SCIENCE AND TECHNOLOGY STATEMENT 1984-85

by

The Minister for Science
The Honourable Barry O. Jones, M.P.

MAY 1985

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A statement on the Commonwealth Government sector

prepared by the Department of Science

on the basis of information provided by

agencies of the Commonwealth Government

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PREFACE

BY THE MINISTER FOR SCIENCE

THE HON. BARRY 0. JONES, M.P.

The Ministry is now Science, but this Statement remains the Science and Technology Statement. This is apt.

Under the new Commonwealth administrative arrangements, prime responsibility for technology, particularly in its direct application to industry, has passed from the old Ministry of Science and Technology to the new Ministry of Industry, Technology and Commerce. The Ministry of Science will concentrate on ensuring that we have the scientific and research capability to face the challenges of the 21st century. The new Ministry of Science, however, in parallel with the intellectual domain of science, is inevitably linked with the development and practical application of technology.

To take this one step further, there remain important linkages between science and industry, as well as between science and technology, and between technology and industry. Science, technology and industry should be regarded as three points on a triangle - with direct linkages between each point. It is essential for our future economic growth that all these linkages should remain in good repair and constant use.

It is also vital that the role of governments in promoting and monitoring technological change in industry should be more adequately recognised. In the detail of this Statement there is a good deal of information on existing programs to support R&D in industry directly and on initiatives which are being taken to promote such R&D through other means.

A significant factor in the achievement of our economic and social objectives is the development of our intellectual resources. Unless Australia has adequate numbers of well-trained R&D workers in industry - numbers sufficient to keep at the technological forefront, we will not be capable of making intelligent choices in industry on which technological options to adopt.

The Government's recent administrative changes are a reflection not only of the very great concern the Government has with improving our technological competence and the efficiency of our industry but also its desire to improve the effectiveness of our national science and research infrastructure in meeting the wide social and economic goals of the community. We are not likely to succeed fully in these aims until the level of this concern is reflected throughout industry itself and, indeed, in the wider community. It is vital that the relation of science and technology to national growth achieves a much higher level of recognition in the Australian consciousness.

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DEVELOPMENT OF THE STATEMENT

This is the sixth annual Statement providing detailed information about expenditure by the Commonwealth Government in support of science and technology (S&T).

It should be emphasised that the Science and Technology Statement is only one among a number of sources of information on Commonwealth Government involvement in scientific and technological matters. The Department of Science is continuing to develop other elements of a larger package of source material for policy makers, policy analysts and advisers, and others concerned with science and technology.

There is a consistent effort to maintain compatibility with international practice, particularly in relation to the terminology and definitions adopted by OECD and UNESCO. One persistent point of confusion to some has been the common usage of "science and technology" as being synonymous with the natural sciences and engineering (NSE), whereas in international usage it extends to the social sciences and humanities (SSH). This was one of the factors which led to the separate presentation of NSE and SSH in the tables of this Statement. The SSH figures and their relationship to the NSE figures are becoming more significant as the economic and social importance of information technology and of the use of information increases.

In this Statement, a number of tables which appeared in the Science and Technology Statement 1983-84 have not been reproduced. Updates of these tables will be available on request from the Indicators and Resource Analysis Section of the Department of Science.

ACCURACY AND ROUNDING CONVENTION

All entries in the Ministry tables have been rounded to the nearest $0.001m, except where a lesser accuracy was quoted by the respondent. It should be recognised, however, that the data are often less accurate than implied. For greater clarity in presenting broad aggregates some tables show figures rounded to the nearest $0.01m, except in cases where the aggregate included items specified only to $0.1m, where only this accuracy is given. Some discrepancies between quoted totals and actual sums of components listed in tables may be noted: these are due to rounding.

BROAD DEVELOPMENTS OF THE PAST YEAR

The period since publication of the previous Statement has seen a number of developments of broad implication. These are outlined below. Developments of a more specific nature are detailed in the section R&D Trends and Developments by Socio-economic Objective.

NEW ADMINISTRATIVE ARRANGEMENTS

Following the Federal election of December 198A, the Department of Industry, Technology and Commerce (DITAC), and the Department of Science (DoS) were established. DITAC was formed by incorporating the Technology Development Division and other elements of the former Department of Science and Technology (DST) with the former Department of Industry and Commerce. Among its new areas, DITAC also took over responsibility for the Australian Industrial Research and Development Incentives Scheme (from DST) and for the Government's Off-sets policy. The Department of Science has retained responsibility for those areas of DST not transferred to DITAC.

OECD REVIEW OF SCIENCE AND TECHNOLOGY POLICY

In 198A, following a request by the Australian Government, the Organisation for Economic Co-operation and Development (OECD) commenced a Review of Australia's Science and Technology Policies. This is the second such Review.

The OECD is regularly requested to examine the science and technology policies of Member nations. These assessments serve dual purposes:

- enabling better national appraisal of the effectiveness of R&D effort and its supporting infrastructure in the achievement of national goals; and

- adding to international knowledge on the operation of science and technology policy as an instrument of government.

A Review meeting of the OECD Committee for Science and Technology Policy was held in April 1985 to discuss the preliminary report of the OECD Examiners with an Australian delegation. Delegates from OECD member countries, the Examiners and the OECD Secretariat also attended. The proceedings of the meeting will be included in the OECD's final report.

NATIONAL TECHNOLOGY STRATEGY

A discussion draft for the National Technology Strategy was released by the Minister for Science and Technology in April 1984. The draft was widely circulated and over 250 written responses were received from a diverse range of business, trade union, government, academic and public interest groups. An extensively revised version, taking account of these submissions, is expected to be released in May 1985. The purpose of the revised discussion draft is to:

- improve understanding of relevant issues and their interdependence
- provide a framework for policy development
- ensure technological objectives are co-ordinated, coherent and can be readily acted on
- establish a basis for consultation and negotiation between industry, unions,
- governments and the educational and research communities on Australia's needs for
- technological development.

Four S&T-oriented objectives are adopted:

- strengthen Australia's scientific and technological capability;

- improve the utilisation of technology in new and existing industries, and promote the development of new technologies;

- ensure the implementation of effective mechanisms for the equitable sharing of the costs and benefits of technological change; and

- integrate S&T policy with other policies and ensure effective national and international co-operation between all government organisations with S&T-related responsibilities.

The revised discussion draft examines each objective in turn and presents a set of policy conclusions and priority actions which together constitute a draft plan for technological development.

COMMISSION FOR THE FUTURE

Terms of reference for the Commission for the Future have been announced and members of the Commission were appointed early in 1985. The Commission's major aim will be to raise community awareness and understanding of the social and economic impacts of technological change. Its terms of reference include:

- promotion of community awareness and understanding of developments in science and technology and their potential impact

- stimulation of discussion and debate on the available options for economic and social policy

- dissemination of information about the implications of such developments - and related social and economic change - for personal choices in education, career, leisure and related matters

The Commission will not be an advisory body for government, but will act rather as a catalyst for community discussion of broad options. It will stimulate public debate by publishing discussion papers, contributing to television and radio programs, preparing newspaper and magazine articles and making itself available for direct contact with groups in the community. In all its work, the Commission will:

- give special attention to the long-term implications for Australians of new or prospective developments in science and technology

- draw public attention to prospective trends, policies and events in Australia and overseas which could have important future consequences.

OTHER DEVELOPMENTS

While their impact is primarily directed to particular sectors there are a number of important developments of significance for overall national growth. These include:

- the intention by the Government to allow 150% deductability for industrial R&D expenditure.

- a review of the effectiveness of the Australian Industrial Research and Development Incentives Scheme.

- a range of initiatives relating to information technology.

These are among those matters discussed in the section R&D Trends and Developments by Socio-economic Objective.

RECENT TRENDS IN COMMONWEALTH FUNDED S&T

Summary

Table 1 and Figures 1 and 2 present broad summaries of the information presented in this section, with references to tables presenting further dissections. The Table refers to the total of the Budget sector (net expenditure) and the Non-Budget sector and thus represents Commonwealth "own finds". Budget sector figures are net of recoveries and comprise expenditures from appropriations specifically identified for R&D, estimated expenditures on R&D from other appropriations, and, in the case of Research Trust Funds, the R&D expenditures from the Trust funds which can be attributed on a pro-rata basis to an appropriation. Commonwealth Non-Budget sector figures represent the R&D funded by Commonwealth bodies from their own funds (other than direct appropriations). These consist mainly of trading revenues of government enterprises, disposals of plant, sales of publications, and residuals of appropriations retained from previous years.

Projected Commonwealth Budget sector expenditure of $941m on R&D for 1984-85 shows an increase of 8% relative to the estimated 1983-84 total of $871m. (Part B of Table 1.)

To discuss trends in expenditure in terms of the levels of activity being supported, the expenditures should ideally be expressed at constant price levels, and adjustments should be made to remove the effects of any expenditure changes which did not influence the level of real activity. This is discussed further in Appendix 3 under the heading "Estimation of trends in real terms". The price indices used to obtain the constant price estimates in Table 1 (broad trends) and Table 9 (socio-economic objective aggregates) are presented in Table 24 of that Appendix. Figure 2 also summarises this constant price information and the same indices are applied to derive the real growth rates in various socio-economic objectives as outlined later in this section. All other expenditures throughout the document are at current prices.

Over the period 1978-79 to 1984-85 the average real growth rate in R&D expenditure funded through the Budget sector is 3% per annum. However if the level of activity being supported is the point of interest rather than the level of expenditure from the public purse, then allowance should be made for a change in the way superannuation for employees of statutory authorities has been funded from 1981-82 onwards. From that year, as a result of changes made to the Superannuation Act in 1976, statutory bodies have paid an employer contribution to the Commonwealth Superannuation Fund and have received increased appropriations for this purpose. When allowance is made for the $36m identified in the 1984-85 Budget for CSIRO and A/EC for the employer contributions to superannuation then the average real growth rate in R&D activity supported through the Budget is estimated to be 2%. It should be noted that these percentage growth figures differ from those presented in the 1983-84 Statement. The changes do not represent any substantial reduction in growth, but are the effect of revised data for the level of R&D carried out in the Department of Defence.

Table 1: Summary of trends in Commonwealth Government support for S&T, 1979-80 to projected 1984-85.

($ million)	R&D						S&T (including R&D)				
	79-80	80-81	81-82	82-83	83-84	Projected 84-85	80-81	81-82	82-83	83-84	Projected 84-85
A. Commonwealth S&T Expenditure* Estimates (adjusted) Compared to Outlays and GDP (S&T ACTIVITY PERSPECTIVE #)											
Identifiable* Commonwealth Government Budget sector funds expended on S&T											
($m current)	520	616	670	795	841	909	1051	1182	1383	1496	1622
% Total Commonwealth outlays (%)	1.66	1.71	1.62	1.64	1.49	1.42	2.91	2.86	2.85	2.64	2.54
% GDP (%)	.446	.462	.445	.480	.449	.442	.790	.785	.836	.798	.789
Identifiable* Commonwealth Government funds expended on S&T (including Non-Budget Sector)											
- excluding Cwlth-owned BE											
($m current)	533	622	678	820	853	930	1059	1192	1415	1512	1648
% GDP (%)	.450	.467	.450	.495	.455	.452	.795	.791	.854	.807	.801
- including Cwlth-owned BE											
($m current)	556	663	722	869	908	987	1179	1334	1563	1664	1815
% GDP (%)	.477	.498	.479	.543	.484	.480	.885	.886	.944	.888	.882
($m constant 84-85 prices)	881	932	884	966	957	987	1659	1630	1737	1752	1815

Fig. 1 Commonwealth Government Funds Expended on R&D by Type of Expenditure

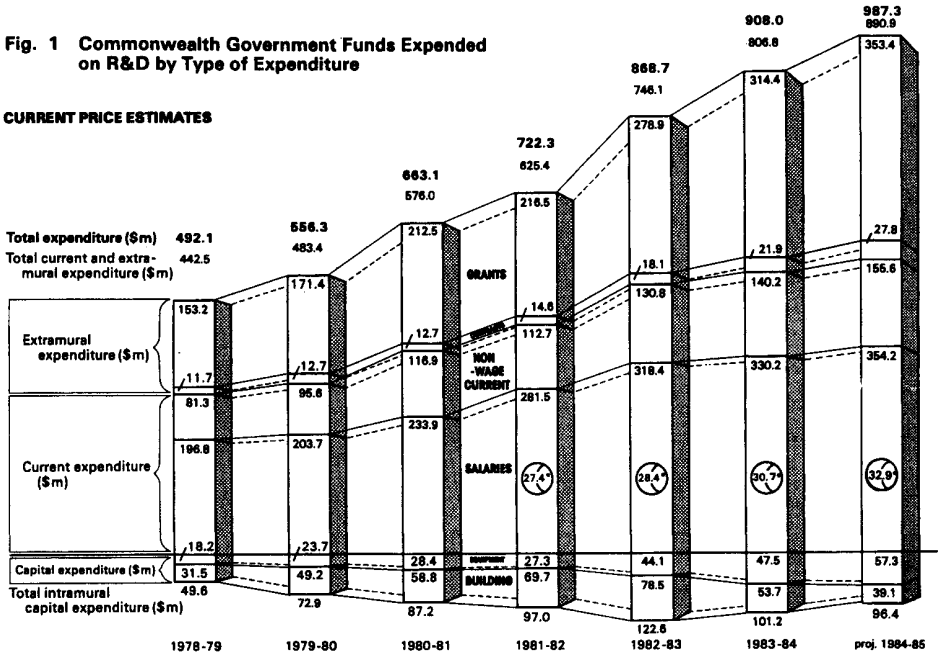
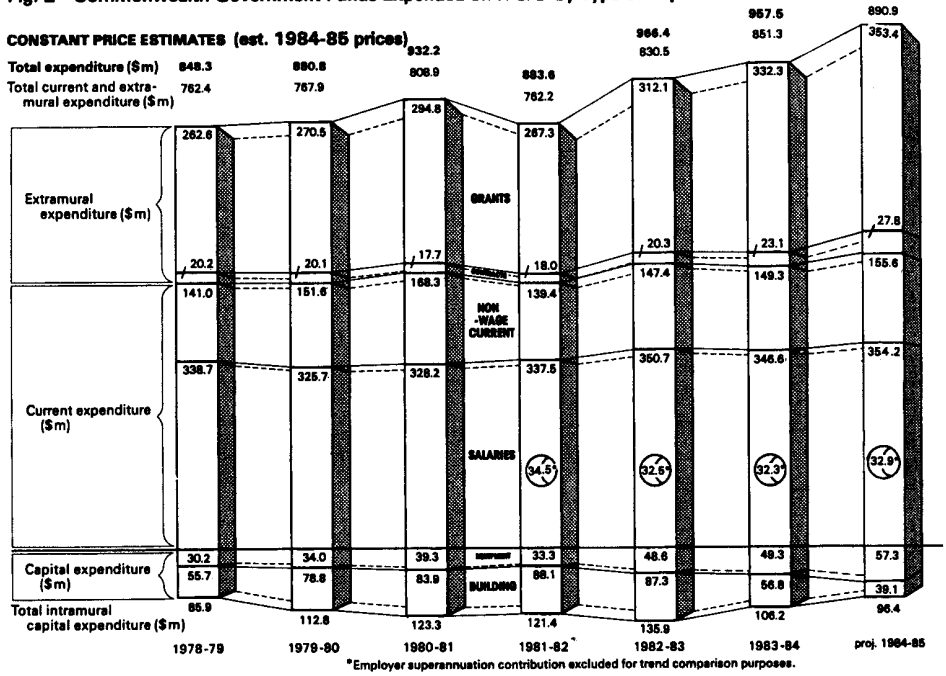


Fig. 2 Commonwealth Government Funds Expended on R & D by Type of Expenditure



*Employer superannuation contribution excluded for trend comparison purposes.

($ million)	R&D						S&T (including R&D)				
	79-80	80-81	81-82	82-83	83-84 Projected	84-85 Projected	80-81	81-82	82-83	83-84 Projected	84-85 Projected
B. Commonwealth Identifiable* S&T Expenditure Estimates Compared to Outlays and GDP (FINANCIAL PERSPECTIVE #)											
Identifiable* Commonwealth Government Budget sector funds expended on S&T											
($m current)	520	616	695	823	871	941	1051	1210	1413	1529	1658
% Total Commonwealth outlays (%)	1.66	1.71	1.68	1.69	1.54	1.47	2.91	2.93	2.91	2.70	2.60
% GDP (%)	.446	.462	.461	.497	.465	.458	.790	.803	.854	.816	.806
Identifiable* Commonwealth Government funds expended on S&T (including Non-Budget Sector)											
($m current)	556	663	749	897	939	1020	1179	1364	1593	1697	1851
% GDP (%)	.477	.498	.497	.542	.501	.496	.885	.905	.963	.906	.900
% Total Commonwealth outlays ($m)	31637	36098	41305	48570	56570	63948					
% GDP ($m)	116617	133142	150683	165499	187405	205700##					

BE Wholly Commonwealth-owned business enterprises.

Note : Table 3 presents a breakdown of intramural expenditure by ministry and agency with major R&D performance. Table 4 presents a similar breakdown of extramural payments by ministry and major granting program. Tables 5 and 6 show the amounts of extramural payments (grants in Table 5 and contracts in Table 6) going to particular sectors.

* The data shown do not contain estimates for the research components of higher education sector teaching-and-research expenditures - see page 86.

\# The principal perspective of the Science and Technology Statement is on trends in Commonwealth support for S&T activity. Thus, an adjustment is made in Table 1.A for changed superannuation arrangements involving increased expenditure by some major agencies, without any corresponding change in function or level of activity. The same adjustment is made elsewhere in the Statement, except in the body of those tables where the adjustment is made explicitly to the total. Those whose major concern is expenditure per se will find Table 1.B, where no adjustment is made, more appropriate for most purposes.

\## DOS estimate, April 1985.

S&T Expenditure by Ministry

Table 2 is a presentation of aggregate Commonwealth funds expended on S&T by ministry. The division between Budget and Non-budget sectors mainly serves to indicate where S&T activities are supported by Parliamentary appropriation and where they are supported by the trading revenues of government business enterprises. Further dissections of S&T expenditure by ministry are provided in Tables 3 and 4.

The main trends evident in data presented by ministry in Table 2 may be compared with trends in aggregate expenditures directed towards particular socio-economic objective categories as used in the Project SCORE R&D survey. The distribution of Budget sector funds by Budget function is also of interest in this context. Although a number of category titles in the socio-economic objective classification are the same as category titles in the Budget function classification, entries in these categories will in general differ because the R&D activities of some organisations contribute to socio-economic objectives other than the Budget function to which they are classified. Further explanation is given in Appendix 3.

Table 2: Estimated Commonwealth Government funds expended on S&T by ministry with prime responsibility for planning the expenditure*

($ million)	R&D					S&T (including R&D)			
				Projected					Projected
	80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
A. Commonwealth Budget sector net expenditure									
Aboriginal Affairs	0.92	0.62	0.53	0.45	0.47	2.75	3.00	3.39	3.34
Arts, Heritage and Environment	4.07	4.88	6.69	5.54	6.43	21.84	24.89	27.963	28.90
Attorney -General's	2.20	2.82	3.46	4.08	5.60	3.85	4.48	5.24	7.41
Aviation	1.30	1.35	1.05	1.29	1.38	17.62	24.33	23.03	23.10
Communications	0.30	0.52	0.36	0.35	0.36	1.04	1.21	1.99	1.82
Community Services	0.69	0.96	1.08	0.82	1.47	2.01	1.61	1.99	2.81
Defence	98.06	103.39	114.43	121.21	131.24	165.41	211.25	227.64	243.05
Education & Y.A.	88.3	98.4	115.2	124.5	141.8	101.0	117.8	128.0	145.9
Employment and Ind. Relations	0.82	1.71	0.75	1.18	1.78	2.43	1.81	2.14	4.23
Foreign Affairs**	15.27	20.06	30.38	32.57	37.95	108.85	151.65	177.06	188.46
Health	29.04	38.25	46.21	56.18	66.41	58.80	70.15	83.09	96.33
Housing & Construction	2.66	1.96	2.10	2.31	2.31	3.79	3.93	7.93	6.29
Immigration & Ethnic Affairs	0.53	0.38	0.43	0.18	0.31	3.13	3.70	4.74	4.18
Industry Technology & Commerce	49.48	26.86	53.22	64.83	62.47	39.74	66.94	87.56	90.92
Local Government & Admin. Services	0.03	0.04	0.05	0.02	0.03	16.12	16.22	17.67	19.43
Primary Industry	18.44	18.54	20.77	24.17	31.51	31.67	37.17	41.59	55.78
P.M. & Cabinet	0.06	0.07	0.08	0.15	0.10	1.40	1.53	2.20	2.30
Resources & Energy	37.79	50.80	48.21	54.40	68.67	97.48	91.87	98.76	117.86
Science	258.88	315.85	367.39	368.59	371.61	399.22	459.00	463.35	471.53
Social Security	0.41	0.55	0.59	0.68	0.68	0.55	0.68	0.77	0.77
Special Ministry	0.19	0.22	0.51	0.41	0.43	0.44	1.20	0.93	0.59
Territories	0.28	0.32	0.37	0.50	0.52	3.86	4.17	5.90	7.14
Transport	2.89	1.86	2.25	2.28	2.65	5.68	6.92	6.59	8.43
Treasury	2.64	3.99	6.16	4.39	5.44	114.05	97.76	98.50	115.10
Veterans' Affairs	0.27	0.32	0.40	0.37	0.44	7.72	9.84	11.20	12.30
Total (Budget sector)	615.5	694.6	822.7	871.2	941.3	1210.4	1413.0	1529.2	1658.0
Adjusted Budget Total#	615.5	667.7	794.6	840.9	908.9	1182.0	1382.9	1495.9	1622.5
B. Commonwealth Non-Budget sector, BE excluded									
Aboriginal Affairs	0.21	-	-	-		0.21	0.17	0.21	0.20
Arts, Heritage and Environment	-	-	-	-		0.01	0.03	..	-
Attorney General's	0.01	0.03	0.09	0.07	0.05	0.06	0.11	0.13	0.07
Education & Y.A.	0.28	0.17	0.06	0.04	0.05	0.39	0.84	0.35	0.43
Health	-	-	-	-	0.12	-	-	-	0.12

($ million)	R&D					S&T (including R&D)			
				Projected					Projected
	80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Housing & Construction	0.07	0.05	0.06	0.02	0.14	0.05	0.07	0.02	0.14
Immigration & Ethnic Affairs	..	0.01	0.02	-	-	0.02	0.04	0.02	0.05
Local Government & Admin. Services	0.05	0.05	0.12	0.05	0.05	0.06	0.15	0.07	0.06
Primary Industry	-	-	-	-	-	-	-	-	0.20
Resources & Energy	-	-	11.69	1.08		-	16.28	3.51	2.43
Science	5.97	9.92	13.52	11.30	21.62	10.58	14.40	11.71	22.16
Territories	0.04	0.03	0.01	0.04	0.07	0.16	0.17	0.22	0.27
Total (Non-Budget, ex-BE)	6.61	10.25	25.58	12.60	22.09	11.52	32.24	16.24	26.12
Adjusted Total#	6.61	9.81	25.17	12.19	21.63	11.06	31.81	15.81	25.63
Total (Direct Commonwealth Funding, ex-BE)	622.1	704.9	848.3	883.8	963.4	1237.9	1464.3	1565.3	1708.9
Adjusted Total#, non-BE	622.1	677.5	819.8	853.1	930.5	1192.5	1414.7	1511.7	1648.1
C. Commonwealth Non-Budget sector, BE only									
Communications	37.3	39.7	44.1	44.2	47.9	82.4	90.4	96.1	112.0
Health	2.08	2.43	2.70	3.46	3.63	2.69	3.06	3.82	4.12
Housing & Construction	0.01	-	-	-		54.20	52.07	44.23	45.00
Treasury (Financial) Enterprise sector)	1.63	2.48	2.09	7.13	5.25	2.61	2.33	9.89	6.28
Total (BE only)	41.0	44.6	48.9	54.8	56.8	141.9	147.9	152.0	167.4
Total (All Non-Budget)	47.6	54.8	74.4	67.4	78.9	153.4	180.1	168.2	193.5
Adjusted Non-Budget Total*	47.6	54.4	74.0	67.0	78.4	153.0	179.7	167.8	193.0
Total (All direct Commonwealth funding)	663.1	749.5	897.1	938.6	1020.2	1379.8	1612.2	1717.3	1876.3
ADJUSTED TOTAL#	663.1	722.1	868.6	907.9	987.3	1334.4	1562.6	1663.7	1815.5

* See Tables 3 and 4 for more detailed dissections of expenditure by ministry.

