

Research Expenditure

Selected Higher Education Statistics

1998



Department of Education,
Training and Youth Affairs

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1. Introduction

1.1 Background

The Australian Bureau of Statistics (ABS) is responsible for collecting and publishing data relating to resources expended within Australia on research and experimental development. The collection is referred to as the *Survey of Research and Experimental Development*. The data from that collection are directed at meeting the data needs of a wide range of clients, and also enables the ABS to meet reporting obligations relating to Australia's participation in collections managed by the Organisation for Economic Co-operation and Development (OECD).

The Department of Education, Training and Youth Affairs (DETYA) also has information requirements relating to resources expended by higher education institutions on research and experimental development. Some of these requirements are met through data provided to the ABS for its collection. Through agreement with higher education institutions and the ABS, DETYA is provided with extracts of the data collected by the ABS.

The ABS publishes data from its collection at an aggregated level. A summary of the data collected appears in the ABS publication *Research and Experimental Development Australia - Higher Education Organisations* (Catalogue No. 8111.0). With the agreement of the ABS, DETYA publishes data from the ABS collections but at a much more detailed level, meeting the needs of higher education institutions and other DETYA clients.

1.2 What is in this publication

This publication provides detailed information about expenditure on research and experimental development by Australian higher education institutions in the calendar year 1998. Details are provided at the institution, state and national levels for expenditure analysed by type of expenditure, source of funds, field of research, socio-economic objective and type of research activity.

1.2.1 How the data were collected

The primary source of the data presented in this publication are the returns made to the ABS for its *Survey of Research and Experimental Development* for 1998.

The original data were provided to the ABS by higher education institutions in accordance with the instructions in the ABS document entitled *1999 (Data year 1998) Higher Education Survey of Research and Experimental Development - Instruction Booklet*.

1.2.2 Research and Experimental Development - Definition

The ABS collection conforms to the standards for collection of research and experimental development statistics formulated by the OECD which defines research and experimental development as follows:

Research and experimental development comprises 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.

Further details about the type of work comprising research and experimental development are provided in Appendix 2 of this document.

1.2.3 Type of Research Activity

The data reported relate to the following type of research and experimental development: pure basic research, strategic basic research, applied research and experimental development. These terms are defined in Appendix 2 of this document.

1.2.4 Type of Expenditure

The data reported relate to capital expenditure and current expenditure. These terms are defined in Appendix 2 of this document.

1.2.5 Direct and Indirect Expenditure

The expenditure data reported in this publication includes both direct expenditure and a share of the higher education institution's overhead costs. Direct expenditure includes capital expenditure and current expenditure (see Appendix 2 for definitions).

Indirect expenditure has been included in the data shown in the tables in this manner:

- Field of research data: apportioned to each field.
- Type of expenditure data: included in 'Other current expenditure'.
- Source of funds data: included in 'General university funds'.
- Socio-economic objective data: apportioned to each objective.

1.2.6 Persons undertaking Research and Experimental Development

The expenditure data for a higher education institution relates to research and experimental development work and work in support of research and experimental development, undertaken by people who are members of staff of the higher education institution and by postgraduate research students. Such work includes that undertaken by academic staff, technical staff, other staff and postgraduate research students.

The definition of a 'member of staff' which applied in the ABS collections and to the data in this publication is specified in DETYA documentation (for the relevant year) entitled *Higher Education Staff Collection Documentation*. Details are also provided at Appendix 2 in this document.

The work of some members of staff relates to research and experimental development work (or support for such work) and to other work. In such cases, the expenditure relating to them has been apportioned and only that part relating to research and experimental development (or support for such work) has been reported as direct expenditure in the ABS collection and the data in this publication.

1.2.7 Treatment of Cooperative Research Centres and controlled entities

Data reported relates to all research carried out by higher education institutions and their controlled entities irrespective of the source of funding. Data shown are for all research carried out by staff and research students for which the higher education institution has responsibility, including:

Research carried out as a participant in all *unincorporated* Cooperative Research Centre (CRC). Only the research carried out by staff or research students of the higher education institution has been included.

Research carried out on contract for other legal entities (such as a private business or *incorporated* CRC).

Research and experimental development performed by incorporated CRC's operating within the higher education institution's campus has been excluded as it will be collected separately by the ABS. Similarly, research and experimental development carried out by staff of other organisations but on the premises of the higher education institution has been excluded.

1.2.8 Price base

The expenditure data reported are in 1998 current prices.

1.2.9 Higher Education Institutions providing data

The data for 1998 were obtained from the higher education institutions listed in Appendix 1.

1.2.10 Definitions

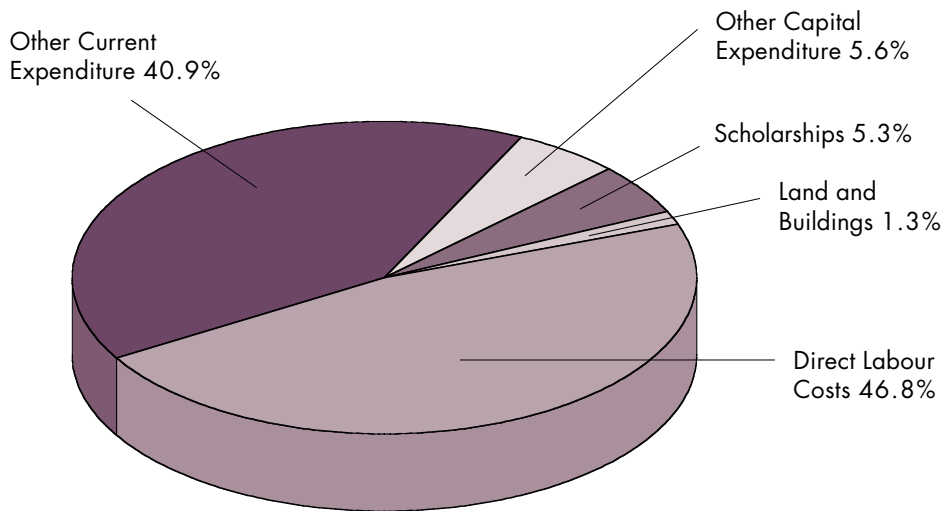
Definitions of the terms used in this publication are provided in Appendix 2.

1.2.11 Reporting conventions for data

In some cases totals do not match precisely with the sums of values in cells in rows and columns. This is due to rounding.

2. Overview of the Data

2.1 Expenditure on Research and Experimental Development by Type of Expenditure



The total expenditure on research and experimental development in 1998 was \$2,603m.

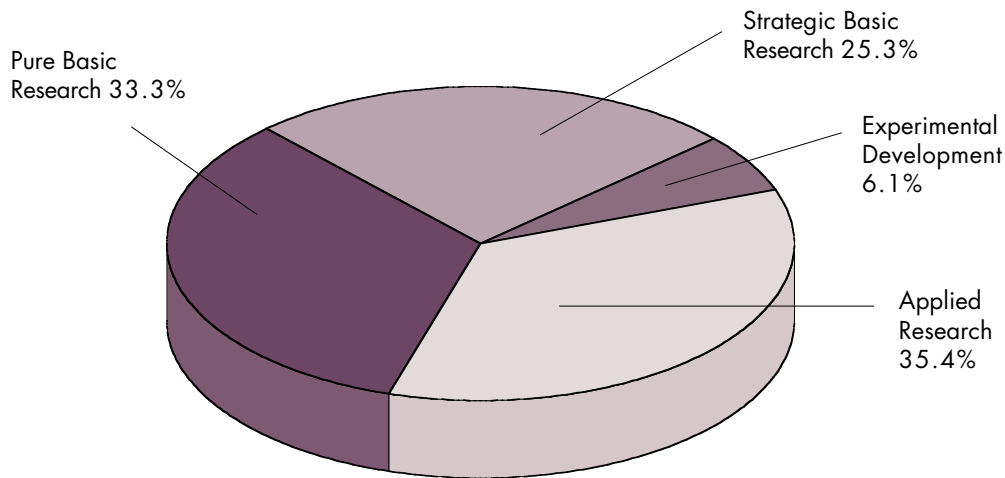
Of that expenditure nearly half (46.8%) was for Direct Labour Costs. The remaining expenditure was attributed to Other Current Expenditure (40.9%), Other Capital Expenditure (5.6%), Scholarships (5.3%) and Land and Buildings (1.3%).

2.2 Expenditure on Research and Experimental Development by Source of Funds

Source of Funds	Research Expenditure	
	(\$'000)	(%)
General University Funds	1,661,153	63.8
Commonwealth Schemes	413,548	15.9
Other Commonwealth Government	191,324	7.4
Business Enterprise	135,778	5.2
Other Australian	74,444	2.9
State and Local Government	68,802	2.6
Overseas	41,220	1.6
Non-Commonwealth Schemes	16,463	0.6
Total	2,602,733	100.0

Of the total expenditure almost two thirds (63.8%) was sourced from General University Funds. The remainder was sourced from Commonwealth Schemes (15.9%), Other Commonwealth Government sources (7.4%), and a number of other sources (12.9%).

2.3 Expenditure on Research and Experimental Development by Type of Research Activity



Of the total expenditure over one-third (35.4%) was expended on Applied Research, a further one-third (33.3%) on Pure Basic Research, and a quarter (25.3%) on Strategic Basic Research. The remaining 6.1% was expended on Experimental Development.

