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RESEARCH AND EXPERIMENTAL DEVELOPMENT

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

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- 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).

COMPARABILITY

Note that the research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.



ABBREVIATIONS

- ABS Australian Bureau of Statistics
- GDP gross domestic product
- GOVERD Government expenditure on R&D
- OECD Organisation for Economic Co-operation and Development
- R&D research and experimental development
- RFCD Research fields, courses and disciplines
- SEO Socio-economic objective

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CHAPTER 1

SUMMARY

EXPENDITURE ON R&D

Expenditure on R&D carried out by Government organisations (GOVERD) in Australia in 2000–01 was estimated to be \$2,368m at current prices. This represented a 14% increase over the two years since 1998–99. In volume terms, with the effect of changes in prices and wages and salaries removed, R&D expenditure increased by 7% compared with 1998–99. GOVERD represented 0.35% of Gross Domestic Product (GDP), the same as in 1998–99.

Expenditure on R&D carried out by Private non-profit organisations in Australia in 2000–01 was estimated to be \$283m at current prices. This represented an increase of 29% compared with 1998–99. In volume terms, R&D expenditure increased by 20% compared with 1998–99.

HUMAN RESOURCES DEVOTED TO R&D

Human resources devoted to R&D in Australia by Government organisations in 2000–01 was estimated to be 18,407 person years. This was 2% lower than in 1998–99.

Human resources devoted to R&D in Australia by Private non-profit organisations in 2000–01 was estimated to be 2,721 person years, up 10% from 1998–99.

PURPOSE OF RESEARCH

Most expenditure on R&D by Government organisations was directed towards Economic development (\$1,375m or 58%). Expenditure on the Environment accounted for a further \$431m or 18% in 2000–01.

Private non-profit organisations direct their R&D mainly towards Health (\$257m or 91%).

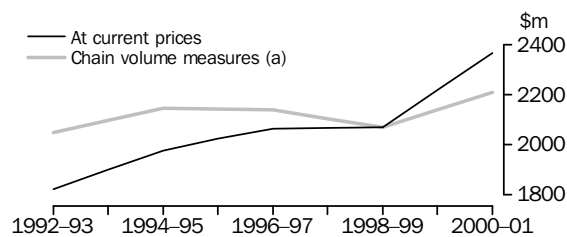
CHAPTER 2

GOVERNMENT R&D

EXPENDITURE ON R&D

GOVERD has increased 14% since 1998–99. R&D expenditure by Commonwealth government organisations rose by \$218m or 18%, while State government organisations increased their R&D expenditure by \$81m or 9%.

EXPENDITURE ON R&D



(a) Reference year for chain volume measures is 1998-99. See paragraph 16 of the Explanatory Notes for details.

EXPENDITURE ON R&D

	1992-93	1994-95	1996-97	1998-99	2000-01
	\$m	\$m	\$m	\$m	\$m
AT CURRENT PRICES					
Commonwealth	1 155.4	1 193.3	r1 266.6	r1 207.1	1 424.8
State	668.5	782.8	r797.7	r862.8	943.6
<i>Total</i>	<i>1 823.9</i>	<i>1 976.1</i>	<i>r2 064.3</i>	<i>r2 069.9</i>	<i>2 368.4</i>
CHAIN VOLUME MEASURES (a)					
Commonwealth	1 299.0	1 297.7	1 315.2	1 207.1	1 330.1
State	752.3	850.3	826.6	862.8	880.2
<i>Total</i>	<i>2 051.3</i>	<i>2 148.0</i>	<i>2 141.8</i>	<i>2 069.9</i>	<i>2 210.3</i>

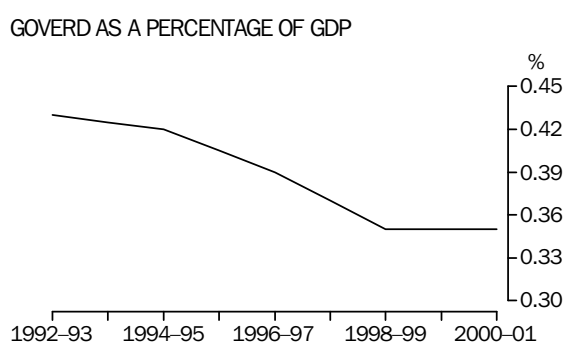
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(a) Reference year for chain volume measures is 1998-99. See paragraph 16 of the Explanatory Notes for details.

GOVERD AS A PERCENTAGE OF GDP

GOVERD as a percentage of GDP was 0.43% in 1992–93 before falling to 0.42% in 1994–95, 0.39% in 1996–97 and 0.35% in 1998–99. It has remained steady at 0.35% in 2000–01.

GOVERNMENT AS A
PERCENTAGE OF GDP
continued



Although the GOVERNMENT/GDP ratio is lower than in earlier years, 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	1998-99	2000-01
	%	%
France	0.40	0.38
Finland	0.36	0.37
Australia	0.35	0.35
Czech Republic	0.32	0.34
Germany	0.34	0.33
Japan	0.27	na
United Kingdom	0.24	na
Poland	0.22	0.23
Canada	0.22	0.22
Italy	0.21	0.22
Hungary	0.21	0.21
United States of America	0.20	0.21
Spain	0.15	0.15
Ireland	0.09	0.07

na not available

HUMAN RESOURCES
DEVOTED TO R&D

Human resources devoted to research by Government organisations has steadily decreased since 1992-93. Since 1998-99 it has fallen 2% from 18,710 to 18,407.