** This Statement incorporates estimates for the S&T component of Australia's development assistance program (see pages 91 to 94).

\# An adjustment is made for changed superannuation arrangements involving increased expenditure by some major agencies, without any corresponding change in functions or level of activity. Those whose major concern is expenditure per se, rather than trends in Commonwealth support for S&T activity, should use the non-adjusted totals.

Overview of Major R&D agencies and granting programs

Tables 3 and 4 (which combine the Budget and Non-Budget sectors) show intramural S&T expenditure within Commonwealth bodies (Table 3), with the larger agencies separately identified, and extramural payments (Table 4) with major R&D granting programs shown.

Table 3: Intramural Commonwealth Government expenditure on S&T by ministry, showing agencies with major R&D performance

($ million)	R&D					S&T (including R&D)			
				Projected				Projected	
	80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Aboriginal Affairs	0.57	-	-	-		2.06	2.24	2.50	2.47
Arts, Heritage and Environment									
. Supervising Scientist	3.04	3.71	5.67	4.26	4.73	3.71	5.67	4.26	4.73
. Other	0.08	0.15	0.22	0.25	0.25	16.27	16.99	10.03	19.79
Attorney-General's	1.87	2.51	3.19	4.00	5.33	3.57	4.22	5.20	7.02
Aviation	1.06	0.98	0.73	0.80	0.80	4.09	7.96	6.97	7.01
Communications									
. Telecom	34.8	37.1	40.8	39.4	42.1	73.6	80.2	81.0	92.0
. Other	1.82	1.77	2.05	3.27	3.56	3.30	4.43	6.64	6.74
Community Services	0.54	0.72	0.61	0.68	0.79	1.21	0.87	0.86	1.09
Defence	98.06	103.30	114.43	121.21	131.24	165.41	211.25	227.64	251.05
Education	1.02	0.81	0.48	0.59	0.65	2.20	1.14	1.37	1.66
Employment & Ind. Relations	0.78	1.60	0.69	0.79	0.88	2.10	1.48	1.54	2.84
Foreign Affairs	-	-	-	-	-	1.99	2.72	3.58	4.43

($ million)	R&D					S&T (including R&D)			
				Projected					Projected
	80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Health									
. Aust. Radiatio n Lab.	1.78	2.11	2.78	2.41	2.65	3.16	4.03	4.02	4.42
. Inst. of Health	2.19	2.06	2.37	2.62	3.29	3.02	3.47	3.84	4.77
. Comm. Serum Lab.	3.22	3.87	5.00	5.50	6.33	4.51	5.79	6.37	6.91
. National Biol. Standards Lab.	2.29	2.27	2.69	3.14	3.62	4.91	5.53	6.50	7.36
. Other	2.27	1.86	2.31	3.51	2.85	15.82	19.33	22.26	24.00
Housing & Construction	2.32	1.88	2.01	2.01	2.17	56.71	54.11	52.06	51.14
Immigration & Ethnic Affairs	0.16	0.12	0.20	0.38	0.09	2.42	3.09	3.94	3.25
Industry Technology & Commerce	1.29	1.72	1.63	2.01	2.28	9.88	7.58	10.35	12.58
Local Government and Administrative Services	0.07	0.08	0.17	0.08	0.07	16.18	16.36	17.74	14.49
Primary Industry	1.26	1.56	1.79	2.13	2.22	11.90	12.08	13.09	15.47
P.M. & Cabinet	-	-	-	0.01	0.01	1.19	1.34	1.91	2.06
Resources & Energy									
. AAEC	19.99	23.00	26.93	21.43	25.31	37.39	39.24	34.58	40.26
. BMR	9.54	13.63	16.56	16.29	25.02	19.59	21.90	21.81	31.72
. Other	0.02	0.53	0.55	0.56	0.68	12.65	14.97	13.44	14.77
Science									
. AATB (Australian funds only)	1.64	1.63	1.82	1.73	1.63	1.63	1.82	1.73	1.63
. Antarctic Div.	12.39	12.08	17.45	18.61	21.01	21.91	32.03	35.21	36.66
. AIMS	5.22	5.72	6.38	6.90	7.35	5.72	6.39	6.90	7.35
. CSIRO	224.03	258.50	303.33	295.43	298.33	272.10	314.04	311.54	311.37
. Other	1.47	1.76	2.76	2.79	3.09	56.96	64.03	59.41	66.59
Social Security	-	-	-	-	-	-	0.09	0.09	0.09
Special Ministry	-	0.03	0.41	0.28	0.28	0.12	0.97	0.60	0.33
Territories	0.30	0.34	0.36	0.51	0.57	3.92	4.21	5.81	7.15
Transport	0.11	0.07	0.19	0.45	0.59	3.16	3.84	3.82	5.14
Treasury									
. ABS	2.55	3.89	6.08	4.33	5.37	113.87	97.44	98.44	115.02
. Other	0.33	0.41	0.26	4.48	2.29	0.63	0.60	5.23	3.32
Veterans' Affairs	0.27	0.32	0.40	0.37	0.44	7.72	9.84	11.20	12.30
Total (Direct Commonwealth funding of intramural expenditure)	438.0	490.9	511.7	571.5	606.0	947.7	1063.1	1089.2	1174.2

NOTE: The table does not purport to show the total amount of expenditure for the agencies identified. Funds sourced to other than Budget and Non-Budget sectors are excluded (see Ministry tables), as are R&D contracted out and grant payments (see Table 4).

Table 4: Extramural Commonwealth Government expenditure on S&T by ministry, showing major extramural R&D funding programs

($ million)	R&D					S&T (including R&D)			
				Projected				Projected	
	80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Aboriginal Affairs	0.56	0.62	0.53	0.45	0.47	0.91	0.92	1.10	1.07
Arts, Heritage and Environment	0.94	1.02	0.80	1.04	1.44	1.86	2.26	3.67	4.38
Attorney-General's	0.34	0.34	0.36	0.16	0.33	0.34	0.36	0.17	0.46
Aviation	0.24	0.36	0.33	0.49	0.59	13.53	16.38	16.06	16.10
Communications	0.94	1.33	1.58	1.84	2.64	6.54	6.98	10.40	15.10
Community Services	0.15	0.24	0.46	0.14	0.68	0.80	0.73	1.14	1.72
Defence	0.40	0.74	1.05	0.91	1.09	17.38	19.40	22.35	21.63
Education									
. Post-grad, awards	7.76	8.54	11.17	14.60	15.94	9.58	12.57	16.48	18.00
. Special Research Grants	77.0	85.0	96.0	102.0	116.0	85.0	96.0	102.0	116.0
. Other	2.84	4.14	7.63	7.33	9.21	4.57	8.88	8.50	10.68
Employment & I.R.	0.03	0.11	0.06	0.39	0.90	0.33	0.33	0.61	1.39
Foreign Affairs									
. ACIAR	-	-	0.96	4.75	7.15	-	1.11	7.00	10.50
. ADAB	14.88	19.85	29.04	27.44	29.69	105.99	146.69	165.30	172.30
. Other	0.38	0.21	0.38	0.38	0.41	1.87	1.13	1.18	1.23
Health									
. NH&MRC	18.70	25.65	29.56	37.98	44.30	25.65	29.56	37.98	44.30
. Other	0.67	2.86	4.20	4.48	7.22	4.42	5.49	5.61	8.80
Housing & Construction	0.42	0.14	0.15	0.12	0.29	1.33	1.95	0.12	0.29
Immigration & E.A.	0.37	0.27	0.25	0.14	0.22	0.73	0.65	0.82	0.98
Industry Technology & Commerce	2.47	3.39	3.72	5.01	4.14	8.12	1128	19.40	22.28
. AIRDIB	45.71	21.75	47.87	57.81	56.05	21.75	47.87	57.81	56.05
Local Government and Admin Services	0.02	0.02	0.08	0.03	0.02	1.44	1.57	1.95	2.12
Primary Industry									
. Rural Research	14.67	16.27	18.02	20.68	25.11	18.23	21.97	24.27	29.27
. Other	2.52	0.72	0.96	1.36	4.19	1.54	3.13	4.23	11.24
P.M. & Cabinet	0.06	0.07	0.08	0.13	0.09	0.21	0.19	0.29	0.24
Resources & Energy									
. Energy R,D&D grants	6.35	9.27	11.69	11.72	13.47	10.41	13.87	16.29	15.99
. Other	1.88	2.21	2.01	1.21	1.77	14.01	14.42	12.05	12.95
Science									
. AMSTAC-FAP	2.00	1.90	2.13	2.05	3.71	1.90	2.13	2.05	3.71
. ARGC	15.20	16.99	18.74	21.24	22.75	16.99	18.74	21.44	22.94
. Other	2.90	2.43	2.48	3.09	5.46	6.53	7.40	7.18	12.05
Social Security	0.41	0.55	0.59	0.68	0.68	0.55	0.59	0.68	0.68
Special Ministry	0.19	0.19	0.11	0.13	0.16	0.32	0.23	0.33	0.27
Territories	0.02	0.01	0.02	0.02	0.02	0.09	0.14	0.31	0.26
Transport	2.77	1.79	2.07	1.83	2.07	2.52	3.08	2.76	3.29

($ million)	R&D					S&T (including R&D)			
				Projected				Projected	
	80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Treasury . Reserve Bank grants	1.39	2.16	1.94	2.71	3.03	2.17	1.94	2.72	3.03
Total (Direct Commonwealth funding of extramural expenditure)	225.2	231.1	297.0	336.3	381.3	386.6	500.1	574.6	641.3

Destination of extramural R&D funds

Extramural expenditure consists of grants and contracts. These categories are defined in Appendix 3. Table 5 is a summary of the amounts of Commonwealth grants for S&T purposes by sector of recipient. Table 6 is a similar summary of contracts. More detailed data by ministry is given in Appendix 1, tables 18 to 21.

Table 5: Commonwealth S&T grants by recipient sector, 1979-80 to projected 1984-85

($ million)		R&D						S&T (including R&D)				
							Projected					Projected
		79-80	80-81	81-82	82-83	83-84	84-85	80-81	81-82	82-83	83-84	84-85
Private Enterprise	N	31.81	48.36	26.53	54.62	67.66	67.08	52.52	30.83	59.94	72.51	72.13
	S	31.89	48.43	26.55	54.64	67.73	67.35	52.59	30.85	59.95	72.59	72.40
	N+S	31.89	48.43	26.55	54.64	67.73	67.35	52.59	30.85	59.95	72.59	72.40
Higher Education	N	73.6	87.4	98.67	116.2	129.2	151.5	95.3	108.1	129.7	149.8	176.7
	S	25.3	27.3	37.8	37.6	39.2	43.1	36.5	43.4	50.7	50.5	54.7
	N+S	98.9	114.7	131.4	153.8	168.4	194.5	131.8	151.6	180.4	200.4	231.5
Other Bodies	N	32.94	40.63	49.74	60.87	67.44	78.73	70.18	79.07	102.18	108.84	122.99
	S	7.73	8.78	8.80	9.57	10.82	11.93	16.50	21.41	27.02	23.87	24.81
	N+S	40.67	49.41	58.54	70.43	78.26	90.65	86.68	100.48	129.20	132.71	147.81
Total (Direct Commonwealth funding all contracts)		171.4	212.5	216.5	278.9	314.4	352.5	271.0	282.9	3695.5	405.7	451.7

N Natural sciences and engineering
S Social sciences and humanities
N+S Total natural sciences and engineering, social sciences and humanities

Table 6: Commonwealth S&T contracts by recipient sector, 1979-80 to projected 1984-85

($ million)		R&D						S&T (including R&D)				
							Projected					Projected
		79-80	80-81	81-82	82-83	83-84	84-85	80-81	81-82	82-83	83-84	84-85
Private Enterprise	N	0.77	0.93	1.71	2.36	1.73	2.39	35.41	49.24	58.47	94.73	104.29
	S	0.27	0.43	0.67	0.56	0.49	0.95	1.46	2.16	3.70	4.14	5.40
	N+S	1.04	1.36	2.38	2.91	2.22	3.34	36.88	51.40	62.17	98.88	117.69
Commonwealth agencies	N	3.95	3.92	3.48	3.95	5.49	9.68	18.99	19.87	30.32	27.09	35.04
	S	0.15	0.03	0.06	0.08	0.46	0.77	0.12	0.28	0.52	1.11	1.34
	N+S	4.10	3.95	3.54	4.04	5.95	10.44	19.10	20.15	30.85	28.20	36.38
Higher Education	N	2.03	2.67	4.79	6.46	8.01	9.24	4.64	7.15	9.59	14.99	16.58
	S	0.67	1.03	0.72	0.89	0.80	0.85	1.61	1.79	2.55	2.58	2.32
	N+S	2.69	3.70	5.52	7.34	8.76	10.09	6.24	8.94	12.14	17.57	18.90
Other Bodies	N	4.57	3.33	2.75	3.26	4.39	2.67	25.61	22.59	24.14	22.70	21.02
	S	0.29	0.33	0.46	0.56	0.58	1.21	0.66	0.63	1.30	1.48	2.36
	N+S	4.87	3.66	3.20	3.82	4.96	3.88	26.27	23.21	25.44	24.19	23.38
Total (Direct Commonwealth funding all contracts)		12.70	12.68	14.64	18.11	21.90	27.76	88.49	103.70	130.60	168.84	188.36

N Natural sciences and engineering
S Social sciences and humanities
N+S Total natural sciences and engineering, social sciences and humanities

Commonwealth Contribution to Gross Domestic Expenditure on R&D (GERD)

Table 7, based on the Project SCORE surveys of R&D performers in all sectors, shows the contribution of each sector to funding GERD. The SCORE surveys have shown that Commonwealth Government support for R&D activities rose substantially between 1968-69 and 1973-74 and again rose in real terms between 1973-74 and 1976-77; and between 1976-77 and 1978-79. The sharp initial rise was due primarily to changed administrative arrangements between the Commonwealth and States for funding higher education. The 1981-82 survey results (when adjusted to remove certain expenditure for that year which did not correspond to an increased level of activity) show the level of Commonwealth support remaining at approximately the same level as in 1978-79. When the general government sector as a whole is considered (i.e., Commonwealth plus States), the picture is similar to that presented by Commonwealth funding alone. For funding of R&D by the States alone, the 1981-82 survey indicates a small decrease in real terms. Table 10 (in a subsequent section) which shows some Australian trends as % GDP, rather than % GERD, shows a more accentuated decrease.

In contrast to the relative stability of support by government, private enterprise funding of R&D fell sharply between 1973-74 and 1976-77. This reduced the private enterprise share of funding of the gross domestic expenditure on R&D (GERD) from 28% to 17%, and correspondingly increased the Commonwealth Government share from 58% to 66%. These shares have remained at about the same levels since that time.

Table 7: Commonwealth Government and other sector funding contributions to Australia's gross domestic expenditure on R&D (GERD): 1968-69 to 1981-82

	1968-69	1973-74	1976-77	1978-79	1981-82
			($m)		
Commonwealth Government					
- General Government	n.a.	n.a.	541	666	938#
- Public Enterprise	n.a.	n.a.	38	29	39
Sub- total	173	333 **	579	695	977#
State Government					
- General Government	n.a.	n.a.	111	140	179
- Public Enterprise*	n.a.	n.a.	6	8	16
Sub- total	61	67 **	117	148	194
Private Enterprise	116	186	152	180	265
Other Australian	9	7	10	18	32
Overseas	10	11	14	13	16
Total (GERD)	368	655	873	1054	1485#
Commonwealth Government funding as % GERD	(%) 47	58 **	66	66	66
State Government funding as % GERD	(%) 17	10 **	13	14	13
Private Enterprise funding as % GERD	(%) 32	28	17	17	18

Note: Table 7 is based on Project SCORE and includes the imputed research component of higher education teaching-and-research expenditures. All other tables exclude this imputed component - see page 86. For consistency with later practice some other adjustments have been made to figures for the first three surveys.

\# A downward adjustment of $37m has been made to allow valid trend comparisons on the level of support for R&D activities. The adjustment allows for changed superannuation arrangements ($27m) and an additional pay period in 1981-82 ($10m) for Commonwealth bodies.

* The attribution of public business enterprise funding between Commonwealth owned and State owned enterprises is based on estimates by the Department of Science.

** Much of the large rise between 1968-69 and 1973-74 is due to changed funding arrangements for universities. For the same reason, the rise in State funding between 1968-69 and 1973-74 is minimal.

Sources: Figures are based on:

- Project SCORE 1968-69, 1973-74, 1976-77, 1978-79
- Research and Experimental Development - All sector Summary, Australia 1981-82, ABS Catalogue No. 8112.0 (3 April 1984).
- Research and Experimental Development - General Government Organisations, Australia, 1981-82, ABS Catalogue No. 8109.0 (27 January 1984).
- Research and Experimental Development, Business Enterprises, Australia 1981-82, ASS Catalogue No. 8104.0 (1 March 1984).
- Research and Experimental Development, Higher Education Organisations, Australia, 1981, ABS Catalogue No. 8111.0 (6 October 1983).
- Quarterly Estimates of National Income and Expenditure, Australia - September Quarter, 1984, ABS Catalogue No. 5206.0 (4 December 1984).

R&D TRENDS AND DEVELOPMENTS BY SOCIO-ECONOMIC OBJECTIVE

Presentation of Trends

The discussion of trends is subject to a number of problems and associated choices. The period of time over which the trend is taken is obviously a major determinant of any percentage increase/decrease which may be derived. Then, should one estimate the trend overall simply by looking at the expenditure level at the beginning and end of the period, or should some smoothing procedure be utilised so that all the data are used? Further, are there some expenditure components which may perhaps confuse rather than enlighten?

There is no generally accepted procedure for dealing with these issues. Usually, the problems are avoided either by avoiding discussion of trends completely, or by presenting year-on-year percentage changes.

In this section we have adopted the following approach. Both long- and short-term trends are given. These are derived using a consistent smoothing technique so that all data are utilised. In addition, Because of the "lumpiness" introduced into expenditure time series by large capital expenditures for major facilities, the data are presented with and without capital items, fill trends shown are on an annual average basis.

Recent Developments

Under most objective headings there is a presentation of relevant items which have come to notice. Sometimes these are highlights of research completed over the past year; sometimes they are developments of other kinds (policy initiatives, problems etc.) which have had, or which are likely to have implications for research directed towards the particular objective.

Summary Data

Table 8, which combines the Budget and Non-budget sectors, shows Commonwealth R&O expenditures at current prices directed towards the various socio-economic objective categories. Table 9 presents the same data as Table 8, but in real terms (constant 84-85 dollars).

Table 8: Total Commonwealth Government expenditure on R&D by socio-economic objective*
Current Prices

Objective Category	1978-79	1979-80	1980-81	1981-82 ($m)	1982-83	1983-84	Projected 84-85
National security							
. Defence	79.18	85.42	98.06	103.39	114.43	121.21	131.24
Economic development							
. Agriculture	64.39	86.65	103.46	114.16	122.43	107.15	110.76
. Other primary industries	11.27	13.20	13.38	15.86	18.28	24.59	20.20
. Mining	14.38	12.39	16.08	21.25	19.02	20.76	22.08
. Manufacturing	62.27	72.97	95.56	80.78	110.97	110.34	112.70
. Construction	7.45	7.12	7.03	7.05	7.69	7.58	8.42
. Energy	26.56	31.16	38.97	48.86	64.08	62.74	73.61
. Transport	4.88	5.05	4.67	3.53	3.55	2.24	2.74
. Communications	27.67	28.58	37.65	40.30	44.55	44.64	48.41
. Economic services nei	11.68	13.49	15.78	18.02	18.72	22.52	23.11
Sub-total	230.5	270.6	332.6	349.8	409.3	402.6	422.0
Community welfare							
. Urban & regional planning	1.31	1.60	1.27	1.60	2.75	2.38	2.59
. Environment*	14.75	18.17	18.80	22.81	33.99	29.39	30.66
. Health	26.54	30.02	35.42	44.61	54.97	65.82	76.64
. Education#	3.57	3.10	3.94	3.70	2.37	2.98	4.43
. Welfare	1.05	1.69	2.51	3.53	4.24	3.14	3.96
. Community services nei							
- Overseas development assistance	12.40	12.47	15.37	20.16	30.38	33.85	37.25
- Other community services	2.50	2.64	3.25	3.77	4.74	4.57	7.54
Sub- total	62.12	69.69	80.45	100.07	133.45	142.12	163.07
Advancement of knowledge							
. Earth, ocean & atmosphere	19.10	19.29	27.82	31.83	41.74	46.88	47.42
. General advancement of knowledge	101.20	111.28	124.23	137.22	169.83	193.92	222.47
Sub-total	120.3	130.6	152.3	169.0	211.6	240.8	269.9
Total	492.1	556.3	663.1	722.3	868.7	906.7	986.2

* See Part B of Appendix 1 for more detailed dissections of expenditure by socio-economic objective. See Table 11 for international comparisons of R&D expenditure by OECD objective category. See Table 9 for constant price estimates.

R&D funded by the Minister for Education for the purpose of producing qualified researchers or for supporting normal academic activities has been included in "General advancement of knowledge". Only research mainly directed towards education processes or education administration has been included in the "Education" objective.

DEFENCE ($131.2m projected for 1984-85)

Major Programs

All R&D under this heading is the responsibility of the Department of Defence.