2.4 Expenditure on Research and Experimental Development by Field of Research

Field of Research	Research Expenditure	
	(\$'000)	(%)
Medical and Health Sciences	592,431	22.8
Social Sciences	506,524	19.5
Biological Sciences	311,813	12.0
Humanities	197,468	7.6
General Engineering	182,275	7.0
Information, Computer and Communication Technologies	139,173	5.3
Agricultural Sciences	170,655	6.6
Earth Sciences	113,002	4.3
Chemical Sciences	121,038	4.7
Physical Sciences	106,474	4.1
Applied Sciences and Technology	98,821	3.8
Mathematical Sciences	63,058	2.4
Total	2,602,733	100.0

Of the total expenditure nearly a quarter (22.8%) was expended on research and experimental development in the Medical and Health Sciences fields. The Social Sciences fields accounted for one-fifth (19.5%) of the expenditure. Also of note is the Biological Sciences fields which accounted for 12.0%. Other fields accounted for smaller proportions of the total expenditure.

2.5 Expenditure on Research and Experimental Development by Socio-Economic Objective

Socio-Economic Objective	Research Expenditure	
	(\$'000)	(%)
Defence		
Defence	5,804	0.2
Economic Development		
Plant-production and Primary Products	94,220	3.6
Animal-production and Primary products	64,707	2.5
Mineral Resources (excluding Energy)	33,742	1.3
Energy resources	16,302	0.6
Energy Supply	21,951	0.8
Manufacturing	116,991	4.5
Construction	39,653	1.5
Transport	15,067	0.6
Information and Communication Services	64,600	2.5
Commercial Services	27,630	1.1
Economic Framework	109,151	4.2
Total Economic Development	604,013	23.2
Society		
Health	506,730	19.5
Education and Training	108,257	4.2
Social Development and Community Services	95,260	3.7
Total Society	710,247	27.3
Environment		
Environmental Knowledge	119,947	4.6
Environmental Aspects of Economic Development	34,234	1.3
Environmental Management and other aspects	34,360	1.3
Total Environment	188,541	7.2
Advancement of Knowledge		
Natural Sciences, Technologies and Engineering	773,093	29.7
Social Sciences and Humanities	321,036	12.3
Total Advancement of Knowledge	1,094,129	42.0
Total	2,602,733	100.0

Research and experimental development undertaken in areas having socio-economic objectives in the Advancement of Knowledge category accounted for almost one-half (42.0%) of the total expenditure. The Society category accounted for over a quarter (27.3%), and Economic Development nearly a quarter (23.2%) of the total expenditure. The remainder of the expenditure related to Environment (7.2%) and Defence (0.2%) categories of Socio-Economic Objective.

3. The Tables

TABLE 1. Expenditure on Research and Experimental Development by State, Institution and Type of Expenditure, 1998 (\$'000)

State/Institution	Land and Buildings	Other Capital Expenditure	Direct Labour Costs	Scholarships	Other Current Expenditure	Total
New South Wales						
Charles Sturt University	45	235	5,394	1,309	6,046	13,030
Macquarie University	0	6,027	35,664	548	15,006	57,245
Southern Cross University	0	533	3,886	534	5,836	10,789
The University of New England	1,321	1,086	18,901	2,960	18,397	42,664
The University of New South Wales	0	3,983	80,896	11,448	87,064	183,391
The University of Newcastle	0	1,299	36,971	4,221	36,157	78,648
The University of Sydney	874	19,729	99,112	16,869	95,815	232,398
University of Technology, Sydney	0	2,027	81,397	0	11,540	94,964
University of Western Sydney	0	486	11,347	2,467	10,375	24,675
University of Wollongong	800	2,800	31,895	1,200	23,837	60,532
Total New South Wales	3,040	38,205	405,463	41,556	310,073	798,337
Victoria						
Deakin University	621	800	12,898	2,271	18,640	35,230
La Trobe University	1,721	8,962	27,875	5,384	16,160	60,103
Monash University	1,308	8,675	66,989	18,486	22,835	118,293
Royal Melbourne Institute of Technology	100	1,630	12,844	1,570	11,921	28,065
Swinburne University of Technology	285	2,712	10,622	1,662	8,679	23,960
The University of Melbourne	0	13,254	122,448	12,165	120,606	268,473
University of Ballarat	0	199	1,321	617	1,625	3,762
Victoria University of Technology	1,135	1,061	12,836	2,189	2,019	19,240
Total Victoria	5,170	37,293	267,834	44,344	202,486	557,127
Queensland						
Central Queensland University	0	1,991	2,744	936	5,581	11,252
Griffith University	15,739	2,942	30,461	2,359	15,354	66,855
James Cook University	44	3,143	16,504	1,550	17,626	38,867
Queensland University of Technology	0	6,430	19,761	2,268	22,008	50,467
The University of Queensland	953	13,944	94,216	8,775	101,330	219,219
University of Southern Queensland	0	366	5,562	425	4,658	11,011
Total Queensland	16,736	28,816	169,248	16,313	166,559	397,671
Western Australia						
Curtin University of Technology	0	1,124	10,348	964	14,469	26,905
Edith Cowan University	0	1,718	8,237	499	2,958	13,412
Murdoch University	170	2,037	11,432	1,791	17,316	32,746
The University of Western Australia	5,705	5,706	65,504	10,047	65,521	152,483
Total Western Australia	5,875	10,587	95,522	13,300	100,263	225,547
South Australia						
The Flinders University of South Australia	0	2,345	28,262	1,397	27,256	59,260
The University of Adelaide	30	5,347	56,559	4,499	72,708	139,143
University of South Australia	0	2,483	18,274	1,814	19,816	42,388
Total South Australia	30	10,175	103,095	7,710	119,780	240,791
Tasmania						
University of Tasmania	551	3,989	26,036	5,022	23,820	59,417
Total Tasmania	551	3,989	26,036	5,022	23,820	59,417
Northern Territory						
Northern Territory University	0	267	6,117	313	7,913	14,611
Total Northern Territory	0	267	6,117	313	7,913	14,611
Australian Capital Territory						
Australian Defence Force Academy	0	339	7,281	332	5,904	13,856
The Australian National University	3,272	15,426	128,070	9,081	119,337	275,187
University of Canberra	0	258	4,340	1,149	4,013	9,760
Total Australian Capital Territory	3,272	16,023	139,691	10,562	129,255	298,802
Multi-State						
Australian Catholic University	100	118	6,270	0	3,943	10,431
Total Multi-State	100	118	6,270	0	3,943	10,431
Total	34,773	145,472	1,219,277	139,120	1,064,092	2,602,733

TABLE 2. Expenditure on Research and Experimental Development by State, Institution and Source of Funds for Expenditure, 1998 (\$'000)

State/Institution	National Competitive Research Grants				Other Australian Sources				Total	
	Commonwealth Schemes	Commonwealth Schemes	Non Commonwealth Schemes	State and Local Government	Other Commonwealth Government	Business Enterprises	General University Funds (GUF)	Other		Overseas
New South Wales										
Charles Sturt University	3,303		12	599	385	860	7,847	9	14	13,030
Macquarie University	11,626		107	1,281	7,131	6,449	28,164	892	1,595	57,245
Southern Cross University	1,463		0	462	947	2,393	4,954	312	258	10,789
The University of New England	7,031		2	705	3,794	1,705	27,733	1,419	276	42,664
The University of New South Wales	36,558		1,252	2,271	12,705	7,377	113,065	7,338	2,824	183,391
The University of Newcastle	16,964		451	3,018	4,444	2,633	48,483	2,188	468	78,648
The University of Sydney	48,452		2,848	1,953	6,893	7,511	142,012	14,793	7,937	232,398
University of Technology, Sydney	2,854		44	728	4,259	2,218	84,421	336	105	94,964
University of Western Sydney	4,476		318	702	1,271	1,378	16,350	41	138	24,675
University of Wollongong	5,223		15	832	5,139	7,872	40,343	1	1,108	60,532
Total New South Wales	137,949		5,050	12,553	46,968	40,394	513,373	27,329	14,722	798,337
Victoria										
Deakin University	4,852		39	200	271	1,555	27,893	155	265	35,230
La Trobe University	10,507		0	2,617	1,496	1,192	38,907	1,241	4,143	60,103
Monash University	32,208		2,464	4,947	12,950	12,487	48,227	3,543	1,467	118,293
Royal Melbourne Institute of Technology	3,376		0	1,584	5,511	4,373	12,736	292	193	28,065
Swinburne University of Technology	1,273		0	250	777	2,827	18,720	49	64	23,960
The University of Melbourne	47,878		1,135	8,371	23,690	13,722	163,071	6,387	4,218	268,473
University of Ballarat	603		0	112	331	340	2,219	156	0	3,762
Victoria University of Technology	1,903		322	509	1,129	677	14,533	87	80	19,240
Total Victoria	102,599		3,960	18,592	46,156	37,173	326,306	11,911	10,431	557,127
Queensland										
Central Queensland University	1,565		0	1,381	1,928	409	5,936	16	18	11,252
Griffith University	7,188		134	686	1,704	5,914	49,661	1,405	164	66,855
James Cook University	169		935	736	10,992	570	20,759	4,707	0	38,867
Queensland University of Technology	4,410		0	777	2,130	320	40,903	1,626	300	50,467
The University of Queensland	41,197		1,737	7,703	15,711	15,241	124,817	8,731	4,081	219,219
University of Southern Queensland	1,276		0	283	285	251	8,917	0	0	11,011
Total Queensland	55,806		2,806	11,565	32,750	22,704	250,992	16,485	4,563	397,671

(Continued)

TABLE 2. Expenditure on Research and Experimental Development by State, Institution and Source of Funds for Expenditure, 1998 (\$'000) (continued)

