2002-03 was \$360m, 24.4% higher than in 2000-01.

In volume terms, with the effect of changes in prices and wages and salaries removed, R&D expenditure increased by 17.2% compared with 2000-01.

### EXPENDITURE ON R&D



(a) Reference year for chain volume measures is 2002-03. See paragraph 15 of the Explanatory Notes for details.

### HUMAN RESOURCES DEVOTED TO R&D

Human resources devoted to R&D by Private non-profit organisations has increased by 11.7% from 2,791 person years in 2000-01 to 3,117 person years in 2002-03.

### RESOURCES DEVOTED TO R&D

	1994-95	1996-97	1998-99	2000-01	2002-03
R&D expenditure					
At current prices (\$m)	152.7	185.8	r225.3	r289.0	359.5
Chain volume measures(a) (\$m)	197.5	226.1	r258.8	r306.8	359.5
Human resources devoted to R&D (person years)	1 666	2 351	r2 551	r2 791	3 117

r revised

(a) Reference year for chain volume measures is 2002-03. See paragraph 15 of the Explanatory Notes for details.

### TYPE OF EXPENDITURE

Labour costs continued to be the main component of R&D expenditure (49.7%), up from 47.1% in 2000-01. Capital expenditure accounted for 11.5% of research expenditure by Private non-profit organisations in 2002-03.

### PURPOSE OF RESEARCH

In the Private non-profit sector, the leading socioeconomic objective was Health, accounting for 90.1% or \$324m of total expenditure. Education and training accounted for \$20m (5.6%) while \$11m (3.1%) was directed towards Economic development.

### RESEARCH FIELDS

In the Private non-profit sector, Medical and health sciences (\$221m) and Biological sciences (\$105m) were the major research fields in terms of R&D expenditure.

---

TYPE OF ACTIVITY	R&D expenditure in the Private non-profit sector was mainly directed towards Strategic basic research (\$150m or 41.8%) and Applied research (\$109m or 30.5%).
SOURCE OF FUNDS	Commonwealth government funds at \$104m (28.9%) and Own funds at \$86m (24.0%) were the main sources of funding for R&D expenditure by Private non-profit organisations.
STATE COMPARISONS	The leading states in terms of the location of Private non-profit R&D expenditure were: <ul style="list-style-type: none"><li>■ Victoria (\$231m or 64.4%)</li><li>■ New South Wales (\$76m or 21.2%)</li><li>■ Western Australia (\$22m or 6.2%).</li></ul>
TYPE OF R&D STAFF	Researchers accounted for 61.1% of the total research human resource effort in staff years, Technicians 28.4% and Other supporting staff 10.4%.

**3.1** EXPENDITURE, by socioeconomic objective, by type of expenditure(a) .....

<i>Socioeconomic objective</i>	<i>Total</i>	<i>Land and buildings</i>	<i>Other capital expenditure</i>	<i>Labour costs(b)</i>	<i>Other current expenditure</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	—	—	—	—	—
<i>Economic development</i>	11 211	np	1 427	3 606	np
<i>Society</i>					
Health	323 956	12 646	25 296	163 063	122 951
Education and training	20 094	np	635	9 378	np
Social development and community services	1 855	np	53	1 268	np
<i>Total society</i>	345 905	12 975	25 983	173 709	133 239
<i>Environment</i>	1 676	—	np	958	np
<i>Non-oriented research</i>	756	np	np	483	210
<b>Total</b>	<b>359 548</b>	<b>13 739</b>	<b>27 480</b>	<b>178 757</b>	<b>139 572</b>

— 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 12 of the Explanatory Notes

(b) See Glossary for definition of labour costs.