Growth Trends

- Long-term trend (1978-79 to projected 1984-85): -1.2% (-2.9%, excluding capital items)
- Short-term trend (1982-83 to projected 1984-85): +1.8% (-0.7%, excluding capital items)

Recent Developments

Achievements in high-technology application to defence industry, both private and government-owned, continued during 1984. These included:

- the development of a laser target designator-ranger for use by the US Navy and RAAF in the F/A18 aircraft (Fairey Australia Pty Ltd in joint venture with Ferranti plc, Scotland);
- involvement of private industry in the future production of an active decoy to neutralise sea-skimming missiles, WINNIN, developed by the Weapons Systems Research Laboratory at Salisbury (SA) and the Government Aircraft Factory in Melbourne;
- a contract, to a value of about $44m was awarded to Plessey Pacific Defence Systems Pty Ltd, for the first phase of the new $150m Defence Integrated Secure Communication Network (DISCON).
- after ten years of research effort by the Defence Science and Technology Organization, at a cost of $31m, the Jindalee over-the-horizon radar (OTHR) system is completing experimental testing.
- high technology projects which have begun over the past year included:
    - the construction of the FFG guided-missile frigates for the RAN, at a cost of $830m, began early in 1984 at Melbourne's Williamson Dockyard, which is being re-equipped for the task,
    - modernization of three RAN DDG guided missile destroyers, at Garden Island Dockyard (Sydney), at a cost of $350m,
    - development of the Wamira A.10 basic trainer, for which the RAAF has a requirement of 69, with a potential overseas market,
    - assembling and testing of 75 F/A-18 tactical fighters for the RAAF at the Government Aircraft Factory in Avalon.

AGRICULTURE ($110.6m projected for 1984-85)

Major programs

CSIRO accounts for about 75% of R&D expenditure under this heading with the Rural Research Trust Finds administered by the Department of Primary Industry accounting for most of the balance (wool, 9%; meat, 5%; wheat, 4%; and others, 4%).

Growth trends

- long-term trend (1978-79 to projected 198A-85): -1.8% (+2.4%, excluding capital items)
- short-term trend (1982-83 to projected 1984-85): -10.0% (+10.9%, excluding capital items)

Recent developments

. Animal Production

Significant developments by CSIRO include:

- The Australian National Animal Health Laboratory (ANAHL), a microbiologically secure laboratory built to assist the disease control authorities of the States and the Commonwealth in the diagnosis and control of any exotic disease outbreak in Australian livestock, was officially opened on 1 April 1985.
- The Division of Animal Production has prepared a computerised data base, the Australian Feeds Information Centre (AFIC), for public use. AFIC provides details of the nutritional quality of feeds for all types of livestock. It incorporates general nutritional information from the Division and the State Departments of Agriculture. AFIC is part of the International Network of Feed Information Centres.
- The long term poultry breeding program of the Division of Animal Production has culminated in the release to industry of a new strain, the SIRO-CT layer, with an increased rate of egg production. It was developed from a cross between an Australorp strain specially selected for high egg production and a commercial White Leghorn strain.

. Plant Production

The application of conventional plant breeding techniques by CSIRO scientists continues to provide improved pasture and crop varieties for Australian agriculture. Recent releases include four tropical pasture varieties by the Division of Tropical Crops and Pastures, and a linseed variety and cotton variety by the Division of Plant Industry, The Division of Plant Industry has also made available twenty advanced breeders lines of drought tolerant wheat to State Departments of Agriculture for field testing.

. Soil Conservation

The National Soil Conservation Program was officially launched in February 1984. The allocation for 1984-85 was $4m. It aims to catalyse increased soil conservation activity by the many disciplines and sectors involved in land management. One hundred and eight projects have been approved for 1984-85 throughout Australia.

. Other Developments

Other significant developments include:

- a Review by the Australian Bureau of Animal Health of national action plans in the event of outbreaks of exotic pig diseases, especially African swine fever, foot and mouth disease, vesicular exantheme and Anjeszky's disease; and
- publication of the 'Compendium of Rural Research and Development' by the Department of Primary Industry.

Table 9: Total Commonwealth Government expenditure on R&D by socio-economic objective*
Constant (1984-85) Prices

Objective Category	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	Projected 84-85
				($m)			
National security							
. Defence	137.37	135.68	138.54	125.05	126.69	127.53	131.24
Economic development							
. Agriculture	109.24	136.80	144.55	139.06	133.75	111.43	110.76
. Other primary industries	19.44	20.91	18.92	19.32	20.31	25.96	20.20
. Mining	24.82	19.64	22.68	25.79	21.07	21.84	22.08
. Manufacturing	110.48	117.53	136.37	99.31	124.41	116.50	112.70
. Construction	12.85	11.26	9.87	8.51	8.51	7.95	8.42
. Energy	46.01	49.34	55.22	59.69	71.25	64.71	73.61
. Transport	8.33	7.88	6.47	4.34	3.97	3.84	2.74
. Communications	47.64	45.22	53.30	49.11	49.50	47.04	48.4
. Economic services nei	20.13	21.34	22.29	21.86	20.73	23.68	23.11
Sub-total	398.9	429.9	469.7	427.0	453.5	423.0	422.0
Community welfare							
. Urban & regional planning	2.27	2.54	1.79	1.94	3.05	2.50	2.59
. Environment*	25.44	28.74	26.60	27.78	37.71	30.96	30.66
. Health	45.58	47.42	49.42	54.86	61.52	69.83	76.64
. Education#	6.00	4.82	5.39	4.50	2.65	3.09	4.43
. Welfare	1.83	2.68	3.51	4.30	4.70	3.31	3.96
. Community services nei							
- Overseas development assistance	21.46	19.58	21.41	25.09	34.37	34.50	37.25
- Other community services	4.10	4.18	4.58	4.57	5.27	6.16	7.54
Sub- total	106.681	109.95	112.69	230.02	149.27	150.35	163.07
Advancement of knowledge							
. Earth, ocean & atmosphere	32.85	30.51	39.25	38.83	46.43	49.56	47.42
. General advancement of knowledge	172.47	174.70	172.01	169.75	190.49	205.02	222.47
Sub-total	205.3	205.2	211.3	208.6	236.9	254.6	269.9
Total	848.3	880.8	932.2	883.6	966.4	957.5	986.2

* See Table 11 for international comparisons of R&D expenditure by OECD objective category. See Table 24 and comments (Appendix 3) for explanation of the constant price estimates.

R&D funded by the Minister for Education for the purpose of producing qualified researchers or for supporting normal academic activities has been included in "General advancement of knowledge". Only research mainly directed towards education processes or education administration has been included in the "Education" objective.

OTHER PRIMARY INDUSTRIES ($20.2m projected for 1984-85)

Major programs

About 90% of R&D here is accounted for by CSIRO. Programs administered by the Department of Primary Industry account for the balance.

Growth trends

- long-term trend (1978-79 to projected 1984-85): +2.2% (+1.0%, excluding capital items)
- short-term trend (1982-83 to projected 1984-85): -0.6% (+4.0%, excluding capital items)

Recent developments

. Fisheries

The new CSIRO Marine Laboratories in Hobart, which provide headquarters for the Divisions of Fisheries Research and related elements of CSIRO, were officially opened in May 1985.

. Forestry

Following completion of the field work for Project Aquarius – CSIRO's study of bushfire behaviour and the use of fire retardant and water dropping to control fires - the Organization announced the formation of the National Bushfire Research Unit to be located within the Division of Forest Research. CSIRO is forming the Unit by re-direction of 12 staff positions and $0.5m from other areas of research, and has approached numerous outside bodies with an interest in bushfire prevention and control for ongoing financial support. The Unit will continue and extend the work carried out under Project Aquarius.

MINING ($22.1m projected for 1984-85)

Major programs

CSIRO accounts for about 77% of R&D expenditure directed towards this objective. The Bureau of Mineral Resources, Geology and Geophysics (BMR) accounts for the remaining 23%.

Growth trends

- Long-term trend (1978-79 to projected 1984-85): -).8% (-0.8%, excluding capital items)
- Short-term trend (1982-83 to projected 1984-85): +2.4% (+4.2%, excluding capital items)

Recent developments

A new process has been developed by CSIRO for treating low grade phosphate rock to produce a high-grade fertilizer, which has performed better than superphosphate in agricultural trials on pasture species. The process is being assessed at a technical scale in collaboration with industry.

CSIRO has established a Bureau to provide QEM*SEM analyses for the mining industry. QEM*SEM, an analytical system developed by CSIRO in collaboration with industry, provides valuable information for the characterisation of mineral particles and for control and design of mineral processes. The QEM*SEM Bureau will operate for two years to establish the demand for such a service in advance of licensing local industry to manufacture and/or operate the system.

Among other activities initiated in 1984, was publication of the first issue of the "BMR Research Newsletter", specifically designed to provide industry with early information and interim results of BMR's research and resources assessment Projects. The Newsletter will be published twice yearly, with one issue focussing mainly, but not exclusively, on energy-related projects and the other on mineral-related projects.

MANUFACTURING ($112.5m projected for 1984-85)

Major programs

For R&D expenditure reported for this objective, the Australian Industrial Research and Development Incentives Scheme accounts for 50% (Project Grants 34% and Commencement Grants 16%). CSIRO, 46%, accounts for most of the balance.

Growth trends

- long-term trend 1978-79 to projected 1984-85): -0.2% (-0.1%, excluding capital items)

- short-term trend (1978-79 to projectd 1984-85): 4.9% (-4.9%, excluding capital items)

Recent developments

. IR&D Incentives

- The Government's intention to allow 150% tax deductability on R&D expenditure in Australia was announced in the Prime Minister's 1984 election policy speech. Details of implementation of the scheme are currently under consideration.

- 'Sunset[1] provisions in the enabling legislation for the Australian Industrial Research and Development Incentives Scheme preclude support for IR&D projects initiated after 30 June 1986. A Review of the scheme's effectiveness is being undertaken to determine what assistance is appropriate beyond that date.

. CSIRO developments

CSIRO and ICI Australia Ltd are jointly developing the capacity to manufacture zirconia and related products in Australia for domestic and export markets. Zirconia is the feedstock for industrial ceramics such as PSZ. Over $2m has been expended so far on R&D to develop a suitable manufacturing process.

A unique vision processor which stores and analyses multiple object television images substantially faster than other comparable systems is being jointly developed by CSIRO with Vision Systems Pty Ltd. Image processing algorithms developed by CSIRO have been implemented in proprietary microelectronic circuits enabling cost-effective high speed vision processing. Applications include real time identification and surveillance in the fields of industrial control, parts inspection, classification, and metallurgical and medical analysis.

A computer aided technique used for the design of metal flow systems in pressure die casting has been developed by CSIRO and is now marketed by Moldflow Pty Ltd. The technology is known as METLFLOW and incorporates analyses of molten metal flow and die thermal effects. The optimised geometry for the metal flow system results in minimised pressure losses and air entrapment, and thereby ensures the manufacture of sound castings.

. Patent system developments

- In August 1984 the Industrial Property Advisory Committee completed its review of the Australian patent system. Its Report, entitled 'Patents, innovation and competition in Australia,' was subsequently released for public comment. The Report, its recommendations, and the public comments received are currently under consideration.

- A Technology and Information Branch was created within the Patent, Trademarks and Designs Office to help stimulate technological innovation and the development of Australian industry by promoting and encouraging effective use of the world-wide patent and information system.

. Aerospace Industry Development

In August 1984, the Minister for Industry and Commerce launched the Government policy on Aerospace Industry. A fundamental step has been taken in establishing the Aerospace Industry Council to advise the Government. Initial moves have been made to:

- concentrate on component production and craft assembly, rather than compete, as at present, in the production of complete, expensive items;

- give priority of support to the embryonic Australian space industry;

- leave the basic drive to the industry itself, with the Government exercising a coordination role.

. Other developments

Some of the other major developments in the manufacturing sector initiated or sponsored by the Commonwealth Government are:

- Fund increases have been granted for the national biotechnology program, the national research fellowship scheme for the industry sector, and for the establishment of a nationwide advisory service on computer assisted manufacturing. In addition to biotechnology, the metals, heavy engineering and automotive industries will be the main beneficiaries of this support;

- a $5.4m contract to a Wormald subsidiary for the commercial development of new fibre optic sensors and sensor systems studied in the Research School of Physical Science of the Australian National University;

- the establishment of an Industrial Automation Centre at the University of Wollongong;

- enhancement of manufacturing-oriented teaching and research in Universities and CAEs, including courses in business and management;

- a contract to the Bridges Corporation of South Australia to undertake a feasibility study under the computer integrated manufacturing (CIM) demonstration program.

CONSTRUCTION ($8.4m projected for 1984-85)

Major programs

CSIRO accounts for about 70% of R&D expenditure under this heading. Elements of the Department of Housing and Construction (Central Investigation and Research Laboratory, 17%; and the Experimental Building Station, 12%) account for the balance.

Growth trends

- Long-term trend (1978-79 to projected 1984-85): 7.3% (-6.3%, excluding capital items)
- Short-term trend (1982-83 to projected 1984-85): -0.8% (-1.8%, excluding capital items)

ENERGY ($73.6m projected for 1984-85)

Major programs

CSIRO (45%) accounts for much of the research expenditure on energy, but other major activities are supported by AAEC (26%), the National Energy Research Development and Demonstration Program (18%) and BMR (12%).

Growth trends

- Long-term trend (1978-79 to projected 1984-85): +8.2% (+7.0%, excluding capital items)
- Short-term trends (1982-83 to projected 1984-85): +1.6% (-1.8% excluding capital items)

Recent developments

. Oil and gas exploration

Recent years witnessed a decline in exploration for oil and natural gas, whose causes were readily identifiable:

- decline of price in real terms;
- high rates of interest, critical in a high cost/high risk industry;
- declining profits, and therefore less money available for exploration; and
- exploration costs increasing above the rate of inflation.

A range of Government actions in recognition of these problems has included increasing the national capability for geoscientific research in areas directly relevant to exploration. Significant in this context is the increased role of the Bureau of Mineral Resources, Geology and Geophysics in marine geology, as opposed to traditional continental geology. A "Continental Margins Program" is underway, and a modern, specially designed geoscience research vessel, the Rig Seismic, has been chartered and is now operating in Australian waters. Meanwhile the scientific and technical staff of the BMR's Division of Marine Geoscience and Petroleum Geology has been significantly increased and recruitment is continuing.

. Coal

The COALSCAN on-line coal ash analyzer won an IR100 Award in September 1984. These American awards go to the 100 best new technologies entering the world market each year. COALSCAN, manufactured by Mineral Control Instrumentation of South Australia is based on technology developed by CSIRO, the AAEC and the Julius Kruttschnitt Mineral Research Centre, aided by funds from NERDDC and AIRDIB.

CSIRO's work on coal liquefaction has reached its concluding stages after 10 years of research and development. A consultant's report on the CSIRO flash pyrolysis process confirmed that it was viable and would produce liquid fuels at a similar cost to other conversion processes. The technology is now ready for transfer to industry when the need arises.

Other Commonwealth sponsored coal R&D continues largely under the NERDD Program. In particular, a major project on coal beneficition, COALSCAN, was completed in 1984, and a technical booklet (appropriately entitled Coalscan) has been published by the Department of Resources and Energy and made freely available to the industry and researchers.

. Energy Conservation

R&D in energy conservation and management received new impetus during 1984-85. Areas of special attention are:

- the prevention of wastes, especially in Government buildings;
- dissemination of publications and advisory material under the National Energy Conservation Program;
- increased allocation to the National Industrial Energy Management scheme, for the dissemination of information to industry, research award, and the payment of subsidies for energy audit.

TRWSPORT ($4.1m projected for 1984-85)

Major programs

R&D activities contributing to this objective include support for the Australian Road Research Board (37%), Department of Aviation programs (31%) and the Office of Road Safety (23%).

Growth trends

- Long-term trend (1978-79 to projected 1984-85): -13.4% (-13.0%, excluding capital items)
- Short-term trend (1978-79 to projected 1984-85): +1.9% (+0.9%, excluding capital items)

COMMUNICATIONS ($48.4m projected for 1984-85)

Major programs

The R&D activities of Telecom (93%) account for almost all this objective. Other elements are AUSSAT Pty Ltd (3%), Australia Post (2%) and the Overseas Telecommunications Commission (2%).

Growth trends

- Long-term trend (1978-79 to projected 1984-85): +0.2% (+0.2%, excluding capital items)
- Short-term trend (1978-79 to projected 1984-85): -1.1% (+0.3%, excluding capital items)

Recent developments

Developments relating to communications have included:

- continuing modernisation within the Ministry of Comunications, such as the allocation of a satellite transponder for South Australia, investigations on scrambling systems to be used in conjunction with satellite transmitted television services, and the introduction of monitoring equipment to prevent congestion of the HF band;

- the intended launching, in the second half of 1985, of the AUSSAT Telecommunication satellite;

- establishment, by the Overseas Telecommunication Commission - Australia (OTC) of an autonomous Research and Development Board.

ECONOMIC SERVICES ($23.1m for 1984-85)

Major Programs

CSIRO provides 56% of R&D expenditure under this heading. Other supporting agencies include the Reserve Bank (11%), Australian Bureau of Statistics (10%) and Bureau of Industry Economics (9%).

Growth trends

- Long-term trend (1978-79 to projected 1984-85): +2.0% (+1.1% excluding capital items)

- Short-term trend (1982-83 to projected 1984-85): +5.6% (+1.1% excluding capital items)

Recent developments

. Information Technology

There were a number of significant developments in CSIRO.

- The Division of Information Technology was established in January 1985 with 9 staff who were formerly members of the CSIRO Division of Computing Research. The new Division is expected to have 25 to 30 staff by mid-1986 who will work on the development and application at advanced techniques in information technology in collaboration with Australian industry. Work in CSIRO in the field of information technology will not be confined to the Division of Information Technology but will be carried out in a large proportion of CSIRO's Divisions and Units, where the application of information technology to particular problems is facilitated by close interaction with the users of the research and development work.

- Grants under the CSIRO Collaborative Program in Information Technology were made for the first time in 1984-85. These grants are for support of collaborative research and development work between CSIRO and Australian industry, universities and other tertiary institutions. The program will aid Australian industry to produce innovative products in the information technology area.

- The technology developed in CSIRO's VLSI (very large scale integrated circuit) project was transferred to Australian industry with the formation of Austek Microsystems in Adelaide, by the former staff of the CSIRO project. This company aims to commercialise the technology and design VLSI chips for the world market.

- CSIRONET was established as an autonomous init of CSIRO in January 1985 by the separation of the Division of Computing Research into two units - CSIRONET and the Division of Information Technology. CSIRONET has a commercial outlook and provides an Australia-wide computing service. As well as introducing and supporting advanced computing services not available elsewhere in Australia, CSIRONET also provides extensive general purpose and specialised computing facilities.

- The CSIRO Computing Grants Scheme was instituted to promote access to the advanced Cyber 205 'super-computer' recently installed as part of CSIRONET. This scheme is designed to facilitate large scale scientific computing requiring the power of the Cyber 205.

Awareness of information technology applications is being promoted by the Department of Industry, Technology and Commerce.

- The Centre for Industrial Microelectronics implications has been established in Melbourne. Its aim is both to help Australian companies which would benefit from incorporating microelectronics in their products, and to assist companies already involved in microelectronics to upgrade their capabilities. The Centre improves awareness and provides training, technical consultancy, design and development in microelectronics. The Melbourne Centre is a pilot project for a broader program aimed at assisting industries throughout Australia.

- The Department is supporting Microcomputer Demonstration Centres in Melbourne and Adelaide. The aims of the centres are to provide an awareness service for microcomputer applications; to provide an unbiased, non-sales environment in which business proprietors can obtain hands-on experience with a range of equipment and software; and to advise on and conduct related training courses and consultancies.

Other recent developments included:

- Continued activity by the National Information Technology Council (NITC) to raise the level of industry and community understanding, and the level of application of information technology. During Information Technology Month 1984, over 1200 activities were conducted thoughout Australia from July to November. The NITC is sponsored by the Department of Industry, Technology and Commerce, the Australian Computer Society and all State and Territory governments. During 1984 NITC published a number of educational software packages aimed at improving student and community awareness of computer technology and its applications.

- The release of a report on information technology produced under commission to the consultant firms W D Scott & Co and Arthur D Little Inc by the former Department of Science and Technology which indicates the potential for lifting Australia's performance in this area in line with most advanced industrial nations.

- Publication, by the former Department of Science and Technology of Smarter Data - Stronger Firm: A guide to science and technology information services available to Australian Industry.

URBAN AND REGIONAL DEVELOPMENT ($2.6m projected for 198A-85)

Major programs

CSIRO accounts for almost 90% of R&D expenditure under this heading.

Growth trends

- Long-term trend (1978-79 to projected 1984-85): +3.2% (+4.9%, excluding capital items)

- Short-term trend (1982-83 to projected 1984-85): -7.8% (-1.4% excluding capital items)

ENVIRONMENT ($30.7m projected for 1984-85)

Major programs

The major part of activites directed to this objective are conducted by CSIRO (almost 75%). Other agencies incude the Office of the Supervising Scientist for the Alligators Rivers Region (15%), and AAEC (8%)

Growth Trends

- Long-term trend (1978-79 to projected 1984-85): 7.9% (+5.2% excluding capital items)

- Short-term trend (1982-83 to projected 1984-85): -9.8% (-9.0% excluding capital items)

Recent developments

. National Conservation Strategy

The first report of the Consultative Committee on the National Conservation Strategy for Australia was presented in May 1984. The Committee has identified about sixty conservation objectives, some of which are already being pursued. For example, water and soil conservation, national parks, reafforestation and coastal protection. Other priorities to be carried out by the Government are education, training and information on conservation, and conservation of rainforest. The final objective of the Strategy remains 'a better understanding of the relationship between development and conservation'.

. Salinity Control

Salinity control is a major environmental problem, which is beginning to impinge on the national economy with the reduction or degradation of productive land. There is no global solution, as the runoff to the sea is very low in Australia. Control measures are available, but are difficult to implement for two main reasons:

- established land use practice in critical areas (which continue to be irrigated or otherwise exploited for short-term return) in preference to conservative, but long-term return practices such as reafforestation;

- Australian State boundaries cut across drainage basins in a haphazard way; despite long standing agreements there is a tendency to an interstate disposal of salt.

There are constitutional problems relating to Commonwealth involvement in this problem, but consideration is being given to ways of improving the situation.

HEALTH ($76.6m projected for 1984-85)

Major programs

The National Health and Medical Research Council grants program (53%) provides the major support for health R&D. Various elements of the Department of Health provide 28% of support, while the Commonwealth Serum Laboratories (9%) and CSIRO (5%) also contribute to this objective.

Growth trends

- Long-term trend (1978-79 to projected 1984-85): +8.9% (+10.0% excluding capital items)

- Short-term trend (1982-83 to projected 1984-85): +8.3% (+8.6% excluding capital items)

Recent developments

The Guidelines for Large Scale Work with Recombinant DNA were published in May 1984, following development by the Recombinant DNA Monitoring Committee. Although DNA technology has applications in various fields it is of particular value in medicine for the development and production of vaccines, artificial hormones, etc, on a large scale.

The Government is becoming involved in medical engineering research, with support to the relevant industry also in the form of grants, in the framework of increased Budget allocations for medical research and specific health programs.

The most significant part of health allocations in 1984-85 is $45.7m in National Health and Medical Research Council (NH&MRC) grants.

Among projects of world-wide significance is the development of a malaria vaccine, by a joint venture of various public and private institutions, and the private industry, with the assistance of the Commonwealth Government.

