

1994-95

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Research and Experimental Development

General Government and Private Non-Profit Organisations

Australia

NOTES

SYMBOLS AND OTHER USAGES

— nil or rounded to zero
r revised since previous issue

INQUIRIES

For further information about statistics in this publication and the availability of related unpublished statistics, contact Derek Byars on Canberra (06) 252 5627 or any Australian Bureau of Statistics (ABS) office.

For further information about constant price estimates, contact Paul Curran on Canberra (06) 252 6801.

For information about other ABS statistics and services, please refer to the back of this publication.

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MAIN FEATURES

EXPENDITURE ON RESEARCH AND DEVELOPMENT (R&D)

- Expenditure on R&D carried out by Government organisations (GOVERD) in Australia in 1994–95 was estimated to be \$1,965m at current prices. This represented an increase of 8% over the two years since 1992–93. At average 1989–90 prices, R&D expenditure was estimated to be \$1,679m, an increase of 6% compared with 1992–93.
- GOVERD represented 0.43% of Gross Domestic Product (GDP), down slightly from 0.45% in 1992–93.
- Expenditure on R&D carried out by Private non-profit organisations in Australia in 1994–95 was estimated to be \$144m at current prices. This represented an increase of 42% compared with 1992–93. At average 1989–90 prices, R&D expenditure was estimated to be \$126m, an increase of 41% compared with 1992–93.

HUMAN RESOURCES DEVOTED TO R&D

- Human resources devoted to R&D in Australia by Government organisations in 1994–95 was estimated to be 19,134 person years. This represented a 3% decrease over 1992–93.
- Human resources devoted to R&D in Australia by Private non-profit organisations in 1994–95 was estimated to be 1,692 person years. This represented a 24% increase over 1992–93.

PURPOSE OF RESEARCH

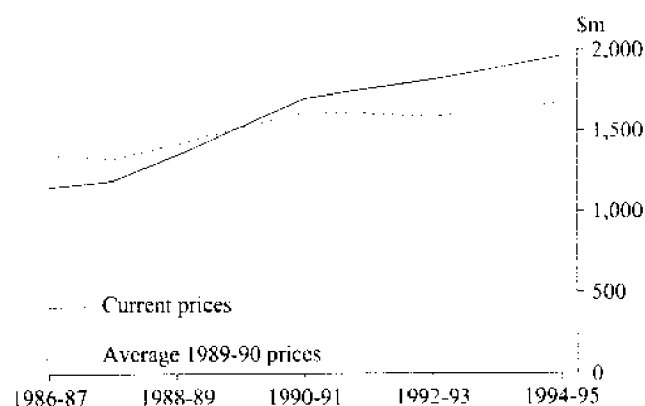
- Most expenditure on R&D carried out by Government organisations was directed towards Economic development (\$1,041m or 53%), down from 57% in 1992–93. Expenditure on the Environment increased from \$295m or 16% in 1992–93 to \$370m or 19% in 1994–95.
- Private non-profit organisations continued to mainly direct their R&D towards Health (\$114m or 79%).

GENERAL GOVERNMENT INTRAMURAL R&D

EXPENDITURE ON R&D

GOVERD has increased every year since 1986-87 in current price terms. In average 1989-90 prices it fell 2% between 1990-91 and 1992-93, before increasing 6% between 1992-93 and 1994-95.

Commonwealth government organisations in 1994-95 accounted for 60% of R&D expenditure in the Government sector. State government organisations increased their share of Government expenditure from 37% in 1992-93 to 40% in 1994-95.



1

EXPENDITURE ON R&D BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA (\$m)

	1986-87	1987-88	1988-89	1990-91 ^r	1992-93 ^r	1994-95
AT CURRENT PRICES						
Government organisations						
Commonwealth	786.5	797.0	869.6	1,034.0	1,151.1	1,178.4
State	368.4	394.6	482.7	670.0	667.6	786.3
Total	1,154.9	1,191.7	1,352.3	1,704.0	1,818.8	1,964.7
AVERAGE 1989-90 PRICES						
Government organisations						
Commonwealth	919.5	892.4	914.4	989.2	1,001.2	1,000.7
State	433.4	435.5	510.9	630.0	589.6	678.4
Total	1,352.9	1,327.9	1,425.3	1,619.2	1,590.8	1,679.1

GOVERNMENT AS A PERCENTAGE OF GDP

GOVERNMENT as a percentage of GDP has been relatively stable over the period 1986-87 to 1994-95, reaching 0.45% in 1990-91 and 1992-93 before falling to 0.43% in 1994-95.



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

2 GOVERNMENT/GDP RATIOS OF OECD COUNTRIES

Country	1992-93	1994-95
Iceland	0.58	0.57
France	0.51	0.50
Finland	0.45	0.44
Australia	0.45	0.43
Germany	0.35	0.36
United Kingdom	0.31	0.30
Italy	0.27	0.27
United States	0.27	0.27
Japan	0.25	0.26
Canada	0.27	0.25
Spain	0.18	0.18

HUMAN RESOURCES DEVOTED TO R&D

Human resources devoted to research by Government organisations steadily increased over the years to peak in 1992-93 at 19,799 person years, before falling 3% to 19,134 person years in 1994-95.

3 HUMAN RESOURCES DEVOTED TO R&D BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA (person years)

	1986-87	1987-88	1988-89	1990-91*	1992-93*	1994-95
Government organisations						
Commonwealth	11,529	11,491	10,863	10,670	11,020	10,562
State	6,796	7,133	8,335	8,990	8,779	8,572
Total	18,325	18,624	19,198	19,660	19,799	19,134

PURPOSE OF RESEARCH

Socio-economic objectives (SFO's) on which most General government R&D expenditure occurred were: Economic development (\$1,041m); Environment (\$370m); and Society (\$258m). Within Economic development, the main objectives were Plant production and primary products (\$270m), Animal production and primary products (\$268m) and Manufacturing (\$223m).

TYPE OF EXPENDITURE

Labour costs continued to be the main component of General government R&D expenditure (46%), down from 50% in 1992-93. Capital expenditure increased by 33% over 1992-93, with the largest expenditures on Health (\$46m) and Defence (\$40m).