**3.2** EXPENDITURE, by research field, by type of expenditure(a) .....

<i>Research field</i>	<i>Total</i>	<i>Land and buildings</i>	<i>Other capital expenditure</i>	<i>Labour costs(b)</i>	<i>Other current expenditure</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	np	66	np	np	np
Physical sciences	np	np	57	np	80
Chemical sciences	4 045	157	683	882	2 323
Earth sciences	—	—	—	—	—
Biological sciences	104 560	3 509	8 092	55 420	37 539
Information, computing and communication sciences	4 844	95	748	1 865	2 137
Engineering and technology	1 465	np	np	706	573
Agricultural, veterinary and environmental sciences	2 087	np	np	1 029	860
Medical and health sciences	220 796	9 180	16 921	108 835	85 859
Other research fields	19 380	np	474	9 139	np
<b>Total</b>	<b>359 548</b>	<b>13 739</b>	<b>27 480</b>	<b>178 757</b>	<b>139 572</b>

— 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 12 of the Explanatory Notes

(b) See Glossary for definition of labour costs.

**3.3** EXPENDITURE, by socioeconomic objective, by type of activity(a) .....

<i>Socioeconomic objective</i>	<i>Total</i>	<i>Pure basic research</i>	<i>Strategic basic research</i>	<i>Applied research</i>	<i>Experimental development</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	—	—	—	—	—
<i>Economic development</i>	11 211	np	2 960	np	2 211
<i>Society</i>					
Health	323 956	59 739	142 814	97 720	23 683
Education and training	20 094	np	4 177	4 857	np
Social development and community services	1 855	np	—	1 133	np
<i>Total society</i>	345 905	60 690	146 991	103 711	34 514
<i>Environment</i>	1 676	np	105	1 480	np
<i>Non-oriented research</i>	756	—	99	np	np
<b>Total</b>	<b>359 548</b>	<b>62 692</b>	<b>150 155</b>	<b>109 485</b>	<b>37 216</b>

— nil or rounded to zero (including null cells)

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

(a) See paragraphs 6 and 12 of the Explanatory Notes.

**3.4** EXPENDITURE, by research field, by type of activity(a) .....

<i>Research field</i>	<i>Total</i>	<i>Pure basic research</i>	<i>Strategic basic research</i>	<i>Applied research</i>	<i>Experimental development</i>
	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	np	1 269	np	np	np
Physical sciences	np	26	np	np	np
Chemical sciences	4 045	2 022	2 023	—	—
Earth sciences	—	—	—	—	—
Biological sciences	104 560	24 336	46 731	30 816	2 677
Information, computing and communication sciences	4 844	np	1 240	1 066	np
Engineering and technology	1 465	np	np	550	689
Agricultural, veterinary and environmental sciences	2 087	np	359	1 259	np
Medical and health sciences	220 796	33 671	96 480	68 717	21 928
Other research fields	19 380	273	np	6 750	np
<b>Total</b>	<b>359 548</b>	<b>62 692</b>	<b>150 155</b>	<b>109 485</b>	<b>37 216</b>

— nil or rounded to zero (including null cells)

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

(a) See paragraphs 6 and 12 of the Explanatory Notes.

### 3.5 EXPENDITURE, by socioeconomic objective, by source of funds(a) .....

Socioeconomic objective	GOVERNMENT								
	Total	Own funds	Common -wealth	State and local	Business	Joint government/business(b)	Universities	Other Aust.	Overseas
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	—	—	—	—	—	—	—	—	—
<i>Economic development</i>	11 211	4 389	np	322	607	np	np	785	np
<i>Society</i>									
Health	323 956	76 675	94 373	36 191	29 424	965	3 635	52 135	30 558
Education and training	20 094	3 587	np	np	1 301	np	np	485	np
Social development and community services	1 855	899	np	np	69	np	np	78	np
<i>Total society</i>	345 905	81 162	100 609	39 303	30 795	np	3 877	52 699	np
<i>Environment</i>	1 676	153	np	151	np	—	—	469	—
<i>Non-oriented research</i>	756	625	12	45	np	—	np	52	—
<b>Total</b>	<b>359 548</b>	<b>86 328</b>	<b>103 939</b>	<b>39 821</b>	<b>31 594</b>	<b>3 019</b>	<b>3 948</b>	<b>54 005</b>	<b>36 894</b>

— 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 12 of the Explanatory Notes.