HUMAN RESOURCES DEVOTED TO R&D

	1992-93	1994-95	1996-97	1998-99	2000-01
	person years	person years	person years	person years	person years
Commonwealth	11 019	10 660	r10 377	r9 516	9 711
State	8 785	8 649	r8 813	r9 194	8 697
Total	19 804	19 309	r19 190	r18 710	18 407

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TYPE OF EXPENDITURE	Labour costs continued to be the main component of Government R&D expenditure (51%), down from 52% in 1998–99. Capital expenditure increased from 8% in 1998–99 to 9% in 2000–01.
PURPOSE OF RESEARCH	Socio-economic objectives (SEO's) on which most Government R&D expenditure occurred were: Economic development (\$1,375m), Environment (\$431m) and Society (\$290m). Within Economic development, the main objectives were Plant production and primary products (\$392m), Animal production and primary products (\$298m) and Manufacturing (\$233m).
RESEARCH FIELDS	The research fields in which most Government R&D expenditure occurred were: Agricultural, veterinary and environmental sciences (\$773m); Engineering and technology (\$385m) and Biological Sciences (\$260m).
TYPE OF ACTIVITY	Applied research accounted for 59% of Government R&D expenditure, up from 55% in 1998–99. Pure basic research remained steady at 5% with Experimental development and Strategic basic research decreasing from 16% and 24% in 1998–99 to 14% and 23% in 2000–01 respectively.
SOURCE OF FUNDS FOR R&D	Most of the funding for Government R&D came from the government sector itself: 74% from within the organisation performing the R&D (own funds), 6% from other Commonwealth organisations and 3% from other State government organisations, totalling \$1,962m. The next major sources of funds were from joint government/business (\$159m, or 7%) and business (\$131m, or 6%).
STATE COMPARISONS	<p>The leading States in terms of location of Government R&D expenditure were Victoria at \$533m and New South Wales at \$520m, accounting for 23% and 22% of total expenditure respectively. Next in order were Queensland (15%), the Australian Capital Territory (14%), South Australia (12%) and Western Australia (8%). The ranking was similar to 1998–99 although Victoria has replaced New South Wales as the leading location for R&D and the Australian Capital Territory is now ranked above South Australia.</p> <p>The R&D expenditure by Commonwealth government organisations was mainly located in Victoria (24%), the Australian Capital Territory (23%), New South Wales (17%) and South Australia (13%).</p> <p>Of the \$944m State government R&D, most was carried out in New South Wales (29%), Queensland (25%) and Victoria (20%).</p>
TYPE OF R&D STAFF	<p>Total human resource effort devoted to R&D by Government organisations has decreased slightly since 1998–99. While the research effort of researchers increased by 2% or 215 person years to 8,972, that of Technicians and Other supporting staff decreased by 6% and 2% respectively.</p> <p>Researchers accounted for 47% of the total research effort in 1998–99 and 49% in 2000–01.</p>

2.1 RESOURCES DEVOTED TO R&D

	TOTAL		COMMONWEALTH		STATE	
	1998-99	2000-01	1998-99	2000-01	1998-99	2000-01
Type of expenditure (\$'000)						
Land and buildings	r57 659	128 311	r28 771	75 059	r28 888	53 253
Other capital expenditure	r102 739	83 710	r73 278	58 150	r29 461	25 560
Labour costs(a)	r1 069 018	1 207 724	r643 588	734 574	r425 430	473 151
Other current expenditure	r840 549	948 621	r461 499	557 012	r379 050	391 609
Type of R&D activity (\$'000)						
Pure basic research	r94 639	107 478	64 689	71 142	r29 949	36 335
Strategic basic research	r502 228	533 104	r375 120	416 325	r127 108	116 779
Applied research	r1 144 432	1 405 251	r571 130	731 625	r573 302	673 626
Experimental development	r328 667	322 534	r196 198	205 703	r132 470	116 832
Source of funds (\$'000)						
Own funds	r1 517 938	1 751 830	r935 429	1 148 621	r582 510	603 209
Commonwealth						
Government	r146 812	135 956	r72 329	64 557	r74 483	71 399
State and local government	r47 218	74 407	r24 932	27 491	r22 286	46 916
Business	r129 754	131 430	r71 702	76 922	r58 052	54 508
Joint						
government/business(b)	r136 580	159 447	44 027	44 231	r92 553	115 216
Universities	r5 968	6 265	116	845	r5 852	5 420
Other Australian	r55 330	67 163	32 467	27 935	r22 863	39 228
Overseas	r30 365	41 871	26 135	34 194	r4 230	7 678
Location of expenditure (\$'000)						
NSW	r485 628	520 142	r238 840	246 129	r246 788	274 013
Vic.	r462 370	533 127	r315 595	345 430	r146 775	187 697
Qld	r347 091	359 838	111 637	119 555	r235 454	240 282
SA	r264 018	287 663	177 519	192 125	r86 499	95 538
WA	r165 703	179 690	64 263	74 210	r101 441	105 480
Tas.	88 593	98 284	77 051	91 813	11 542	6 471
NT	r42 363	45 818	14 604	16 861	r27 759	28 957
ACT	r206 053	333 888	r202 040	331 620	r4 013	2 269
Other(c)	r8 147	9 918	5 588	7 052	r2 559	2 865
Total R&D expenditure (\$'000)	r2 069 966	2 368 367	r1 207 137	1 424 794	r862 829	943 573
Human resources (person years)						
Researchers	r8 757	8 972	r3 989	4 524	r4 768	4 448
Technicians	r6 929	6 485	r3 537	3 328	r3 392	3 156
Other supporting staff	r3 024	2 951	r1 990	1 859	r1 034	1 092
Total	r18 710	18 407	r9 516	9 711	r9 194	8 697

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- (a) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax, workers compensation insurance, overtime earnings, shift allowances, penalty rates, bonuses, commission payments, holiday pay, long service leave payments, sick pay, employer contributions to superannuation and pension schemes.
- (b) Includes funds provided by government levies.
- (c) Includes Australian external territories and overseas.