EDUCATION ($4.4m projected for 1984-85)

Major programs

A variety of programs undertaken within the Department of Education contribute the major part (70%) of R&D directed to understanding, improving or evaluating the education process. (Note that Commonwealth Tertiary Education Commission funds for research in the tertiary education sector, and post-graduate awards, are classed as being directed towards 'general advancement of knowledge'.) Research on curriculum development, now under the aegis of the Commonwealth Schools Commission, makes up the bulk of the remaining R&D into educational matters (27%).

Growth trends

- Long-term trend (1978-79 to projected 1984-85): -11.3% (-16.2% excluding capital items)
- Short-term trend (1982-83 to projected 1984-85): +12.6% (+9.0% excluding capital items)

WELFARE ($4.0m projected for 1984-85)

Major programs

Major elements include the Bureau of Labour Market Research (35%), the Departments of Community Services, Social Security and Immigration and Ethnic Affairs, and the Austraian Bureau of Statistics.

Growth trends

- Long-term trend (1978-79 to projected 1984-85): +11.5% (+11.7% excluding capital items)
- Short-term trend (1982-83 to projected 1984-85): -8.2% (-8.3% excluding capital items)

OVERSEAS DEVELOPMENT ASSISTANCE ($37.2m projected for 1984-85)

Major programs

About 85% of R&D support under this heading is provided by the Australian Development Assistance Bureau. The balance is mostly provided by the Australian Centre for International Agricultural Research.

Growth trends

- Long-term trend (1978-79 to projected 1984-85): +12.5% (no capital items)
- Short-term trend (1982-83 to projected 1984-85): + 4.1%

Recent developments

The Project for Animal Research and Development, Indonesia, which is operated by CSIRO on behalf of the Australian Development Assistance Bureau, recently underwent review. The review reinforced the animal husbandry priorities of the Project. There will be a progressively increasing Indonesian direction and control of the Project with decreasing Australian input through to the end of 1989.

OTHER COMMUNITY SERVICES ($7.5m projected for 1984-85)

Major programs

The R&D supported by the Law Reform Commission (about 60%), the Human Rights Commission (25%) and the Australian Institute of Criminology (10%) constitute most of the activities for this objective.

Growth trends

- Long-term trend (1978-79 to projected 1984-85): +10.3% (+9.1% excluding capital items)
- Short term trend (1982-83 to projected 1984-85): +19.6% (+21.2% excluding capital items)

EARTH, OCEAN and ATMOSPHERE ($47.4m projected for 1984-85)

Major programs

R&D activities towards this objective are undertaken or supported by CSIRO (60%); the Australian Institute of Marine Science (15%); BMR (11%); the marine science grants and fellowships programs (5%); the Bureau of Meteorology (4%); and the Water Division of the Department of Resources and Energy (2%).

Growth Trends

- Long-term trend (1978-79 to projected 1984-85): +9.5% (+6.5% excluding capital items)
- Short-term trend (1982-83 to projected 1984-85): +4.9% (+9.9% excluding capital items)

Recent developments

. Water Resources

Following the publication of the "Water 2000" Report in 1983, a program of assistance to the States was introduced in 1984-85 under the name of the Federal Water Resources Assistance Program, funded from a record allocation of $64.3m appropriation for water resources. Additionally, the Government has decided to continue the Australian Water Resources Council Research Program for a further 12 months, pending a decision on the recommendations of the investigation on the need for an Institute of Freshwater Studies.

Following the successful control of the aquatic weed salvinia (Salvinia molesta) at Mt Isa in 1981 by a weevil released by the CSIRO Division of Entomology, a major success was recently achieved in Papua New Guinea using the same approach to control large infestations of salvina in the Sepik River system. This is the first recorded case in the world of a biological control program against an aquatic weed being significantly aided by the application of a fertilizer to the weed. In this case, the nitrogen fertilizer used overcame the nutritional inadequacy of the host plant towards the weevil and allowed the

insect to successfully reproduce and establish itself. This success has encouraged ACIAR (the Australian Centre for International Agricultural Research) to financially support the Division of Entomology in other aid projects against salvinia in Sri Lanka, Botswana and Zimbabwe.

. Reorganisation of Atmospheric Research

A new Bureau of Meteorology Research Centre has been constituted. This Centre together with the CSIRO Division of Atmospheric Research is absorbing the activities of the former Australian Numerical Meteorology Research Centre.

. Climate Research and Monitoring

The effect of drought on Australian environment and economy is recognised by the Government as being critical. Drought and climate research therefore continue to be given very high priority in the programs of both the Bureau of Meteorology and the CSIRO. Research ranges from reconstruction of past and recent climatic fluctuations from patterns of growth in coral skeletons to the construction of new indices of drought. The establishment of the National Climate Centre (NCC) within the Bureau of Meteorology will provide a focus for the provision of climate data and information. The NCC will also undertake a comprehensive climate monitoring program aimed towards imroving our ability to forecast variations in climate on a monthly or seasonal time-scale.

. Atmospheric Pollution Monitoring

Responsibility for the operation of the Cape Grim Baseline Pollution Station (Tas) was transferred to the Bureau of Meteorology early in 1984. The station operates as part of a worldwide network monitoring background levels of atmospheric constituents, particularly those considered relevant to long term climate variations - carbon dioxide, for example.

. Technological Developments in the Bureau of Meteorology

A high speed meteorological data link between Tokyo and Melbourne was established in early 1984 and is being upgraded. The existing cyclone warning system covering our northern coastline is being assessed, with a view to a substantial overhaul in the near future. Meanwhile a third geostationary meteorological satellite has been launched in Japan, with Australia assisting in maintaining it in the correct orbit, and receiving three-hourly transmissions of cloud imagery and other important data.

. Remote Sensing Applications

The CSIRO Division of Water and Land Resources has developed a computerised method of recording and mapping the Great Barrier Reef using satellite imagery from LANDSAT. This has been done in collaboration with the Great Barrier Reef Marine Park Authority, the Australian Survey Office, and the James Cook University of North Queensland. It has been estimated by the Marine Park Authority that this method of mapping will save at least $28m in mapping costs and greatly assist in the planning and management of the Park.

The transfer of the Australian Landsat Station from the Department of Science to the Department of Resources and Energy's Division of National Mapping points to the increasing role of LANDSAT in map revision. Because of the near-completion of Australia's topographic map coverage, National Mapping is reshaping itself for continuous map revision as priority task.

. Earth Science

In addition to the major marine geoscience program referred to under the energy objective, BMR is also undertaking an expanded program of research into the Geology of the Australian continent. A major study of the deep structure of the continent by seismic reflection techniques has begun, and will be complemented by detailed studies of Australia's major sedimentary basins and mineral provinces. These programs will be supported by BMR's new Seismic Processing Centre which is now fully operational.

. Oceanography

Australia's most advanced oceanographic research vessel, the RV Franklin, was launched in October 1984. The Franklin, Australia's first civilian deep-water oceanography research vessel, will be operated by CSIRO's Division of Oceanography (now based at the new Marine Laboratories in Hobart) as a national facility to serve the long-neglected needs of Australia in physical, chemical and biological oceanography. As a national facility Franklin will be available to oceanographers from all Australian marine science institutions.

GENERAL ADVANCEMENT OF KNOWLEDGE ($222.5m projected for 1984-85)

Major programs

R&D activities under this heading are supported through grants to universities (55%), the Australian Research Grants Scheme (11%), Commonwealth Postgraduate Research Awards (7%), Commonwealth Special Research Centres (3%), the Antarctic Division of the Department of Science (9%), CSIRO (9%), AAEC (3%) and Anglo-Australian Telescope Board (1%).

Growth trends

- Long-term growth (1978-79 to projected 1984-85): +4.3% (+3.8% excluding capital items)
- Short-term growth (1982-83 to projected 1984-85): +0.9% (+3.3% excluding capital items)

Recent developments

. Astronomy

Construction of the Australia Telescope was inaugurated in September 1984. The Australia Telescope will provide a multi-element synthesis array of antennae for radio astonomy. It will comprise a compact array of six antennae at Culgoora, NSW and a seventh antenna near Coonabarabran, NSW. The existing 64-metre radio telescope at Parks, NSW will also be incorporated into the array. The Australia Telescope has been endorsed as a Bicentennial Activity and will be completed in 1988. It will be operated as a national facility by the CSIRO Division of Radiophysics.

. Australian Research Grants Scheme

Basic research grants under the Australian Research Grants Scheme (ARGS) decreased in number from 1313 in 1984 to 1226 in 1985, but with the allocation increasing from $22.42 million to $23.88 million, indicating a trend towards larger or more complex projects. The fellowships supported in association with the Scheme increased from 161 to 172.

. Bicentennial Science Centre Project

The Ministers for Science, Territories, and Arts, Heritage and Environment have jointly initiated negotiations for the establishment of a National Science Centre as a bicentennial project.

The Centre, based in Canberra, would reach the whole Australian community through exhibitions, information and provision of exhibits to other institutions. The cost of the Centre has been estimated at $12.5 million at 1982 prices, of which about one third will be committed by the Commonwealth Government. Sponsors are being sought for the remainder. The first allocation is expected in the 1985-86 Budget.

. Space Science and Technology

In December 1984, CSIRO established an Office of Space Science and Applications (COSSA) following an extensive study of the opportunities for the Organisation to contribute in the areas of space-based communications systems, earth sensing systems, navigation, geodesy and space science. The role of COSSA includes:

- development and implementation of policy and planning, and allocation of special funds for the Organisation's space activities;
- co-ordination of CSIRO[1] s space research and development program, including CSIRO/Industry interactions, multi -Divisional projects, and involvement in international space-related activities;
- interaction with Australian government instrumentalities, universities and other agencies with space interests.

. Academy of Technological Sciences Space Science and Technology Working Party

At the invitation of the Minister for Science and Technology, the Academy of Technological Sciences formed a working party on space science and technology. The aims of the working party were:

- to identify goals for the development of Australia's industrial capability in the supply of space technology products and services;
- to propose a national strategy for the achievement of these goals and to identify suggested action to be taken by the Government, tertiary education and industry sectors;
- to propose institutional arrangements for the implementation of the strategy;
- to liaise with relevant organisations.

The working party comprised six members, representing industry, academic institutions and the Government. Secretariat services were provided by the Department of Science with the support of CSIRO and the Department of Industry, Technology and Commerce. A report will be presented to the Minister for Science in May 1985.

INTERNATIONAL COMPARISONS AND TRENDS(1)

Total resources devoted to R&D

Figure 3 and Table 10 (overpage) show the source of funds and sector of performance of R&D expenditure of OECD member countries for the latest year for which data are available, grouped according to gross expenditure on R&D (GERD). The figure shows that all the large R&D performing OECD countries are also highly R&D intensive and perform the greater part of their R&D in the business enterprise sector. Of those countries for which recent estimates are available only New Zealand, Portugal and Iceland had higher proportions of government performance and funding of R&D than Australia. Another feature of particular note is the very low proportion of funds provided for R&D by business enterprise in Australia. Figure 3 indicates that only in New Zealand, Portugal and Iceland does the business enterprise sector contribute a lower proportion of GERD as a percentage of GDP.

In comparing GERD as a percentage of GDP among OECD countries, Australia's position prior to 1973 was close to the median, but between 1973 and 1976 our position deteriorated. This was a result of a sharp decline in business enterprise sector R&D in Australia, a decline in strong contrast with the stabilisation or increase in privately funded business enterprise R&D which occurred over the years prior to 1976 in almost all other OECD countries. Subsequent survey information indicates that while the decline in Australian private business enterprise R&D had been arrested by 1978-79 (2), there has been no significant recovery. Private business enterprise R&D funding declined by 3% in real terms between 1978-79 and 1981-82. These trends are shown at the foot of Table 10.

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(1) International comparisons are subject to a number of caveats arising from differences in R&D survey practice in the various countries. The proposed standard OECD practice is set out in the "Frascati Manual": The Measurement of Scientific and Technical Activities, OECD Paris 1980, but most member countries differ from the proposed standard in some areas. Readers should refer to the publications of the OECD Science and Technology Indicators Unit for details. Source documents for this section were:

- Recent Results - Selected S&T Indicators 1979-1984,Paris, December 1984
- OECD Science and Technology Indicators, Resources Devoted to R&D, OECD, Paris 1984
- Science Resources Newsletter, No 7, Sunnier 1983

(2) Research and Experimental Development - Business Enterprises, Australia - 1981-82, Australian Bureau of Statistics Catalogue No 8104.0, 1 March 1984

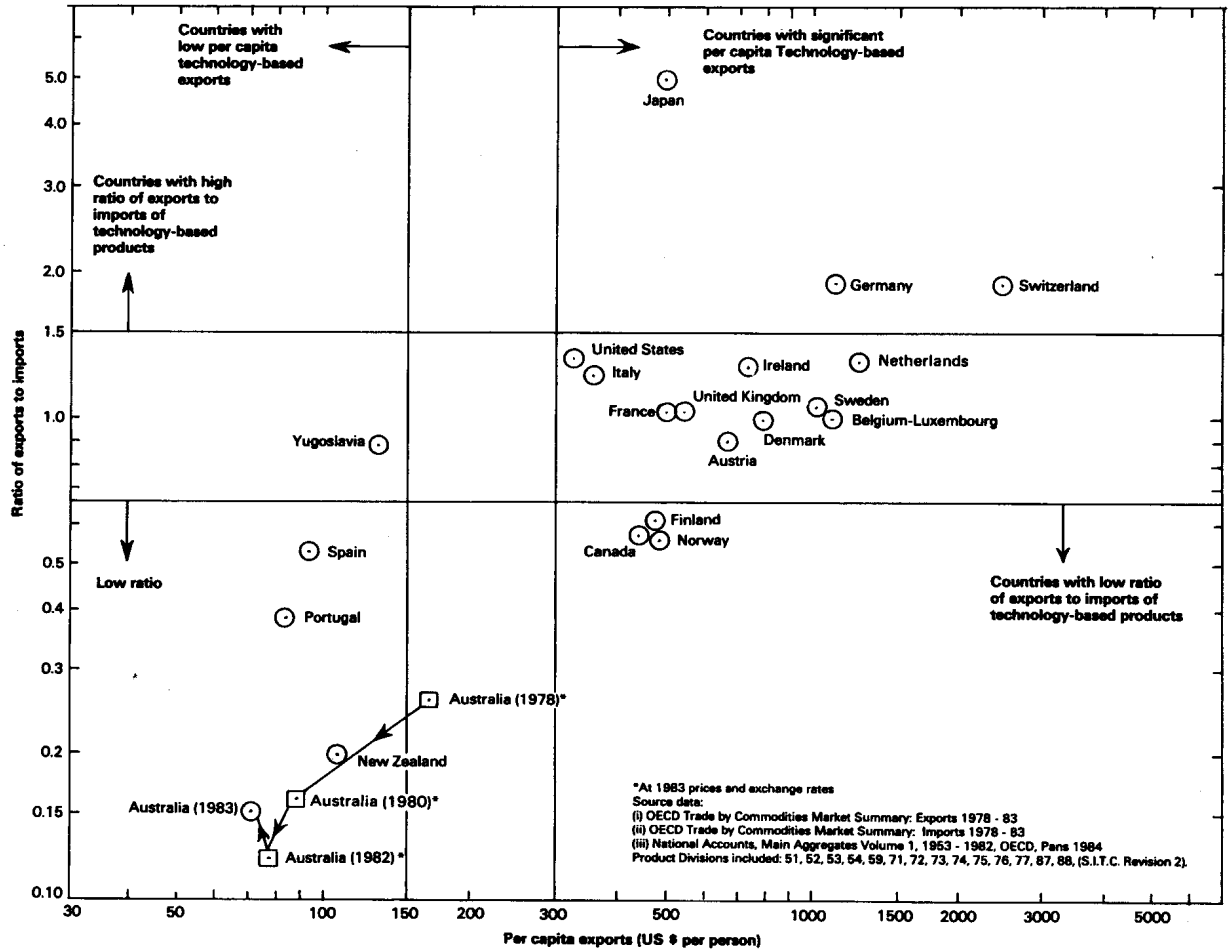
Table 10: Comparisons between OECD nations - R&D employment as % Total Workforce and gross domestic expenditure on R&D (GERD) as % GDP (latest available year)

Country	R&D Employment as % total workforce	% GERD/ GDP	R&D in Sector* as % GDP					
			Source of Funds*			Performance*		
			Business Enterpr.	Government Civil	Defence	Business Enterprise	Government	Higher Education
Large R&D Performers								
U.S.A. (1984)	1.27	2.74	1.35	0.42	0.81	1.99	0.31	0.36
F.R. Germany (1983)	1.36	2.57	1.46	1.00	0.11	1.79	0.36	0.41
(Group Median)	1.17	2.47	1.35	0.70	0.46	1.53	0.36	0.36
Japan (1982)	1.16	2.47	1.50	0.63	0.01	1.53	0.25	0.58
U.K. (1981)	1.17	2.46	0.93	0.70	0.68	1.52	0.53	0.33
France (1984)	1.07	2.19	0.91	0.84	0.44	1.24	0.47	0.34
Medium R&D Performers								
Switzerland (1981)	1.23	2.29	1.72	0.26	0.04	1.70	0.14	0.45
Sweden (1981)	1.00	2.23	1.26	0.76	0.21	1.49	0.14	0.60
Netherlands (1984)	1.01	1.87	0.86	0.96	0.03	1.02	0.38	0.44
(Group Median, excluding Australia)	0.89	1.65	0.89	0.63	0.04	0.98	0.20	0.33
Canada (1983)	0.55	1.42	0.60	0.65	0.04	0.73	0.35	0.34
Belgium (1979)	0.78	1.40	0.91	0.49	..	0.97	0.13	0.29
Italy (1984)	0.46	1.19	0.54	0.60	0.05	0.64	0.26	0.19
AUSTRALIA (1981)	0.65	1.01	0.21	0.67	0.07	0.23	0.46	0.30
Small R&D Performers								
Finland (1983)	0.79	1.37	0.72	0.62	0.01	0.78	0.21	0.29
Norway (1981)	0.75	1.28	0.49	0.70	0.07	0.67	0.24	0.37
Denmark (1981)	0.57	1.07	0.47	0.50	..	0.54	0.21	0.25
(Group Median)	0.60	0.89	0.26	0.50		0.27	0.28	0.19
New Zealand (1979)	0.62	0.88	0.14	0.73	0.01	0.18	0.53	0.15
Ireland (1982)	0.42	0.79	0.27	0.38	..	0.34	0.30	0.13
Iceland (1981)	0.69	0.75	0.04	0.57	..	0.07	0.46	0.20
Portugal (1980)	0.18	0.33	0.08	0.22		0.09	0.15	0.07
Australian Trends								
Australia (1968-69)	0.80	1.34	0.48		0.79	0.49	0.53	0.32
Australia (1973-74)	0.85	1.26	0.42		0.79	0.42	0.50	0.33
Australia (1976-77)	0.70	1.05	0.24		0.78	0.24	0.50	0.29
Australia (1978-79)	0.68	1.03	0.21		0.79	0.24	0.46	0.32
Australia (1981-82)	0.65	1.00**	0.21		0.74**	0.23	0.44**	0.30

* In OECD data the Business Enterprise sector includes both private and public business enterprises. The General Government sector includes federal and provincial or State governments and their agencies excluding public business enterprises. "Government" as a source of funds includes the "Own funds" of public universities. Note that there are sectors other than those shown, so that the totals are less than the % GERD/GDP.

** The figures are adjusted for trend comparison purposes (to remove the effect of changed superannuation arrangements and the additional pay period in 1981-82 for Commonwealth bodies). For unadjusted figures (more appropriate for international comparisons) see under "Medium R&D performers"

Fig. 4 Trade per head of population in selected technology-based products 1983



Government funding for R&D socio-economic objectives

Table 11 shows for twelve countries the distribution of Government funds to R&D in selected OECD socio-economic objective categories. The funding levels are expressed as parts per 10 000 of GDP. By comparison with the median values for countries other than Australia and for which data are available, it can be seen that Australian Government funding in 1980-81 was high for agriculture (4 1/2 times the median), and environment (3 times); close to the median for industrial growth, advancement of knowledge, and defence; and low for energy, health, and social development and services (all less than half of the respective median values).

These comparisons need to be taken with some reservation, as the data are only broadly comparable between countries. In particular all general university funds devoted to R&D have been included under advancement of knowledge. Thus, in Australia for example, a considerable amount of medical R&D is included in advancement of knowledge, thereby considerably understating the total Government support for the health objective. Moreover, each country has its own spectrum of needs which is reflected in differing funding priorities. The observed differences must therefore be interpreted in the context of additional information about the countries concerned.

Table 11: Government R&D funding by OECD socio-economic objectives*, (1982 or nearest year)

(Cents expended per $100 of gross domestic product)

Country	Agr.	Ind.	Energy	Env.	Health	Soc.	A. of K.	Def.	Other
F.R. Germany	2.4	14.4	19.5	2.2	5.0	4.8	49.2	10.9	8.2
U.S.A.	2.5	0.4	18.9	0.7	12.3	1.4	n.a.	81.2	20.8
U.K.	5.3	9.5	8.4	1.4	1.6	1.5	32.0	68.2	4.9
France	5.2	16.6	9.4	1.3	5.9	1.6	31.3	45.8	15.2
Netherlands	7.0	9.7	4.2	.	3.9	4.4	49.0	3.1	11.8
Sweden	2.5	5.6	12.9	2.1	8.8	9.4	47.7	28.8	11.0
Belgium	2.9	10.7	6.0	2.0	9.4	7.2	19.1	0.1	3.1
Australia	15.5	8.4	3.3	1.8	3.0	2.3	29.2	6.9	3.7
Italy	1.9	8.6	13.9	1.2	1.8	0.9	25.8	6.4	4.5
Norway	7.8	10.8	3.7	2.7	3.7	6.1	32.2	7.4	5.8
Finland	7.1	13.8	3.5	0.5	0.8	4.7	24.5	1.0	5.8
Denmark	4.2	7.9	5.3	0.8	4.5	3.5	16.3	0.1	4.4
Median (excl. Aust.)	4.2	9.7	8.9	1.4	4.5	4.4	31.7	7.4	5.8

* OECD socio-economic objectives

Agr.:	Agriculture, Forestry, Fishing	Health:	Health
Ind.:	Industrial Growth	Soc.:	Social Development Services
Energy:	Production of Energy	A. of K.:	Advancement of Knowledge
Env.:	Environment Protection	Def:	Defence
Other:	Includes		
	Transport and Telecommunications		Earth and Atmosphere
	Urban and Rural Planning		Civil Space
	Not Specified		

Note:

These data are subject to a number of qualifications for which the original source should be consulted. In addition, some categories for a number of countries contain S&T (other than R&D) categories as well as R&D, as they are based on "science budgets" or similar analyses for the countries concerned. Some R&D outside the science budgets may be omitted.

Another important point is that all general funding of universities (other than special purpose granting schemes) is allocated to "Advancement of knowledge". Thus, for example, Advancement of Knowledge for Australia contains a large component directed towards the Health objective (which would rise to about 7.6 if this component was included) and a further amount for Agriculture (which would rise to over 20). For federal systems such as Australia, the table includes both State and federal funds.