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R&D BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA, BY SOCIO-ECONOMIC OBJECTIVE, BY TYPE OF EXPENDITURE AND TYPE OF ACTIVITY, 1994-95 (\$'000)

Socio-economic objective	Type of expenditure				Type of activity(a)				
	Total	Land and buildings	Other capital expenditure	Labour costs(b)	Other current expenditure	Pure basic research	Strategic basic research	Applied research	Experimental development
Defence	223,099	13,348	26,269	95,416	88,065	9,733	51,471	131,096	30,799
<i>Economic development</i>									
Plant -- production and primary products	269,964	21,485	15,880	126,788	105,811	849	26,422	185,970	56,723
Animal -- production and primary products	267,955	22,846	10,903	124,557	109,649	557	33,060	201,859	32,478
Mineral resources (excl. energy)	68,049	1,232	7,084	30,874	28,859	1,502	29,427	33,709	3,411
Energy resources	59,660	1,004	4,288	23,221	31,147	3,010	14,515	39,632	2,503
Energy supply	27,157	605	3,673	14,509	8,370	746	7,737	10,144	8,530
Manufacturing	222,951	12,930	15,103	109,536	85,383	11,478	76,249	97,994	37,230
Construction	31,109	233	2,241	16,317	12,318	284	11,152	13,846	5,826
Transport	18,347	356	1,991	8,721	7,279	476	3,261	10,053	4,558
Information and communication services	37,269	2,116	3,928	17,943	13,281	3,936	6,101	18,110	9,121
Commercial services	10,468	148	1,141	5,714	3,464	40	1,756	4,787	3,885
Economic framework	28,027	72	2,168	16,807	8,979	257	5,606	17,573	4,590
Total economic development	1,640,955	63,027	68,401	494,987	414,540	23,135	215,287	633,678	168,855
<i>Society</i>									
Health	209,350	27,156	18,604	96,804	66,787	32,454	69,992	86,446	20,458
Education and training	7,429	131	335	4,330	2,632	270	2,697	3,280	1,182
Social development and community services	41,125	1,015	1,450	20,339	18,322	834	12,597	19,488	8,206
Total society	257,904	28,302	20,389	121,473	87,741	33,558	85,286	109,214	29,847
<i>Environment</i>									
Environmental knowledge	206,497	8,517	14,153	83,848	99,980	11,826	67,827	109,955	16,889
Environmental aspects of economic development	108,409	4,709	7,252	54,119	42,330	2,418	30,077	61,671	14,244
Environmental management and other aspects	55,212	1,627	3,591	24,556	25,439	2,260	13,523	31,264	8,166
Total environment	370,118	14,852	24,995	162,522	167,748	16,504	111,427	202,889	39,299
<i>Advancement of knowledge</i>									
Natural sciences, technologies and engineering	69,674	2,724	7,192	30,421	29,336	29,402	15,458	17,357	7,457
Social sciences and humanities	2,925	358	171	1,608	788	1,207	501	910	308
Total advancement of knowledge	72,599	3,082	7,363	32,029	30,125	30,609	15,959	18,267	7,765
TOTAL	1,964,676	122,613	147,417	906,427	788,219	113,538	479,431	1,095,144	276,564
<i>Commonwealth contribution</i>	1,178,394	49,187	89,972	547,352	491,883	68,032	359,871	604,963	145,528
<i>State contribution</i>	786,282	73,426	57,445	359,075	296,336	45,506	119,559	490,181	131,036

(a) Data within this classification are subjectively allocated by respondents at the time of reporting, using OECD-ABS definitions. Analysts using this classification should bear the original subjectivity in mind. See Paragraph 8 of the Explanatory Notes. (b) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax and 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.

FIELD OF RESEARCH (FOR)

The FOR's in which most General government R&D expenditure occurred were: Agricultural sciences (\$584m); Biological sciences (\$221m); and Medical and health sciences (\$202m).

TYPE OF ACTIVITY

Applied research was 56% of government R&D expenditure, up from 50% in 1992-93 and 52% in 1990-91. Pure basic research increased as a proportion of total research, from 3% in 1992-93 to 6% in 1994-95.

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R&D BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA, BY FIELD OF RESEARCH, BY TYPE OF EXPENDITURE AND TYPE OF ACTIVITY, 1994-95 (\$'000)

Field of research	Type of expenditure					Type of activity(a)			
	Total	Land and buildings	Other capital expenditure	Labour costs(b)	Other current expenditure	Pure basic research	Strategic basic research	Applied research	Experimental development
<i>Natural sciences, technologies and engineering</i>									
Mathematical sciences	22,350	800	1,259	14,211	6,080	750	4,234	12,587	4,779
Physical sciences	94,591	3,327	9,636	44,373	37,255	21,358	18,295	41,071	13,867
Chemical sciences	85,045	2,730	7,213	41,798	33,304	3,875	26,240	42,211	12,719
Earth sciences	185,551	4,506	14,345	74,751	91,949	10,649	62,876	100,791	11,235
Information, computers and communication technologies	186,894	10,457	24,117	80,284	72,036	2,178	37,998	111,649	35,069
Applied sciences and technologies	188,968	6,268	14,917	93,793	73,990	17,519	52,596	84,318	34,535
General Engineering	110,707	3,054	11,281	53,464	42,907	3,240	36,117	46,305	25,045
Biological sciences	220,872	16,388	14,229	99,682	90,573	17,009	79,537	111,679	12,647
Agricultural sciences	583,808	46,665	28,545	270,601	237,998	2,295	64,738	421,782	94,993
Medical and health sciences	202,068	26,772	16,110	93,005	66,182	31,163	73,779	77,908	19,218
Total natural sciences, technologies and engineering	1,880,855	120,967	141,652	865,963	752,274	110,037	456,410	1,050,301	264,106
<i>Social sciences and humanities</i>									
Accounting and finance	1,064	—	412	313	340	—	—	1,064	—
Economics	23,849	146	1,405	12,748	9,549	271	3,023	19,561	995
Political sciences	4,578	138	199	2,585	1,656	47	1,339	1,231	1,961
Sociology	8,305	190	370	2,627	5,117	140	3,660	2,843	1,661
Law	4,864	—	157	1,966	2,740	41	4,567	167	89
Psychology	4,359	159	315	2,018	1,866	257	1,690	1,546	866
Education	4,300	44	151	2,753	1,351	90	1,568	1,756	886
Other social sciences	28,904	540	2,421	13,744	12,200	1,170	6,505	15,267	5,963
Humanities	3,599	428	335	1,710	1,126	1,485	670	1,408	37
Total social sciences and humanities	83,821	1,646	5,765	40,465	35,945	3,501	23,020	44,842	12,458
TOTAL	1,964,676	122,613	147,417	906,427	788,219	113,538	479,431	1,095,144	276,564
<i>Commonwealth contribution</i>	1,178,394	49,187	89,972	547,352	491,883	68,032	359,871	604,963	145,528
<i>State contribution</i>	786,282	73,426	57,445	359,075	296,336	45,506	119,559	490,181	131,036

(a) Data within this classification are subjectively allocated by respondents at the time of reporting, using OECD/ABS definitions. Analysts using this classification should bear the original subjectivity in mind. See Paragraph 8 of the Explanatory Notes. (b) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax and 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.

SOURCE OF FUNDS
FOR R&D

Most of the funding for General government R&D came from the government sector itself: 76% from within the organisation performing the R&D (own funds), 7% from other Commonwealth organisations and 2% from other State government organisations, totalling \$1,678m. The next major sources of funds were from private business and joint government/business, both contributing 5% of total funding.

Funding from external sources continued to increase to be \$462m in 1994-95. External funding accounted for 24% of total R&D funding for General government, up from 22% in 1992-93.