2.2 EXPENDITURE, By socio-economic objective(a)—By type of expenditure

	Total	Land and buildings	Other capital expenditure	Labour costs(b)	Other current expenditure
<i>Socio-economic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	238 665	402	5 490	165 329	67 444
<i>Economic development</i>					
Plant — production and primary products	392 484	13 424	10 377	196 847	171 836
Animal — production and primary products	297 799	9 952	8 241	141 808	137 798
Mineral resources (excl. energy)	81 902	4 335	3 609	42 285	31 674
Energy resources	65 265	3 049	2 498	28 926	30 792
Energy supply	28 343	2 305	930	16 091	9 016
Manufacturing	232 785	21 699	9 552	101 493	100 041
Construction	33 240	2 300	1 680	17 337	11 923
Transport	20 337	366	951	6 798	12 223
Information and communication services	52 814	3 425	3 615	30 336	15 439
Commercial services and tourism	11 412	611	1 101	5 582	4 118
Economic framework	158 656	4 940	1 414	66 732	85 570
<i>Total economic development</i>	<i>1 375 035</i>	<i>66 405</i>	<i>43 966</i>	<i>654 234</i>	<i>610 430</i>
<i>Society</i>					
Health	213 003	32 612	7 863	114 810	57 719
Education and training	14 768	239	669	8 638	5 221
Social development and community services	61 780	2 275	1 754	36 034	21 716
<i>Total society</i>	<i>289 550</i>	<i>35 127</i>	<i>10 286</i>	<i>159 482</i>	<i>84 656</i>
<i>Environment</i>					
Environmental policy frameworks and other aspects	50 415	1 291	1 103	28 903	19 118
Environmental management	380 903	21 096	18 304	184 721	156 783
<i>Total environment</i>	<i>431 318</i>	<i>22 387</i>	<i>19 407</i>	<i>213 624</i>	<i>175 901</i>
<i>Non-oriented research</i>	<i>33 799</i>	<i>3 991</i>	<i>4 561</i>	<i>15 056</i>	<i>10 191</i>
Total	2 368 367	128 311	83 710	1 207 724	948 621

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax, workers compensation insurance, overtime earnings, shift allowances, penalty rates, bonuses, commission payments, holiday pay, long service leave payments, sick pay, employer contributions to superannuation and pension schemes.

2.3 EXPENDITURE, By research field(a)—By type of expenditure

<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	25 130	1 278	1 918	15 264	6 671
Physical sciences	93 257	4 268	6 894	52 458	29 638
Chemical sciences	95 298	5 229	4 046	52 050	33 973
Earth sciences	215 118	10 075	10 766	95 058	99 220
Biological sciences	259 787	32 510	9 961	126 183	91 133
Information, computing and communication sciences	216 803	4 237	6 829	99 617	106 121
Engineering and technology	384 761	17 938	15 485	206 688	144 650
Agricultural, veterinary and environmental sciences	773 263	27 264	20 285	379 635	346 079
Medical and health sciences	182 664	23 409	5 776	104 700	48 779
Economics	50 839	192	368	31 678	18 601
Law, justice and law enforcement	22 683	953	346	13 759	7 625
Other research fields, courses and disciplines	48 764	960	1 037	30 635	16 132
Total	2 368 367	128 311	83 710	1 207 724	948 621

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax, workers compensation insurance, overtime earnings, shift allowances, penalty rates, bonuses, commission payments, holiday pay, long service leave payments, sick pay, employer contributions to superannuation and pension schemes.

2.4 EXPENDITURE, By socio-economic objective(a)—By type of activity

	Total	Pure basic research	Strategic basic research	Applied research	Experimental development
<i>Socio-economic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>					
<i>Defence</i>	238 665	23 652	70 783	72 387	71 844
<i>Economic development</i>					
Plant — production and primary products	392 484	5 624	51 430	283 908	51 522
Animal — production and primary products	297 799	3 957	31 976	238 298	23 567
Mineral resources (excl. energy)	81 902	1 000	34 088	37 273	9 542
Energy resources	65 265	5 777	17 443	33 105	8 940
Energy supply	28 343	167	9 198	16 162	2 816
Manufacturing	232 785	6 540	63 193	122 937	40 114
Construction	33 240	99	11 375	16 501	5 264
Transport	20 337	116	2 536	9 221	8 464
Information and communication services	52 814	1 328	10 148	26 464	14 874
Commercial services and tourism	11 412	220	2 365	7 352	1 476
Economic framework	158 656	741	2 622	146 585	8 708
<i>Total economic development</i>	1 375 035	25 568	236 374	937 806	175 287
<i>Society</i>					
Health	213 003	18 815	60 247	112 432	21 509
Education and training	14 768	1 315	2 859	7 470	3 124
Social development and community services	61 780	3 900	15 745	34 912	7 223
<i>Total society</i>	289 550	24 030	78 851	154 814	31 855
<i>Environment</i>					
Environmental policy frameworks and other aspects	50 415	2 842	6 400	38 805	2 367
Environmental management	380 903	12 671	135 359	195 019	37 854
<i>Total environment</i>	431 318	15 513	141 759	233 825	40 222
<i>Non-oriented research</i>	33 799	18 715	5 339	6 419	3 326
Total	2 368 367	107 478	533 104	1 405 251	322 534

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

2.5 EXPENDITURE, By research field(a)—By type of activity

<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	25 130	429	4 898	13 676	6 127
Physical sciences	93 257	22 826	17 831	28 787	23 814
Chemical sciences	95 298	3 659	27 443	44 767	19 429
Earth sciences	215 118	6 912	93 320	92 846	22 040
Biological sciences	259 787	19 421	81 573	137 107	21 686
Information, computing and communication sciences	216 803	5 834	25 609	150 403	34 957
Engineering and technology	384 761	19 778	106 687	174 038	84 258
Agricultural, veterinary and environmental sciences	773 263	9 708	96 639	587 856	79 060
Medical and health sciences	182 664	13 973	56 671	93 310	18 710
Economics	50 839	524	1 448	44 326	4 541
Law, justice and law enforcement	22 683	97	6 751	14 433	1 402
Other research fields, courses and disciplines	48 764	4 317	14 235	23 702	6 509
Total	2 368 367	107 478	533 104	1 405 251	322 534