Source: OECD Science Resources Newsletter, No. 7 Summer 1983

Technology-based export performance

Figure 4 and Table 12 give an indication in broad terms of Australia's low position among OECD countries in relation to exports of "technology-based" products. While all manufactured products are technology-based according to a strict definition of technology (1), the term "technology-based" is used in this report to refer to products falling within Standard International Trade Classification divisions which include the recognised "high-technology" or "technology-intensive" product classes. The data are drawn from OECD publications (2), in the Standard International Trade Classification divisions 51 (organic chemicals), 52 (inorganic chemicals), 53 (dyeing, tanning and colour materials), 54 (medicinal and pharmaceutical products), 58 (artificial resins and plastic materials and cellulose esters and ethers), 59 (chemical materials and products n.e.i.), 71 (power generating machinery and equipment), 72 (machinery specialised for particular industries), 73 (metalworking machinery), 74 (general industrial machinery and equipment n.e.i. and machine parts n.e.i.), 75 (office machines and automatic data processing equipment), 76 (telecommunications and sound recording and reproducing equipment), 77 (electrical machinery, apparatus and appliances n.e.i. and electrical parts thereof), 87 (professional scientific and controlling instruments and apparatus n.e.i.) and 88 (photographic apparatus, equipment and supplies, and optical goods n.e.i., watches and clocks).

Although some of the products in these product divisions would not be regarded as technology-intensive on the usually accepted basis of above average R&D intensity in the associated industry class, and some high technology products (eg. aircraft and associated parts) have not been included, taken overall it is thought that exports in these fifteen product divisions may be regarded as a reasonably satisfactory comparative measure of a country's capability in producing technology-based products. Aircraft and parts were excluded because Australia's exports in this product class are almost entirely re-exports of imported products.

Interpretation of this indicator may differ according to the economic philosophy adopted. The indigenous levels of installed technology and technical skills of the workforce are among the economic determinants of the national product mix and competitiveness on the export market. In looking at trade in the technology-based product groups we are looking at the outcome of many economic factors and influences, but this paper adopts the viewpoint that trade in these product groups represents demonstrated technological capability. It may well be that countries such as Australia which are low on the scale of technology-based exports have either consciously elected or through market forces come to rely on trade in other commodities in which they have comparative advantage and/or traditional involvement. However, if they are not involved in producing a technology-based product competitive on the export market it is fair to assume that in most cases they will not be current in the state-of-the-art for that product.

Figure 4, shows that Australia's position in regard to both technology-based exports per capita and ratio of technology-based exports to imports declined from 1978 to 1980, and had declined even further by 1982. There has been a small recovery on the export/import ratio indicated in 1983.

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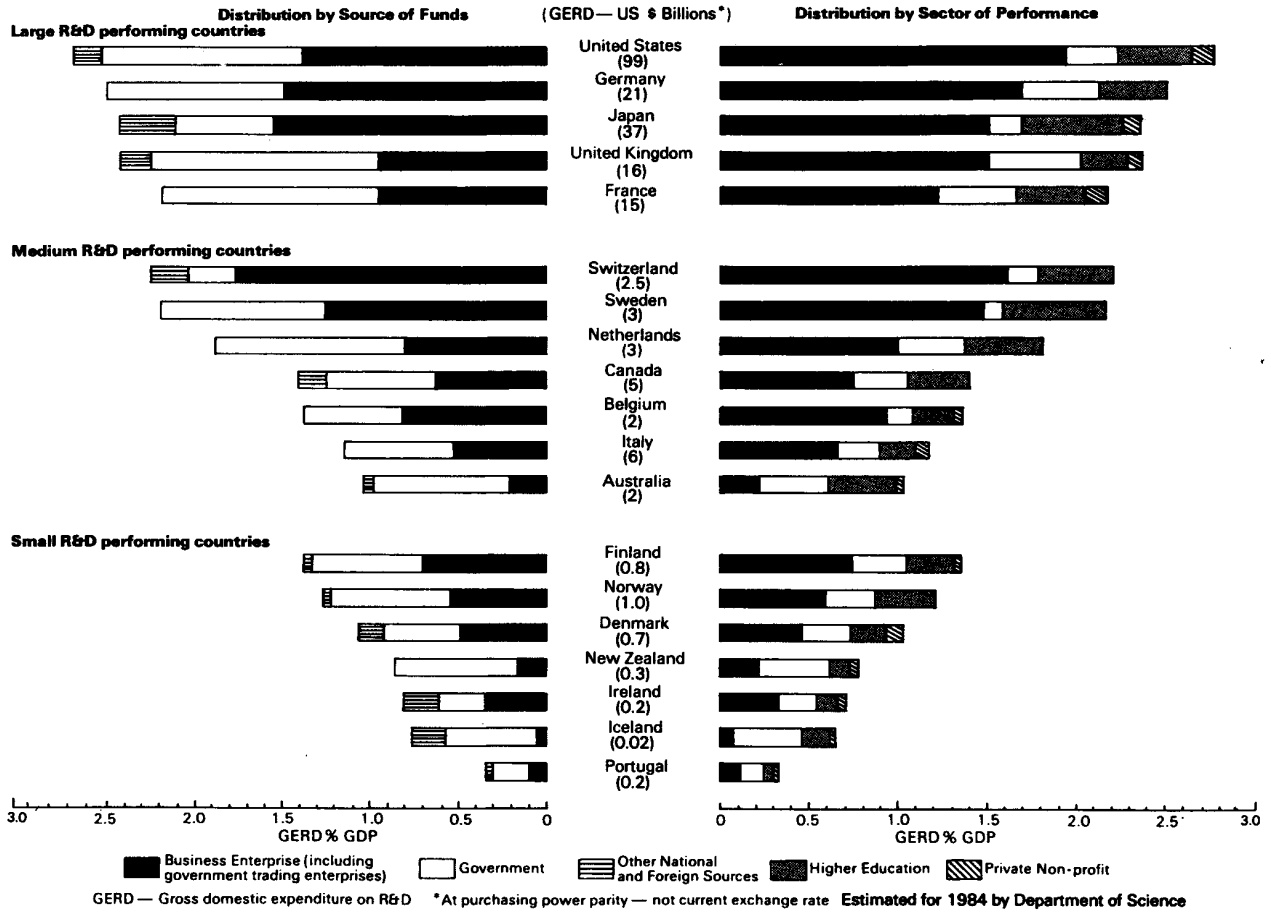
(1) "Technology is a perishable resource comprising knowledge, skills, and the means of using and controlling factors of production for the purpose of producing, delivering to users, and maintaining goods and services from which there is an economic and/or social demand."

(2) (i) OECD Trade by Commodities Market Summary: Exports 1979-83
(ii) OECD Trade by Commodities Market Summary: Imports 1979-83
(iii) National Accounts, Main Aggregates, Volume 1, 1954-1983, OECD, Paris, 1985

Fig. 3 R & D Expenditures by Country — latest available year.



GERD — Gross domestic expenditure on R&D *At purchasing power parity — not current exchange rate **Estimated for 1984 by Department of Science**

In general the countries exporting large volumes of technology-based products are also large importers. The average relationship for all 24 OECD countries suggests that imports are roughly proportional to the square root of the exports. Japan has a much higher than average ratio of exports to imports in these product groups, because its imports are only about 40% of the average level corresponding to its export figure. This is probably due to a high level of self sufficiency combined with difficulties experienced by other countries in penetrating the Japanese market.

Table 13 presents some further indicators which correlate to some degree with the trade-based ones. Patenting in the US System (for non-American countries) may be a good indicator of propensity to export. For a number of countries there appears to be a broad relation between the level of trade in technology-based products (Table 12 and Figure 7), patenting in the US system (Table 13) and the amount of R&D in manufacturing industry (Table 13). Australia has a higher level of US-System Patenting than would be expected from its level of manufacturing R&D and comparison with other countries. However, the comparisons also show a lower than expected level of technology-based exports.

Table 12: Trade in selected Technology - Based Products - OECD Nations, 1983

Country	Population (Million persons)	Exports (US $m)	Imports (US $m)	Ratio of exports to imports	Per Capita exports (US $ per person)
Large R&D Performers					
U.S.A.	234.496	97983.0	63761.9	1.25	340.2
F.R. Germany	61.421	69591.6	35725.6	1.95	1133.0
Japan	119.259	68096.1	14737.2	4.62	571.0
U.K.	56.364	32067.8	30370.8	1.06	568.9
France	54.438	30004.6	28384.7	1.06	551.2
Medium R&D Performers					
Switzerland	6.505	15784.6	8633.5	1.83	2426.5
Sweden	8.331	8832.2	8642.4	1.02	1060.2
Netherlands	14.362	18861.3	15235.2	1.24	1313.3
Canada	24.907	11177.3	21029.8	0.53	448.8
Belgium	9.860	11427.8	11402.7	1.00	1159.0
Italy	56.835	20682.2	17533.9	1.18	363.9
AUSTRALIA	15.369	1119.6	7342.7	0.15	72.8
Small R&D Performers					
Finland	43.863	2364.3	3991.6	0.59	486.2
Norway	4.130	2012.3	3885.4	0.52	487.2
Denmark	5.114	4355.5	4403.6	0.99	851.7
New Zealand	3.203	353.9	1937.4	0.18	110.5
Ireland	3.510	3461.2	2853.5	1.21	986.1
Iceland	0.237	2.8	200.8	0.01	11.6
Portugal	10.099	872.3	2325.8	0.38	86.4
Austria	7.549	5512.9	6017.7	0.92	730.3
Greece	9.850	287.9	2101.4	0.14	29.2
Spain	38.228	3551.2	7153.6	0.50	92.9
Turkey	47.750	419.1	3508.7	0.12	8.8
Yugoslavia	22.855	3047.1	3574.2	0.85	133.3

Note: The table is arranged to place the countries in the same order as Table 10.

Table 13: US patenting and the manufacturing sector - OECD nations, 1981.

Country	BERD (US $m) 1981	Manufacturing industry BERD (US $m) 1981	Domestic product of manufacturing industry (US $m)	Average annual US patents= (1977-1984)
Large R&D Performers				
USA	51810.0	49716.3	650954	40521
FR Germany	10824.8	10062.6	201795	5876
Japan	16445.2	14998.0*	330319	8151
UK	7115.4	6411.0##	92597	1989
France	6378.7	5906.7*	133118	2162
Medium R&D performers				
Switzerland	1328.4	1301.4	na	1317
Sweden	1482.4	1283.8	20522	836
Netherlands	1345.2	1213.1	31305*	707
Canada	1616.1	1257.3*	57455	1274
Belgium	824.2*	751.6**	22727	276
Italy	2590.6	2130.8	129779	806
AUSTRALIA	378.3	232.3	26162+	325
Small R&D performers				
Finland	326.8	298.9	10171	136
Norway	326.0	225.9	7119	97
Denmark	275.2	228.7#	8211	160
New Zealand	41.1*	37.5*#	6015	50
Ireland	68.4	57.9##	3603**	25
Iceland	1.7	1.5	na	1
Portugal	42.8+	30.0+	11862	5
Austria	450.4	412.9	17758	286
Greece	23.1	16.1	8602	12
Spain	462.3	385.9	54866++	79
Turkey	na	na	29598	2
Yugoslavia	289.9	na	20001	12

Notes: The table is arranged to place the countries in the same order as Table 10.

= Patents taken out in the US having one or more inventors domiciled in the nation shown.
* 1979 figure converted to 1981 figure using GDP deflator.
\+ 1980 " " " " " " "
\# Figure estimated on the basis of the 1977 manufacturing BERD's proportion of the total 1977 BERD.
\## Figure estimated on the basis of the 1975 manufacturing BERD's proportion of the total 1975 BERD.
** 1978 figure converted to 1981 figure using GDP deflator.
++ 1977 figure converted to 1981 figure using GDP deflator.

Sources:

BERD and the manufacturing sector data were derived from OECD publications. US patenting data were derived through on-line access to the USPA and USP77 data bases mounted on the System Development Corporation's ORBIT system.

MINISTRY ACTIVITIES

PRESENTATION

This Section is a presentation of Commonwealth R&D and S&T expenditures by ministry. Readers are reminded that the S&T figures include the R&D expenditures, and that the purpose of the S&T figures is to identify programs and agency units primarily devoted to S&T activities. (See Appendix 3 for definitions and further details).

The tables for the ministries are presented in three categories (not all the categories apply for particular ministries), Commonwealth Budget sector net expenditure, Commonwealth Non-Budget sector, and expenditure from other sources. Figures listed under Commonwealth Budget sector net expenditure correspond to expenditure on S&T from amounts appropriated by Parliament under the Appropriation Acts, less any relevant recoveries or income received by the Commonwealth in respect of particular activities. Commonwealth Non-Budget sector figures represent the S&T funded by Commonwealth bodies from their own funds (other than direct appropriations). These consist mainly of trading revenues of government enterprises, disposals of plant and sales of publications. They also include residuals of appropriations retained from previous years. The sum of the Budget and Non-Budget sectors constitutes all direct funding by the Commonwealth Government. Expenditure from other sources covers S&T activities funded by recoveries (and hence excluded from the Budget sector) plus amounts received by the Commonwealth from sources such as industry and State or foreign governments in respect of particular activities of a non-commercial nature.

As in previous Statements, the aim has been to list expenditures of each agency or program for all years under the Ministry which holds responsibility for that agency or program at the time the Statement is drafted. Unless stated otherwise, sources for the information presented in the tables are the agencies listed.

DERIVATION AND VALIDATION

Data for the Science and Technology Statement are derived through a survey of about 70 agencies or units of the Commonwealth Government. These respondents return over 300 data collection forms for processing by the Department of Science. In a few cases (notably for ADAB) there are special data collection procedures. Validity of the data is checked, as far as possible, by staff of the Department of Science (DOS) who refer to Annual Reports, Budget documents, departmental explanations of estimates and other material for this purpose. (For the definitions used see Appendix 3).

Great stress is placed on continuity of reporting procedures from year to year. In addition, it is sometimes necessary to discuss returns with respondents and amend the returns as a result.

Since the first Science and Technology Statement in 1981, most respondents to these annual surveys have established appropriate internal procedures to derive the necessary data. The Department of Science is grateful for the continued co-operation of most agencies in the provision of material for the Statement. Requests for the provision of data were forwarded during the period 19-27 October 1984 and follow-up requests were made by telephone where this was necessary.

For a variety of reasons, agencies are sometimes slow to provide their survey data. In a few isolated cases they are unable to do so in time and these data are estimated by DOS staff. In either case the ability to validate data adequately is correspondingly reduced and the data presented for those organisations should be regarded appropriately. For 1984-85, these organisations included:

. Bureau of Flora and Fauna
(Arts, Heritage and Environment)

- data estimated by DoS on the basis of lists of approved grants provided on 23 March 1985.

. Commonwealth Schools Commission
(Education)

- no response received by 10 April 1985, data estimated by DOS.

. Department of Foreign Affairs
(Foreign Affairs)

- no response received by 10 April 1985, data estimated by DOS.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Aboriginal Affairs	S(c)	0.073	0.088	0.057	0.101	0.170	0.101	0.170
	N(c)	-	0.006	-	-	-	-	-
Applied Ecology Pty Ltd	N(a)	0.142	-	-	-	-	-	-
	N(b)	0.220	-	-	-	-	-	-
Australian Institute of Aboriginal Studies (AIAS)	S(a)	-	-	-	-	-	0.232	0.095
	S(b)	-	-	-	-	-	2.057	2.176
	[n]S(c)	0.489	0.530	0.468	0.344	0.300	0.922	0.828
Total (Budget sector)		0.924	0.623	0.525	0.446	0.470	3.391	3.341
B. Commonwealth Non-Budget sector								
Applied Ecology Pty Ltd	N(a)	0.083	-	-	-	-	-	-
	N(b)	0.127	-	-	-	-	-	
Australian Institute of Aboriginal Studies	S(a)	-	-	-	-	-	0.022	0.008
	S(b)	-	-	-	-	-	0.192	0.192
Total (Non-Budget sector)		0.210	-	-	-	-	0.214	0.200
Total (Direct Commonwealth funding)		1.134	0.623	0.525	0.446	0.470	3.605	3.541
C. Expenditure from other sources								
Australian Institute of Aboriginal Studies (AIAS)	S(a)	-	-	-	-	-	0.007	0.002
	S(b)	-	-	-	-	-	0.063	0.048
Total (Other sources)		-	-	-	-	-	0.070	0.050
Total (A+B+C)		1.134	0.623	0.525	0.446	0.470	3.676	3.591

N Natural sciences and engineering S Social sciences and humanities

^{n}S Includes some natural sciences and engineering

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

DEPARTMENT OF ABORIGINAL AFFAIRS

The Department's research program is undertaken by outside agencies and is primarily directed to the collection and analysis of data needed by the Government for policy definition and determination. Specific examples include; research into operation of community stores, employment policies and practices of major mining companies towards Aboriginals, decision-making by Aboriginal communities in relation to mining royalties, and impacts of training and educational programs.

On a biennial basis the Department collects data which is used to provide a general measure of the well being of Aboriginal communities. The data is aggregated by type of community, and cross-classified across major areas of concern - population, employment, schooling, community facilities, etc. Material is coded and placed on computer tape: a wide variety and number of tables and publications result from the collections.

AUSTRALIAN INSTITUTE OF ABORIGINAL STUDIES

The Institute promotes Aboriginal studies and assists relevant cooperation among universities, museums and other institutions. This entails the collection, processing and storage of data on all aspects of Aboriginal culture and the facilitation of studies by its own staff and others. Work being undertaken by the Institute includes the preservation of Aboriginal languages, compilation of dictionaries of the main languages, recording of music and dances, taping of oral history and studies of food sources and herbs used by Aborigines. The Institute disseminates information about Aboriginal culture, both by publishing its own findings and making available material from other sources.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Arts, Heritage and Environment								
. Bureau of Flora and Fauna*	N(b)	0.009	0.034	0.128	0.144	0.156	0.724	0.766
	N(c)	0.267	0.409	0.362	0.465	0.600	0.871	0.934
. Environmental Activities								
- Australian Environment Council Trust Fund *	N(c)	-	-	-	-	-	0.053	0.063
- Other	N(b)	-	-	-	-	-	3.193	3.149
	N(c)	-	-	-	-	-	1.732	2.018
Australian Film and Television School	S(a)	-	0.015	0.005	-	-	-	-
	S(b)	0.080	0.094	0.090	0.099	0.096	0.139	0.143
	S(c)	0.009	0.033	0.014	-	-	0.001	0.002
Australian National Parks and Wildlife Service (ANPWS)	N(c)	0.198	0.140	0.071	0.191	0.365	0.407	0.600
Great Barrier Reef Marine Park Authority	N(b)	-	-	-	-	-	0.036	0.039
	^{S}N(c)	0.066	0.097	0.032	0.082	0.125	0.282	0.352
	S(b)	-	-	-	-	-	0.012	0.010
	S(c)	0.008	-	-	0.037	-	0.079	0.061
National Library of Australia	N(a)	-	-	-	-	-	1.322	1.272
	N(b)	-	-	-	-	-	0.389	0.389
	^{S}N(c)	0.009	0.007	-	-	-	-	-
	S(a)	-	-	-	-	-	2.873	2.682
	S(b)	-	-	-	0.005	-	11.342	11.337
	S(c)	-	-	0.011	0.017	-	0.017	-
Office of the Supervising Scientist for the Alligator Rivers Region	N(a)	0.972	1.654	2.855	0.994	0.735	0.994	0.735
	N(b)	2.062	2.060	2.814	3.264	3.997	3.264	3.997
	N(c)	0.384	0.333	0.313	0.245	0.353	0.245	0.353
Total (Budget Sector)		4.065	4.876	6.694	5.542	6.500	27.455	28.947

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
B. Commonwealth Non-Budget Sector								
Department of Arts, Heritage and Environment								
. Environmental Activities								
- Australian Environment Council Trust Fund*	N(c)	-	-	-	-	-	0.004	-
Total (Non-budget Sector)		-	-	-	-	-	0.004	-
Total (Director Commonwealth funding		4.065	4.876	6.69i4	5.542	6.500	97.959	28.947
C. Expenditure from other sources								
Department of Arts, Heritage and Environment								
. Environmental Activities								
- Australian Environment Council Trust Fund	N(c)	-	-	-	-	-	0.037	0.063
Australian Film and Television School	S(b)	0.001	-	-	-	-	-	-
National Library of Australia	S(c)	-	0.001	-	-	0.018	-	0.018
Total (Other sources)		0.001	0.001	-	-	0.018	0.037	0.081
Total (A+B)		4.066	4.877	6.694	5.542	6.518	27.996	29.028

N Natural sciences and engineering S Social sciences and humanities

$_{S}$N Includes a small component of social sciences and humanities for 1979-80

^{S}N Includes some social sciences and humanities

(a) Intramural capital expenditure (for the National Library includes monographs, serials, films and data bases)
(b) Intramural current expenditure (c) Extramural expenditure

* Partly DOS estimates

DEPARTMENT OF ARTS, HERITAGE AND ENVIRONMENT

. Bureau of Flora and Fauna

The Bureau of Flora and Fauna is responsible for conducting the Australian Biological Resources Study (ABRS). Its main work is to develop and promote studies of the taxonomy and distribution of the Australian flora and fauna. Working in close collaboration with other Commonwealth and State agencies the Bureau plans, coordinates and directs the national effort to describe and document Australia's vast and unique biota.

The ABRS Participatory Program provides grants to support individual projects within the objectives of the Study. The staff of the Bureau are also involved in scientific work essential to national taxonomic documentation.

Current ABRS programs include the Flora of Australia, Zoological Catalogue of Australia, Fauna of Australia, Australian Plant Name Index, Census of Australian Plants, and tHe computer-based Australian Biogeographic Information System.

. Environmental Activities

The Environment Division provides the focus for Commonwealth responsibilities in environmental matters and for communication with international environmental agencies, particularly the United Nations Environment Programme and the Environment Directorate of the OECD. In general, the Division is responsible for policy advice, developing proposals, administering legislation, implementing programs, carrying out studies and assessments and general coordination of Commonwealth environmental interests.

A National Air Quality Data Program is being commenced to expand the data provided by the States to the National Air Quality Data Centre. This data is used for the development of long term strategies for the control of motor vehicle emissions and the establishment of national air quality goals and standards.

A National Notification and Assessment Scheme for industrial chemicals is being developed. The department is also completing a National Inventory of Existing Chemicals.

Marine environment activities have included work on the marine quality assessment program which includes monitoring baseline pollution levels and bio-indicator studies.

Environmental assessments of proposals affecting the environment to a significant extent, and which involve the Commonwealth Government are carried out under the Environment Protection (Impact of Proposals) Act 1974. The assessment of uranium mining, mineral sands mining and woodchipping have been particularly important.

The National Tree Program aims to promote action at the Government, community and individual level to conserve, regenerate, plant and maintain trees.

Environment studies undertaken by the Division include measurement of the costs of environment protection measures, utilisation of environment statistics, and the evaluation of the environmental implications of present and proposed public policies that may be environmentally important.

The responsibilities of the Division also include the administration of grants to voluntary conservation bodies, and the provision of secretariat and other support services to the Australian Environment Council, the Australian Council of Nature Conservation Ministers and the Australian Ionising Radiation Advisory Council.