State/Institution	National Competitive Research Grants				Other Australian Sources					Total
	Commonwealth Schemes	Commonwealth Schemes	Non Commonwealth Schemes	State and Local Government	Other Commonwealth Government	Business Enterprises	General University Funds (GUF)	Other	Overseas	
Western Australia										
Curtin University of Technology	1,607	869		5,456	295	741	17,724	213	0	26,905
Edith Cowan University	1,068	53		785	400	318	10,788	1	0	13,412
Murdoch University	6,471	48		1,248	5,145	2,741	15,983	545	565	32,746
The University of Western Australia	30,605	555		5,540	2,514	2,885	97,478	12,907	0	152,483
Total Western Australia	39,751	1,525		13,028	8,354	6,685	141,973	13,666	565	225,547
South Australia										
The Flinders University of South Australia	11,357	863		1,713	2,883	470	37,951	1,785	2,237	59,260
The University of Adelaide	30,144	277		3,344	13,400	14,642	75,752	552	1,033	139,143
University of South Australia	5,769	63		1,225	4,681	4,930	23,548	62	2,110	42,388
Total South Australia	47,270	1,203		6,282	20,964	20,042	137,251	2,398	5,380	240,791
Tasmania										
University of Tasmania	7,971	55		4,945	11,095	2,760	31,796	688	106	59,417
Total Tasmania	7,971	55		4,945	11,095	2,760	31,796	688	106	59,417
Northern Territory										
Northern Territory University	1,050	0		684	1,865	114	10,737	148	12	14,611
Total Northern Territory	1,050	0		684	1,865	114	10,737	148	12	14,611
Australian Capital Territory										
Australian Defence Force Academy	1,516	0		50	510	161	11,387	232	0	13,856
The Australian National University	18,525	736		727	19,807	4,782	223,587	1,582	5,441	275,187
University of Canberra	865	1,129		307	2,822	945	3,686	6	0	9,760
Total Australian Capital Territory	20,906	1,865		1,084	23,139	5,888	238,660	1,819	5,441	298,802
Multi-State										
Australian Catholic University	247	0		70	33	17	10,065	0	0	10,431
Total Multi-State	247	0		70	33	17	10,065	0	0	10,431
Total	413,548	16,463		68,802	191,324	135,778	1,661,153	74,444	41,220	2,602,733

TABLE 3. Expenditure on Research and Experimental Development by State, Institution and Field of Research, 1998 (\$'000)

State/Institution	Information, Computer and Communication Technologies											Total	
	Mathematical Sciences	Physical Sciences	Chemical Sciences	Earth Sciences	Information, Computer and Communication Technologies	Applied Sciences and Technologies	General Engineering	Biological Sciences	Agricultural Sciences	Medical and Health Sciences	Social Sciences		Humanities
New South Wales													
Charles Sturt University	14	0	37	10	829	127	0	1,157	4,965	716	4,446	728	13,030
Macquarie University	1,300	2,903	2,864	6,722	4,553	2,112	773	8,336	358	3,976	16,041	7,308	57,245
Southern Cross University	0	0	168	537	230	31	0	5,062	288	1,181	2,544	747	10,789
The University of New England	436	744	1,114	1,390	607	172	865	4,747	13,835	2,448	11,414	4,892	42,664
The University of New South Wales	4,104	8,056	9,240	5,465	8,478	13,367	21,748	14,441	1,344	55,459	31,849	9,840	183,391
The University of Newcastle	2,833	1,170	1,256	2,445	2,388	85	14,906	4,338	883	23,730	17,864	6,753	78,648
The University of Sydney	4,495	12,999	10,432	2,130	8,268	7,006	12,047	25,889	16,145	85,292	30,036	17,659	232,398
University of Technology, Sydney	2,738	2,124	2,527	4,975	10,042	4,779	11,529	6,084	2,799	7,554	30,955	8,858	94,964
University of Western Sydney	13	152	446	492	390	1218	652	4,262	5,966	1,742	6,271	3,071	24,675
University of Wollongong	3,763	3,621	4,909	2,894	4,263	4,489	7,693	3,622	1,732	4,811	15,536	3,199	60,532
Total New South Wales	19,697	31,768	32,992	27,062	40,049	33,384	70,213	77,939	48,316	186,909	166,955	63,054	798,337
Victoria													
Deakin University	584	0	2,001	2,260	1,694	887	887	1,572	794	7,738	12,372	4,441	35,230
La Trobe University	1,351	486	2,274	1,662	3,338	1,362	449	11,785	1,488	16,202	13,242	6,465	60,103
Monash University	2,339	1,536	6,647	3,194	6,650	7,500	13,520	8,283	3,937	34,275	19,180	11,232	118,293
Royal Melbourne Institute of Technology	749	756	1,011	164	4,464	4,701	2,675	3,096	415	3,276	5,351	1,409	28,065
Swinburne University of Technology	1,368	1,407	2,293	0	2,876	3,267	5,073	0	0	1,639	5,776	262	23,960
The University of Melbourne	9,036	8,914	8,914	6,856	12,304	4,964	9,926	23,614	24,415	94,394	44,068	21,069	268,473
University of Ballarat	96	0	0	246	1,380	49	82	707	6	720	360	115	3,762
Victoria University of Technology	254	583	256	391	1,502	2,582	1,302	1,164	474	1,718	7,907	1,109	19,240
Total Victoria	15,776	13,680	23,395	14,774	34,206	25,312	33,913	50,221	31,529	159,962	108,255	46,102	557,127
Queensland													
Central Queensland University	13	550	1,333	186	190	143	2,095	930	3,157	481	2,175	0	11,252
Griffith University	431	1,532	3,502	446	3,375	1,548	2,583	9,069	322	13,942	20,560	9,547	66,855
James Cook University	148	392	1,821	5,177	359	1,209	2,512	13,940	5,022	2,858	4,455	974	38,867
Queensland University of Technology	2,310	1,848	1,635	797	3,789	1,991	7,481	5,291	199	7,172	16,188	1,766	50,467
The University of Queensland	2,989	4,058	11,719	10,851	9,624	9,481	23,252	35,177	17,189	59,422	23,867	11,590	219,219
University of Southern Queensland	934	133	8	0	181	254	2,530	490	237	360	4,874	1,011	11,011
Total Queensland	6,825	8,514	20,017	17,457	17,518	14,627	40,452	64,896	26,125	84,236	72,118	24,887	397,671

(Continued)

TABLE 3. Expenditure on Research and Experimental Development by State, Institution and Field of Research, 1998 (\$'000) (continued)

State/Institution	Mathematical Sciences	Physical Sciences	Chemical Sciences	Earth Sciences	Information, Computer and Communication Technologies	Applied Sciences and Technologies	General Engineering	Biological Sciences	Agricultural Sciences	Medical and Health Sciences	Social Sciences	Humanities	Total
Western Australia													
Curtin University of Technology	430	356	1,122	3,329	5,921	710	3,937	1,040	1,026	4,188	4,163	683	26,905
Edith Cowan University	92	12	9	5	1,296	31	108	2,966	47	1,268	6,476	1,103	13,412
Murdoch University	415	966	3,764	887	444	3,609	1,180	5,862	4,516	1,427	7,887	1,789	32,746
The University of Western Australia	1,227	5,776	3,597	7,507	4,971	3,918	13,290	19,476	17,617	45,281	20,960	8,864	152,483
Total Western Australia	2,163	7,109	8,492	11,728	12,632	8,267	18,516	29,345	23,206	52,164	39,486	12,439	225,547
South Australia													
The Flinders University of South Australia	871	746	2,104	1,728	1,507	125	512	8,077	937	32,780	6,405	3,466	59,260
The University of Adelaide	5,944	5,562	3,611	5,407	7,487	2,657	8,676	20,905	18,084	30,820	21,248	8,742	139,143
University of South Australia	474	130	7,461	461	7,187	3,542	5,065	793	215	5,056	10,134	1,872	42,388
Total South Australia	7,289	6,438	13,175	7,597	16,181	6,324	14,253	29,776	19,236	68,656	37,787	14,080	240,791
Tasmania													
University of Tasmania	251	2,115	2,171	10,425	1,070	289	1,637	6,383	13,184	6,334	10,929	4,629	59,417
Total Tasmania	251	2,115	2,171	10,425	1,070	289	1,637	6,383	13,184	6,334	10,929	4,629	59,417
Northern Territory													
Northern Territory University	121	449	674	144	636	630	893	2,187	1,942	743	5,269	923	14,611
Total Northern Territory	121	449	674	144	636	630	893	2,187	1,942	743	5,269	923	14,611
Australian Capital Territory													
Australian Defence Force Academy	1,666	1,579	1,408	1,502	1,538	1,411	1,137	4	217	50	2,079	1,264	13,856
The Australian National University	9,255	34,821	18,674	22,219	14,691	8,564	1,261	50,412	3,874	30,363	54,064	26,989	275,187
University of Canberra	0	0	0	0	543	0	0	432	3,025	864	4,895	0	9,760
Total Australian Capital Territory	10,921	36,400	20,082	23,721	16,772	9,975	2,398	50,848	7,117	31,277	61,038	28,253	298,802
Multi-State													
Australian Catholic University	16	0	40	95	111	13	0	217	0	2,151	4,686	3,102	10,431
Total Multi-State	16	0	40	95	111	13	0	217	0	2,151	4,686	3,102	10,431
Total	63,058	106,474	121,038	113,002	139,173	98,821	182,275	311,813	170,655	592,431	506,524	197,468	2,602,733

TABLE 4. Expenditure on Research and Experimental Development by Socio-Economic Objective, State and Institution, 1998 (\$'000)