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

2.6 EXPENDITURE, By socio-economic objective(a)—By source of funds

	OWN FUNDS					
	<i>Total</i>	<i>Commonwealth</i>	<i>State</i>	<i>Commonwealth government</i>	<i>State and local government</i>	<i>Business</i>
<i>Socio-economic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	238 665	237 568	—	190	35	307
<i>Economic development</i>						
Plant — production and primary products	392 484	74 904	179 136	13 814	7 778	22 943
Animal — production and primary products	297 799	62 860	154 977	17 082	6 409	10 699
Mineral resources (excl. energy)	81 902	52 142	10 225	1 936	1 792	8 194
Energy resources	65 265	46 218	5 430	945	2 584	3 769
Energy supply	28 343	20 680	24	351	764	4 224
Manufacturing	232 785	154 697	12 946	9 086	4 990	26 618
Construction	33 240	23 320	2 448	566	1 077	4 176
Transport	20 337	8 523	10 294	504	350	379
Information and communication services	52 814	39 265	2 318	1 664	1 571	3 767
Commercial services and tourism	11 412	8 866	575	282	221	775
Economic framework	158 656	132 931	11 845	5 993	527	2 264
<i>Total economic development</i>	<i>1 375 035</i>	<i>624 406</i>	<i>390 219</i>	<i>52 222</i>	<i>28 064</i>	<i>87 807</i>
<i>Society</i>						
Health	213 003	15 181	67 396	35 392	22 776	28 445
Education and training	14 768	1 982	9 644	2 231	490	116
Social development and community services	61 780	26 301	23 650	5 148	3 582	1 151
<i>Total society</i>	<i>289 550</i>	<i>43 464</i>	<i>100 690</i>	<i>42 771</i>	<i>26 848</i>	<i>29 711</i>
<i>Environment</i>						
Environmental policy frameworks and other aspects	50 415	13 237	26 023	4 454	1 564	822
Environmental management	380 903	208 599	81 862	32 931	16 916	11 961
<i>Total environment</i>	<i>431 318</i>	<i>221 836</i>	<i>107 885</i>	<i>37 385</i>	<i>18 480</i>	<i>12 784</i>
<i>Non-oriented research</i>	<i>33 799</i>	<i>21 347</i>	<i>4 415</i>	<i>3 387</i>	<i>980</i>	<i>822</i>
Total	2 368 367	1 148 621	603 209	135 956	74 407	131 430

— nil or rounded to zero (including null cells)

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

2.6 EXPENDITURE, By socio-economic objective(a)—By source of funds *continued*

<i>Socio-economic objective</i>	<i>Joint government/ business(b)</i>	<i>Universities</i>	<i>Other Australian</i>	<i>Overseas</i>
	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	23	—	104	437
<i>Economic development</i>				
Plant — production and primary products	84 594	116	5 184	4 014
Animal — production and primary products	41 646	129	2 303	1 693
Mineral resources (excl. energy)	42	32	3 453	4 087
Energy resources	39	25	2 792	3 463
Energy supply	79	—	1 119	1 102
Manufacturing	7 596	499	10 090	6 262
Construction	190	1	284	1 178
Transport	6	—	181	100
Information and communication services	564	1	952	2 713
Commercial services and tourism	53	1	146	494
Economic framework	3 333	—	293	1 469
<i>Total economic development</i>	<i>138 142</i>	<i>804</i>	<i>26 796</i>	<i>26 574</i>
<i>Society</i>				
Health	606	4 662	31 522	7 024
Education and training	19	7	154	125
Social development and community services	537	81	536	795
<i>Total society</i>	<i>1 162</i>	<i>4 749</i>	<i>32 212</i>	<i>7 944</i>
<i>Environment</i>				
Environmental policy frameworks and other aspects	3 431	20	712	152
Environmental management	16 258	290	6 231	5 855
<i>Total environment</i>	<i>19 689</i>	<i>310</i>	<i>6 942</i>	<i>6 007</i>
<i>Non-oriented research</i>	<i>431</i>	<i>401</i>	<i>1 109</i>	<i>909</i>
Total	159 447	6 265	67 163	41 871

— nil or rounded to zero (including null cells)

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes funds provided by government levies.

2.7 EXPENDITURE, By research field(a)—By source of funds

<i>Research field</i>	<i>Total</i>	<i>OWN FUNDS</i>		<i>Commonwealth government</i>	<i>State and local government</i>	<i>Business</i>
		<i>Commonwealth</i>	<i>State</i>			
	<i>\$'000</i>	<i>\$'000</i>	<i>\$'000</i>	<i>\$'000</i>	<i>\$'000</i>	<i>\$'000</i>
Mathematical sciences	25 130	18 833	1 614	1 045	924	1 596
Physical sciences	93 257	80 664	127	3 275	748	3 837
Chemical sciences	95 298	71 245	3 213	2 388	2 117	10 241
Earth sciences	215 118	147 602	30 043	10 865	5 742	6 392
Biological sciences	259 787	110 189	57 024	25 314	16 072	14 051
Information, computing and communication sciences	216 803	173 964	26 619	3 950	3 141	4 352
Engineering and technology	384 761	300 292	17 552	5 506	4 973	32 481
Agricultural, veterinary and environmental sciences	773 263	159 062	379 800	43 795	18 456	28 679
Medical and health sciences	182 664	21 326	51 849	27 709	18 938	27 597
Economics	50 839	39 578	2 440	5 402	243	645
Law, justice and law enforcement	22 683	9 790	9 176	1 859	1 469	376
Other research fields, courses and disciplines	48 764	16 077	23 753	4 847	1 585	1 184
Total	2 368 367	1 148 621	603 209	135 956	74 407	131 430

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

2.7 EXPENDITURE, By research field(a)—By source of funds *continued*

<i>Research field</i>	<i>Joint government/ business(b)</i>	<i>Universities</i>	<i>Other Australian</i>	<i>Overseas</i>
	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	241	46	284	549
Physical sciences	446	397	930	2 834
Chemical sciences	1 417	254	2 725	1 697
Earth sciences	4 517	303	3 152	6 503
Biological sciences	15 082	898	15 417	5 740
Information, computing and communication sciences	1 813	1	1 102	1 862
Engineering and technology	3 749	38	9 061	11 111
Agricultural, veterinary and environmental sciences	129 111	210	8 410	5 741
Medical and health sciences	166	4 016	25 502	5 562
Economics	2 468	4	35	24
Law, justice and law enforcement	—	13	1	—
Other research fields, courses and disciplines	438	86	546	248
Total	159 447	6 265	67 163	41 871

— nil or rounded to zero (including null cells)

- (a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.
- (b) Includes funds provided by government levies.