AUSTRALIAN FILM AND TELEVISION SCHOOL

The School's Research and Information Department brings together the Book and Film Libraries, the Resources Unit and the Research and Survey Unit. These sections collect data, undertake research and disseminate the information on all aspects of the radio, film and television industries. This assists the formulation of the School's training policy and provides resources for students of media in all tertiary courses and for the industry.

The School also co-ordinates and disseminates research which has been undertaken elsewhere and co-operates in joint research projects with other allied organisations in the creative and performing arts fields. It also publishes the quarterly research journal "Media Information Australia".

Currently the School is exploring ways of developing its computerised information retrieval database to provide public access to this material nationally. It is also evaluating the "On the Job Training for Women" scheme.

AUSTRALIAN NATIONAL PARKS AND WILDLIFE SERVICE

The Australian National Parks and Wildlife Service is responsible for providing policy advice to the Commonwealth Government. It's role embraces both terrestrial and marine nature conservation issues which are nationally and internationally significant. The Service's diverse role necessitates extensive information requirements for policy development and for planning and managing national parks.

Scientific information gathering is achieved primarily through the Service's Research and Survey Program. The prime objective of this program is to sponsor research, survey and monitoring projects to collect information on ecological resources and ecological processes. The program covers a wide range of nature conservation policy and park management related issues. Current research areas include:

- Kakadu National Park - landscape appraisal, indigenous culture resources, and wildlife dynamics;

- Marine Resources/Marine Mammals;

    . whales
    . dugong
    . dolphins
    . marine national parks

- Ecological Resources of External Territories

    . Christmas Island/Cocos-Keeling
    . Norfolk/Philip Islands

- International

    . Migratory birds

- Public Information and Education

    . public awareness
    . ranger training
    . interpretative programs

GREAT BARRIER REEF MARINE PARK AUTHORITY

The Great Barrier Reef Authority is responsible for the development and care of the Great Barrier Reef Marine Park within the Great Barrier Reef Region.

The Authority's research role is principally to secure information needed for marine park planning and management.

The Authority is concerned with three broad areas of research:

- studies of marine organisms and ecosystems, reef geomorphology, hydrology and other aspects of the biological and physical environment. A sound, basic understanding of what constitutes the Reef and how it has evolved is fundamental to the development and monitoring of the Authority's zoning and management plans;

- knowledge of the impact of human uses on the biological and physical environment, leading to identification of the levels of use at which critical damage begins to occur; and

- demographic, sociological and economic studies which will enable the Authority to anticipate changing patterns and intensities of use and adjust its planning accordingly.

Current research projects include:

- Oceanographic studies - evaluation of surface currents in the Great Barrier Reef Region; models of flows in the Central Great Barrier Reef.

- Reef studies - bioerosion (products, rates, causes): development and evaluation of techniques for coral recolonization; evaluation of tourist impact on reef corals (completed) coral reproduction and movement and settlement of coral larvae.

- Techniques for monitoring dugong populations.

- Remote Sensing - evaluation of LANDSAT imagery versus aerial photography (completed); analysis of spectrographic data from new satellites.

- Data Bases - development of a computerised geographic relational data base.

- Environmental Impact - criteria for assessment of offshore developments, shipping risks.

- Marine Geosciences - accretion and erosion/stability of cays; sediment studies.

- Marine Biology - collection of data on populations of organisms in the Great Barrier Reef Region to examine stock levels, discreteness larval dispersal, effect of human impact - concentrating in 84-85 on demersal reef fish, coral, giant clams, dugong, crown of thorns, shells. Studies of the troll fishery and by-catch from the red spot prawn fishery.

NATIONAL LIBRARY OF AUSTRALIA

The National Library of Australia has a statutory responsibility to:

- maintain and develop a national collection of library materials in all areas of science and technology;

- make these materials available, through reference, current awareness and retrospective search services by traditional or computer based methods; and

- encourage the development of resource sharing networks among libraries and organisations with similar objectives in order to ensure that scientific and technological information is readily available to the nation.

Research projects funded for 1983-84 were:

- Development of vacuum packaging process for preservation of newspapers;

- Professional segmentation of Australian Library educators;

- Braille reading trends in Australia;

- Buying non-book resources in languages other than English.

- Percy Grainger Archive Project: project to compile a complete catalogue of the sound recordings of the composer Percy Grainger

The National Library Fellowship Scheme has been established with the following aims:

. to provide the Library as a centre of scholarly activity and research

- to encourage scholarly use of the collections and the production of publications based on them

- to publicise the Library's collections.

The first 3 Fellowships were granted in 1984-85.

OFFICE OF THE SUPERVISING SCIENTIST FOR THE ALLIGATOR RIVERS REGION

In recognition of the unique environment of the Alligator Rivers Region and the interests of the Aboriginal people of the area, the Ranger Environmental Inquiry recommended the establishment of a complex regime of environmental protection to guard against damage to the environment by uranium mining operations.

The Supervising Scientist manages the Alligator Rivers Region Research Institute, which conducts a multi-disciplinary research program, components of which include aquatic biology, terrestrial ecology, analytical chemistry, geomorphology and hydrology.

Primary responsibility for environmental protection and monitoring rests with the mining companies. Under agreed arrangements, the Northern Territory supervising authorities are responsible for day-to-day regulation of the uranium mining and milling activities.

Fundamentally the work of the Supervising Scientist is directed towards:

. acquiring an adequate knowledge of the environment and of uranium mining operations and practices in the Region, and of best practicable technology used anywhere in the world for such operations and practices, so as to be able to assess the actual and potential environmental impact of mining in the Region;

. promoting and assisting in the development of standards, practices and procedures for use in uranium mining operations in the Region, and of measures for the protection and restoration of the enviroment, such that those operations are carried out in accordance with best practicable technology;

- providing co-ordinated advice to the various parties (Commonwealth, Northern Territory, private sector, and traditional land owners) who have a close interest in the extent to which the environment is likely to be affected by uranium mining in the Region; and
- assessing the adequacy with which the environment is protected and restored.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Australian Institute of Criminology	S(a)	0.016	0.001	0.001	0.018	0.021	0.039	0.059
	S(b)	0.390	0.470	0.425	0.520	0.704	1.320	1.975
Commonwealth Legal Aid Council**	S(a)	0.004	-	-	-	-	-	-
	S(b)	0.165	0.177	0.159	0.035	0.046	0.035	0.046
	S(c)	0.045	0.041	0.086	0.065	0.120	0.065	0.120
Criminology Research Council*	S(b)	-	-	-	-	-	0.001	0.001
	S(c)	0.034	0.030	0.054	0.036	0.037	0.036	0.037
Human Rights Commission	S(a)	-	-	0.117	0.024	0.022	0.025	0.024
	S(b)	-	0.263	0.513	0.841	1.253	0.916	1.345
	S(c)	-	0.004	0.089	0.029	0.135	0.036	0.265
Institute of Family Studies	S(a)	-	-	0.018	0.042	0.002	0.069	0.003
	S(b)	0.243	0.418	0.510	0.596	0.708	0.825	0.982
	S(c)	0.250	0.250	0.114	0.012	0.015	0.012	0.015
Law Reform Commission	S(b)	-	-	-	0.125	0.128	0.125	0.128
	S(b)	1.055	1.163	1.373	1.732	2.406	1.732	2.406
	S(c)	-	-	-	0.008	0.008	0.008	0.008
Total (Budget sector)		2.203	2.816	3.459	4.083	5.603	5.244	7.413
B. Commonwealth Non-Budget sector								
Australian Institute of Criminology	S(a)	-	-	-	-	-	0.001	0.001
	S(b)	-	-	-	-	-	0.054	0.017
Criminology Research Council* . Attributable to past Commonwealth contributions	S(c)	0.007	0.012	0.013	0.013	0.013	0.013	0.013
Law Reform Commission	S(a)	-	-	-	0.004	0.002	0.004	0.002
	S(b)	-	0.019	0.075	0.055	0.034	0.055	0.034
Total (Non-Budget sector)		0.007	0.031	0.088	0.071	0.048	0.127	0.067
Total (Direct Commonwealth funding)		2.211	2.847	3.547	4.155	5.652	5.372	7.479

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
C. Expenditure from other sources								
Criminology Research Council*								
. Attributable to State contributions	S(b)	-	-	-	-	-	0.001	0.001
	S(c)	0.042	0.042	0.066	0.050	0.050	0.050	0.050
Law Reform Commission								
. Attributable to State	S(a)	-	-	-	0.003	0.004	0.003	0.004
contribution	S(b)	-	-	-	0.036	0.082	0.036	0.082
Total (Other sources)		0.042	0.042	0.066	0.088	0.136	0.090	0.137
Total (A+B+C)		2.252	2.889	3.613	4.243	5.788	5.462	7.617

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

* In each year the Commonwealth and States make matching contributions to the Criminology Research Trust Fund. Moneys may be carried over from year to year and the expenditure in any year may derive from accumulated contributions and interest. See Appendix 3.

** Figures for 1979-80 and 1980-81 are for the Commonwealth Legal Aid Council.

AUSTRALIAN INSTITUTE OF CRIMINOLOGY

Since its establishment the Institute has undertaken a wide range of research in cooperation with Commonwealth and State authorities on such subjects as crime trends, drug offences, prison labour, suicide, juvenile justice, domestic violence, police administration, terrorism, corporate crime, the costs of crime, sentencing and crime prevention planning. The publication of the results of such research and of the Institute's training activities is evidence of the close day to day relationship that has been established and developed with criminal justice administrations and the judiciaries since 1973.

Crime remains a serious problem in Australia and the cost to the community, in identifiable terms, is well in excess of $2 000m per annum and continues to increase. The Institute sees a growing need at government policy levels for large-scale imaginative efforts to deal with the causes. Research is aimed at containing the costs of crime not only in economic terms but also in social damage and personal tragedy.

In this regard the Institute has established and continues to develop its relations with international agencies in the sphere of crime prevention and correction and has been instrumental in the promotion of conferences overseas held under United Nations auspices and hosted by overseas governments.

During 1983-84, the Institute's research program included work on Corporate Crime, Victimology, Domestic Violence, Aborigines and Criminal Justice, Public Order Policing, and Crime and Justice Statistics.

Seminars conducted by the Training Division during the same period covered such subjects as Aborigines and Criminal Justice, Community Service Orders, Social Change and Juvenile Delinquency, Corruption and Illegal Markets, Victims of Crime, Alchol and the Drug Crime Link and Women in the Prison System.

CRIMINOLOGY RESEARCH COUNCIL

The Criminology Research Council was established in 1972 to control and administer a Criminology Research Fund and to determine the manner in which the moneys from the Fund are allocated. The State governments match the Commonwealth Government's annual contributions to the Fund on a dollar for dollar basis with individual State government contributions being determined on a pro rata population basis.

The Council invites applications for research grants from individuals and organisations wishing to undertake research in connection with the causes, correction and prevention of criminal behaviour and any related matter. Since its establishment the Council has awarded over 100 grants for research projects, with more emphasis on community attitudes to crime, juvenile criminal behaviour, Aboriginal and the criminal justice system and matters concerned with police administration, operations and training.

The Australian Institute of Criminology provides secretarial and administrative services for the Council.

COMMONWEALTH LEGAL AID COUNCIL

The Commonwealth Legal Aid Council was established to section 4 of the Commonwealth Legal Aid Commission Amendment Act 1981, which came into operation on 1 July 1981. The Council replaces the Commonwealth Legal Aid Commission which was abolished by the legislation mentioned above. The first members of the Commonwealth Legal Aid Council were appointed on 17 September 1981.

Recent projects involving studies of the legal needs of social security claiments and of institutionalised people have now been completed. Another project concerned with the legal needs of youth is underway. The National Legal AID Computer Project mentioned in last years Statement is now in advanced stage of development.

INSTITUTE OF FAMILY STUDIES

The Institute of Family Studies was established to conduct, encourage and coordinate research into the factors affecting marital and family stability in Australia. It also collects, analyses and disseminates information on the impact of government policies and social change on families.

Major projects in 1983-84 were:

- the development of AFIT (Australian Families Income Transfer), a computer assisted technique to evaluate the costs and impact on different family types of proposed changes to the taxation and welfare transfer systems;

- the study of the Economic Consequences of Marital Breakdown being undertaken in conjuncton with the Matrimonial Property Inquiry.

The Institute advises and assists the Attorney-General en the making of grants for purposes related to its functions and supervises the employment of such grants.

THE LAW REFORM COMMISSION

The Commission has been established as a result of the Government's concern to modernise, simplify, eliminate defects in, and adopt more effective methods for administering the law and dispensing justice.

The Commission works pursuant to references from the Commonwealth Attorney General. At present the Commission has before it twelve such References - Consumer Insolvency Stage 2; - Debt Recovery and Insolvency; Access to the Courts; Aboriginal Customary Laws; Sentencing Stage 2; Evidence; Admiralty; Service and Execution of Civil and Criminal Process; Contempt of Court; Matrimonial Property; and two References relating to the Australian Capital Territory - Community Law Reform.

The final product of the research undertaken in the Commission is a Report to the Commonwealth Parliament. Reports contain a full discussion of an area of law which needs to be developed, changed or modernised as well as draft legislation.

HUMAN RIGHTS COMMISSION

The Human Rights Commission was established in December 1981. Its mandate is to ensure that the laws of the Commonwealth and acts and practices under those laws conform with the provisions of the International Covenant on Civil and Political Rights, the Declaration of the Rights of the Child, the Declaration on the Rights of Mentally Retarded Persons and the Declaration on the Rights of Disabled Persons. The Commission is also responsible for the administration of the Racial Discrimination Act 1975 and the Sex Discrimination Act 1984.

The Commission's Research program involves three main strands - research stemming from formal complaints to the Commission, research following a reference of existing or draft legislation by the Attorney-General, and research which the Commission considers to be of priority concern for the promotion of human rights in Australia.

The Commission has an extensive in-house research program but also contracts out research to tertiary institutions, non-governmental organisations and individual researchers. Research projects for 1983-84 included Epilepsy and Human Rights; Guardianship options for Intellectually Disadvantaged People; Survey of Human Rights Literature and Associated Bibliography; and Human Rights in Country Towns.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Aviation								
. Air transport forecasting statistics and ADP	S(a)	-	-	-	-	-	0.001	0.001
	S(b)	-	-	-	-	-	0.668	0.699
. Bureau of Air Safety Investigation	S(b)	-	-	-	0.060	0.060	0.060	0.060
. Major Projects	sN(b)	-	0.014	0.020	0.022	0.029	0.022	0.045
	S(c)	-	-	-	-	-	0.100	0.008
. Provision of Meteoro-logical Services	N(c)	-	-	-	-	-	15.474	15.500
. Provision, Operation & Maintenance of Airways Facilities	N(a)	0.800	0.700	0.380	0.400	0.400	5.400	5.400
	N(b)	0.240	0.270	0.328	0.314	0.300	0.814	0.800
	N(c)	0.100	0.235	0.235	0.260	0.330	0.260	0.330
. Regulation of Air Transport								
- Environment and security	S(c)	0.027	0.014	-	-	-	-	-
- Aviation medicine	N(c)	0.043	0.044	0.040	0.085	0.108	0.085	0.108
- Airworthiness	N(b)	0.020	-	-	-	-	-	-
	N(c)	0.069	0.071	0.050	0.145	0.152	0.145	0.152
Total (Direct Commonwealth funding)		1.299	1.347	1.053	1.286	1.379	23.029	23.103

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

DEPARTMENT OF AVIATION

. Bureau of Air Safety Investigation

The Bureau of Air Safety Investigation is responsible for investigating all civil aircraft accidents and incidents occurring in Australia and its Territories. In April 1983, a major reorganisation was implemented which placed greater emphasis on the role of data analysis in accident prevention and created a specialist Air Safety Research Group. Research includes projects identified on the basis of experience in the field and statistical analysis of the Bureau's computerised Accident and Incident data base.

. Major Projects (Airport/Airways Development)

A number of master planning studies associated with the development of major airports around Australia are continuing. The financial and economic assessment of airports/airways infrastructure investment proposals is an ongoing task. An example of the work which supports master-planning and project development is a study at Kingsford-Smith Airport involving collection of a comprehensive range of usage statistics including air passenger characteristics and flows through the airport.

. Provision, Operation and Maintenance of Airways Facilities

The Department has obligations under the Air Navigation Act and Regulations and commitments arising from Australia's membership of the International Civil Aviation Organisation (ICAO} which require the establishment, provision, maintenance and operation of air route and airway facilities and associated services. The objective is to ensure the continued safe, efficient and economic performance of the national network of airways facilities and services and to ensure that the network expands or changes as necessary to meet Australia's future air transport needs.

The capital expenditure reported includes a large expenditure for the installation of earth stations in conjunction with the use of the national communications satellite when it becomes operational in 1985-86.

. Regulation of Air Transport

- Environment and security

The Department is responsible for policy, standards and procedures on aircraft noise and other environmental matters associated with aircraft operations as well as aviation security policy and procedures. It also co-ordinates operational (airways/airports) protective security and related intelligence arrangements.

- Aviation medicine

The Department has a continuing commitment to discharge statutory obligations and responsibilities by establishing and enforcing medical standards for flight crew and air traffic controllers to ensure the maintenance of safe flying operations. Activities include an on-going 'crash protection' project (Aeronautical Research Laboratory), a study on oxigen saturation in patients with head injuries, research on risk factors in air crews with specific regards to epilepsy, the development of a speech based hearing standard for air traffic controllers, an investigation initiated in 1983-84 into new aircraft instrumentation and their effect on pilots with colour vision problems, and an investigation of suitable spectacle prescriptions for flight crew with presbyopia.

- Airworthiness

The Department has responsibilities under the Air Navigation Act and Regulations which necessitate the development and implementation of standards for aircraft airworthiness. Research projects are carried out at the Aeronautical Research Laboratories and other institutions. Such research makes an important contribution to aircraft safety, mainly in the fields of aircraft structure, corrosion and engine failure. The Royal Melbourne Institute of Technology has been selected to carry out a full scale fatigue test on a glider composite material wing and the Government Aircraft Factories are carrying out flight testing to determine the viable life of Nomad N22 aircraft.

. Provision of Meteorological Services

The Department is obliged to obtain meteorological services from the Bureau of Meteorology as part of the statutory responsibilities for the safety of aircraft operations. The services are provided in accordance with Air Navigation Regulations and working arrangements between the Department of Aviation and the Bureau of Meteorology.

. Air Transport Forecasting and Statistics

Science and Technology activities are the collection and publication of aviation activity statistics and the forecasting of aviation activity by airports for the period 1985-2010.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Communications	N(a)	0.011	-	-	-	-	0.510	0.358
	N(b)	-	-	-	-	-	0.798	0.699
	S(b)	0.027	0.012	-	-	-	-	-
	S(c)	0.013	0.043	-	-	-	-	0.042
Australian Broadcasting Corporation	N(a)	0.051	0.030	0.049	0.036	0.027	0.072	0.054
	N(b)	0.094	0.093	0.129	0.171	0.200	0.342	0.400
Australian Broadcasting Tribunal	nS(b)	0.102	0.195	0.186	0.142	0.136	0.225	0.220
	nS(c)	-	0.144	-	-	-	0.040	0.046
Total (Direct Commonwealth funding, excluding BE)		0.297	0.518	0.364	0.349	0.363	1.987	1.819
B. Commonwealth Non-Budget sector								
Australia Post BE	N(a)	0.130	0.085	0.065	0.078	0.083	0.253	0.247
	N(b)	0.605	0.459	0.707	1.030	1.045	2.555	2.685
	N(c)	0.060	0.085	0.085	0.091	0.081	0.289	0.286
Overseas Telecommunications Commission, Australia (OTC) BE	N(b)	-	-	0.013	0.047	0.518	0.087	0.522
	N(c)	0.195	0.345	0.592	0.443	1.043	0.765	1.208
Telecom Australia BE*	sN(a)	7.9	6.3	4.8	4.8	3.9	9.0	8.4
	sN(b)	27.7	31.8	36.9	36.4	39.7	73.8	85.1
	sN(c)	0.671	0.717	0.905	1.310	1.518	9.310	13.518
Total (Non-Budget sector)		37.3	39.7	44.1	44.2	47.9	96.1	112.0
Total (Direct Commonwealth funding, including BE)		37.6	40.2	44.4	44.5	48.3	98.0	113.8
C. Expenditure from other sources								
Telecom Australia	N(a)	0.022	0.050	0.034	0.031	0.016	0.031	0.016
	N(b)	0.078	0.250	0.266	0.269	0.184	0.269	0.184
Total (Other sources)		0.100	0.300	0.300	0.300	0.200	0.300	0.200
Total (A+B+C)		37.7	40.5	44.7	44.8	48.5	98.3	114.0

N Natural sciences and engineering S Social sciences and humanities

$_{S}$N Includes small proportion of social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

BE Wholly Commonwealth-owned business enterprise

*Includes AUSSAT Pty Ltd

DEPARTMENT OF COMMUNICATIONS

The Department of Communications' responsibilities include the policy and technical aspects involved in developing and maintaining broadcasting services and the management and use of the radio frequency spectrum. An intensive program of field and laboratory investigations is being undertaken to determine system standards and performance specifications for small earth stations to be used in the reception of the Homestead and Community Broadcast Satellite Service (HACBSS). The Communications Development Division is also involved in investigations of the supplementary monophone transmission on an FM broadcast transmission, and preparation of a reference television receiving system specification for spectrum planning purposes.

AUSTRALIAN BROADCASTING CORPORATION (ABC)

The ABC has the responsibility to provide adequate and comprehensive television and radio programs throughout Australia. To further this aim, its R&D activities cover the design, using innovative techniques where appropriate, of specialised equipment which is not otherwise available. Technical support is also given to facilitate the introduction of technological changes into the ABC's operations and to allow effective liaison with overseas and Australian organisations.

AUSTRALIAN BROADCASTING TRIBUNAL

The Australian Broadcasting Tribunal is responsible for matters relating to licensing and overseeing of public and commercial broadcasting and commercial television stations.

During 1983-84, the Research Branch continued to provide the Tribunal with original field research, background and discussion papers and statistical analyses. During 1984-85 and in future years, it is anticipated that less emphasis will be placed on the examination of community attitudes in the field. Accordingly, it is anticipated that expenditure in these areas will decline. Major projects undertaken by the Research Branch during 1983-84 included a report of a detailed study of aspects of the Australian television drama series 'A Country Practice[1], a study of young people's responses to music in the media and elsewhere, a study of television program and advertising production during 1982-83, and embarking on a discussion paper for public comment on the status of women in the media. The content of programs televised during sample periods in 1983-84 was analysed as part of a continuing study.

The following studies were continued into 1984-85:

1 Status of Women discussion paper.

2 Survey of Australian television production.

3 Survey of Youth and Music.

AUSTRALIAN POSTAL COMMISSION ('Australia Post')

The Postal Services Act requires that the Commission perform its functions in such a manner as will best meet the social, industrial and commercial needs of the Australian people. In providing these services, the commission is required to have regard to the need to operate its services as efficiently and economically as practicable. It must have regard also to the special needs for postal services of Australian people who reside or carry on business outside the cities and the desirability of improving and extending its postal services.

The Commission, which trades as "Australia Post", carries out research and development aimed at providing new and improved products, services, management systems, procedures and techniques which have been identified as important for the achievement of its broad objectives. Current research is directed towards developing electronic mail containerisation, robotics, control circuity and mail coding.