Socio-Economic Objective	New South Wales										Victoria		
	Charles Sturt University	Macquarie University	Southern Cross University	The University of New England	The University of South Wales	The University of Newcastle	The University of Sydney	University of Technology, Sydney	University of Western Sydney	University of Wollongong	Total New South Wales	Deakin University	La Trobe University
Defence	0	0	0	0	68	0	170	0	12	60	310	0	20
Economic Development													
Plant-Production and Primary products	504	83	3,866	1,637	1,764	1,385	8,411	412	3,402	807	22,271	0	595
Animal-Production and Primary products	514	83	0	10,778	622	488	4,485	299	1,056	402	18,727	0	337
Mineral Resources (excluding energy)	0	558	0	170	701	0	183	739	10	0	2,360	0	85
Energy Resources	0	256	0	0	3,620	561	327	317	61	643	5,786	0	0
Energy Supply	69	0	0	0	5,300	0	418	2,120	13	1,322	9,243	189	1,132
Manufacturing	121	416	0	0	11,188	4,257	5,125	3,373	1,417	8,087	33,984	709	1,250
Construction	0	135	0	0	5,048	623	1,846	3,891	194	2,633	14,369	712	21
Transport	0	7	0	110	1,379	85	1,646	34	43	53	3,356	0	5
Information and Communication Services	1,099	1,199	0	922	1,759	262	1,498	6,588	411	6,752	20,490	1,542	1,229
Commercial Services	54	1,113	0	217	3,564	525	483	1,717	100	48	7,821	467	495
Economic Framework	757	4,844	0	3,001	11,305	951	1,061	4,938	1,326	5,385	33,568	2,684	2,906
Total Economic Development	3,120	8,694	3,866	16,834	46,250	9,135	25,482	24,428	8,033	26,131	171,974	6,304	8,054
Society													
Health	715	2,639	0	2,651	44,823	24,878	35,988	5,730	2,286	3,609	123,319	6,628	14,399
Education and Training	1,334	2,400	0	4,134	3,300	473	5,300	11,579	1,743	4,730	34,993	3,132	2,467
Social Development and Community Services	910	1,119	0	587	5,425	3	2,150	4,541	2,102	5,001	21,838	723	2,411
Total Society	2,960	6,158	0	7,372	53,548	25,353	43,438	21,849	6,131	13,340	180,150	10,483	19,278
Environment													
Environmental Knowledge	684	4,315	311	2,459	6,521	3,257	2,875	5,151	1,124	4,188	30,885	3,292	1,957
Environmental Aspects of Economic Development	2,222	557	0	661	3,016	2,880	840	3,281	343	993	14,793	0	570
Environmental Management & other aspects	1,789	1,874	382	1,577	2,071	1,249	653	1,588	1,650	487	13,320	0	260
Total Environment	4,694	6,746	693	4,698	11,607	7,386	4,369	10,020	3,117	5,667	58,998	3,292	2,788
Advancement of Knowledge													
Natural Sciences, Technologies and Engineering	662	22,525	2,862	6,414	53,880	17,663	122,382	25,978	3,387	12,745	268,497	6,547	18,379
Social Sciences and Humanities	1,594	13,122	3,367	7,346	18,038	19,112	36,557	12,688	3,994	2,589	118,407	8,603	11,584
Total Advancement of Knowledge	2,256	35,647	6,230	13,760	71,918	36,774	158,939	38,666	7,381	15,334	386,904	15,150	29,963
Total	13,030	57,245	10,789	42,664	183,391	78,648	232,398	94,964	24,675	60,532	798,337	35,230	60,103

(Continued)

TABLE 4. Expenditure on Research and Experimental Development by Socio-Economic Objective, State and Institution, 1998 (\$'000) (continued)

Socio-Economic Objective	Victoria (Continued)							Queensland			
	Monash University	Royal Melbourne Institute of Technology	Swinburne University of Technology	The University of Melbourne	University of Ballarat	Victoria University of Technology	Total Victoria	Central Queensland University	Griffith University	James Cook University	Queensland University of Technology
Defence	0	1,176	0	509	0	41	1,747	0	0	115	0
Economic Development											
Plant-Production and Primary products	0	277	0	10,443	0	349	11,663	1,641	1,375	1,141	191
Animal-Production and Primary products	1,181	743	0	13,185	38	240	15,724	781	66	2,326	51
Mineral Resources (excluding energy)	0	32	0	1,981	239	5	2,342	0	16	366	12
Energy Resources	332	49	1,433	37	34	6	1,891	6	57	443	16
Energy Supply	1,538	185	0	665	2	196	3,908	0	16	372	81
Manufacturing	9,458	4,358	8,035	6,687	430	2,322	33,250	71	8,508	1,558	3,077
Construction	4,494	557	510	3,736	59	897	10,986	0	561	394	880
Transport	3,079	643	1,433	392	5	110	5,666	2,266	22	103	133
Information and Communication Services	1,469	3,336	2,751	6,238	992	571	18,128	265	1,856	59	3,016
Commercial Services	1,655	938	2,245	2,689	0	848	9,336	0	1,743	50	11
Economic Framework	6,926	652	919	10,886	85	2,923	27,980	445	2,622	393	3,248
Total Economic Development	30,132	11,769	17,325	56,938	1,884	8,468	140,874	5,475	16,842	7,205	10,716
Society											
Health	28,448	3,494	2,601	89,044	448	1,782	146,843	208	3,301	2,668	7,110
Education and Training	7,425	2,027	655	12,987	149	1,234	30,077	1,060	4,115	1,242	4,520
Social Development and Community Services	1,273	886	1,243	6,012	119	1,898	14,566	290	5,223	482	6,528
Total Society	37,146	6,406	4,500	108,043	716	4,913	191,485	1,558	12,640	4,392	18,158
Environment											
Environmental Knowledge	1,828	1,226	1,433	6,746	4	742	17,229	802	4,645	10,347	235
Environmental Aspects of Economic Development	2,269	569	234	272	42	276	4,233	96	750	847	26
Environmental Management & other aspects	286	1,317	0	149	735	235	2,982	973	1,078	978	203
Total Environment	4,384	3,112	1,667	7,167	781	1,253	24,443	1,870	6,472	12,171	464
Advancement of Knowledge											
Natural Sciences, Technologies and Engineering	32,349	5,089	469	66,984	188	2,474	132,481	2,307	15,731	12,520	18,257
Social Sciences and Humanities	14,282	513	0	28,831	193	2,090	66,097	42	15,169	2,463	2,872
Total Advancement of Knowledge	46,631	5,602	469	95,816	381	4,565	198,578	2,349	30,900	14,983	21,129
Total	118,293	28,065	23,960	268,473	3,762	19,240	557,127	11,252	66,855	38,867	50,467

(Continued)

TABLE 4. Expenditure on Research and Experimental Development by Socio-Economic Objective, State and Institution, 1998 (\$'000) (continued)

Socio-Economic Objective	Queensland (Continued)				Western Australia				South Australia			
	The University of Queensland	University of Southern Queensland	Total Queensland	Curtin University of Technology	Edith Cowan University	Murdoch University	The University of Western Australia	Total Western Australia	The Flinders University of South Australia	The University of Adelaide	University of South Australia	Total South Australia
Defence	0	0	115	306	0	0	103	409	86	1,075	811	1,971
Economic Development												
Plant-Production and Primary products	8,937	283	13,568	134	28	2,665	12,653	15,480	398	14,678	390	15,466
Animal-Production and Primary products	8,455	181	11,860	599	0	1,961	3,691	6,251	948	3,468	102	4,518
Mineral Resources (excluding energy)	10,893	0	11,288	1,654	0	2,494	4,499	8,646	0	532	3,617	4,150
Energy Resources	1,771	0	2,294	1,782	0	98	1,499	3,378	0	1,832	281	2,113
Energy Supply	377	0	846	401	0	1,384	382	2,167	17	2,755	761	3,533
Manufacturing	13,161	405	26,779	2,507	323	640	982	4,451	1,023	4,197	5,506	10,726
Construction	954	129	2,918	4,049	0	30	3,177	7,256	62	2,266	778	3,105
Transport	21	0	2,544	30	6	112	301	448	102	1,853	653	2,608
Information and Communication Services	5,484	393	11,073	681	756	174	462	2,072	467	2,554	5,094	8,115
Commercial Services	1,303	21	3,128	56	181	280	664	1,181	235	1,359	279	1,873
Economic Framework	3,966	1,923	12,597	1,487	803	578	5,403	8,271	568	7,225	2,383	10,176
Total Economic Development	55,321	3,335	98,895	13,379	2,097	10,414	33,712	59,602	3,820	42,720	19,843	66,383
Society												
Health	57,419	331	71,037	4,497	1,653	1,783	32,675	40,608	36,181	29,663	4,219	70,063
Education and Training	2,800	1,480	15,218	2,619	3,208	1,904	3,528	11,259	1,900	3,165	2,363	7,429
Social Development and Community Services	2,777	70	15,371	344	1,779	1,016	1,465	4,605	4,121	5,340	2,692	12,152
Total Society	62,996	1,881	101,625	7,461	6,639	4,703	37,669	56,472	42,202	38,168	9,274	89,644
Environment												
Environmental Knowledge	4,589	220	20,837	1,208	1,925	1,900	5,853	10,887	2,555	6,595	660	9,810
Environmental Aspects of Economic Development	2,019	20	3,758	615	212	600	2,265	3,691	385	1,676	313	2,374
Environmental Management & other aspects	3,296	252	6,779	705	443	763	1,030	2,940	139	4,080	367	4,586
Total Environment	9,904	492	31,374	2,528	2,580	3,263	9,148	17,518	3,079	12,350	1,340	16,770
Advancement of Knowledge												
Natural Sciences, Technologies and Engineering	69,063	3,957	121,835	3,168	585	9,173	55,250	68,175	7,447	35,151	7,323	49,922
Social Sciences and Humanities	21,934	1,347	43,827	64	1,510	5,194	16,602	23,371	2,625	9,679	3,796	16,100
Total Advancement of Knowledge	90,997	5,304	165,662	3,232	2,096	14,367	71,852	91,546	10,072	44,831	11,119	66,022
Total	219,219	11,011	397,671	26,905	13,412	32,746	152,483	225,547	59,260	139,143	42,388	240,791