2.8 EXPENDITURE, By socio-economic objective(a)—By location

	<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>Socio-economic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	238 665	13 688	76 779	95	137 248	3 412	2 256	—
<i>Economic development</i>								
Plant — production and primary products	392 484	68 534	69 324	106 664	27 909	46 646	5 699	6 666
Animal — production and primary products	297 799	91 009	74 657	54 551	21 045	31 172	10 402	7 434
Mineral resources (excl. energy)	81 902	14 258	15 848	17 626	1 764	20 646	460	1 206
Energy resources	65 265	18 486	10 469	6 931	2 991	17 778	3 986	1 972
Energy supply	28 343	17 044	7 610	1 642	461	1 116	34	—
Manufacturing	232 785	61 367	108 029	25 093	20 652	5 676	623	203
Construction	33 240	8 865	19 577	2 147	237	346	98	68
Transport	20 337	8 093	2 779	969	2 499	302	38	400
Information and communication services	52 814	22 443	6 186	3 256	2 582	3 092	247	57
Commercial services and tourism	11 412	6 999	2 116	240	480	137	281	161
Economic framework	158 656	15 148	17 031	1 199	2 618	452	203	61
<i>Total economic development</i>	1 375 035	332 246	333 626	220 318	83 236	127 363	22 070	18 227
<i>Society</i>								
Health	213 003	56 161	41 570	58 220	41 261	8 532	1 147	1 335
Education and training	14 768	5 233	440	3 270	2 134	808	75	1 345
Social development and community services	61 780	13 414	16 625	2 529	3 097	4 855	322	1 376
<i>Total society</i>	289 550	74 808	58 635	64 019	46 492	14 195	1 544	4 056
<i>Environment</i>								
Environmental policy frameworks and other aspects	50 415	20 099	4 667	8 876	714	6 434	1 943	269
Environmental management	380 903	56 125	59 254	60 239	19 838	27 609	69 595	21 761
<i>Total environment</i>	431 318	76 224	63 920	69 115	20 552	34 043	71 538	22 029
<i>Non-oriented research</i>	33 799	23 176	167	6 291	134	678	876	1 506
Total	2 368 367	520 142	533 127	359 838	287 663	179 690	98 284	45 818

— nil or rounded to zero (including null cells)

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

2.8 EXPENDITURE, By socio-economic objective(a)—By location *continued*

	<i>ACT</i>	<i>Other(b)</i>
<i>Socio-economic objective</i>	\$'000	\$'000
.....		
<i>Defence</i>	5 187	—
<i>Economic development</i>		
Plant — production and primary products	60 004	1 038
Animal — production and primary products	7 043	487
Mineral resources (excl. energy)	9 545	549
Energy resources	768	1 884
Energy supply	436	—
Manufacturing	10 749	393
Construction	1 867	35
Transport	4 697	560
Information and communication services	14 901	50
Commercial services and tourism	994	4
Economic framework	121 788	158
<i>Total economic development</i>	232 791	5 158
<i>Society</i>		
Health	4 633	145
Education and training	1 405	57
Social development and community services	19 286	276
<i>Total society</i>	25 324	478
<i>Environment</i>		
Environmental policy frameworks and other aspects	7 092	322
Environmental management	62 799	3 684
<i>Total environment</i>	69 891	4 006
<i>Non-oriented research</i>	696	276
Total	333 888	9 918

— nil or rounded to zero (including null cells)

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes Australian external territories and overseas.

2.9 EXPENDITURE, By research field(a)—By location

	<i>Total</i>	<i>NSW</i>	<i>Vic.</i>	<i>Qld</i>	<i>SA</i>	<i>WA</i>	<i>Tas.</i>
<i>Research field</i>	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	25 130	5 690	5 040	1 931	1 106	2 508	205
Physical sciences	93 257	41 412	21 421	1 172	23 535	1 230	1 491
Chemical sciences	95 298	26 967	36 347	6 396	16 517	4 349	1 632
Earth sciences	215 118	27 228	37 882	37 967	12 376	35 847	39 148
Biological sciences	259 787	40 398	37 132	65 942	16 518	16 221	20 038
Information, computing and communication sciences	216 803	27 826	27 966	5 000	37 676	8 317	1 569
Engineering and technology	384 761	92 356	147 570	28 350	85 569	19 962	1 242
Agricultural, veterinary and environmental sciences	773 263	186 693	153 490	165 202	54 574	77 010	31 353
Medical and health sciences	182 664	55 568	40 790	41 127	30 942	7 589	1 056
Economics	50 839	612	8 910	1 426	342	1 021	236
Law, justice and law enforcement	22 683	6 305	5 499	121	2 111	254	—
Other research fields, courses and disciplines	48 764	9 088	11 080	5 204	6 397	5 383	313
Total	2 368 367	520 142	533 127	359 838	287 663	179 690	98 284

— nil or rounded to zero (including null cells)

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

2.9 EXPENDITURE, By research field(a)—By location *continued*

	<i>NT</i>	<i>ACT</i>	<i>Other(b)</i>
<i>Research field</i>	\$'000	\$'000	\$'000
Mathematical sciences	—	8 651	—
Physical sciences	3	2 712	282
Chemical sciences	25	2 788	275
Earth sciences	4 729	15 535	4 407
Biological sciences	12 192	49 808	1 538
Information, computing and communication sciences	99	108 235	117
Engineering and technology	208	8 761	742
Agricultural, veterinary and environmental sciences	23 005	79 658	2 278
Medical and health sciences	1 300	4 281	11
Economics	557	37 730	6
Law, justice and law enforcement	475	7 917	—
Other research fields, courses and disciplines	3 225	7 813	261
Total	45 818	333 888	9 918

— nil or rounded to zero (including null cells)

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes Australian external territories and overseas.