(b) Includes funds provided by government levies.

**3.6** EXPENDITURE, by research field, by source of funds(a) .....

<i>Research field</i>	GOVERNMENT .....								
	<i>Total</i>	<i>Own funds</i>	<i>Common -wealth</i>	<i>State and local</i>	<i>Business</i>	<i>Joint government/business(b)</i>	<i>Universities</i>	<i>Other Aust.</i>	<i>Overseas</i>
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	np	np	np	np	—	—	—	np	486
Physical sciences	np	254	12	45	4	—	np	np	—
Chemical sciences	4 045	614	2 192	—	—	—	—	644	595
Earth sciences	—	—	—	—	—	—	—	—	—
Biological sciences	104 560	np	31 072	8 783	8 419	np	860	18 570	10 717
Information, computing and communication sciences	4 844	2 079	1 229	177	np	np	110	330	537
Engineering and technology	1 465	512	366	202	np	—	np	206	np
Agricultural, veterinary and environmental sciences	2 087	386	249	255	np	np	8	180	np
Medical and health sciences	220 796	53 378	62 726	27 635	21 514	567	2 799	33 203	18 975
Other research fields	19 380	4 299	np	np	np	np	np	703	np
<b>Total</b>	<b>359 548</b>	<b>86 328</b>	<b>103 939</b>	<b>39 821</b>	<b>31 594</b>	<b>3 019</b>	<b>3 948</b>	<b>54 005</b>	<b>36 894</b>

— 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 12 of the Explanatory Notes

(b) Includes funds provided by government levies.

**3.7** EXPENDITURE, by socioeconomic objective, by location(a) .....

<i>Socioeconomic objective</i>	<i>Total</i>	<i>NSW</i>	<i>Vic.</i>	<i>Qld</i>	<i>SA</i>	<i>WA</i>	<i>Tas.</i>	<i>NT</i>	<i>ACT</i>	<i>Other(b)</i>
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	—	—	—	—	—	—	—	—	—	—
<i>Economic development</i>	11 211	1 880	3 840	np	np	139	np	—	np	—
<i>Society</i>										
Health	323 956	71 908	208 547	8 402	4 915	np	np	5 348	—	3 528
Education and training	20 094	np	np	np	—	np	—	—	np	—
Social development and community services	1 855	np	np	np	32	84	4	—	np	—
<i>Total society</i>	345 905	74 105	226 326	8 503	4 947	22 242	np	5 348	np	3 528
<i>Environment</i>	1 676	np	np	np	np	np	np	np	np	—
<i>Non-oriented research</i>	756	np	np	465	—	np	—	—	—	—
<b>Total</b>	<b>359 548</b>	<b>76 168</b>	<b>231 474</b>	<b>9 647</b>	<b>6 135</b>	<b>22 388</b>	<b>235</b>	np	np	<b>3 528</b>

— 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 12 of the Explanatory Notes

(b) Includes Australian external territories and overseas.

**3.8** EXPENDITURE, by research field, by location(a) .....

<i>Research field</i>	<i>Total</i>	<i>NSW</i>	<i>Vic.</i>	<i>Qld</i>	<i>SA</i>	<i>WA</i>	<i>Tas.</i>	<i>NT</i>	<i>ACT</i>	<i>Other(b)</i>
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	np	—	1 693	—	—	—	—	—	np	—
Physical sciences	np	np	208	np	—	np	—	—	—	—
Chemical sciences	4 045	—	4 045	—	—	—	—	—	—	—
Earth sciences	—	—	—	—	—	—	—	—	—	—
Biological sciences	104 560	27 409	70 050	851	2 859	np	—	np	np	333
Information, computing and communication sciences	4 844	np	2 354	np	—	np	—	—	np	—
Engineering and technology	1 465	92	np	—	192	np	np	—	np	—
Agricultural, veterinary and environmental sciences	2 087	np	525	12	np	139	121	—	np	91
Medical and health sciences	220 796	45 082	135 999	8 343	np	21 113	np	4 774	64	3 105
Other research fields	19 380	1 789	np	303	388	—	9	—	np	—
<b>Total</b>	<b>359 548</b>	<b>76 168</b>	<b>231 474</b>	<b>9 647</b>	<b>6 135</b>	<b>22 388</b>	<b>235</b>	np	np	<b>3 528</b>

— 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 12 of the Explanatory notes

(b) Includes Australian external territories and overseas.