(Continued)

TABLE 4. Expenditure on Research and Experimental Development by Socio-Economic Objective, State and Institution, 1998 (\$'000) (continued)

Socio-Economic Objective	Tasmania		Northern Territory		Australian Capital Territory				Multi-State		Total
	University of Tasmania	Total Tasmania	Northern Territory University	Total Northern Territory	Australian Defence Academy	The Australian National University	University of Canberra	Total Australian Capital Territory	Australian Catholic University	Total Multi-State	
Defence											
Defence	2	2	0	0	630	621	0	1,251	0	0	5,804
Economic Development											
Plant-Production and Primary products	7,518	7,518	344	344	0	7,911	0	7,911	0	0	94,220
Animal-Production and Primary products	4,598	4,598	262	262	6	164	2,593	2,763	3	3	64,707
Mineral Resources (excluding energy)	3,394	3,394	112	112	87	1,363	0	1,450	0	0	33,742
Energy Resources	98	98	0	0	47	696	0	743	0	0	16,302
Energy Supply	371	371	282	282	6	1,595	0	1,601	0	0	21,951
Manufacturing	1,476	1,476	0	0	606	5,330	389	6,324	0	0	116,991
Construction	588	588	177	177	68	97	88	254	0	0	39,653
Transport	182	182	0	0	131	132	0	263	0	0	15,067
Information and Communication Services	383	383	75	75	888	3,147	121	4,157	106	106	64,600
Commercial Services	86	86	73	73	85	1,200	2,821	4,106	26	26	27,630
Economic Framework	2,072	2,072	980	980	372	12,019	1,034	13,426	80	80	109,151
Total Economic Development	20,766	20,766	2,305	2,305	2,297	33,654	7,047	42,998	216	216	604,013
Society											
Health	5,288	5,288	920	920	0	45,602	1,297	46,899	1,754	1,754	506,730
Education and Training	2,536	2,536	2,014	2,014	121	1,088	759	1,968	2,762	2,762	108,257
Social Development and Community Services	2,217	2,217	885	885	328	22,364	226	22,918	708	708	95,260
Total Society	10,042	10,042	3,820	3,820	449	69,055	2,281	71,785	5,224	5,224	710,247
Environment											
Environmental Knowledge	8,687	8,687	2,548	2,548	1,869	16,859	0	18,729	335	335	119,947
Environmental Aspects of Economic Development	979	979	1,147	1,147	376	2,452	432	3,260	0	0	34,234
Environmental Management & other aspects	833	833	633	633	240	2,043	0	2,283	3	3	34,360
Total Environment	10,500	10,500	4,328	4,328	2,485	21,354	432	24,271	338	338	188,541
Advancement of Knowledge											
Natural Sciences, Technologies and Engineering	11,571	11,571	3,054	3,054	6,110	111,311	0	117,421	138	138	773,093
Social Sciences and Humanities	6,537	6,537	1,104	1,104	1,885	39,192	0	41,077	4,516	4,516	321,036
Total Advancement of Knowledge	18,108	18,108	4,158	4,158	7,994	150,503	0	158,498	4,653	4,653	1,094,129
Total	59,417	59,417	14,611	14,611	13,856	275,187	9,760	298,802	10,431	10,431	2,602,733

TABLE 5. Expenditure on Research and Experimental Development by State, Institution and Type of Research Activity, 1998 (\$'000)

State/Institution	Pure Basic Research	Strategic Basic Research	Applied Research	Experimental Research	Total
New South Wales					
Charles Sturt University	8,217	1,947	2,614	251	13,030
Macquarie University	25,465	13,642	16,992	1,146	57,245
Southern Cross University	6,052	0	4,735	2	10,789
The University of New England	12,557	10,623	14,891	4,594	42,664
The University of New South Wales	60,875	49,996	55,173	17,348	183,391
The University of Newcastle	31,737	36,548	6,126	4,237	78,648
The University of Sydney	148,865	29,943	47,654	5,935	232,398
University of Technology, Sydney	19,604	16,837	53,707	4,816	94,964
University of Western Sydney	4,424	7,112	12,128	1,012	24,675
University of Wollongong	19,275	9,099	14,178	17,980	60,532
Total New South Wales	337,071	175,746	228,198	57,321	798,337
Victoria					
Deakin University	7,492	14,326	11,738	1,673	35,230
La Trobe University	30,474	7,976	20,325	1,328	60,103
Monash University	33,360	38,526	38,134	8,274	118,293
Royal Melbourne Institute of Technology	2,474	6,468	16,845	2,279	28,065
Swinburne University of Technology	2,862	1,670	17,331	2,097	23,960
The University of Melbourne	82,785	67,242	101,334	17,112	268,473
University of Ballarat	1,205	757	1,753	48	3,762
Victoria University of Technology	4,150	4,173	10,284	634	19,240
Total Victoria	164,800	141,139	217,744	33,444	557,127
Queensland					
Central Queensland University	1,587	3,081	6,194	391	11,252
Griffith University	19,500	16,186	25,053	6,116	66,855
James Cook University	10,268	9,507	16,479	2,614	38,867
Queensland University of Technology	316	123	49,952	75	50,467
The University of Queensland	57,853	61,445	89,160	10,760	219,219
University of Southern Queensland	1,094	3,999	5,738	181	11,011
Total Queensland	90,618	94,340	192,576	20,136	397,671
Western Australia					
Curtin University of Technology	3,236	2,841	19,665	1,162	26,905
Edith Cowan University	10,617	468	1,452	875	13,412
Murdoch University	3,384	21,442	7,643	277	32,746
The University of Western Australia	45,933	44,608	55,288	6,655	152,483
Total Western Australia	63,169	69,359	84,049	8,970	225,547
South Australia					
The Flinders University of South Australia	18,268	16,741	21,158	3,092	59,260
The University of Adelaide	35,967	41,231	52,004	9,942	139,143
University of South Australia	8,156	9,348	21,217	3,666	42,388
Total South Australia	62,391	67,320	94,379	16,700	240,791
Tasmania					
University of Tasmania	14,175	17,018	25,574	2,649	59,417
Total Tasmania	14,175	17,018	25,574	2,649	59,417
Northern Territory					
Northern Territory University	3,268	3,437	6,373	1,533	14,611
Total Northern Territory	3,268	3,437	6,373	1,533	14,611
Australian Capital Territory					
Australian Defence Force Academy	5,956	2,654	4,213	1,033	13,856
The Australian National University	115,973	83,256	59,716	16,243	275,187
University of Canberra	2,745	1,670	5,129	216	9,760
Total Australian Capital Territory	124,674	87,580	69,057	17,492	298,802
Multi-State					
Australian Catholic University	6,279	1,344	2,489	319	10,431
Total Multi-State	6,279	1,344	2,489	319	10,431
Total	866,447	657,282	920,440	158,563	2,602,733

TABLE 6. Expenditure on Research and Experimental Development by Field of Research and Type of Expenditure, 1998 (\$'000)

Field of Research	Land and Buildings	Other Capital Expenditure	Direct Labour Costs	Scholarships	Other Current Expenditure	Total
Mathematical Sciences						
Pure Mathematics	35	513	10,108	829	7,898	19,383
Applied Mathematics	166	823	11,156	1,138	9,312	22,595
Statistics	40	667	9,623	845	7,396	18,572
Other Mathematical Sciences	7	320	991	155	1,036	2,509
Total Mathematical Sciences	247	2,324	31,879	2,967	25,642	63,058
Physical Sciences						
Astronomical Sciences	107	1,633	11,367	752	10,673	24,532
Theoretical and Condensed Matter Physics	331	1,713	10,168	1,129	10,553	23,895
Atomic, Molecular, Nuclear, Particle and Plasma Physics	981	3,899	11,572	676	11,253	28,381
Acoustic and Optical Physics	185	1,015	6,996	645	5,757	14,599
Other Physical Sciences	213	2,043	6,200	665	5,947	15,066
Total Physical Sciences	1,818	10,303	46,304	3,866	44,183	106,474
Chemical Sciences						
Physical Chemistry (incl. Theoretical and Structural)	345	4,703	18,128	2,775	18,000	43,951
Inorganic Chemistry	143	1,023	6,539	1,030	6,310	15,045
Organic Chemistry	698	3,757	14,002	2,410	12,682	33,550
Analytical Chemistry	199	751	3,485	697	3,374	8,505
Other Chemical Sciences	297	1,988	8,067	1,658	7,977	19,987
Total Chemical Sciences	1,682	12,223	50,220	8,571	48,342	121,038
Earth Sciences						
Geology	370	3,378	18,529	2,915	17,162	42,354
Geophysics	222	1,745	4,667	526	4,700	11,861
Geochemistry	279	819	5,565	553	5,291	12,506
Oceanography	37	362	2,422	227	2,675	5,723
Hydrology	57	372	5,610	529	3,494	10,062
Atmospheric Sciences	112	763	3,709	411	3,727	8,722
Other Earth Sciences	128	1,169	9,597	1,059	9,821	21,774
Total Earth Sciences	1,205	8,608	50,099	6,221	46,870	113,002
Information, Computer and Communication Technologies						
Information Systems and Technologies	532	3,550	26,647	4,082	20,404	55,214
Computer Hardware	26	679	1,766	249	2,232	4,952
Computer Software	379	1,133	11,689	1,550	7,784	22,536
Communication Technologies	158	3,209	16,084	1,514	13,615	34,580
Other Information, Computer and Communication Technologies	187	2,224	9,530	1,072	8,878	21,892
Total Information, Computer and Communication Technologies	1,282	10,796	65,715	8,468	52,912	139,173
Applied Sciences and Technologies						
Aerospace Technologies and Engineering	337	1,278	5,726	871	5,613	13,825
Manufacturing and Process Technologies and Engineering	261	2,187	7,729	1,797	6,222	18,196
Industrial Biotechnology and Food Sciences	77	837	6,486	1,207	5,883	14,490
Material Sciences and Technologies	320	4,397	16,483	3,024	14,794	39,018
Other Applied Sciences and Technologies	299	1,846	5,776	574	4,796	13,291
Total Applied Sciences and Technologies	1,294	10,546	42,201	7,473	37,307	98,821
General Engineering						
Mechanical and Industrial Engineering	440	4,490	16,412	2,479	13,556	37,377
Chemical Engineering	153	2,767	10,551	3,133	11,815	28,420
Mining and Mineral Processing	539	1,780	8,923	1,217	10,535	22,994
Civil Engineering	1,308	3,291	22,954	3,400	17,170	48,123
Electrical and Electronic Engineering	245	1,516	13,008	1,640	11,116	27,524
Other General Engineering	108	868	8,963	1,042	6,858	17,838
Total General Engineering	2,793	14,712	80,810	12,911	71,049	182,275
Biological Sciences						
Biochemistry	473	4,200	16,285	2,494	13,847	37,300
Genetics, Molecular Biology and Biotechnology	1,760	7,450	49,351	4,819	50,384	113,765
Microbiology	120	952	9,443	1,402	9,826	21,743
Botany	443	2,491	15,085	2,050	14,734	34,803
Zoology	373	1,362	12,786	1,717	11,236	27,475
Ecology	1,488	2,769	21,380	2,715	20,875	49,227
Other Biological Sciences	807	3,377	11,253	1,386	10,678	27,500
Total Biological Sciences	5,464	22,601	135,584	16,584	131,580	311,813