2.10**HUMAN RESOURCES, By socio-economic objective(a)—By type of employee ...**

<i>Socio-economic objective</i>	<i>Total</i> person years	<i>Researchers</i> person years	<i>Technicians</i> person years	<i>Other supporting staff</i> person years
<i>Defence</i>	1 975	1 171	704	101
<i>Economic development</i>				
Plant — production and primary products	3 228	1 294	1 398	536
Animal — production and primary products	2 236	780	1 010	446
Mineral resources (excl. energy)	544	243	191	109
Energy resources	368	194	116	58
Energy supply	172	52	73	46
Manufacturing	1 598	570	661	368
Construction	220	83	92	45
Transport	93	64	16	12
Information and communication services	409	191	147	71
Commercial services and tourism	76	40	25	12
Economic framework	865	651	90	124
<i>Total economic development</i>	9 807	4 162	3 819	1 827
<i>Society</i>				
Health	2 559	1 539	736	285
Education and training	135	94	25	16
Social development and community services	550	407	69	73
<i>Total society</i>	3 243	2 040	830	373
<i>Environment</i>				
Environmental policy frameworks and other aspects	441	215	156	70
Environmental management	2 680	1 274	910	496
<i>Total environment</i>	3 121	1 489	1 066	567
<i>Non-oriented research</i>	260	110	67	83
Total	18 407	8 972	6 485	2 951

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

2.11**HUMAN RESOURCES, By research field(a)—By type of employee**

<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	235	122	78	36
Physical sciences	687	320	235	133
Chemical sciences	650	308	233	108
Earth sciences	1 326	683	397	245
Biological sciences	2 006	954	713	340
Information, computing and communication sciences	1 241	804	281	155
Engineering and technology	2 805	1 253	1 088	464
Agricultural, veterinary and environmental sciences	6 055	2 404	2 590	1 061
Medical and health sciences	2 294	1 308	716	271
Economics	442	364	32	46
Law, justice and law enforcement	191	153	16	23
Other research fields, courses and disciplines	476	301	106	69
Total	18 407	8 972	6 485	2 951

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

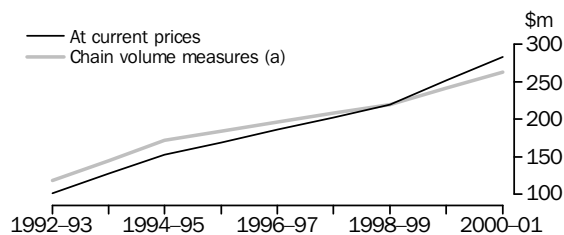
CHAPTER 3

PRIVATE NON-PROFIT R&D

EXPENDITURE ON R&D

Private non-profit expenditure on R&D has steadily increased since 1992–93. Expenditure in current prices in 2000–01 was 29% higher than in 1998–99.

EXPENDITURE ON R&D



(a) Reference year for chain volume measures is 1998-99. See paragraph 16 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 from 2,468 person years in 1998–99 to 2,721 person years in 2000–01.

RESOURCES DEVOTED TO R&D

	1992-93	1994-95	1996-97	1998-99	2000-01
R&D expenditure					
At current prices (\$m)	101.9	152.7	r185.8	r220.1	283.2
Chain volume measures(a) (\$m)	118.5	171.7	196.6	220.1	263.2
Human resources devoted to R&D (person years)	1 369	1 666	r2 351	r2 468	2 721

r revised

(a) Reference year for chain volume measures is 1998-99. See paragraph 16 of the Explanatory Notes for details.

TYPE OF EXPENDITURE

Labour costs continued to be the main component of R&D expenditure (47%), down from 50% in 1998–99. Capital expenditure accounted for 15% of research expenditure by Private non-profit organisations.

PURPOSE OF RESEARCH

In the Private non-profit sector, the leading SEO was Health, accounting for 91% or \$257m of total expenditure. Education and training accounted for \$17m (6%), while \$5m (2%) was directed towards Economic development.

RESEARCH FIELDS

In the Private non-profit sector, Medical and health sciences (\$181m) and Biological sciences (\$77m) 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 (\$122m or 43%).
SOURCE OF FUNDS	Own funds at \$92m (33%), and Commonwealth government funds at \$73m (26%), 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 Victoria at \$193m, New South Wales at \$57m and Western Australia at \$17m, accounting for 68%, 20% and 6% of total expenditure respectively.
TYPE OF R&D STAFF	The total R&D human resource effort of Private non-profit organisations in 2000–01 was estimated to be up 10% from 1998–99. Researchers accounted for 55% of the total research effort, Technicians 34% and Other supporting staff 11%.

3.1 EXPENDITURE, By socio-economic objective(a)—By type of expenditure

	Total	Land and buildings	Other capital expenditure	Labour costs(b)	Other current expenditure
<i>Socio-economic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	—	—	—	—	—
<i>Economic development</i>	5 359	48	297	2 896	2 119
<i>Society</i>					
Health	256 879	25 636	16 046	119 031	96 166
Education and training	16 853	np	np	8 019	8 029
Social development and community services	1 437	np	np	978	434
<i>Total society</i>	275 169	25 797	16 717	128 027	104 629
<i>Environment</i>	2 201	1	5	1 457	738
<i>Non-oriented research</i>	471	—	14	304	154
Total	283 200	25 845	17 032	132 684	107 639

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax, workers compensation insurance, overtime earnings, shift allowances, penalty rates, bonuses, commission payments, holiday pay, long service leave payments, sick pay, employer contributions to superannuation and pension schemes.

3.2 EXPENDITURE, By research field(a)—By type of expenditure

<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	1 124	34	100	368	623
Physical sciences	617	—	82	209	325
Chemical sciences	2 628	19	221	1 084	1 304
Earth sciences	—	—	—	—	—
Biological sciences	77 133	672	5 247	40 491	30 723
Information, computing and communication sciences	2 940	41	234	1 458	1 207
Engineering and technology	np	—	np	np	np
Agricultural, veterinary and environmental sciences	np	—	np	np	np
Medical and health sciences	180 777	24 939	10 657	80 063	65 118
Other research fields, courses and disciplines	16 518	140	435	8 178	7 765
Total	283 200	25 845	17 032	132 684	107 639

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax, workers compensation insurance, overtime earnings, shift allowances, penalty rates, bonuses, commission payments, holiday pay, long service leave payments, sick pay, employer contributions to superannuation and pension schemes.