6 SOURCE OF FUNDS FOR R&D BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA, BY SOCIO-ECONOMIC OBJECTIVE, 1994-95 (\$'000)

Socio-economic objective	Source of funds										
	Total	Own funds			State and local government	Private business enterprises	Public business enterprises	Joint govt/business (a)	Universities and colleges	Private non-profit and other Australian	Overseas
		Commonwealth	State	Commonwealth government							
Defence	223,099	221,808	--	616	26	531	45	28	--	19	26
<i>Economic development</i>											
Plant --- production and primary products	269,964	53,927	143,786	15,341	6,334	11,911	7,273	29,607	111	798	875
Animal --- production and primary products	267,955	72,095	135,178	11,970	1,172	8,272	6,312	30,678	91	1,627	559
Mineral resources (excl. energy)	68,049	40,400	6,303	3,049	191	13,232	247	828	57	3,168	573
Energy resources	59,660	43,752	3,123	959	200	9,685	117	1,097	52	571	105
Energy supply	27,157	13,313	8,353	1,164	669	3,128	116	50	10	150	205
Manufacturing	222,951	142,578	15,535	13,370	2,236	21,948	4,704	17,547	257	2,252	2,525
Construction	31,109	17,450	6,661	2,393	506	3,733	188	132	10	3	33
Transport	18,347	5,403	9,470	1,145	643	763	738	123	9	1	52
Information and communication services	37,269	23,022	5,530	2,960	210	2,494	1,602	1,153	38	94	165
Commercial services	10,468	3,535	4,674	931	519	344	79	274	36		77
Economic framework	28,027	22,126	3,280	1,160	22	457	49	285	9	77	563
Total economic development	1,040,955	437,602	341,892	54,440	12,702	75,966	21,425	81,774	680	8,742	5,733
<i>Society</i>											
Health	209,350	26,747	84,591	32,208	17,435	13,782	1,362	1,470	4,468	24,229	3,057
Education and training	7,429	1,905	3,483	899	641	157	84	89	--	140	33
Social development and community services	41,125	25,770	11,541	1,576	1,179	458	200	217	71	73	39
Total society	257,904	54,422	99,615	34,682	19,255	14,397	1,646	1,775	4,539	24,442	3,129
<i>Environment</i>											
Environmental knowledge	206,407	113,128	58,547	19,922	3,847	3,190	892	3,793	406	926	1,847
Environmental aspects of economic development	108,409	61,860	15,603	11,293	2,068	5,709	1,146	9,378	73	620	659
Environmental management and other aspects	55,212	20,499	21,938	6,701	1,862	1,029	695	2,154	16	63	257
Total environment	370,118	195,486	96,088	37,916	7,778	9,928	2,733	15,325	494	1,609	2,762
<i>Advancement of knowledge</i>											
Natural sciences, technologies and engineering	69,674	31,825	20,865	5,945	2,051	2,652	263	176	418	1,423	4,056
Social sciences and humanities	2,925	643	2,152	87	35	5	--	--	1	4	--
Total advancement of knowledge	72,599	32,468	23,017	6,032	2,085	2,657	263	176	419	1,427	4,056
TOTAL	1,964,676	941,786	560,611	133,686	41,847	103,479	26,112	99,079	6,132	36,239	15,706
<i>Commonwealth contribution</i>	1,178,394	941,786	--	65,001	11,401	76,542	8,799	53,938	1,047	8,059	11,821
<i>State contribution</i>	786,282	--	560,611	68,685	30,446	26,937	17,313	45,141	5,085	28,180	3,885

(a) Includes funds provided via government levies.

SOURCE OF FUNDS FOR R&D BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA, BY FIELD OF RESEARCH, 1994-95 (\$'000)

Field of research	Source of funds										
	Own funds				Private business enterprises				Private non-profit and other Australian		Overseas
	Total	Commonwealth	State	Commonwealth government	State and local government	Private business enterprises	Public business enterprises	Joint gov't/business (a)	Universities and colleges	Private non-profit and other Australian	
<i>Natural sciences, technologies and engineering</i>											
Mathematical sciences	22,350	17,076	1,367	1,497	91	1,771	60	251	90	8	140
Physical sciences	94,591	82,931	405	1,937	165	3,780	247	611	45	336	4,134
Chemical sciences	85,045	58,366	6,313	3,548	807	12,585	1,081	998	154	561	633
Earth sciences	185,551	125,313	22,877	12,999	2,351	12,242	421	4,229	376	2,387	2,357
Information, computers and communication technologies	186,894	148,815	22,878	6,178	1,237	4,276	662	1,598	32	534	685
Applied sciences and technologies	188,968	133,252	7,626	7,506	1,783	15,197	5,184	16,399	110	659	1,252
General Engineering	110,707	63,319	20,506	5,412	2,897	14,648	1,369	774	48	1,311	423
Biological sciences	220,872	112,939	53,277	22,131	5,521	5,427	703	12,662	674	5,772	1,767
Agricultural sciences	583,808	112,644	330,150	36,937	8,902	17,739	14,617	59,592	178	1,741	1,306
Medical and health sciences	202,068	34,463	74,309	30,752	15,650	14,315	1,485	1,501	4,308	22,337	2,949
Total natural sciences, technologies and engineering	1,880,855	889,119	539,707	128,896	39,403	101,979	25,830	98,615	6,016	35,645	15,646
<i>Social sciences and humanities</i>											
Accounting and finance	1,064	—	1,064	—	—	—	—	—	—	—	—
Economics	23,849	18,148	3,068	1,445	241	117	58	239	2	514	16
Political sciences	4,578	2,353	2,144	1	80	—	—	—	—	—	—
Sociology	8,305	6,479	1,485	49	244	—	—	—	—	47	—
Law	4,864	4,370	71	—	223	4	192	—	—	5	—
Psychology	4,359	2,888	823	173	92	139	7	151	36	24	26
Education	4,300	133	2,831	744	583	7	1	—	—	—	—
Other social sciences	28,904	17,636	6,648	2,267	932	1,231	25	74	78	3	10
Humanities	3,599	660	2,769	111	49	4	—	—	—	—	6
Total social sciences and humanities	83,821	52,667	20,904	4,790	2,444	1,500	282	464	116	593	60
TOTAL	1,964,676	941,786	560,611	133,686	41,847	103,479	26,112	99,079	6,132	36,239	15,706
<i>Commonwealth contribution</i>	1,178,394	941,786	—	65,001	11,401	76,542	8,799	53,938	1,047	8,059	11,821
<i>State contribution</i>	786,282	—	560,611	68,685	30,446	26,937	17,313	45,141	5,085	28,180	3,885

(a) Includes funds provided via government levies.

STATE COMPARISONS

The leading States in terms of the location of General government R&D expenditure were New South Wales at \$509m and Victoria at \$430m, accounting for 26% and 22% of total expenditure respectively. Next in order were Queensland (14%), South Australia (13%), the Australian Capital Territory (10%) and Western Australia (7%). The ranking was the same as 1992-93 except for New South Wales replacing Victoria as the leading State.

Of the \$786m State government R&D, most was carried out in New South Wales (32%), Queensland (22%), Victoria (17%) and Western Australia (12%).

Economic development was the predominant SEO of R&D expenditure in all States, except for South Australia, where most expenditure was directed towards Defence, and Tasmania and the Northern Territory where Environment was the major objective.