(Continued)

TABLE 6. Expenditure on Research and Experimental Development by Field of Research and Type of Expenditure, 1998 (\$'000) (continued)

Field of Research	Land and Buildings	Other Capital Expenditure	Direct Labour Costs	Scholarships	Other Current Expenditure	Total
Agricultural Sciences						
Soil and Water Sciences	277	857	6,079	1,461	7,157	15,830
Crop and Pasture Production	297	2,346	19,962	2,583	25,103	50,291
Horticulture	46	962	5,127	1,075	5,498	12,708
Animal Production	460	938	11,779	1,946	12,107	27,231
Veterinary Sciences	84	1,575	11,306	1,228	11,079	25,272
Forestry Sciences	152	696	7,218	1,280	8,081	17,427
Fisheries Sciences	72	474	5,954	946	6,207	13,653
Other Agricultural Sciences	67	540	3,094	294	4,248	8,243
Total Agricultural Sciences	1,455	8,387	70,519	10,813	79,480	170,655
Medical and Health Sciences						
Immunology	159	1,443	13,653	1,408	15,441	32,104
Medical Biochemistry and Clinical Chemistry	199	1,006	7,276	983	6,983	16,449
Medical Microbiology	64	545	6,295	859	5,626	13,390
Pharmacology	816	2,024	20,498	2,024	20,094	45,456
Physiology	788	2,422	15,988	1,286	14,496	34,981
Neurosciences	373	2,854	24,464	1,831	19,570	49,091
Clinical Sciences	1,044	11,077	103,144	8,883	92,654	216,801
Public Health Research	1,489	2,466	48,229	3,541	45,185	100,910
Health Services Research	596	1,380	28,943	1,280	28,693	60,891
Other Medical and Health Sciences	619	2,387	9,224	1,262	8,867	22,358
Total Medical and Health Sciences	6,146	27,604	277,713	23,358	257,610	592,431
Social Sciences						
Accounting and Finance	409	671	18,760	889	12,221	32,951
Economics	1,649	1,581	32,198	2,613	26,353	64,394
Business Studies	1,123	1,148	30,725	2,534	20,583	56,113
Political Sciences and Public Policy	392	906	17,727	1,973	15,759	36,758
Architecture and Urban Environment	79	450	8,491	644	5,245	14,910
Sociology	274	691	12,747	1,763	9,278	24,753
Anthropology	74	540	8,129	1,463	7,689	17,895
Social Studies	105	642	13,726	1,019	14,444	29,935
Human Geography	26	381	5,344	578	3,502	9,832
Population Studies	26	90	2,682	204	2,655	5,657
Law	593	913	22,315	964	16,246	41,031
Psychology	931	1,904	24,423	2,924	16,946	47,128
Education	1,815	2,559	54,970	3,552	38,552	101,447
Media and Communication Studies	352	215	6,456	648	3,730	11,401
Other Social Sciences	331	386	7,084	229	4,289	12,319
Total Social Sciences	8,179	13,078	265,777	21,996	197,493	506,524
Humanities						
Language and Literature	715	1,165	28,793	5,103	21,069	56,846
Historical Studies	661	901	24,215	3,340	18,497	47,613
Archaeology and Classical Studies	32	261	3,568	618	2,443	6,921
Arts	1,399	1,005	22,164	3,238	13,743	41,549
Design Studies	5	126	3,855	147	1,544	5,676
Philosophy	111	284	7,064	1,587	5,507	14,554
Religious Studies	109	108	2,748	350	1,959	5,274
History and Philosophy of Science and Medicine	19	35	1,326	212	1,234	2,826
Other Humanities	157	406	8,722	1,296	5,627	16,209
Total Humanities	3,208	4,292	102,455	15,891	71,623	197,468
Total	34,773	145,472	1,219,277	139,120	1,064,092	2,602,733

Table 7. Expenditure on Research and Experimental Development by Socio-Economic Objective and Type of Expenditure, 1998 (\$'000)

Socio-Economic Objective	Land and Buildings	Other Capital Expenditure	Direct Labour Costs	Scholarships	Other Current Expenditure	Total
Defence						
Defence	30	329	2,733	176	2,536	5,804
Economic Development						
Plant-production and Primary Products	898	4,624	38,169	5,228	45,302	94,220
Animal-production and Primary Products	536	2,607	27,117	4,070	30,376	64,707
Mineral Resources (excluding energy)	290	2,180	13,161	1,975	16,135	33,742
Energy Resources	115	1,470	6,783	992	6,941	16,302
Energy Supply	44	1,299	10,350	1,456	8,802	21,951
Manufacturing	1,788	11,588	49,430	8,398	45,788	116,991
Construction	1,284	2,274	19,910	2,625	13,560	39,653
Transport	186	1,295	6,972	996	5,617	15,067
Information and Communication Services	689	3,303	32,177	3,447	24,984	64,600
Commercial Services	681	644	14,827	1,160	10,320	27,630
Economic Framework	1,356	2,915	57,340	4,882	42,658	109,151
Total Economic Development	7,868	34,198	276,235	35,228	250,482	604,013
Society						
Health	4,876	18,607	243,655	20,286	219,306	506,730
Education and Training	1,516	2,897	58,207	4,218	41,420	108,257
Social Development and Community Services	1,776	2,521	47,990	3,098	39,875	95,260
Total Society	8,168	24,025	349,852	27,602	300,600	710,247
Environment						
Environmental Knowledge	2,068	6,919	53,932	5,959	51,069	119,947
Environmental Aspects of Economic Development	549	1,451	16,055	2,256	13,923	34,234
Environmental Management & other aspects	460	1,434	15,491	1,884	15,090	34,360
Total Environment	3,078	9,805	85,477	10,099	80,083	188,541
Advancement of Knowledge						
Natural Sciences, Technologies and Engineering	10,679	68,990	338,066	43,137	312,221	773,093
Social Sciences and Humanities	4,950	8,126	166,914	22,878	118,170	321,036
Total Advancement of Knowledge	15,629	77,116	504,980	66,014	430,390	1,094,129
Total	34,773	145,472	1,219,277	139,120	1,064,092	2,602,733

Table 8. Expenditure on Research and Development by Field of Research and Source of Funds for Expenditure, 1998 (\$'000)

Field of Research	National Competitive Research Grants				Other Australian Sources					Total
	Commonwealth Schemes	Commonwealth Schemes	Non Commonwealth Schemes	State and Local Government	Other Commonwealth Government	Business Enterprises	General University Funds (GUF)	Other	Overseas	
Natural Sciences, Technologies and Engineering										
Mathematical Sciences	10,160	58	870	3,663	1,868	45,287	236	917	63,058	
Physical Sciences	15,407	135	373	8,078	1,919	74,645	5,103	814	106,474	
Chemical Sciences	22,301	1,292	1,213	12,350	9,220	72,137	1,537	988	121,038	
Earth Sciences	17,689	806	2,885	12,376	6,511	68,302	2,941	1,492	113,002	
Information, Computer and Communication Technologies	17,123	71	2,464	14,800	9,284	90,656	888	3,887	139,173	
Applied Sciences and Technologies	19,105	500	1,389	11,936	9,001	55,182	743	965	98,821	
General Engineering	30,790	1,614	6,822	12,825	19,326	105,242	4,098	1,559	182,275	
Biological Sciences	64,230	1,631	5,780	23,053	16,017	187,942	9,619	3,541	311,813	
Agricultural Sciences	43,554	1,101	6,713	17,792	11,934	81,683	6,621	1,256	170,655	
Medical and Health Sciences	108,383	8,629	25,927	30,506	34,903	331,278	34,336	18,470	592,431	
Total Natural Sciences, Technologies and Engineering	348,742	15,836	54,436	147,379	119,981	1,112,355	66,121	33,889	1,898,741	
Social Sciences and Humanities										
Accounting and Finance	1,649	30	64	2,869	1,160	26,317	544	318	32,951	
Economics	5,642	2	1,286	3,776	2,632	49,205	875	976	64,395	
Political Sciences	3,638	2	620	2,337	603	28,961	230	367	36,758	
Sociology	2,932	31	826	1,764	423	18,136	367	273	24,753	
Law	2,580	24	709	1,087	974	34,929	553	176	41,031	
Psychology	8,331	50	1,825	2,893	1,099	31,989	602	339	47,128	
Education	8,096	162	4,360	7,495	1,369	77,525	1,440	1,000	101,448	
Other Social Sciences	12,776	139	3,175	8,598	5,151	123,654	1,815	2,753	158,062	
Humanities	19,162	186	1,499	13,126	2,386	158,082	1,898	1,128	197,468	
Total Social Sciences and Humanities	64,806	627	14,366	43,945	15,797	548,798	8,323	7,331	703,992	
Total	413,548	16,463	68,802	191,324	135,778	1,661,153	74,444	41,220	2,602,733	