3.3 EXPENDITURE, By socio-economic objective(a)—By type of activity

	<i>Total</i>	<i>Pure basic research</i>	<i>Strategic basic research</i>	<i>Applied research</i>	<i>Experimental development</i>
<i>Socio-economic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	—	—	—	—	—
<i>Economic development</i>	5 359	346	1 762	1 508	1 743
<i>Society</i>					
Health	256 879	72 509	115 541	54 669	14 161
Education and training	16 853	950	3 862	6 207	5 835
Social development and community services	1 437	—	76	873	488
<i>Total society</i>	275 169	73 459	119 478	61 749	20 484
<i>Environment</i>	2 201	—	90	2 111	—
<i>Non-oriented research</i>	471	141	243	70	18
Total	283 200	73 945	121 572	65 438	22 245

— nil or rounded to zero (including null cells)

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

3.4 EXPENDITURE, By research field(a)—By type of activity

<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	1 124	843	281	—	—
Physical sciences	617	3	94	225	296
Chemical sciences	2 628	868	981	438	341
Earth sciences	—	—	—	—	—
Biological sciences	77 133	23 541	37 675	13 816	2 100
Information, computing and communication sciences	2 940	882	847	np	np
Engineering and technology	np	10	np	100	np
Agricultural, veterinary and environmental sciences	np	—	np	np	308
Medical and health sciences	180 777	47 710	78 279	42 345	12 442
Other research fields, courses and disciplines	16 518	88	2 915	7 474	6 041
Total	283 200	73 945	121 572	65 438	22 245

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

3.5 EXPENDITURE, By socio-economic objective(a)—By source of funds

	Total	Own funds	Common- wealth government	State and local government	Business	Joint government/ business(b)	Universities
<i>Socio-economic objective</i>	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
<i>Defence</i>	—	—	—	—	—	—	—
<i>Economic development</i>	5 359	1 552	545	326	938	np	np
<i>Society</i>							
Health	256 879	86 688	67 373	25 953	16 597	1 144	2 613
Education and training	16 853	3 389	3 625	3 213	564	np	np
Social development and community services	1 437	572	104	25	—	—	np
<i>Total society</i>	275 169	90 650	71 102	29 190	17 160	np	np
<i>Environment</i>	2 201	31	737	161	291	—	—
<i>Non-oriented research</i>	471	210	145	97	—	—	—
Total	283 200	92 442	72 529	29 774	18 389	1 446	2 830

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes funds provided by government levies.

3.5 EXPENDITURE, By socio-economic objective(a)—By source of funds *continued*

	<i>Other Australian</i>	<i>Overseas</i>
<i>Socio-economic objective</i>	\$'000	\$'000
.....		
<i>Defence</i>	—	—
<i>Economic development</i>	358	np
<i>Society</i>		
Health	37 101	19 412
Education and training	623	5 309
Social development and community services	400	np
<i>Total society</i>	38 124	np
<i>Environment</i>	981	—
<i>Non-oriented research</i>	20	—
Total	39 483	26 308

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

3.6 EXPENDITURE, By research field(a)—By source of funds

<i>Research field</i>	<i>Total</i>	<i>Own funds</i>	<i>Common-wealth government</i>	<i>State and local government</i>	<i>Business</i>	<i>Joint government/business(b)</i>
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
Mathematical sciences	1 124	26	748	—	21	—
Physical sciences	617	253	97	51	100	—
Chemical sciences	2 628	1 366	590	111	166	—
Earth sciences	—	—	—	—	—	—
Biological sciences	77 133	25 531	22 505	5 708	2 769	637
Information, computing and communication sciences	2 940	1 081	569	134	80	38
Engineering and technology	np	220	—	25	55	53
Agricultural, veterinary and environmental sciences	np	20	20	95	375	—
Medical and health sciences	180 777	60 546	44 835	20 589	14 210	718
Other research fields, courses and disciplines	16 518	3 401	3 167	3 061	614	—
Total	283 200	92 442	72 529	29 774	18 389	1 446

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes funds provided by government levies.

3.6 EXPENDITURE, By research field(a)—By source of funds *continued*

<i>Research field</i>	<i>Universities</i>	<i>Other Australian</i>	<i>Overseas</i>
	\$'000	\$'000	\$'000
Mathematical sciences	—	77	253
Physical sciences	20	79	17
Chemical sciences	3	276	117
Earth sciences	—	—	—
Biological sciences	617	13 424	5 943
Information, computing and communication sciences	19	np	np
Engineering and technology	—	np	—
Agricultural, veterinary and environmental sciences	—	np	np
Medical and health sciences	2 054	24 187	13 638
Other research fields, courses and disciplines	117	973	5 186
Total	2 830	39 483	26 308

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

3.7 EXPENDITURE, By socio-economic objective(a)—By location

<i>Socio-economic 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>	5 359	527	978	122	207	1 634	np	—	np	—
<i>Society</i>										
Health	256 879	55 257	173 321	4 276	3 722	14 961	18	4 266	95	962
Education and training	16 853	686	15 445	40	63	36	np	26	np	2
Social development and community services	1 437	17	737	13	192	19	np	53	np	5
<i>Total society</i>	275 169	55 960	189 504	4 329	3 977	15 016	np	4 346	np	969
<i>Environment</i>	2 201	201	1 846	65	—	84	—	5	—	—
<i>Non-oriented research</i>	471	5	467	—	—	—	—	—	—	—
Total	283 200	56 692	192 795	4 516	4 184	16 734	np	4 351	np	969

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes Australian external territories and overseas.

3.8 EXPENDITURE, By research field(a)—By location

<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	1 124	—	1 124	—	—	—	—	—	—	—
Physical sciences	617	208	—	—	—	381	—	—	—	27
Chemical sciences	2 628	495	1 562	—	—	572	—	—	—	—
Earth sciences	—	—	—	—	—	—	—	—	—	—
Biological sciences	77 133	18 570	52 734	2 309	np	2 314	—	—	np	—
Information, computing and communication sciences	2 940	271	2 005	—	—	np	—	—	np	—
Engineering and technology	np	—	—	108	190	—	np	—	—	—
Agricultural, veterinary and environmental sciences	np	—	176	—	144	np	80	—	np	—
Medical and health sciences	180 777	36 903	119 930	2 042	3 638	13 090	np	4 190	np	930
Other research fields, courses and disciplines	16 518	246	15 264	57	np	77	42	161	np	12
Total	283 200	56 692	192 795	4 516	4 184	16 734	np	4 351	np	969

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those
used in earlier years. See paragraph 14 of the Explanatory Notes.