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LOCATION OF R&D EXPENDITURE BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA, BY SOCIO-ECONOMIC OBJECTIVE, 1994-95 (\$'000)

Socio-economic objective	Location of expenditure									
	Total	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Other(a)
Defence	223,099	12,666	69,925	420	130,287	14	1,659	—	7,530	597
<i>Economic development</i>										
Plant — production and primary products	269,964	44,842	39,599	70,962	20,025	35,666	10,751	3,709	41,863	2,547
Animal — production and primary products	267,955	74,209	53,236	54,485	24,875	25,356	8,561	13,807	12,120	1,305
Mineral resources (excl. energy)	68,049	13,664	76,869	21,736	364	8,559	22	272	6,023	538
Energy resources	59,660	12,326	10,147	3,651	106	11,354	3,083	4,428	4,121	10,444
Energy supply	27,157	17,188	6,461	449	214	679	—	284	1,834	49
Manufacturing	222,951	84,665	96,513	21,092	7,494	2,376	205	819	9,164	625
Construction	31,109	9,012	17,246	2,010	700	1,136	108	9	840	47
Transport	18,347	3,242	5,566	5,380	332	1,131	30	—	2,667	—
Information and communication services	37,269	9,681	6,757	4,295	3,495	959	368	93	11,473	149
Commercial services	10,468	3,015	499	623	1,684	2,899	8	49	1,692	—
Economic framework	28,027	10,769	1,492	540	250	1,580	24	150	13,223	—
Total economic development	1,040,955	282,613	254,384	185,223	59,538	91,695	23,159	23,619	105,021	15,704
<i>Society</i>										
Health	209,350	74,471	47,150	26,059	36,850	9,426	2,099	4,630	8,380	284
Education and training	7,429	826	632	1,856	911	784	663	797	877	85
Social development and community services	41,125	11,620	6,337	1,285	1,608	2,450	1,209	1,515	14,857	245
Total society	257,904	86,917	54,118	29,200	39,369	12,659	3,971	6,942	24,114	614
<i>Environment</i>										
Environmental knowledge	206,497	44,101	24,418	26,375	6,940	17,325	37,305	17,665	29,558	2,810
Environmental aspects of economic development	108,409	27,505	17,035	17,582	11,597	5,826	1,750	4,422	21,983	710
Environmental management and other aspects	55,212	17,500	1,428	6,427	1,609	13,355	3,328	2,083	9,072	411
Total environment	370,118	89,106	42,881	50,384	20,146	36,506	42,383	24,170	60,613	3,931
<i>Advancement of knowledge</i>										
Natural sciences, technologies and engineering	69,674	36,714	8,053	7,513	1,770	1,216	7,570	2,823	3,480	535
Social sciences and humanities	2,925	705	430	92	77	499	49	825	233	15
Total advancement of knowledge	72,599	37,419	8,483	7,605	1,848	1,715	7,619	3,648	3,713	550
TOTAL	1,964,676	508,719	429,791	272,832	251,187	142,589	78,792	58,379	200,990	21,397
<i>Commonwealth contribution</i>	1,178,394	258,741	294,925	102,549	167,571	47,629	56,982	33,526	197,262	19,209
<i>State contribution</i>	786,282	249,978	134,866	170,283	83,616	94,961	21,810	24,852	3,728	2,188

(a) Includes Australian External Territories and overseas

STATE COMPARISONS —
continued

In New South Wales, Queensland, Western Australia and the Northern Territory, the major FOR was Agricultural sciences. In Victoria the major FOR was Applied sciences and technologies, in South Australia, Information, computers and communication technologies, in Tasmania, Earth sciences and in the Australian Capital Territory, Biological sciences.

The Australian Capital Territory accounted for 42% of the R&D expenditure on Social sciences and humanities.

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LOCATION OF R&D EXPENDITURE BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA, BY FIELD OF RESEARCH, 1994-95 (\$'000)

Field of research	Location of expenditure									
	Total	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Overseas
Natural sciences, technologies and engineering										
Mathematical sciences	22,350	5,682	5,008	849	2,015	1,124	89	994	6,570	19
Physical sciences	94,591	44,285	18,200	360	25,483	293	1,162	1,536	2,740	532
Chemical sciences	85,045	22,084	43,908	3,484	4,477	3,880	2,094	1,729	3,065	324
Earth sciences	185,551	29,688	21,805	27,812	6,253	22,023	32,555	10,376	21,297	13,742
Information, computers and communication technologies	186,894	32,253	23,443	6,678	90,269	7,140	799	1,857	24,197	259
Applied sciences and technologies	188,968	54,140	92,174	12,225	15,712	3,111	700	737	9,487	682
General Engineering	110,707	38,652	41,980	20,669	3,402	3,078	312	268	2,208	139
Biological sciences	220,872	46,425	39,370	37,855	7,514	9,988	15,195	16,734	46,124	1,666
Agricultural sciences	583,808	149,835	86,076	130,120	54,158	77,487	20,962	18,884	42,655	3,631
Medical and health sciences	202,068	74,460	46,783	19,738	37,641	10,430	3,445	2,245	7,062	263
Total natural sciences, technologies and engineering	1,880,855	497,505	418,746	259,790	246,924	138,553	77,313	55,360	165,406	21,258
Social sciences and humanities										
Accounting and finance	1,064	—	—	1,064	—	—	—	—	—	—
Economics	23,849	226	313	2,163	248	1,089	—	1,097	18,691	22
Political sciences	4,578	560	96	1,440	164	48	36	57	2,179	—
Sociology	8,305	1,070	140	478	750	64	436	27	5,328	12
Law	4,864	4,597	20	233	—	—	—	—	—	15
Psychology	4,359	795	2,003	134	557	318	33	—	506	12
Education	4,300	298	442	1,500	596	574	4	791	94	—
Other social sciences	28,904	2,269	7,518	5,912	1,713	1,333	962	489	8,643	66
Humanities	3,599	1,400	512	119	236	609	8	559	143	12
Total social sciences and humanities	83,821	11,214	11,045	13,042	4,263	4,036	1,479	3,019	35,584	139
TOTAL	1,964,676	508,719	429,791	272,832	251,187	142,589	78,792	58,379	200,990	21,397
<i>Commonwealth contribution</i>	1,178,394	258,741	294,925	102,549	167,571	47,629	56,982	33,526	197,262	19,209
<i>State contribution</i>	786,282	249,978	134,866	170,283	83,616	94,961	21,810	24,852	3,728	2,188

(a) Includes Australian External Territories and overseas

TYPE OF R&D STAFF

Total human resource effort devoted to R&D by General government organisations decreased slightly since 1992-93. While the research effort of Researchers decreased by 10% or 929 person years to 8,680, that of Technicians and Other supporting staff increased by 2% and 5% respectively.

Researchers accounted for 45% of the total research effort, down from 49% in 1992-93.