**3.9** HUMAN RESOURCES, by socioeconomic objective, by type of employee(a) .....

<i>Socioeconomic objective</i>	<i>Total</i>	<i>Researchers</i>	<i>Technicians</i>	<i>Other supporting staff</i>
	person years	person years	person years	person years
<i>Defence</i>	—	—	—	—
<i>Economic development</i>	65	37	18	10
<i>Society</i>				
Health	2 882	1 740	843	299
Education and training	119	89	17	12
Social development and community services	20	14	3	2
<i>Total society</i>	3 021	1 844	863	314
<i>Environment</i>	21	21	np	np
<i>Non-oriented research</i>	10	5	np	np
<b>Total</b>	<b>3 117</b>	<b>1 906</b>	<b>885</b>	<b>325</b>

— 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 12 of the Explanatory Notes.

**3.10** HUMAN RESOURCES, by research field, by type of employee(a) .....

<i>Research field</i>	<i>Total</i>	<i>Researchers</i>	<i>Technicians</i>	<i>Other supporting staff</i>
	person years	person years	person years	person years
Mathematical sciences	np	np	np	np
Physical sciences	np	np	np	np
Chemical sciences	15	11	3	1
Earth sciences	—	—	—	—
Biological sciences	966	556	323	86
Information, computing and communication sciences	32	17	11	5
Engineering and technology	12	9	1	3
Agricultural, veterinary and environmental sciences	18	10	4	4
Medical and health sciences	1 945	1 202	526	217
Other research fields	116	94	13	10
<b>Total</b>	<b>3 117</b>	<b>1 906</b>	<b>885</b>	<b>325</b>

— 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 12 of the Explanatory Notes.

## EXPLANATORY NOTES .....

### INTRODUCTION

**1** This publication presents estimates of expenditure and human resources devoted to R&D carried out in Australia by Government and Private non-profit organisations during 2002–03.

**2** For details of R&D statistics available for the Business and Higher education sectors see paragraph 18.

### DATA SOURCES

**3** The 2002–03 data 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 2003. This survey was based on a complete enumeration of Government and Private non-profit organisations identified by the Australian Bureau of Statistics (ABS) as likely R&D performers. The survey was conducted by mail questionnaires and a 97% response rate was obtained.

**4** The GDP figures used to derive Government expenditure on R&D/GDP ratios are current at the time of manuscript finalisation – *Australian National Accounts: National Income, Expenditure and Product, June quarter 2004* (cat. no. 5206.0) – and, at current prices, are as follows: \$471,348m (1994–95); \$529,886m (1996–97); \$591,917m (1998–99); \$671,120m (2000–01); and \$756,170m (2002–03). The available Government expenditure on R&D/GDP ratios for other Organisation for Economic Co-operation and Development (OECD) countries are current at the time of manuscript finalisation and are sourced from *Main Science and Technology Indicators, 2004/1*, OECD, Paris, 2004.

### DEFINITIONS

**5** R&D 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'.

**6** Type of R&D activity comprises pure basic research, strategic basic research, applied research and experimental development. Data in this classification are subjectively allocated by data providers at the time of reporting, using OECD/ABS definitions. The ABS makes every effort to ensure correct and consistent interpretation and reporting of these data and applies consistent processing methodologies. Analysts using this classification should bear the original subjectivity in mind.