(b) Includes Australian external territories and overseas.

3.9 HUMAN RESOURCES, By socio-economic objective(a)—By type of employee

<i>Socio-economic 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>	45	29	12	5
<i>Society</i>				
Health	2 515	1 353	888	275
Education and training	109	74	26	9
Social development and community services	15	12	1	2
<i>Total society</i>	2 639	1 439	915	286
<i>Environment</i>	28	26	2	—
<i>Non-oriented research</i>	9	2	6	1
Total	2 721	1 496	935	291

— nil or rounded to zero (including null cells)

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

3.10 HUMAN RESOURCES, By research field(a)—By type of employee

<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	8	5	2	—
Physical sciences	4	2	1	—
Chemical sciences	21	15	5	2
Earth sciences	—	—	—	—
Biological sciences	883	448	355	81
Information, computing and communication sciences	27	15	np	np
Engineering and technology	4	3	—	—
Agricultural, veterinary and environmental sciences	9	7	np	np
Medical and health sciences	1 665	921	549	195
Other research fields, courses and disciplines	101	79	13	9
Total	2 721	1 496	935	291

— nil or rounded to zero (including null cells)

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

(a) The research classifications used in this publication differ from those used in earlier years. See paragraph 14 of the Explanatory Notes.

EXPLANATORY NOTES

- INTRODUCTION**
- 1** This publication presents estimates of expenditure and human resources devoted to R&D carried out by Government and Private non-profit organisations during 2000–01.
- 2** Comparable R&D statistics are produced for the Business and Higher Education sectors (see paragraph 19).
- DATA SOURCES**
- 3** The 2000–01 statistics presented in this publication have been compiled from data collected from Government and Private non-profit organisations in the ABS Survey of Research and Experimental Development in respect of the year ended 30 June 2001. This survey was based on a complete enumeration of Government and Private non-profit organisations identified by the ABS as likely R&D performers. The survey was conducted by mail questionnaire and a 96% response rate was obtained. The ABS believes that the non-respondents were non-R&D performers.
- 4** Statistics for earlier years were derived from similar surveys. Minor revisions have been made to previous years statistics.
- 5** The Gross Domestic Product (GDP) figures used to derive Government expenditure on R&D/GDP ratios are current at the time of manuscript finalisation (*National Income, Expenditure and Product, March Quarter 2002* (cat. no. 5206.0)), and, at current prices, are as follows: \$425,706m (1992–93); \$471,348m (1994–95); \$529,886m (1996–97); \$591,592m (1998–99) and \$672,223m (2000–01). The available Government expenditure on R&D/GDP ratios for other OECD countries are current at time of manuscript finalisation and are sourced from *Main Science and Technology Indicators, 2001/2*, OECD, Paris, 2001.
- DEFINITIONS**
- 6** 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".
- 7** 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 respondents 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.
- 8** For a more comprehensive interpretation of the definition of R&D activity, contact the ABS or refer to the OECD publication, *The Measurement of Scientific and Technological Activities (Frascati Manual 1993)*, OECD, Paris 1994.
- SCOPE**
- 9** The Government sector includes all Commonwealth, State and Local government departments and authorities. However, for the purpose of this survey Local government organisations have been excluded as it is considered that their contribution to total R&D activity would be minimal.

SCOPE *continued*

10 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 Enterprise sector.

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

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

SOCIO-ECONOMIC OBJECTIVE
AND RESEARCH FIELDS,
COURSES AND DISCIPLINES
CLASSIFICATIONS

13 The statistics in this publication are classified by Socio-economic objective (SEO) and Research fields, courses and disciplines (RFCD). For more information on these classifications see the *Australian Standard Research Classification, 1998* (cat. no. 1297.0).

14 The research classifications used in this publication differ from those used in earlier years. The classifications used in this publication were from the 1998 edition of the Australian Standard Research Classification whereas the 1993 edition was used for previous publications.

15 Respondents 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 respondents. Most of the data have been reported on the second basis.

CHAIN VOLUME MEASURES

16 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 1998–99). They can be thought of as current price values re-expressed in (i.e. based on) the prices of the previous year and linked together to form continuous time series. They are formed in a multi-stage process of which the major steps are described in Section 15 of the information paper, *Introduction of Chain Volume Measures in the Australian National Accounts* (cat. no. 5248.0).

RELIABILITY OF STATISTICS

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

- many respondents had to make estimates because their accounts did not separately record data on R&D activity; and
- the OECD standard definition of R&D used in this survey differs in some respects from what respondents may regard as R&D activity.

UNPUBLISHED STATISTICS

18 Limited additional detailed R&D statistics are available at a charge from the ABS.

RELATED PUBLICATIONS

19 Users may also wish to refer to the following publications:
Research and Experimental Development, Businesses, Australia, 2000–01
 cat. no. 8104.0
*Research and Experimental Development, Higher Education
 Organisations, Australia, 2000* cat. no. 8111.0
*Research and Experimental Development, All Sector Summary, Australia,
 2000–01* cat. no. 8112.0 (to be released later this month)

RELATED PUBLICATIONS

continued

Main Science and Technology Indicators 2001/2, OECD, Paris, 2001
The Measurement of Scientific and Technological Activities (Frascati Manual 1993) OECD, Paris, 1994

20 Current publications and other products released by the ABS are listed in the *Catalogue of Publications and Products, Australia* (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.

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

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.
Basic research	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.
Capital expenditure	Expenditure on the acquisition of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment attributable to R&D activity.
Chain volume measures	Annually reweighted chain Laspeyres indexes referenced to the current price values in a chosen reference year (currently 1998–99). They can be thought of as current price values re-expressed in (i.e. based on) the prices of the previous year and linked together to form continuous time series.
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	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.
Other current expenditure	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.
Other supporting staff	Skilled and unskilled craftpersons, secretarial and clerical staff directly associated with R&D activity.
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 fields, courses and disciplines	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.

Researchers	Those involved with the conception and/or development of new knowledge/products (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 area of expected national 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. It describes the purpose of the research (i.e. why the research is being performed).
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 data.
Type of R&D activity	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.
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