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HUMAN RESOURCES DEVOTED TO R&D BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA, BY SOCIO-ECONOMIC OBJECTIVE, 1994-95 (\$'000)

<i>Socio-economic objective</i>	<i>Type of employee</i>			
	<i>Total</i>	<i>Researchers</i>	<i>Technicians</i>	<i>Other supporting staff</i>
Defence	2,009	1,226	554	229
<i>Economic development</i>				
Plant — production and primary products	2,750	1,103	1,178	469
Animal — production and primary products	2,667	968	1,034	664
Mineral resources (excl. energy)	588	239	202	148
Energy resources	494	320	198	76
Energy supply	234	112	73	49
Manufacturing	2,079	743	772	564
Construction	306	91	122	94
Transport	152	95	33	25
Information and communication services	341	159	103	79
Commercial services	101	57	21	22
Economic framework	340	224	57	58
Total economic development	10,051	4,011	3,793	2,247
<i>Society</i>				
Health	2,620	1,458	859	303
Education and training	103	66	16	21
Social development and community services	388	272	50	67
Total society	3,112	1,796	924	392
<i>Environment</i>				
Environmental knowledge	1,731	726	678	327
Environmental aspects of economic development	1,042	322	432	287
Environmental management and other aspects	509	246	184	79
Total environment	3,281	1,294	1,294	693
<i>Advancement of knowledge</i>				
Natural sciences, technologies and engineering	641	328	205	108
Social sciences and humanities	39	25	10	5
Total advancement of knowledge	680	353	215	113
TOTAL	19,134	8,680	6,780	3,674
<i>Commonwealth contribution</i>	10,562	4,367	3,554	2,641
<i>State contribution</i>	8,572	4,313	3,226	1,032

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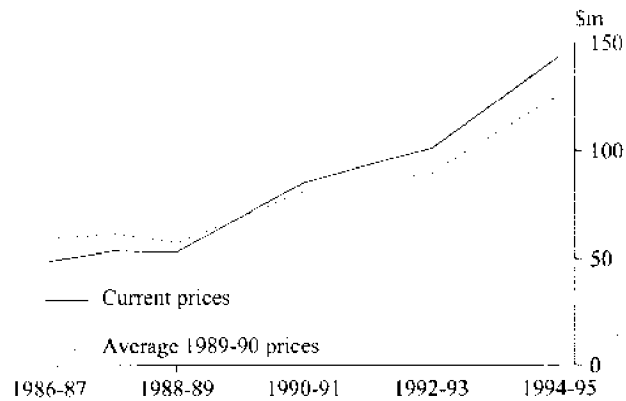
HUMAN RESOURCES DEVOTED TO R&D BY GENERAL GOVERNMENT ORGANISATIONS, AUSTRALIA, BY FIELD OF RESEARCH, 1994-95 (\$'000)

<i>Field of research</i>	<i>Type of employee</i>			
	<i>Total</i>	<i>Researchers</i>	<i>Technicians</i>	<i>Other supporting staff</i>
<i>Natural sciences, technologies and engineering</i>				
Mathematical sciences	291	189	52	50
Physical sciences	838	369	270	199
Chemical sciences	801	332	312	158
Earth sciences	1,560	779	505	276
Information, computers and communication technologies	1,617	896	401	321
Applied sciences and technologies	1,778	658	705	414
General Engineering	975	409	357	209
Biological sciences	2,094	852	780	462
Agricultural sciences	5,841	2,254	2,449	1,138
Medical and health sciences	2,497	1,379	837	282
Total natural sciences, technologies and engineering	18,293	8,117	6,667	3,509
<i>Social sciences and humanities</i>				
Accounting and finance	5	4	1	—
Economics	266	188	30	49
Political sciences	51	37	3	11
Sociology	45	34	4	6
Law	33	22	3	8
Psychology	43	21	15	6
Education	67	47	4	16
Other social sciences	295	188	40	67
Humanities	36	21	13	2
Total social sciences and humanities	841	563	113	165
TOTAL	19,134	8,680	6,780	3,674
<i>Commonwealth contribution</i>	10,562	4,367	3,554	2,641
<i>State contribution</i>	8,572	4,313	3,226	1,032

PRIVATE NON-PROFIT INTRAMURAL R&D

EXPENDITURE ON R&D

Private non-profit R&D expenditure fell between 1987–88 and 1988–89, but has since increased significantly each year in both current and average 1989–90 prices. Expenditure in current prices in 1994–95 was 42% higher than in 1992–93.



HUMAN RESOURCES DEVOTED TO R&D

Human resources devoted to R&D by Private non-profit organisations has increased steadily over the years, reaching 1,692 person years in 1994–95. This represented a 24% increase over 1992–93.

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EXPENDITURE ON R&D AND HUMAN RESOURCES DEVOTED TO R&D BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA

	1986-87	1987-88	1988-89	1990-91 ^r	1992-93 ^r	1994-95
Expenditure at current prices (\$m)	49.1	53.9	53.3	85.4	101.2	143.7
Expenditure at average 1989-90 prices (\$m)	59.6	62.0	57.5	81.2	89.6	126.2
Human resources devoted to R&D (person years)	945	1,016	1,023	1,282	1,370	1,692

PURPOSE OF RESEARCH

In the Private non-profit sector, Health remained the leading SEO, accounting for 79% or \$114m of total R&D expenditure. Advancement of knowledge accounted for \$10m (7%), while \$8m (6%) was directed towards Education and training.

TYPE OF EXPENDITURE

Labour costs continued to be the main component of R&D expenditure (47%), down from 55% in 1992-93. Capital expenditure accounted for 17% of research expenditure by Private non-profit organisations.

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R&D BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, BY SOCIO-ECONOMIC OBJECTIVE, BY TYPE OF EXPENDITURE AND TYPE OF ACTIVITY, 1994-95 (\$'000)

<i>Socio-economic objective</i>	<i>Type of expenditure</i>					<i>Type of activity(a)</i>			
	<i>Total</i>	<i>Land and buildings</i>	<i>Other capital expenditure</i>	<i>Labour costs(b)</i>	<i>Other current expenditure</i>	<i>Pure basic research</i>	<i>Strategic basic research</i>	<i>Applied research</i>	<i>Experimental development</i>
Defence	—	—	—	—	—	—	—	—	—
Economic development	6,022	180	222	3,070	2,550	257	874	3,477	1,413
<i>Society</i>									
Health	113,989	15,835	5,735	52,036	40,384	41,180	46,577	19,897	6,335
Education and training	8,155	486	211	4,159	3,299	833	1,790	2,938	2,594
Social development and community services	2,114	11	86	1,161	855	308	827	651	328
Total society	124,258	16,332	6,032	57,356	44,537	42,322	49,194	23,485	9,257
Environment	3,188	80	219	1,809	1,081	308	1,418	1,177	285
Advancement of knowledge	10,249	101	739	5,566	3,843	2,372	5,937	1,475	465
TOTAL	143,718	16,694	7,213	67,801	52,011	45,259	57,424	29,615	11,420

(a) Data within this classification are subjectively allocated by respondents at the time of reporting, using OECD:ABS definitions. Analysts using this classification should bear the original subjectivity in mind. See Paragraph 8 of the Explanatory Notes. (b) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax and 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.

FIELD OF RESEARCH

In the Private non-profit sector, Medical and health sciences (\$94m) and Biological sciences (\$33m) remained the leading FOR's in terms of R&D expenditure.