**7** 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

**8** The Government sector includes all Commonwealth, state and local government departments and authorities. However, for the purpose of this survey local government organisations were excluded as research has indicated that their contribution to total R&D activity would be minimal.

**9** Public sector organisations mainly engaged in higher education (e.g. universities) are included in the Higher education sector whilst those mainly engaged in trading or financial activities are included in the Business sector.



SCOPE *continued*

**10** The Private non-profit sector includes private or semi-public incorporated organisations which are established with the intention of not making a profit.

**11** If an organisation is considered as Private non-profit but was established to serve the Business sector then it is included in that sector.

## SOCIOECONOMIC OBJECTIVE (SEO) AND RESEARCH FIELDS, COURSES AND DISCIPLINES (RFCD) CLASSIFICATIONS

**12** The statistics in this publication are classified by Socioeconomic objective (purpose of the research) and Research fields, courses and disciplines (fields in which the research was undertaken). Data were subjectively allocated by data providers at the time of reporting, using OECD/ABS definitions. The ABS makes every effort to ensure correct and consistent interpretation and reporting of these data and applies consistent processing methodologies. Analysts using these data should bear the original subjectivity in mind.

**13** For more information on these classifications see the *Australian Standard Research Classification (ASRC), 1998* (cat. no. 1297.0).

**14** Data providers are asked to classify each of their R&D programs or projects to a SEO and a RFCD. Two reporting possibilities exist. The first possibility allows for reporting of an obviously predominant SEO and RFCD. The second allows for reporting at program level of several SEOs and RFCDs where there was no obvious single predominant classification for either or both SEO and RFCD. In these instances the ABS distributes the reported data to R&D projects with relevant SEOs and RFCDs according to classifications and estimated percentage splits provided by data providers. Most of the data have been reported on this basis.

## CHAIN VOLUME MEASURES

**15** The chain volume measures appearing in this publication are annually reweighted chain Laspeyres indexes referenced to the current price values in a chosen reference year (currently 2002–03). 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).

## RELIABILITY OF STATISTICS

**16** The statistics in this publication should be used with caution for the following reasons:

- Many data providers made estimates because their accounts did not separately record data on R&D activity.
- The OECD standard definition of R&D used in this survey differs in some respects from what data providers may regard as R&D activity. This is because the definitions used within the grants for industry R&D schemes (for the allocation of grants) and the R&D Tax Concession scheme (for tax deductibility for specific R&D activities) are slightly different from the international standard.
- Some data providers had difficulties describing their R&D programs in terms of socioeconomic objectives, research fields and types of activity. The data presented under these classifications therefore reflect a degree of subjectivity.

## ABS DATA AVAILABLE ON REQUEST

**17** 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 135070.

## RELATED PUBLICATIONS

**18** 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 2002, *Research and Experimental Development, All Sector Summary, Australia, 2000–01*, cat. no. 8112.0, ABS, Canberra

Australian Bureau of Statistics 2004, *Research and Experimental Development, Businesses, Australia, 2002–03*, cat. no. 8104.0, ABS, Canberra

RELATED PUBLICATIONS

*continued*

Australian Bureau of Statistics 2004, *Research and Experimental Development, Higher Education Organisations, Australia, 2002*, cat. no. 8111.0, ABS, Canberra  
Organisation for Economic Co-operation and Development 2004, *Main Science and Technology Indicators 2004/1*, 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