AUSTRALIAN TELECOMMUNICATIONS COMMISSION ('Telecom Australia')

The provision of telecommunications services and the ongoing development and efficient operation of the national telecommunications network infrastructure are technology-dependent. Hence, the general thrust of Telecom Australia's R&D and S&T activities is towards the timely adoption of appropriate technology to assist Telecom to fulfil its charter to provide, maintain and operate national telecommunications services which meet the social, industrial and commercial needs of people throughout Australia, with charges that are as low as practicable, and to keep these services up to date through the efficient and economic development and operation of the national network infrastructure.

Priority objectives of Telecom's S&T and R&D activities are:

- the introduction of new customer services, facilities and products, such as mobile telephone and paging services,
- the provision of automatic telephone and data transmission services to customers in the remote parts of Australia,
- the introduction, through microelectronics and optical fibre technology, of digital switching and transmission techniques and computer control of switching systems into the national network infrastructure, to improve service standards and create a flexible network infrastructure which can evolve to provide an integrated services digital network, with international accessibility and quality, in the 1990s,
- the maintenance of network integrity and survivability.

Telecom's R&D activities are directed at the development of an independent competence within Telecom for the evaluation of world trends in telecommunications science and technology, to assist the planning and specification of new developments relevant to the Australian telecommunications environment. The development of such competence is especially important in the Australian context since Australia is relatively isolated from the world centres of telecommunications R&D. Telecom's R&D also provides specialist knowledge and facilities for the solution of unusual technical problems arising in the operation of its networks, and a basis for Telecom's contributions to the development of international standards for telecommunications.

Telecom's R&D activities provide an input to Telecom's wider S&T activities, which are concerned with technical innovations leading to the planning, development, implementation and operation of:

- new or improved services, facilities and products,
- expansion and development of the network infrastructure,
- improved network management, administration and integrity,
- improved operational and maintenance practices.

Telecom's R&D and S&T activities range over the whole spectrum of telecommunications science and engineering. Projects cover:-

- research related to techniques, technologies and standards with longer term potential for application in customer services or network systems,
- investigations related to the planning, specification and adaptive design of customer services and network systems for medium term implementaton,
- solution of technical problems arising in the operation of systems, equipment, components and materials in the network,
- development of new or improved network management systems and operational and maintenance practices.

The projects being pursued by Telecom in 1984/85 encompass:

- signal processing techniques;
- multi-mode and single mode optical fibre transmission systems;
- digital microwave radio transmission systems;
- teleconferencing;
- software architectures and specification and description techniques for real time control of telecommunications systems;
- common channel signalling techniques in stored program controlled exchange networks;
- communication protocols;
- circuit and packet switched digital networks for voice and data;
- telecommunications network dimensioning and dynamic management techniques;
- digital reticulation in the local subscriber network;
- customer access and network interface standards for the evolution of an Integrated Services Digital Network;
- advanced voice and non-voice, real-time and non-real-time business communications services and networks;
- radiocommunications antennas and propagation techniques;

- microelectronics technology;
- advanced semiconductor and optical devices;
- reliability of telecommunications plant and equipment;
- scientific techniques for the assessment of hazards (chemical, electrical, etc) arising in telecommunication operations, and for the protection of both personnel and plant from such hazards.

Significant achievements during 1983/84 include:-

- introduction of a new standard telephone with push button dialling, and other premium and business telephones
- introduction of a new generation AXE digital telephone exchanges
- steady progress in providing automatic services to customers living in the more remote parts of Australia
- successful trials and planning for the introduction of digitial radio and optical fibre transmission systems in the trunk network
- implementation planning for the Iterra Network Service over the national communications satellite in 1986
- continued rapid extension and development of data services and networks
- implementation planning for the Viatel videotex service
- extension of mobile radio paging and telephony services
- introduction of new generation digital private automatic branch exchanges (PABX)
- extension of international subscriber dialling facilities and automated call charge recording
- improved Confravision services between Melbourne and Sydney
- commencement of the joint development, with LM Ericsson (Australia), of a digital, computer controlled exchange for rural applications.
- formulation of polymer materials for reliable application in telecommunications plant; and
- analytical techniques for the assessment of hazardous chemicals arising in telecommunication operations.

OVERSEAS TELECOMMUNICATIONS COMMISSION (Australia) (OTC)

The Overseas Telecommunications Commission (Australia) is responsible for the establishment, maintenance, operation and development of all public telecommunications services between Australia and other countries, between Australia and its external territories and with ships at sea. Its R&D activities and supported projects, which encompass telecommunications, submarine cable and satellite technologies, are funded from trading revenues.

In 1983 OTC established its own external Research and Development Board whose main objective is to guide research and development funded by the Commission. The establishment of the R&D Board is part of an expanded R&D program being undertaken by OTC. The program is directed towards servicing the future technological needs of the international telecommunications business, including research in physics, engineering and communications theory.

A significant proportion of the expenditure proposed for 1984/85 will be on external contracts placed with industry and research institutions. To date this year, two contracts have been let. These relate to feasibility studies into Digital Modulation of Analogue Submarine Cables and the development of a USA/Australia Data Transmission Standards Converter. Further research proposals currently being evaluated include studies into signal processing, traffic engineering, signalling and switching, satellite earth station techniques, and opto-electronic systems and techniques. In the S&T category, OTC has funded the establishment of a centre of expertise in radio frequency interference prediction at a research institution in NSW which will assist in the location and licensing of new satellite earth stations.

As well as direct OTC expenditure on R&D, as a member of the International Telecommunications Satellite Organisation (INTELSAT) and the International Maritime Satellite Organisaton (INMARSAT) OTC contributes to the funding of R&D programs conducted by these organisations. This expenditure has been included in the extramural R&D activities.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Community Services								
. Office of Child Care	S(b)	-	0.082	0.012	0.021	0.021	0.198	0.198
	S(c)	0.052	0.124	0.041	0.079	0.080	0.515	0.470
. Studies on Rehabilitation and Services for the Handicapped	S(c)	0.096	0.113	0.399	-	-	0.532	0.622
. Welfare Research	S(b)	-	-	-	-	-	-	0.120
	S(c)	-	-	-	0.065	0.600	0.090	0.625
. Social Welfare Policy Secretariat	S(b)	0.542	0.642	0.602	0.657	0.771	0.657	0.771
	S(c)	-	-	0.023	-	-	-	-
Total (Direct Commonwealth funding)*		0.690	0.961	1.077	0.822	1.472	1.992	2.806

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure

(c) Extramural expenditure

DEPARTMENT OF COMMUNITY SERVICES

The Department conducts a wide range of research, evaluation and statistical activities in the context of its policy analyses relating to various aspects of the social welfare system, including income security, child care, rehabilitation and services for the aged and handicapped.

. Office of Child Care

Tasks of the Office are:

- to provide specific knowledge and information on the effectiveness and appropriateness of current programs;
- to identify the need for new or revised Government initiatives in the area of child care;
- to provide information and advice on the resources available to early childhood services;
- data collection on the provision and use of early childhood services.

. Studies on Rehabilitation and Services for the Handicapped.

Studies carried out are aimed at improving rehabilitation and services for the handicapped through specific program upgrading measures directed at service content, staff development and training. The 1983-84 studies program included the production on an Activity Therapy Handbook - a detailed guide to the establishment and conduct of activity therapy centres for disabled people; the production of a Residential Handbook on services for disabled people, and of a Sheltered Employment Handbook; the development of an evaluation methodology for services to disabled people and of an information Kit on 'Ethnicity and Disability'. New and continuing studies in 1984-85 include a Pilot Attendant Care Project - evaluation of a system to provide paid attendants for disabled people; the pilot testing of the US-developed 'Specialised Training Program' for severely disabled people; the evaluation of the Accreditation Manual for Sheltered Workshops, now in the final stage of production; the conduct, provision of audio-visual aids and administration of training courses for sheltered workshops staff, and the establishment of a model activity therapy program within the CCAE.

. Welfare Research

The expenditure reported covers the WELSTAT project, studies of the aged, and the Welfare Research Centre. WELSTAT is a joint State and Commonwealth project concerned with the standardisation and improvement of social welfare statistics. The project is managed by committees consisting of representatives from each State and Territory Welfare department, the Australian Bureau of Statistics, the Commonwealth Department of Community Services and the Social Welfare Policy Secretariat. It is serviced by a Secretariat which operates full time and which is located in the central office of the Department of Community Services.

Studies of the aged include contracted research projects to study the standard cost of providing services to the aged and disabled in voluntary non-profit hostels receiving recurrent Commonwealth subsidies, and to study staffing and quality of care within the voluntary non-profit hostels for the aged and disabled, plus emergency relief data collection.

Extramural expenditures shown represent the Department's contribution to the ACTU for its Welfare Research Unit.

. Social Welfare Policy Secretariat

The Social Welfare Policy Secretariat was established in 1978 and is responsible to the Minister for Community Services. Although it is closely associated with the Department for administrative purposes, the Secretariat is separately staffed and financed and functions as an independent organisation.

The role of the Secretariat is to provide advice on, and promote the coordinated development and review of policies and programs in the broad field of health and welfare; and to promote the direction of appropriate research and statistical activities to these ends.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Defence								
. DSTO and Armed Services	N(a)	7.931	8.265	15.743	17.747	23.532	22.851	30.524
	N(b)	89.693	94.378	97.636	102.551	106.622	165.689	173.604
	N(c)	0.399	0.742	1.049	0.914	1.090	0.914	1.090
. Office of Defence Production								
- Aircraft Guided Weapons and Electronics Supply	N(a)	-	-	-	-	-	0.342	0.013
	N(b)	-	-	-	-	-	5.034	6.959
- Industry Development Branch	N(c)	-	-	-	-	-	21.431	20.540
- Munitions and Ordnance Supply	N(a)	-	-	-	-	-	3.095	2.190
	N(b)	0.032	-	-	0.090	0.077	8.284	8.132
Total (Direct Commonwealth Funding)		98.055	103.385	114.428	121.212	131.244	227.639	243.050
B Expenditure from other sources								
Department of Defence								
. DSTO and Armed Services	N(b)	1.832	1.134	0.085	0.243	0.166	0.243	0.166
. Office of Defence Production								
- Munitions and Ordnance Supply	N(a)	-	-	-	-	-	3.378	1.986
	N(b)	-	-	-	-	-	9.044	7.374
Total (other sources)		1.832	1.134	0.085	0.243	0.166	12.666	9.526
Total (A+B+C)		99.887	104.519	114.513	121.455	131.410	240.304	252.576

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure

(c) Extramural expenditure

NOTE

The costs shown in the table are estimates of expenditure or actual expenditure incurred against appropriations to the Department of Defence and from other sources. Costs classified as R&D expenditure include:

- Most capital and current expenditure by the Defence Science and Technology Organisation (DSTO), including salaries of some Service Personnel attached to the DSTO; and
- payments to CSIRO for assistance to Defence on environmental matters relevant to land management.

Costs classified as expenditure on S&T (other than R&D) include:

- a portion of DSTO expenditure relating to policy determination, staff training and the operation of library and information services for DSTO Laboratories;

DEPARTMENT OF DEFENCE

. Defence Science and Technology Organisation (DSTO)

DSTO's functions are to:

- provide scientific and technical advice on defence policy matters;
- provide scientific and technical support:
  - . to the Australian Defence Force in its task of maintaining effective forces in being and for the developent of the Force;
  - . for the acquisition of defence materiel; and
  - . for such other matters as specified by the Minister for Defence;
- maintain a technology base to support the Australian Defence Force, the Department of Defence and defence industry; and
- carry out the initial development of selected prototype equipment, to meet approved Defence requirements.

Current projects of significance include the JINDALEE over the horizon radar and the WINNIN active expendable decoy to protect ships against anti-ship missiles.

DSTO actively participates in international cooperative programs in science and technology, notably the Technical Co-operation Program (UK, USA, Canada, Australia and NZ).

The work of DSTO is matched to the needs and trends of Australian defence (present and future). While DSTO's work mostly involves its principal customers - the Defence Force and defence industry - there is considerable interaction with other science and technology bodies in the private and public sectors including tertiary institutions both in Australia and overseas.

DSTO has had a policy of contracting to industry, wherever possible, development work on projects likely to lead to volume production. DSTO tries to involve industry as early in the project as is practicable but needs to have sufficient competence initially to provide "R&D authority" supervision. Some large tasks have been placed in Australian industry, e.g. contracts worth $25m for development of the BARRA sonobuoy and $3.9m for the development, operation and maintenance of the JINDALEE Experimental Facility.

DSTO's program of research agreements with tertiary education institutions has grown considerably in recent years. Current research agreements cover such areas as signal processing, aerodynamics, lasers, adhesive bonding, shock wave effects, optical fibres, artificial intelligence, high temperature corrosion and digital control systems. DSTO is represented on and provides modest funding for the Radio Research Board and the Computer Research Board. Some funds are also provided to the Ocean Sciences Institute.

. Armed Services

The Armed Services each conduct some scientific and technological work to meet specific operational needs.

Extramural research and consultancy in relation to land management of Defence properties which will ensure long term conservation is conducted by the CSIRO.

. Office of Defence Production

- Aircraft, Guided Weapons and Electronics Supply Division

    . Provides policy advice to the Minister on the capacity, efficiency, and technological capability of the Australian aerospace industry.

    . Formulates proposals and implements programs for improving the structure and efficiency of the industry, for the development and acquisition of new technologies and equipment, and for the economic utilisation of defence production capacity.

    . Manages government aerospace production facilities concerned with the design, development, manufacture, maintenance, and export of aircraft and guided missiles.

    . Plans and oversees defence aircraft activities in the private sector.

- Industry Development Branch (including Industry Development Regional Office)

    . Formulates and develops local industry development policies.

    . Co-ordinates industry development and assistance activities across the department.

    . Maintains liaison with other organisations and departments in relation to industry technology of defence interest.

    . Develops proposals for, and/or provides advice on, the involvement of Australian industry in specific defence procurement.

    . Monitors, and, where necessary, manages Australian industry programs forming part of specific defence procurements.

. Develops and implements proposals for the establishment in specific fields of technology.

. Manages specific development programs to meet unique defence requirements based on both local and imported R&D.

Among the technologies being developed in industry in support of defence capability, but which have potential for civilian uses, are micro-electronics, multi-layer circuit boards, thick film hybrids, piezo-electric ceramics, precision optics, infrared sensors and thermal imagers, lasers, optical fibres, lithium batteries, and crack patching for aircraft.

- Munitions Supply Division

. Formulates detailed proposals for planning, allocation and control of production capacity in government munitions factories to meet the requirements of the defence services.

. Oversees and coordinates the management of the government's munitions factories and the design projects and planning of capital projects and new equipment programs.

. Develops production practices embracing quality control and the safe handling of munitions material in government establishments.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Education								
. Australian Council for Educational Research	S(c)	0.319	0.370	0.420	0.443	0.491	0.443	0.491
. CERI participation	S(c)	-	-	-	-	-	0.005	0.010
. Education Research and Development Committee	S(c)	0.992	0.679	0.135	-	-	-	-
. Education Review and Evaluation Studies	S(c)	0.140	0.070	0.129	0.115	0.155	0.115	0.155
. Educational use of Communications Technology	S(c)	-	-	0.048	0.109	0.060	0.109	0.060
. Participation and Equity Program	S(c)	0.250	0.236	0.218	0.274	0.363	0.274	0.363
. Postgraduate Awards	SN(c)	7.756	8.537	11.165	14.601	15.944	16.476	18.000
. Research Statistics Branch	S(b)	0.067	0.066	0.040	0.124	0.118	0.217	0.232
. TAFE National R&D Centre	S(c)	0.020	0.212	0.282	0.320	0.345	0.320	0.345
A.C.T. Schools Authority	S(b)	0.118	0.152	0.175	0.131	0.131	0.162	0.162
Commonwealth Schools Commission	S(c)	0.369	0.495	0.314	0.088	0.069	0.538	0.445
. Curriculum Development	S(b)	0.602	0.469	0.200	0.299	0.364	0.897	1.152
	S(c)	0.445	0.408	0.093	0.571	1.715	0.721	2.053
Commonwealth Tertiary Education Commission								
. Evaluations and Investigations	S(b)	0.078	0.035	-	-	-	-	-
	S(c)	0.186	0.095	0.095	-	-	0.316	0.438
Grants to universities**								
. Commonwealth Special Research Centres	SN(c)	-	1.5	5.9	5.4	6.0	5.4	6.0
. Other	SN(c)	77.0	85.0	96.0	102.0	116.0	102.0	116.0
Total (Budget sector)		88.3	96.3	115.2	124.5	141.8	128.0	145.9

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
B. Commonwealth Non-Budget sector								
Commonwealth School Commission								
. Curriculum Development	S(b)	0.158	0.089	0.063	0.031	0.038	0.093	0.113
	S(c)	0.117	0.077	-	0.010	0.012	0.262	0.319
Total (Non-Budget sector)		0.275	0.166	0.063	0.041	0.050	0.354	0.432
Total (Direct Commonwealth funding)		88.6	98.5	115.3	124.5	141.8	128.4	146.4
C. Expenditure from other sources								
Department of Education								
. Educational use of Communications Technology	S(c)	-	-	0.048	-	-	-	-
Total (Other sources)		-	-	0.048	-	-	-	-
Total (A+B+C)		88.6	98.5	115.3	124.5	141.8	128.4	146.4

N Natural sciences and engineering S Social sciences and humanities

^{S}N Includes significant proportion of social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

** The amounts which universities spend on research from their general recurrent grants and equipment grants are not included. Total R&D expenditure funded by the Commonwealth in the Higher Education sector was $423.2m in 1981 (ABS - Publ no 8111.0, Oct 1983.

DEPARTMENT OF EDUCATION

. Australian Council for Educational Research (ACER)

The annual research program and level of funding of ACER is agreed to by the Australian Education Council (AEC) which provides Commonwealth/State coordination at Ministerial level. As well as receiving the Commonwealth grants shown in the table, ACER also receives matching grants from the States.

The grant to ACER assists it:

- to promote research and development in education in Australia;
- to conduct research and undertake development in any matters affecting education through its own staff and in cooperation with other bodies in Australia and overseas; and
- to disseminate publications and results of research and development.

In 1983-84 the direct Commonwealth contribution represented 50% of the total core grant received by ACER, and 25% of total ACER R&D expenditure for that year.

Broad research programs cover teaching and learning; the social context of education; and measurement and evaluation. These are supported by programs covering library and information services; survey and psychometric services; advisory services; and publishing. The research program contains many diverse projects. Examples of substantial projects current in 1983-84 and continuing (unless otherwise stated) in 1984-85 include:

- the Second IEA Science Study, which aims to measure the current state of science education across the world, and to investigate curricular and other factors which explain differences in the outcomes of science programs;
- the IEA Classroom Environment: Teaching for Learning Study, is investigating the relationships between specific teaching practices and student outcomes, both cognitive and affective;
- Australian Scholastic Apitude Test: the ACT, WA and Queensland use ASAT for various purposes including the moderation of school assessment at year 12 and a new form of ASAT is commissioned annually;
- Youth in transition (Formerly known as the Survey of School Leavers) is a major longitudinal study of students who were 10 and 14 in 1975. The 10 years of data will be used to assess links between education and the labour market;
- Secondary School Mathematics and Technical Careers: its study investigates factors affecting participation in science and mathematics in upper secondary school and the decision to train for a career in science and technology.

. OECD Centre for Educational Research and Innovation (CERTI)

Australian participation in the OECD Centre for Educational Research and Innovation is directed to investigatory exercises in the areas of Education and New Information Technology; Transition of Handicaped Youth from School to Work; School Improvement; Education and Linguistic and Cultural Pluralism and Innovation exchange.

. Educational Use of Communications Technology

A Commonwealth/State Advisory Committee was established in 1982 to recommend a balanced program of trials or other projects in the educational use of communications technology. The program is for a three year period commencing in the 1982-83 financial year. In 1984-85 the Commonwealth is providing $60 000 to match on a dollar-for-dollar basis expenditure by the States on approved trials and evaluation of the program.

Twelve trial projects have received funding in the first two years of the program. Those projects of a research nature include experimentation in the coordination of access to the ATS-1 satellite for educational trials; an interactive television teaching program; the use of distance learning materials by the Primary School child as an isolated learner; the use of an FM radio sub-carrier for the provision of tutorial interaction in University distance education; facsimile reproduction to increase student-teacher feedback in a secondary correspondence school; audio-video-teleconferencing for the in-service education of teacher-librarian; use of UHF audio and video to link specialist services to rural schools; and the development of interactive video and computer learning programs.

. Research and Statistics Branch

The Research and Statistics Branch is concerned broadly with education at the national level.

Included amongst the Research and Statistics Branch functions are:

- provision of research and analysis resources and statistical services for the portfolio;
- reporting on, reviewing and evaluating existing policies and programs; and
- conducting analytical projects in relation to major dimensions of, or issues in, Australian education with particular reference to coordinated projects involving other parts of the portfolio and other Departments.

The Research and Statistics Branch conducts in-house studies for these purposes, and manages contracts under the Education Review and Evaluation Studies program and the Participation and Equity Program.

. Education Review and Evaluation Studies

These studies contribute to the Department's continuing proceses of assistance of its programs and other functional responsibilities. They include evaluation of major student existence programs in terms of their effectiveness in meeting the needs of client groups and exploratory studies or literature reviews designed to provide information for policy development. In 1983-84 projects included a Review of Aboriginal Study Grants Scheme, an investigation of the English language needs of newly arrived migrants and refugee youth, and an assessment of adult literacy needs and provision.

. Participation and Equity Program

Funds for the National Projects and Evaluation within the Participation and Equity Program were spent mainly in the areas of evaluation, research, dissemination and conference activities.

The National Projects and Evaluation allocation was established to provide a modest capacity at the national level to take initiatives within a State grants program where the initiative for program development lies mainly with the State authorities.

The projects are policy orientated and developmental in nature, with a view of extending the concept of and policies for transition education. Areas covered by projects current in 1984-85 include a longitudinal study of school leavers and studies on TAFE curriculum development and on the impact of transition programs.

. Education Research and Development Committee (ERDC)

The Committee advised the Minister on educational research priorities and made education research grants and annual awards as well as arranging dissemination of reports. The ERDC has been abolished and its programs have been terminated following the Review of Commonwealth Functions. The last of its programs was completed by the end of March 1983.

. Postgraduate Awards

There are three categories of postgraduate awards. Research awards are for PhD and Masters research courses in universities. Course awards are for coursework Masters programs in universities. Advanced Education Institution awards are for Masters programs in Colleges of Advanced Education. The living allowance under the awards was increased for 1985 from $7 330 to $7 616.

. TAFE National Research and Development Centre Ltd

The TAFE National Centre for Research and Development Ltd was established jointly by the Commonwealth and the States as a company in South Australia and commenced operations in November 1981. Its members are the Commonwealth and State Education Ministers. A Board of Directors, consisting of TAFE administrators and business people, manages the company on behalf of the members. The purpose of the Centre is to stimulate and co-ordinate research and curriculum development in technical and further education throughout Australia.