TYPE OF ACTIVITY

Most R&D expenditure in the Private non-profit sector was directed towards Strategic basic research (\$57m or 40%). Pure basic research increased its share of total research, up from 26% in 1992-93 to 31% in 1994-95.

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R&D BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, BY FIELD OF RESEARCH, BY TYPE OF EXPENDITURE AND TYPE OF ACTIVITY, 1994-95 (\$'000)

Field of research	Type of expenditure					Type of activity(a)			
	Total	Land and buildings	Other capital expenditure	Labour costs(b)	Other current expenditure	Pure basic research	Strategic basic research	Applied research	Experimental development
<i>Natural sciences, technologies and engineering</i>									
Applied sciences and technologies	1,104	135	66	370	533	—	70	134	900
General engineering	1,941	70	69	1,238	564	334	401	913	293
Biological sciences	33,482	5,371	1,461	14,889	11,761	13,562	12,923	4,910	2,087
Medical and health sciences	93,816	10,522	5,250	44,447	33,597	30,356	41,108	17,244	5,109
Other natural sciences, technologies and engineering	1,355	83	73	759	440	177	357	573	248
Total natural sciences, technologies and engineering	131,698	16,182	6,919	61,702	46,895	44,429	54,857	23,774	8,637
<i>Social sciences and humanities</i>									
Economics	1,794	7	4	694	1,088	28	197	1,505	64
Education	6,820	461	147	3,437	2,774	327	1,518	2,644	2,332
Other social sciences and humanities	3,406	44	143	1,967	1,253	474	852	1,692	387
Total social sciences and humanities	12,020	512	294	6,098	5,115	830	2,567	5,841	2,783
TOTAL	143,718	16,694	7,213	67,801	52,011	45,259	57,424	29,615	11,420

(a) Data within this classification are subjectively allocated by respondents at the time of reporting, using OECD/ABS definitions. Analysts using this classification should bear the original subjectivity in mind. See Paragraph 8 of the Explanatory Notes. (b) Includes wages and salaries, payroll tax, payments to contract staff on the payroll, fringe benefits tax and 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.

SOURCE OF FUNDS

The main source of funding for Private non-profit R&D expenditure was the Commonwealth government which provided \$43m (30%), while State and local government provided a further \$23m (16%). Own funding of research accounted for \$36m (25%).

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SOURCE OF FUNDS FOR R&D BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, BY SOCIO-ECONOMIC OBJECTIVE, 1994-95 (\$'000)

Socio-economic objective	Source of funds									
	Total	Own funds	Commonwealth government	State and local government	Private business enterprises	Public business enterprises	Joint govt/business (a)	Universities and colleges	Private non-profit and other Australian	Overseas
Defence	—	—	—	—	—	—	—	—	—	—
Economic development	6,022	2,427	287	672	991	646	—	351	647	2
<i>Society</i>										
Health	113,989	27,526	36,970	17,982	10,085	309	785	999	16,255	3,079
Education and training	8,155	1,864	1,479	2,948	183	—	—	291	1,123	268
Social development and community services	2,114	898	287	119	94	16	—	402	259	40
Total society	124,258	30,288	38,736	21,048	10,361	325	785	1,692	17,636	3,387
Environment	3,188	980	291	366	565	121	—	368	488	9
Advancement of knowledge	10,249	2,281	3,720	621	1,021	5	—	216	1,984	401
TOTAL	143,718	35,975	43,035	22,708	12,938	1,096	785	2,627	20,755	3,799

(a) Includes funds provided via government levies.

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SOURCE OF FUNDS FOR R&D BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, BY FIELD OF RESEARCH, 1994-95 (\$'000)

Field of research	Source of funds									
	Total	Own funds	Commonwealth government	State and local government	Private business enterprises	Public business enterprises	Joint govt/business (a)	Universities and colleges	Private non-profit and other Australian	Overseas
<i>Natural sciences, technologies and engineering</i>										
Applied sciences and technologies	1,104	700	—	50	218	10	—	20	106	—
General engineering	1,941	532	145	254	335	185	—	427	64	—
Biological sciences	33,482	8,820	9,341	4,313	1,767	—	282	243	8,137	580
Medical and health sciences	93,816	21,931	31,542	14,399	9,555	301	503	1,027	11,669	2,889
Other natural sciences, technologies and engineering	1,355	524	80	128	281	82	—	180	71	9
Total natural sciences, technologies and engineering	131,698	32,507	41,107	19,143	12,156	577	785	1,897	20,048	3,478
<i>Social sciences and humanities</i>										
Economics	1,794	645	247	73	411	394	—	—	22	2
Education	6,820	1,671	1,293	2,713	104	3	—	273	316	247
Other social sciences and humanities	3,406	1,153	388	779	267	122	—	457	170	71
Total social sciences and humanities	12,020	3,469	1,927	3,564	782	519	—	730	707	321
TOTAL	143,718	35,975	43,035	22,708	12,938	1,096	785	2,627	20,755	3,799

(a) Includes funds provided via government levies.

STATE COMPARISONS

The leading States in terms of the location of Private non-profit R&D expenditure were Victoria at \$79m, New South Wales at \$44m and Western Australia at \$11m, accounting for 55%, 31% and 7% of total expenditure respectively. The remaining States accounted for only \$10m of R&D expenditure.

In Victoria the predominant SEO's were Health, Education and training and Advancement of knowledge, accounting for 77%, 9% and 9% respectively. In New South Wales and Western Australia, Health was also the predominant SEO accounting for 88% and 91% of total State R&D expenditure respectively.

17 LOCATION OF R&D EXPENDITURE BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, BY SOCIO-ECONOMIC OBJECTIVE, 1994-95 (\$'000)

<i>Socio-economic objective</i>	<i>Location of expenditure</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(a)</i>
Defence	—	—	—	—	—	—	—	—	—	—
Economic development	6,022	2,283	2,267	120	126	475	451	40	3	258
<i>Society</i>										
Health	113,989	38,935	60,759	4,233	299	9,593	110	10	52	—
Education and training	8,155	369	7,463	31	2	—	—	—	2	287
Social development and community services	2,114	417	446	90	118	93	—	556	394	—
Total society	124,258	39,721	68,667	4,354	419	9,686	110	566	448	287
Environment	3,188	1,117	569	318	217	237	109	224	114	284
Advancement of knowledge	10,249	1,106	7,142	60	1,636	161	6	2	136	—
TOTAL	143,718	44,227	78,645	4,852	2,398	10,559	676	832	701	829

(a) Includes Australian External Territories and overseas

STATE COMPARISONS —
continued

In Victoria, New South Wales, Queensland and South Australia the predominant FOR's were Medical and health sciences and Biological sciences.

Victoria accounted for 55% (\$51m) of the Private non-profit sectors' expenditure on Medical and health sciences, 55% (\$18m) of that on Biological sciences and 91% (\$6m) of expenditure on Education.

New South Wales accounted for 28% (\$27m) of the expenditure on Medical and health sciences and 41% (\$14m) of that on Biological sciences.