Table 9. Expenditure on Research and Experimental Development by Socio-Economic Objective and Source of Funds for Expenditure, 1998 (\$'000)

Socio-Economic Objective	National Competitive Research Grants				Other Australian Sources					Total
	Commonwealth Schemes	Non Commonwealth Schemes	State and Local Government	Other Commonwealth Government	Business Enterprises	General University Funds (GUF)	Other	Overseas		
Defence	997	1	232	666	379	3,498	23	9	5,804	
Economic Development										
Plant-Production and Primary products	25,993	150	3,372	10,438	6,186	42,626	4,777	678	94,220	
Animal-Production and Primary products	16,390	811	2,903	6,520	4,752	30,903	1,703	727	64,707	
Mineral Resources (excluding energy)	4,247	27	1,185	3,892	7,142	16,020	678	551	33,742	
Energy Resources	1,284	1,017	492	1,336	1,921	10,048	117	86	16,302	
Energy Supply	4,181	125	322	1,890	2,550	11,920	510	452	21,951	
Manufacturing	19,221	559	2,330	8,987	17,569	64,505	1,571	2,248	116,991	
Construction	5,143	246	1,596	3,637	2,416	25,570	947	97	39,653	
Transport	2,489	70	2,529	1,326	1,119	7,332	99	103	15,067	
Information and Communication Services	7,296	14	1,140	3,328	6,360	43,598	414	2,450	64,600	
Commercial Services	1,599	29	561	2,404	1,239	21,426	294	79	27,630	
Economic Framework	8,853	57	1,715	6,626	6,075	81,587	1,032	3,206	109,151	
Total Economic Development	96,697	3,103	18,145	50,384	57,331	355,535	12,141	10,678	604,013	
Society										
Health	89,831	6,654	25,086	29,228	26,096	294,393	24,153	11,289	506,730	
Education and Training	10,122	626	4,399	8,222	2,527	79,784	1,750	826	108,257	
Social Development and Community Services	7,612	263	2,665	5,929	1,988	74,818	842	1,142	95,260	
Total Society	107,564	7,544	32,150	43,379	30,612	448,996	26,745	13,257	710,247	
Environment										
Environmental Knowledge	16,099	452	3,521	13,939	5,354	75,026	4,603	952	119,947	
Environmental Aspects of Economic Development	6,916	402	1,067	2,211	3,754	18,865	710	310	34,234	
Environmental Management & other aspects	4,952	192	1,924	2,279	4,590	19,380	623	418	34,360	
Total Environment	27,968	1,047	6,512	18,429	13,698	113,271	5,936	1,680	188,541	
Advancement of Knowledge										
Natural Sciences, Technologies and Engineering	146,508	4,660	8,247	60,507	30,127	483,885	25,757	13,402	773,093	
Social Sciences and Humanities	33,816	108	3,516	17,960	3,631	255,969	3,842	2,194	321,036	
Total Advancement of Knowledge	180,323	4,768	11,763	78,467	33,758	739,854	29,599	15,596	1,094,129	
Total	413,548	16,463	68,802	191,324	135,778	1,661,153	74,444	41,220	2,602,733	

Table 10. Expenditure on Research and Experimental Development by Field of Research and Type of Research Activity, 1998 (\$'000)

Field of Research	Pure Basic Research	Strategic Basic Research	Applied Research	Experimental Research	Total
Natural Sciences, Technologies and Engineering					
Mathematical Sciences	32,013	12,312	14,110	4,623	63,058
Physical Sciences	64,993	16,378	18,392	6,711	106,474
Chemical Sciences	50,840	35,071	26,252	8,875	121,038
Earth Sciences	35,367	33,546	36,754	7,335	113,002
Information, Computer and Communication Technologies	34,463	32,234	57,659	14,818	139,173
Applied Sciences and Technologies	15,606	32,670	41,435	9,109	98,821
General Engineering	26,039	48,303	88,967	18,966	182,275
Biological Sciences	130,616	93,553	75,122	12,523	311,813
Agricultural Sciences	26,470	45,912	82,296	15,977	170,655
Medical and Health Sciences	162,490	170,682	222,354	36,906	592,431
Total Natural Sciences, Technologies and Engineering	578,898	520,660	663,341	135,841	1,898,741
Social Sciences and Humanities					
Accounting and Finance	9,483	5,290	17,732	445	32,951
Economics	11,986	13,875	37,521	1,013	64,394
Political Sciences	17,397	8,872	9,507	982	36,758
Sociology	10,944	5,541	7,508	759	24,753
Law	11,735	12,827	14,747	1,722	41,031
Psychology	21,008	11,318	12,903	1,900	47,128
Education	22,183	20,093	52,346	6,824	101,447
Other Social Sciences	46,271	34,723	73,078	3,990	158,062
Humanities	136,543	24,082	31,757	5,087	197,468
Total Social Sciences and Humanities	287,549	136,622	257,099	22,722	703,992
Total	866,447	657,282	920,441	158,563	2,602,733

Table 11. Expenditure on Research and Experimental Development by Socio-Economic Objective and Type of Research Activity, 1998 (\$'000)

Socio-Economic Objective	Pure Basic Research	Strategic Basic Research	Applied Research	Experimental Research	Total
Defence					
Defence	426	1,604	3,283	491	5,804
Economic Development					
Plant-Production and Primary products	13,069	26,080	48,754	6,316	94,220
Animal-Production and Primary products	7,501	17,295	32,345	7,566	64,707
Mineral Resources (excluding energy)	4,810	11,384	16,422	1,126	33,742
Energy Resources	2,056	3,420	9,135	1,691	16,302
Energy Supply	1,942	5,863	9,641	4,505	21,951
Manufacturing	18,814	39,645	45,413	13,119	116,991
Construction	6,077	8,023	22,683	2,869	39,653
Transport	1,363	3,606	8,596	1,502	15,067
Information and Communication Services	14,335	14,574	26,398	9,292	64,600
Commercial Services	3,784	4,944	18,012	891	27,630
Economic Framework	19,057	27,135	61,174	1,785	109,151
Total Economic Development	92,808	161,969	298,572	50,663	604,013
Society					
Health	94,515	162,800	214,753	34,661	506,730
Education and Training	21,735	22,400	56,024	8,098	108,257
Social Development and Community Services	24,773	24,583	40,747	5,158	95,260
Total Society	141,023	209,783	311,524	47,917	710,247
Environment					
Environmental Knowledge	31,337	40,402	41,799	6,409	119,947
Environmental Aspects of Economic Development	6,255	10,137	15,023	2,819	34,234
Environmental Management & other aspects	5,426	9,054	16,749	3,131	34,360
Total Environment	43,018	59,593	73,570	12,359	188,541
Advancement of Knowledge					
Natural Sciences, Technologies and Engineering	385,306	178,914	169,926	38,946	773,093
Social Sciences and Humanities	203,866	45,417	63,565	8,187	321,036
Total Advancement of Knowledge	589,172	224,332	233,491	47,134	1,094,129
Total	866,447	657,282	920,441	158,563	2,602,733

4 Appendices

Appendix 1. Institutions listed in this publication

New South Wales

Charles Sturt University
Macquarie University
Southern Cross University
The University of New England
The University of New South Wales
The University of Newcastle
The University of Sydney
University of Technology, Sydney
University of Western Sydney
University of Wollongong

Victoria

Deakin University
La Trobe University
Monash University
Royal Melbourne Institute of Technology
Swinburne University of Technology
The University of Melbourne
University of Ballarat
Victoria University of Technology

Queensland

Central Queensland University
Griffith University
James Cook University
Queensland University of Technology
The University of Queensland
University of Southern Queensland

Western Australia

Curtin University of Technology
Edith Cowan University
Murdoch University
The University of Western Australia

South Australia

The Flinders University of South Australia
The University of Adelaide
University of South Australia

Tasmania

University of Tasmania

Northern Territory

Northern Territory University

Australian Capital Territory

Australian Defence Force Academy
The Australian National University
University of Canberra

Multi-State

Australian Catholic University

Appendix 2. Definitions

A2.1 Field of Research Classification

A classification of research and experimental development in terms of its field of research. The ABS's Field of Research Classification (FOR) enables research and experimental development work to be classified in terms of research discipline. The FOR classification is primarily structured around disciplines or activities. It describes what research is being performed. The classification is maintained by the Australian Bureau of Statistics (see 1993 edition of ABS Catalogue no. 1297.0)

A2.2 Persons undertaking research and experimental development

The data included relate to research and experimental development undertaken by or for which support is provided by members of staff as defined in DETYA documentation (for the relevant year) entitled *Selected Higher Education Staff Statistics*. These include:

- persons employed by the institution on a full-time, fractional full-time or casual basis;
- employees of another institution who are working at the institution as either:
 - visiting staff,
 - exchange staff, or
 - seconded staff.
- a person who works for the institution or one of its controlled entities on a regular basis but who receives no remuneration (eg. members of religious denominations, unpaid visiting fellows).