**19** 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.

ROUNDING

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

## GLOSSARY .....

<b>Applied research</b>	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.
<b>Basic research</b>	Experimental and theoretical work undertaken primarily to acquire new knowledge without a specific application in view. It consists of pure basic research and strategic basic research. Pure basic research is carried out without looking for long-term benefits other than the advancement of knowledge. Strategic basic research is directed into specified broad areas in the expectation of useful discoveries. It provides the broad base of knowledge for the solution of recognised practical problems.
<b>Capital expenditure</b>	Expenditure on the acquisition of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment attributable to R&D activity.
<b>Chain volume measures</b>	Annually reweighted chain Laspeyres indexes referenced to the current price values in a chosen reference year (currently 2002-03). They are formed in a multi-stage process of which the major steps are described in Section 15 of the <i>Information Paper: Introduction of Chain Volume Measures in the Australian National Accounts</i> (cat. no. 5248.0).
<b>Current expenditure</b>	Expenditure on direct labour costs, materials, fuels, rent and hiring, repairs and maintenance, data processing etc. and the proportion of expenditure on general services and overheads which is attributable to R&D activity.
<b>Experimental development</b>	Systematic work, using existing knowledge gained from research or practical experience, for the purpose of creating new or improved products/processes.
<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>	Wages and salaries, overtime allowances, penalty rates, leave loadings, bonuses, commission payments, all paid leave, employer contributions to superannuation and pension schemes, payroll tax, fringe benefits tax, payments to contract staff on the payroll, severance, termination and redundancy payments and workers' compensation insurance.
<b>Other current expenditure</b>	Expenditure on 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>Other supporting staff</b>	Skilled and unskilled craftpersons, secretarial and clerical staff directly associated with R&D activity.
<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>Research field</b>	Field in which the R&D activity was performed. The Research fields, courses and disciplines classification is primarily structured around disciplines or activities. It describes what research is being performed.

---

<b>Researchers</b>	Those involved with the conception and/or development of new products/processes (e.g. executives and directors involved in the planning or management of scientific and technical aspects of R&D projects, and software developers/programmers). They exclude executives and directors concerned primarily with budgets and human resources rather than project content.
<b>Socioeconomic objective</b>	The area of expected national benefit rather than the immediate objectives of the researcher. The Socioeconomic objective classification defines the main areas of Australian economic and social activity to which the results of research programs are applied. It describes the purpose of the research (i.e. why the research is being performed).
<b>Technicians</b>	Those performing technical tasks in support of R&D activity, normally under the direction and supervision of a researcher. These tasks include preparation of experiments, taking records, preparation of charts and graphs and coding computer programs.
<b>Type of R&amp;D activity</b>	Comprises basic research, applied research and experimental development.







## FOR MORE INFORMATION . . .

- INTERNET* **www.abs.gov.au** the ABS web site is the best place to start for access to summary data from our latest publications, information about the ABS, advice about upcoming releases, our catalogue, and Australia Now—a statistical profile.
- LIBRARY* A range of ABS publications is available from public and tertiary libraries Australia-wide. Contact your nearest library to determine whether it has the ABS statistics you require, or visit our web site for a list of libraries.
- CPI INFOLINE* For current and historical Consumer Price Index data, call 1902 981 074 (call cost 77c per minute).
- DIAL-A-STATISTIC* For the latest figures for National Accounts, Balance of Payments, Labour Force, Average Weekly Earnings, Estimated Resident Population and the Consumer Price Index call 1900 986 400 (call cost 77c per minute).

## INFORMATION SERVICE

Data already published that can be provided within five minutes will be free of charge. Our information consultants can also help you to access the full range of ABS information—ABS user pays services can be tailored to your needs, time frame and budget. Publications may be purchased. Specialists are on hand to help you with analytical or methodological advice.

- PHONE* 1300 135 070
- EMAIL* [client.services@abs.gov.au](mailto:client.services@abs.gov.au)
- FAX* 1300 135 211
- POST* Client Services, ABS, GPO Box 796, Sydney NSW 2001

## WHY NOT SUBSCRIBE?

ABS subscription services provide regular, convenient and prompt deliveries of selected ABS publications and products as they are released. Email delivery of monthly and quarterly publications is available.

- PHONE* 1300 366 323
- EMAIL* [subscriptions@abs.gov.au](mailto:subscriptions@abs.gov.au)
- FAX* (03) 9615 7848
- POST* Subscription Services, ABS, GPO Box 2796Y, Melbourne Vic 3001



2810900007027

ISSN 1444 2663

RRP \$23.00