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LOCATION OF R&D EXPENDITURE BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, BY FIELD OF RESEARCH, 1994-95 (\$'000)

Field of research	Location of expenditure									
	Total	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Other(a)
<i>Natural sciences, technologies and engineering</i>										
Applied sciences and technologies	1,104	242	119	15	26	283	417	—	3	—
General engineering	1,941	1,031	224	77	115	57	62	50	—	325
Biological sciences	33,482	13,886	18,447	266	276	210	157	151	21	68
Medical and health sciences	93,816	26,725	51,365	4,269	1,910	9,465	6	9	67	—
Other natural sciences, technologies and engineering	1,355	581	98	75	35	266	34	27	93	147
Total natural sciences, technologies and engineering	131,698	42,464	70,253	4,702	2,363	10,280	676	237	184	540
<i>Social sciences and humanities</i>										
Economics	1,794	327	1,301	5	1	156	—	—	1	3
Education	6,820	327	6,186	35	2	3	—	3	2	261
Other social sciences and humanities	3,406	1,109	905	110	32	120	—	591	514	26
Total social sciences and humanities	12,020	1,763	8,392	150	35	278	—	594	517	289
TOTAL	143,718	44,227	78,645	4,852	2,398	10,559	676	832	701	829

(a) Includes Australian External Territories and overseas

TYPE OF R&D STAFF

The total human resource effort of Private non-profit organisations in 1994-95 was estimated to be 24% greater than in 1992-93. Researchers accounted for 55% of the total research effort, Technicians 31% and Other supporting staff 14%.

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HUMAN RESOURCES DEVOTED TO R&D BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, BY SOCIO-ECONOMIC OBJECTIVE, 1994-95 (\$'000)

<i>Socio-economic objective</i>	<i>Total</i>	<i>Type of employee</i>		
		<i>Researchers</i>	<i>Technicians</i>	<i>Other supporting staff</i>
Defence	—	—	—	—
Economic development	74	53	10	11
<i>Society</i>				
Health	1,332	711	449	172
Education and training	77	41	14	22
Social development and community services	30	21	2	7
Total society	1,439	773	466	200
Environment	58	46	4	9
Advancement of knowledge	121	58	48	14
TOTAL	1,692	930	528	235

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HUMAN RESOURCES DEVOTED TO R&D BY PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, BY FIELD OF RESEARCH, 1994-95 (\$'000)

<i>Field of research</i>	<i>Total</i>	<i>Type of employee</i>		
		<i>Researchers</i>	<i>Technicians</i>	<i>Other supporting staff</i>
<i>Natural sciences, technologies and engineering</i>				
Applied sciences and technologies	11	6	3	2
General engineering	30	21	2	7
Biological sciences	387	194	145	48
Medical and health sciences	1,120	616	362	142
Other natural sciences, technologies and engineering	22	16	2	4
Total natural sciences, technologies and engineering	1,570	853	513	203
<i>Social sciences and humanities</i>				
Economics	13	10	—	3
Education	61	33	9	19
Other social sciences and humanities	48	33	6	9
Total social sciences and humanities	123	77	15	31
TOTAL	1,692	930	528	235

EXTRAMURAL R&D

General government extramural R&D expenditure (payments to other organisations to undertake R&D projects) was estimated to be \$1,110m, an increase of 23% over 1992-93. Most of these payments were by the Commonwealth Government (\$1,056m).

Extramural payments were equivalent to 56% of General government intramural R&D expenditure, up from 49% in 1992-93.

Only \$15m (1%) of General government extramural payments were to organisations outside Australia.

Private non-profit extramural R&D expenditure was estimated to be \$25m, a decrease of 9% over 1992-93. Extramural payments were equivalent to 17% of Private non-profit expenditure on R&D, down from 27% in 1992-93.

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EXTRAMURAL R&D EXPENDITURE(a) BY GENERAL GOVERNMENT AND PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA BY COUNTRY OF RECIPIENT (\$'000)

Type of organisation	Country of recipient										
	Total payments	Australia	Africa	Asia	Canada	Europe	New Zealand	Oceania	U.K.	U.S.A.	Other Countries
<i>General government</i>											
Commonwealth	1,056,170	1,041,205	991	4,953	5	2,111	2,351	496	640	455	2,963
State	53,514	53,328	—	41	100	25	—	—	—	20	—
Total — 1994-95	1,109,684	1,094,533	991	4,994	105	2,136	2,351	496	640	475	2,963
Total — 1992-93	900,250	885,984	1,045	4,919	10	2,760	1,007	740	628	719	2,438
<i>Private non-profit</i>											
Total — 1994-95	24,682	24,356	—	—	—	—	63	—	10	207	46
Total — 1992-93	27,184	26,817	—	15	78	—	36	—	41	165	32

(a) Expenditure on R & D which is funded by an organisation but carried out by other organisations.

TECHNICAL KNOW-HOW

PAYMENTS FOR TECHNICAL KNOW-HOW (TKH)

General government payments for TKH in 1994-95 were estimated to be \$4.7m, with 93% being payments within Australia.

Private non-profit payments for TKH were estimated to be \$0.1m, of which 87% were payments within Australia.

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PAYMENTS FOR TECHNICAL KNOW-HOW BY GENERAL GOVERNMENT AND PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA (\$'000)

Type of organisation	Total payments	Type of technical know-how		Country of recipient									
		Patent licence fees and royalties	Other technical know-how	Australia	Africa	Asia	Canada	Europe	New Zealand	Oceania	U.K.	U.S.A.	Other Countries
<i>General government</i>													
Commonwealth	2,217	313	1,904	1,938	3	229	14				33		
State	2,451	210	2,241	2,424				17				10	
Total — 1994-95	4,668	523	4,145	4,362	3	229	14	17			33	10	
Total 1992-93	2,231	391	1,840	2,127		3	63	12					6 20
<i>Private non-profit</i>													
Total — 1994-95	125	32	93	109						2		7	7
Total 1992-93	97		97	89						4			4

RECEIPTS FOR TKH

Receipts for TKH by General government organisations in 1994-95 were estimated to be \$6.5m, of which 75% were receipts from Australian organisations.

Receipts for TKH by the Private non-profit sector were estimated to be \$1.6m, nearly all being receipts from Australian organisations.

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RECEIPTS FOR TECHNICAL KNOW-HOW BY GENERAL GOVERNMENT AND PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA (\$'000)

Type of organisation	Type of technical know-how			Country of paying organisation									
	Total receipts	Parent licence fees and royalties	Other technical know-how	Australia	Africa	Asia	Canada	Europe	New Zealand	Oceania	U.K.	U.S.A.	Other Countries
<i>General government</i>													
Commonwealth	4,723	1,546	3,177	3,212	--	233	--	4	--	281	558	434	1
State	1,820	243	1,577	1,671	--	--	--	--	--	10	--	139	--
Total — 1994-95	6,543	1,789	4,754	4,883	--	233	--	4	--	291	558	573	1
Total 1992-93	4,859	812	4,047	4,484	--	83	--	90	--	6	10	175	11
<i>Private non-profit</i>													
Total — 1994-95	1,604	210	1,394	1,599	--	--	--	--	5	--	--	--	--
Total — 1992-93	1,206		1,206	1,206	--	--	--	--	--	--	--	--	--

PATENT ACTIVITY

General government organisations with R&D activity during 1994–95 lodged 145 patent applications within Australia and 9,353 abroad during the period 1 July 1993 to 30 June 1995. During this period 96 patents were granted in Australia and 361 granted abroad.