Such staff may be:

- Academics. Staff engaged in or supporting research and experimental development and who are defined as having an academic classification in the Definition Appendix of the DETYA manual Higher Education Staff Statistics.
- Technical Staff. Staff undertaking technical tasks in support of research and experimental development, normally under the direction and supervision of an academic. Typical activities include preparation for experiments, taking records, preparation of charts and graphs and coding data.
- Other staff. Staff supporting research and experimental development who do not fall into the above two categories. Includes secretarial and clerical staff working on, or directly associated with research and experimental development activity.

A2.3 Research and Experimental Development

The ABS collection conforms to the standards for collection of research and experimental development statistics formulated by the OECD which defines research and experimental development as follows:

Research and experimental development comprises 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.

Any activity classified as research and experimental development is characterised by *originality*, should have *investigation* as a primary objective and should have the potential to produce results that are sufficiently *general* for humanity's stock of knowledge (theoretical and/or practical) to be recognisably increased.

In addition to the activity of staff who are obviously engaged in research and experimental development, research activity *includes*:

- the provision of professional, technical, administrative or clerical support and/or assistance to staff directly engaged in research and experimental development;
- management of staff who are either directly engaged in research and experimental development or are providing professional, technical or clerical support or assistance to those staff;

- activities of students undertaking postgraduate research courses;
- supervision and monitoring of postgraduate research courses;
- supervision of students undertaking postgraduate research courses;
- computer programming, systems work or software maintenance where there are technological uncertainties to be resolved;
- research work in the social sciences and humanities.

The following specific activities are *excluded* except where they are used primarily for the support of, or as part of, research and experimental development activities:

- preparation for teaching;
- scientific and technical information services;
- engineering and technical services;
- general purpose or routine data collection;
- standardisation and routine testing;
- feasibility studies (except into research and experimental development projects);
- specialised routine medical care;
- the commercial, legal and administrative aspects of patenting, copyrighting or licensing activities;
- routine computer programming, systems work or software maintenance where there are no technological uncertainties to be resolved.

Research and experimental development activity may be pure basic research, strategic basic research, applied research or experimental development.

A2. 4 Socio-Economic Objective Classification

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. The classification is maintained by the Australian Bureau of Statistics (see 1993 edition of ABS Catalogue no. 1297.0).

A2. 5 Source of Funds

The sources of funds for research and experimental development comprise:

A2. 5.1 National Competitive Research Grants:

A2. 5.1.1 Commonwealth schemes (by portfolio):

- **Attorney-General:**
 - Criminology Research Council
- **Employment, Education, Training and Youth Affairs:**
 - Australian Institute of Aboriginal and Torres Strait Islander Studies
 - Australian National Training Authority, VET Research Centres
 - National Centre for Vocational Education Research Ltd
 - > Research into Vocational Education and Training Sector
 - Australian Research Council
 - > Aboriginal and Torres Strait Islander Researchers Development Program
 - > Collaborative Grants

- > Key Centres of Teaching and Research
- > Large Grants
- > Research Fellowships
- > Small Grants
- > Special Research Centres
- Children’s Literacy National Projects
- Indigenous Higher Education Centres Program
- National Youth Affairs Research Scheme
- Targeted Institutional Links

- **Environment, Sport and Territories:**
 - Antarctic Science Advisory Committee Grants Scheme
 - Australian Biological Resources Study
 - Climate Change Impacts and Adaptation Grants Program
 - Great Barrier Reef Marine Park Authority Augmentative Reef Research Grant Scheme

- **Foreign Affairs and Trade:**
 - Australian Centre for International Agricultural Research (ACIAR)

- **Health and Family Services:**
 - General Practice Evaluation Program
 - Research into Drug Abuse Advisory Committee
 - National Health and Medical Research Council:
 - > Health Services Research and Development Grants Advisory Committee
 - > Medical Research Grants Scheme
 - > Public Health Research & Development Grants Scheme

- **Industry, Science and Tourism:**
 - Space Industry Development Centres Program
 - AusIndustry
 - > R&D Start Program Grants for Collaborative R&D Projects
 - > R&D Start Program Grants for Graduate-based R&D Projects

- **Primary Industries and Energy:**
 - Cotton R&D Corporation
 - Dairy R&D Corporation
 - Dried Fruits R&D Corporation
 - Fisheries R&D Corporation
 - Forest and Wood Products R&D Corporation
 - Grains R&D Corporation
 - Grape and Wine R&D Corporation
 - Horticultural R&D Corporation
 - Land and Water Resources R&D Corporation
 - Meat Research Corporation
 - Pig R&D Corporation

- Rural Industries R&D Corporation
- Sugar R&D Corporation
- Tobacco R&D Council

- **Veterans' Affairs:**

- Health and Medical Research Grants

A2. 5.1.2 Non-Commonwealth schemes:

- Australian Brewers Foundation
- Australian Coal Research Ltd
- Australian Institute of Nuclear Science and Engineering Inc
- Australian Kidney Foundation
- Australian Rotary Health Research Fund
- Clive and Vera Ramaciotti Foundation
- IWS International Pty Ltd
- Kathleen Cunningham Foundation
- National Heart Foundation
- National Multiple Sclerosis Society of Australia
- Telstra Corporation Ltd – Fund for Social and Policy Research in Telecommunications
- The Ophthalmic Research Institute of Australia
- WA Estuarine Research Foundation
- Wellcome Trust Senior Research Fellowships in Biomedical Sciences

A2. 5.2 State and local government

Covers any other research funding from state and local government not included above.

A2. 5.3 Other Commonwealth government

Covers any other research funding from Commonwealth departments other than those included above. Includes Research Infrastructure grants.

A2. 5.4 Other Australian sources:

A2. 5.4.1 Business enterprises

Include both privately and government owned businesses which produce goods or services for sale to the general public at a price intended to cover the cost of production.

A2. 5.4.2 Donations, bequests and foundations

Includes donations and bequests specifically for research from Australian individuals and non profit organisations

A2. 5.4.3 General university funds

Includes funding acquired from sources other than the ones listed above and other than non-Australian sources. Includes:

- grants made by the Commonwealth in accordance with provisions of the Higher Education Funding Act 1988 but excluding grants for Special Research Assistance under provisions in section 23 of that Act;
- income relating to HECS liabilities;

- funding from Commonwealth, State or Local Government agencies but excluding funding provided specifically for research or development work;
- fees and charges;
- income from donations, bequests and foundations but excluding income from donations, bequests and foundations which were provided specifically for research purposes;
- investment income; and
- reversions from provisions accounts, loans drawn down, income from the institutions commercial operations and from sale of products or assets.

A2. 5.4.4 Other

Covers all other sources from within Australia not included above.

A2. 5.5 Overseas

Covers all sources of funding from outside Australia.

A2. 6.1 Type of expenditure

Type of expenditure comprise capital and current:

A2. 6.1 Capital expenditure:

The acquisition of new and second hand fixed tangible assets, either on the institutions own account or under a finance lease, with an expected life of greater than one year. To enable comparability, both with data collected from other sectors and with data for other countries, capital expenditure should be reported in full for the period when it took place, rather than on an accrual basis. Includes:

A2. 6.1.1 Land and buildings and other structures

Comprises expenditure on land acquired for R&D (eg testing grounds, sites for laboratories and pilot plants), landscaping, site preparation works, buildings (constructed or purchased), fit-out costs for new buildings and major improvements and modifications. Repair and maintenance expenditure is excluded from this category and included in 'Other current expenditure'. Depreciation provisions are excluded.

A2. 6.1.2 Vehicles, plant, machinery and equipment

Includes expenditure on office and other equipment, furnishings, plants and motor vehicles. Where existing equipment is 'traded-in' then the expenditure to be reported is to reflect the net cost after the deduction of trade-in allowances. Excludes fit-out costs for new buildings and depreciation provisions.

A2. 6.2 Current expenditure:

Data should be reported on an accruals basis of accounting where possible. They should relate to expenditure incurred during the year, whether paid or not. If a university prepares it's accounts on a cash basis, reporting on this basis will suffice. All depreciation provisions should be excluded. If depreciation was included in current expenditure, then the addition of capital expenditure would result in double counting.

A2. 6.2.1 Staff expenditure:

Comprises the wages, salaries and other labour costs for the reported staff resources. The other labour costs included are contributions to superannuation and pension schemes, payroll tax, workers' compensation insurance, payments into long service provision accounts and other salary related expenses.

A2. 6.2.2 Scholarships for research higher degrees

Comprises expenditure on scholarships (eg stipends) for research higher degrees. Includes HECS postgraduate scholarships other than those funded by DETYA. Scholarships which are paid directly to a student by an outside individual or organisation, and scholarships for which funding is provided to the university to pass on to specific individuals (eg Australian Postgraduate Awards with Stipends, Overseas Postgraduate Research Scholarships) should be excluded from this item and included in 'Other current expenditure'.

A2. 6.2.3 Other current expenditure

Comprises all other non-staff expenditures including materials, fuels, water, sewerage, rent and hiring expenses, repairs and maintenance, academic services purchased from outside, cleaning services, postage, freight, telephone and any other expenses other than included above. Exclude depreciation provisions and payments for patent searches and for purchases of technical know-how.

A2. 7 Type of Research Activity

A classification used to categorise research and experimental development by type of activity:

- **Pure basic research** is experimental and theoretical work undertaken to acquire new knowledge without looking for long term benefits other than the advancement of knowledge.
- **Strategic basic research** is experimental and theoretical work undertaken to acquire new knowledge 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.
- **Applied research** is original work undertaken primarily to acquire new knowledge with a specific application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new ways of achieving some specific and predetermined objectives.
- **Experimental development** is systematic work, using existing knowledge gained from research or practical experience for the purpose of creating new or improved products/processes.