The Private non-profit sector lodged 90 patents in Australia and 330 overseas during the period 1 July 1993 to 30 June 1995. During this period 13 patents were granted in Australia and 25 overseas.

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PATENT ACTIVITY BY GENERAL GOVERNMENT AND PRIVATE NON-PROFIT ORGANISATIONS, AUSTRALIA, UNDERTAKING R&D

<i>Type of organisation</i>	<i>Australia</i>		<i>Overseas</i>	
	<i>Patents lodged</i>	<i>Patents granted</i>	<i>Patents lodged(a)</i>	<i>Patents granted</i>
<i>General government</i>				
Commonwealth	132	90	8,841	344
State	13	6	512	17
Total — July 1993 to June 1995	145	96	9,353	361
Total — July 1991 to June 1993	149	146	5,737	268
<i>Private non-profit</i>				
Total — July 1993 to June 1995	90	13	330	25
Total — July 1991 to June 1993	23	9	354	27

(a) The number of countries in which protection initially sought. See paragraph 10 of the Explanatory Notes.

EXPLANATORY NOTES

INTRODUCTION

1 This publication presents estimates of expenditure and human resources devoted to R&D carried out by General government and Private non-profit organisations during 1994–95.

2 Statistics are included for extramural R&D activity, payments and receipts for technical know-how and patent activity.

3 Comparable R&D statistics are produced for the Business Enterprise and Higher Education sectors (see paragraph 22).

DATA SOURCES

4 The 1994–95 statistics presented in this publication have been compiled from data collected from General government and Private non-profit organisations in the ABS Survey of Research and Experimental Development in respect of the year ended 30 June 1995. This survey was based on a complete enumeration of General government and Private non-profit organisations identified by the ABS as likely R&D performers. The survey was conducted by mail questionnaire and a 92% response rate was obtained. The ABS believes that the non-respondents were non-R&D performers.

5 Statistics for earlier years were derived from similar surveys. A number of revisions have been made to previous statistics.

6 The Gross Domestic Product (GDP)(I) figures used to derive General government expenditure on R&D/GDP ratios are current at the time of manuscript finalisation (*National Income, Expenditure and Product, March Quarter 1996*, (5206.0)), and, at current prices, are as follows: \$264,007m (1986–87); \$298,395m (1987–88); \$339,068m (1988–89); \$378,681m (1990–91); \$404,275m (1992–93); and \$455,675m (1994–95). The available General government expenditure on R&D/GDP ratios for other OECD countries are current at the time of manuscript finalisation and are sourced from *Main Science and Technology Indicators, 1996–I*, OECD, Paris, 1996.

DEFINITIONS

7 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.

8 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 this data and applies consistent processing methodologies. Analysts using this classification should bear the original subjectivity in mind.

9 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.

10 The question relating to lodgement of patent applications overseas specifically asks for the number of countries in which protection was initially sought. For example, if four countries were designated in an application (a Patent Co-operation Treaty application or a European patent application) then the General government or Private non-profit organisation was asked to record the number of patent applications lodged as four. Prior to 1992-93 it is possible that the patent application would have been recorded as only one lodgement.

SCOPE

11 The General government sector includes all Commonwealth, State and local government departments and authorities.

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

13 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.

COVERAGE

14 Local government organisations are excluded from this survey because it is considered that their contribution to total R&D activity would be minimal. 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.

SEO AND FOR CLASSIFICATIONS

15 The statistics in this publication are classified by Socio-economic objective (SEO) and Field of research (FOR). For more information on these classifications see the *Australian Standard Research Classification, 1993* (1297.0).

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

CONSTANT PRICE ESTIMATES

17 Estimates of total R&D expenditure are shown at average 1989–90 prices in tables 1 and 12. In concept, constant price estimates are measures from which direct effects of price change have been eliminated. Although expressed in monetary terms, the constant price measures shown vary only with changes in the underlying quantities of inputs purchased (including labour). In effect, quantities of broadly defined categories of inputs are weighted by their prices in the base year (1989–90). Because the measures relate to input quantities, they do not reflect changes in the efficiency with which labour, capital and other inputs are used.

18 The estimate of the labour costs component was obtained by multiplying each broad category of labour used in each period by the relevant average labour costs in the base year (1989–90). The non-labour costs components were estimated by deflating each by a composite price index of relevant materials or capital expenditure items. In revaluing R&D non-labour expenditure, extensive use has been made of price series used in deriving constant price national accounts estimates.

19 For a more comprehensive description of constant price concepts and estimation procedures see *Australian National Accounts: Concepts, Sources and Methods* (5216.0).

RELIABILITY OF STATISTICS

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

- many respondents had to make estimates because their accounts do not separately record data on R&D activity, receipts and payments for technical know-how or patent 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

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

RELATED PUBLICATIONS

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

Research and Experimental Development, Business Enterprises, Australia, 1994–95 (8104.0)

Research and Experimental Development, Higher Education Organisations, Australia, 1994 (8111.0) (to be released later this year)

Research and Experimental Development, All Sector Summary, Australia, 1994–95 (8112.0) (to be released later this year)

Australian Business Innovation — A Strategic Analysis, Measures of Science and Innovation 5, Department of Industry, Technology and Commerce, Canberra, Australia, 1996

Main Science and Technology Indicators 1996–1, OECD, Paris, 1996

The Measurement of Scientific and Technological Activities (Frascati Manual 1993) OECD, Paris, 1994

23 Current publications issued by the ABS are listed in the *Catalogue of Publications and Products, Australia* (1101.0). The ABS also issues, on Tuesdays and Fridays, a *Release Advice* (1105.0) which lists publications to be released in the next few days. The Catalogue and Release Advice are available from any ABS office.

24 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 necessary for the solution of recognised practical problems.
Capital expenditure	Expenditure on the acquisition (less disposals) of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment.
Experimental development	Systematic work, using existing knowledge gained from research or practical experience for the purpose of creating new or improved products/processes.
Extramural R&D	R&D activity funded by an organisation but carried out by other enterprises, organisations, institutions or individuals.
Field of research (FOR)	Field in which the R&D activity was performed. The FOR classification is primarily structured around disciplines or activities. It describes what research is being performed.
GOVERD — Government expenditure on R&D	The sum of all intramural R&D expenditure incurred by all Government organisations in the survey.
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.
Intramural R&D	R&D carried out by an organisation on its own behalf or on behalf of other organisations, institutions or individuals.
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 proportion of expenditure on general services and overheads.
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.
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 (SEO)	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.
Technical know-how (TKH)	Specialised technical knowledge required to successfully produce a product or implement a process, etc. (e.g. patent licences; technical data and information; scientific, technical or engineering assistance) that increases technical knowledge and understanding in an organisation. Payments are those made directly to the holders of TKH which is new to an organisation. They exclude non-monetary transfers, and costs incurred by an organisation in obtaining TKH, such as overseas travel costs.
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.



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