1984 activities included in-house projects such as translating occupational data into curriculum, an analysis of appropriate modes of teaching external studies to TAFE students, the selection of students for trades-based pre-vocational or pre-apprenticeship course and the job profiles of trainees in industry. In June 1984 there were 11 in-house projects in progress. A significant proportion of the Centre's budget is allocated to providing grants to appropriate agencies for undertaking projects directly relevant to TAFE, eg, mathematics and reading programs for adult Aboriginal students, videotapes in external studies, adult literacy materials development, monitoring technolgical change. By June 1984 53 major projects had been commissioned. The centre also operates the National TAFE Clearing house, which disseminates information on TAFE research and development projects.

COMMONWEALTH TERTIARY EDUCATION COMMISSION

The prime functions of the Commission under the Commonwealth Tertiary Education Commission Act 1977 are to advise the Minister on the necessity for, and the conditions and allocation of, financial assistance in respect of universities, colleges of advanced education and technical and further education institutions, and to administer approved policies and grants. The Act specifies that the commission is to perform its functions with the object of promoting:

- the balanced and coordinated development of the provision of tertiary education in Australia; and
- the diversifying of opportunities for tertiary education.

. Evaluations and Investigations Program

The Commission's Evaluations and Investigations Program seeks to:

- obtain information which will assist in future decision-making by the Commission and its Councils, State authorities and individual institutions;
- encourage the development of evaluative skills;
- promote a climate of critical self-assessment within institutions and authorities.

Studies funded under the Program include investigatory studies conducted along the lines of a research project and internal reviews, including reviews of administrative practices and structures. Examples of the studies funded in 1983/84 and 1984/85 include evaluations of pilot college-based basic nursing courses, the development of measures of quality and efficiency in higher education, a review of tertiary arts education and training and a study of women's access to work through TAFE.

GRANTS TO UNIVERSITIES

. Commonwealth Special Research Centres

In 1982, ten Special Research Centres were established under the Commonwealth Program for Promotion of Excellence in Research. One of the Centres, the Nerve-Muscle Research Centre at the University of New South Wales closed in 1984.

. Other Grants

Expenditure on research and development in universities falls into three categories.

These are:

1 Funds specifically earmarked for research in the States grants legislation (known as Special Research Grants), together with other funds earmarked for research by the institutions themselves from recurrent and equipment grants provided under this legislation, or, in the case of the Australian National University, from its direct appropriation. These identifiable research expenditures are shown in the above table.

2 Funds specifically allocated to research activities but which are derived from sources other than those in Category 1 . It is assumed that the Commonwealth components of such funding eg ARGC, NH&MRC, NERDDC have been included as extramural expenditure by the departments and authorities concerned.

3 Expenditure on research activities which is funded from grants provided under the States grants legislation but which is part of the general teaching and research functions of the university. While the value of this research cannot be separately identified, an imputed value of $280m was estimated for 1981 in the 1981-82 Project SCORE Survey. If the 1981 proportion of imputed to total expenditure from all sources is applied to total expenditure from all sources in subsequent years, the imputed value of R&D in this category performed by universities would be approximately $310m in 1982, $330m in 1983 and $360 million in 1984. Comparable figures for earlier years are $220m in 1979 and $250m in 1980.

For colleges of advanced education the R&D reported to Project SCORE for 1981 was $9m which represented 1.5% of total Commonwealth grants to these bodies.

The imputed figures for R&D in Category 3 have not been included in the above table because they are based on subjective assessments and are thus subject to some degree of uncertainty.

Because financial accounting in universities is on a calendar year basis, the amounts shown in the above table are based on the following actual expenditures:

Identifiable research expenditure	1979	1980	1981	1982	1983
	$m	$m	$m	$m	$ m
- from general funds	52.2	57.9	65.3	72.2	78.8
- special research grants	5.6	6.2	7.1	8.0	10.5
- from equipment grants	7.7	8.3	8.7	9.5	5.9
TOTAL	65.5	72.4	81.1	89.7	95.2

ACT Schools Authority

The research program of the ACT Schools Authority is aimed at improving the operation of schools and education in the ACT. Major areas of research and development are evaluation of schools, design and implementation of a research program for the High School Review, and establishment of a test development program.

COMMONWEALTH SCHOOLS COMMISSION

The Commission advises the Minister for Education on the needs of schools in Australia. In additon to its general funding programs the Commission has specific purpose programs designed to assist special target groups such as children in disadvantaged schools or areas, migrants and the handicapped. Other programs address particular educational issues, for example, the needs of school communities, student needs in particular age groups, and the special needs of girls.

. Curriculum Development

From 1984-85, the Schools Commission has responsibility for the curriculum development activities of the former Curriculum Development Branch of the Department of Education, originally established as the Curriculum Development Centre (CDC). The Centre was a national statutory body that worked on school curricula in co-operation with educational authorities and agencies throughout Australia and overseas.

Activities of the former CDC are being re-established by the Commission and include research into curriculum development, and the publishing and marketing of curriculum and teaching materials. In conjunction with the decision by the former Government to wind down the Centre and set up a Curriculum Development Branch within the Department of Education, recent curriculum development activities have continued only in areas deemed to be of national significance, such as Aboriginal education and multicultural education. Some bilateral projects have also been maintained in international education.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Employment and Industrial Relations								
. Australian Standard Classification of Occupations	S(b)	0.501	0.619	-	-	-	0.234	0.260
	S(c)	-	0.018	-	-	-	-	-
. Bureau of Labour Market Research	S(a)	-	0.009	-	-	-	-	-
	S(b)	0.089	0.626	0.690	0.790	0.825	1.302	1.356
	S(c)	0.006	0.067	0.047	0.385	0.525	0.385	0.525
. Employee Relations Program	S(c)	0.021	0.025	0.009	-	-	0.060	0.120
. Grant to National Safety Council	N(b)	-	-	-	-	0.050	-	1.225
	N(c)	-	-	-	-	0.375	0.160	0.745
. Physical environment standards	S(b)	0.077	0.137	-	-	-	-	-
	N(b)	0.116	0.206	-	-	-	-	-
	N(c)	0.007	-	-	-	-	-	-
Total (Direct Commonwealth funding)		0.818	1.706	0.746	1.175	1.775	2.142	4.229

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

DEPARTMENT OF EMPLOYMENT AND INDUSTRIAL RELATIONS

. Bureau of Labour Market Research

The Bureau of Labour Market Research (BLMR) is the research arm of the Department of Employment and Industrial Relations.

The Bureau undertakes research and analysis, sponsors research by other bodies and acts as a "clearing house" for labour market research to ensure that advances in understanding are widely known and used. Senior staff are responsible for the design, implementation and dissemination of research. An Advisory Council oversights the work of the Bureau and advises the Minister for Employment and Industrial Relations on the Bureau's research program and priorities.

The BLMR is independent and publishes the results of research. Funding for 1983-84 was provided for the preliminary phase of the Longitudinal survey of the Long Term Unemployed which will investigate the processes of change in the labour market with particular emphasis on unemployed persons. It is expected to examine the labour market status and behaviour of approximately 10 000 individuals over a period of three to five years, having regard to their characteristics, attributes and household circumstances. Research will also be carried out into three areas of women's employment. The areas are: the entry of women into professional careers; women in management; and small employer attitudes to the entry of females into non-traditional trades.

. Australian Standard Classification of Occupations (ASCO)

The Department of Employment and Industrial Relations and the Australian Bureau of Statistics jointly are developing a new comprehensive ASCO which will be used by the ABS, State and Commonwealth Government departments and authorities (including the Commonwealth Employment Service), universities, schools, and private industry for various purposes. ASCO will provide a systematic classification and description of occupations in the Australian labour market to assist:

- labour market analysis;
- development of training programs and labour force planning;
- improved manpower forecasting;
- accessibility to occupational information; and
- more efficient matching of job seekers and vacancies.

A working draft of ASCO was released in August 1983. An information paper announcing the short-term future direction of the project is planned for release by end 1985. The ASCO first edition is to be published in 1986 revising and replacing the working Draft. This will complete the S&T activities for ASCO.

. Working Environment Branch

The aim of the Working Environment Branch is to promote the spread of Industrial Democracy Employee Participation. It advises the Government with regard to these issues and provides Secretarial support to the NLCC Committee on Employee Participation. The aim of the Industrial Democracy research grants is to provide research into the following issues:

- the maintenance of the long-term effectiveness of industrial democracy/employee participation programs;
- the development of a shared understanding on goals, objectives etc, between the various parties concerned in industrial democracy/employee participation programs;
- the role and training/resource needs of middle management and supervisors;
- the training and resource needs of employees and their representatives;
- critical factors in the effective functioning of representative systems;
- the design of technical systems to suit human as well as technical requirements;
- analysis and solution of legal problems related to the development of industrial democracy;
- information disclosure to employees, particularly in the context of technological change and health and safety at work;

- changes necessary to the industrial relations system to accommodate industrial democracy;

- National Safety Council of Australia

The National Safety Council of Australia aims to encourage, and work for, the spread of safety awareness and safety practices throughout Australia by providing an authoritiative source of information, opinion and advice to industry, unions, Governments, media and the community.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Foreign Affairs								
. Bilateral Agreements	N(c)	-	-	-	-	-	0.100	0.110
	S(c)	-	-	-			0.100	0.110
. Economic Studies	S(c)	0.332	0.172	0.332	0.332	0.372	0.332	0.372
. Multilateral Grants	N(c)	0.012	0.011	0.012	0.012	-	0.012	-
	S(c)	0.037	0.030	0.034	0.033	0.038	0.033	0.038
Australian Centre for International Agricultural Research (ACIAR)	N(a)	-	-	-	-	-	-	0.070
	N(b)	-	-	-			1.155	1.470
	N(c)	-	-	0.960	4.750	7.150	6.865	10.310
	S(c)	-	-	-	-	-	0.135	0.190
Australian Development Assistance Bureau (ADAB)*								
. Administration	N(b)	-	-	-	-	-	1.870	2.125
	S(b)	-	-	-			0.550	0.635
. ASEAN Australian Economic Cooperation Program (AAECP)	N(c)	2.204	2.478	4.900	4.597	3.998	7.723	7.105
	S(c)	1.104	2.200	2.339	1.384	1.647	2.861	3.235
. Bilateral Aid – South East Asia and Pacific Region	N(c)	4.048	5.525	6.406	6.025	6.769	49.829	48.098
	S(c)	0.026	0.073	0.087	1.155	1.685	5.032	3.838
. Bilateral Aid - n.e.i.	N(c)	0.490	0.422	0.977	0.903	0.717	17.578	15.446
	S(c)	-	-	0.116	0.075	-	1.090	0.459
. Co-financing with International Financial Institutions	N(c)	-	-	-	-	-	9.266	13.701
	S(c)	-	-	-	-	-	0.154	1.644
. Development Training	N(c)	1.760	2.065	3.135	1.469	1.831	15.514	18.969
	S(c)	1.163	1.300	2.121	1.505	0.705	11.622	11.042
. International Science, Technology and Research Programs	N(c)	3.736	4.717	6.477	6.271	7.873	6.457	8.199
. Multilateral support	N(c)	-	-	-	0.868	1.282	18.316	18.807
	S(c)	-	0.050	0.055	0.511	0.528	6.647	6.538
. Non Government Organisations	N(c)	0.010	0.075	0.187	0.258	0.208	0.428	0.323
	S(c)	0.030	0.075	0.182	0.233	0.182	0.691	0.583
. Regional Programs and Organisations	N(c)	0.221	0.705	1.950	2.023	2.093	4.562	4.723
	S(c)	0.083	0.117	0.093	0.088	0.088	0.374	0.367

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
. Scientific and Technological Aid	N(c)	-	0.038	-	0.005	0.004	6.173	8.096
	S(c)	0.009	0.009	0.016	0.007	0.007	0.758	0.908
Total (Direct Commonwealth funding)		14.265	20.062	30.377	32.567	37.246	176.788	188.457

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

* Data for ADAB are compiled by DOS with ADAB cooperation.

DEPARTMENT OF FOREIGN AFFAIRS

. Bilateral Agreements

The Australia-China Council (ACC) grants on science and technology exchanges with China have been mainly concerned with projects that have emerged from the Academy of Sciences' exchange program, or which involved other government departments, universities, and private institutions. The Council acts as a focus for information dissemination, commissions research work and promotes Chinese studies in Australia.

The USSR/Australia Agreement for Scientific and Technical Cooperation involved the exchange of visits by scientists from Australia and the USSR and joint research projects. All activities in respect of the Agreement have been suspended as a result of Soviet intervention in Afghanistan.

. Multilateral Grants

Australia contributes to the funding of certain international organisations which undertake S&T activities. The expenditure shown in the table above includes contributions to the Commonwealth Science Council and specific programs of the International Atomic Energy Agency, Food and Agriculture Organisation and the Organisation for Economic Cooperation and Development which can be identified as falling within the scope of this Statement. In addition to the amounts shown above, approximately $11m (1984-85) is contributed to the core budgets of these organisations and the United Nations Education, Scientific and Cultural Organisation. However, it has not been possible to identify the proportion of this amount which was directed towards scientific and technological activities.

. Economic and Social Studies

The Australia/Japan and Western Pacific Economic Relations Project is funded by both Australia and Japan and coordinates research by Australian and Japanese economists on economic relations between the two countries. Support is also given to the Indonesia Project at the Australian National University to carry out research on Indonesian economic affairs. The grant to the Australian Studies Centre in London is also included here.

AUSTRALIAN DEVELOPMENT ASSISTANCE BUREAU (ADAB)

Australia's development assistance program is a major focus of our relations with many Third World countries. This program has given increasing priority to science and technology. New avenues outside the scope of the traditional aid framework have been instituted to strengthen scientific and technical institutions in developing countries.

. International Science, Technology and Research Programs

Support is provided for the core budgets and special projects of international and regional research programs. Institutes supported include the International Agricultural Research Institutes of the Consultative Group on International Agricultural Research (CGIAR) and other research institutes.

. Regional Programs and Organisations

This program provides funds for institutional and program support and fellowship grants for regional organisations and programs in the Asian and Pacific regions. Institutes and Centres receiving support include the Asian and Pacific Development Centre, Kuala Lumpar, the Statistical Institute for Asia and the Pacific, Tokyo and the South Pacific Commission.

. Bilateral Projects

These projects are undertaken in response to requests from developing countries and many of them have a substantial scientific component or draw heavily on scientific knowledge or expertise. It is Australia's aim to use these projects to build up the development capacity of developing countries so there is a strong emphasis on technology transfer through the provision of experts, equipment and training associated with the projects.

. Scientific and Technological Aid

Programs funded include the International Seminars Support Scheme, the Australian Universities International Development Program, the Research for Development Seminar series, support for the South East Asian Ministers for Education Organisation and support for regional scientific projects. Activities recently supported under these programs include a Virus information exchange newsletter, Research for Development seminars on 'Acute Respiratory Infections in Childhood' and the 'Micro Approach to the Collection of Demographic Data'.

. ASEAN Australian Economic Co-Operation Program (AAECP)

The AAECP facilitates ASEAN regional co-operation by assisting projects of regional importance jointly conducted by member countries of ASEAN. This has stimulated research and development work, technology transfer, and has laid the foundation for further co-operation among ASEAN countries. Australia has established close contact with the ASEAN Committee on S&T (COST) through the five ongoing R&D projects in the food technology and energy areas. There are also others in the pipeline in the fields of marine science, research and development management training, diabetes research and food habits.

. Co-financing with International Financial Institutions

The co-financing facility which began in 1982-83 provides funds in co-operation with the World Bank for financing and implementing development projects. In consultation with the World Bank a program in the Asia/Pacific region has been developed which concentrates on project preparation studies.

. Development Training

Training assistance enables Australia to assist in the development of skilled manpower resources in developing countries. The governments of developing countries decide how they will use the training allocation provided under the aid program.

Training can be offered to meet special needs. For example, within Australia funds are spent to enable Australian educational institutions to run Australian Development Assistance Courses (ADACS). These courses may be intensive practical or formal postgraduate programs. In addition, governments may nominate candidates to attend regular courses at Australian tertiary institutions.

While the emphasis of the program is on training in Australia, awards are also made available for study at institutions in the Pacific and South East Asian regions.

In 1983-84 Australia sponsored approximately 3 500 students and trainees; 2 700 are expected in 1984-85.

. Multilateral Programs

Organisations receiving funding include the United Nations Development Program which is the largest multilateral funding agency for technical assistance, the United Nations Fund for Population Activities which assists countries to be aware of the social, economic and environmental implications of population problems and the Commonwealth Fund for Technical Cooperation which provides technical assistance to the developing countries of the Commonwealth in fields such as finance, statistics, development planning, project evaluation and preparation, public administration and taxation.

. Non-Government Organisations

Non-government organisations, operating mainly through channels outside the official aid program, effectively complement the Government's program. Government assistance is provided for the International Union for the Scientific Study of Population, the Population Council, the International Foundation for Science and the Association of Geoscientists for International Development.

AUSTRALIAN CENTRE FOR INTERNATIONAL AGRICULTURE RESEARCH (ACIAR)

The ACIAR was established by an Act of the Australian Parliament which came into effect in June 1982. The Centre is designed to encourage research aimed at identifying agricultural problems in developing countries and at finding solutions to such problems.

From initial studies it is clear that Australia can assist in problems in crop and pasture legumes and areas such as biological nitrogen fixation, animal health and nutrition, plant protection, soil and water management, plant nutrition, agro-climatology, post-harvest technology and socio-economic analysis. ACIAR is developing an initial portfolio of projects covering some of these areas. The research will be contracted to Australian research institutions and other suitably qualified groups in collaboration with developing country scientists whenever possible.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Health								
. Australian Radiation Laboratory	N(a)	0.190	0.190	0.510	0.220	0.231	0.367	0.305
	N(b)	1.590	1.915	2.265	2.191	2.418	3.652	4.030
. Building grants to W. & E. Hall Institute	N(c)	0.294	2.170	3.211	3.538	6.811	3.538	6.811
. Commonwealth Institute of Health	N(a)	0.476	0.150	0.100	0.187	0.300	0.187	0.300
	N(b)	1.715	1.914	2.265	2.434	2.991	3.652	4.474
. Health Services R&D Grants Program	N(c)	-	0.218	0.293	0.313	0.306	1.577	1.600
. National Acoustics Laboratories	$_{S}$N(a)	0.126	0.700	1.232	2.014	1.321	4.959	4.220
	$_{S}$N(b)	0.619	0.645	0.652	0.853	0.961	2.154	2.462
. National Biological Standards Laboratory	N(a)	0.171	0.046	0.241	0.415	0.565	0.688	0.729
	N(b)	2.116	2.220	2.450	2.721	3.054	5.790	6.490
	N(c)	-	-	-	-	-	0.023	0.144
. National Health and Medical Research Council	N(c)	18.698	25.648	29.557	37.979	44.182	37.979	44.182
. Pathology Laboratories	N(a)	-	-	-	-	-	0.421	1.056
	N(b)	-	-	-	-	-	13.906	15.588
. Ultrasonics Institute	N(a)	0.194	0.047	0.094	0.116	0.150	0.116	0.150
	N(b)	0.530	0.308	0.341	0.378	0.410	0.378	0.410
	N(c)	0.007	-	-	-	-	-	-
. Other*	N(a)	0.558	0.002	-	-	-	-	-
	N(b)	0.243	0.162	-	-	-	0.148	0.231
	$_{S}$N(c)	0.286	0.246	0.475	0.493	0.110	0.662	0.250
Capital Territory Health Commission	N(b)	0.004	0.004	-	0.156	-	0.212	0.034
Commonwealth Serum Laboratories	N(a)	0.040	0.078	0.078	0.108	0.098	0.137	0.109
	N(b)	1.103	1.359	2.222	1.933	2.497	2.409	2.680
	N(c)	0.083	0.224	0.220	0.135	-	0.135	-
Total (Budget Sector)		29.044	38.246	46.206	56.184	66.406	83.088	96.334

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
B. Commonwealth Non-Budget sector								
Department of Health								
. National Health & Medical Research Council	N(c)	-	-	-	-	0.115	-	0.115
.Commonwealth Serum Laboratories BE	N(a)	0.074	0.132	0.092	0.183	0.137	0.204	0.166
	N(b)	2.004	2.297	2.608	3.275	3.492	3.616	3.952
Total (Non-budget Sector)		2.078	2.429	2.699	3.458	3.744	3.820	4.233
Total (Direct Commonwealth funding, including BE)		31.121	40.675	48.905	59.642	70.150	86.908	100.657
C. Expenditure from other sources								
Department of Health								
. Other*	N(a)	0.002	0.001	-	-	-	-	-
	N(b)	0.057	0.032	-	-	-	-	-
Capital Territory Health Commission	N(a)	-	-	0.001	-	-	-	-
	N(b)	0.080	0.164	0.110	0.193	0.191	0.193	0.191
Total (Other sources)		0.139	0.196	0.111	0.193	0.191	0.193	0.191
Total (A+B+C)		31.260	40.871	49.017	59.835	70.341	87.101	100.758

N Natural sciences and engineering S Social sciences and humanities

$_{S}$N Includes small proportion of social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure

(c) Extramural expenditure

* "Other" covers R&D expenditure by the Dental Health Unit, Institute of Child Health, Health Facilities Branch, Public Health Division, Therapeutics Division etc

DEPARTMENT OF HEALTH

. Australian Radiation Laboratory (ARL)

ARL undertakes research and development mostly in radiation physics and chemistry relating to the public and occupational health implications of the uses of ionising radiations, radioactive materials, non-ionising radiation, and of uranium mining and milling and of levels of radioactivity in the Australian environment. During 1983-84 Laboratory Research and Development was especially devoted to:

. national standards of ionising radiation dose,

. national standards of radioactivity and dose levels from radioactivity,

. public health hazards, dose levels and national standards of radiation dose in relation to uranium and thorium mining,

. physical aspects of radioactive materials in medical diagnosis or treatment,

. public health hazards due to microwaves and on dose levels from sources of microwaves,

. lasers and ultraviolet in relation to public health hazards, dose levels, use in medicine and on the establishment of standards,

. dose levels from sources of ionising radiations and on standards of radiation dose,

. public health hazards of ionising radiations.

The laboratory prepared and reviewed Codes of Practice, safety standards and guidelines relating to radiation health including the preparation and dissemination of technical hand books.

The laboratory continued to operate a National Personal Monitoring Service for occupationally exposed employees.

. Commonwealth Institute of Health

The work of the Institute comprises teaching, investigation-and consultation in all fields relating to health and its maintenance and promotion. This includes resources devoted to the study of health problems of the tropics and the developing nations.

The Australian Institute of Health is being established in 1984-85 to provide a national focus for health services research and planning. It will conduct or support studies and research into the health status of the Australian population and the effective and efficient provision and use of health services. The existing Commonwealth Institute of Health will be renamed the School of Public Health and form the nucleus of the Institute's public health activities.

. National Acoustics Laboratories (NAL)

NAL undertakes research and development in respect of hearing aids and their application to the needs of individuals, and in respect of problems of noise as it affects individuals. Projects underway include the investigation of auditory processing problems in children, techniques for the selection, fitting, evaluation and development of hearing aids and methods of rehabilitation of deaf people, and studies of the physiological and sociological effects of noise.

The commencement of a new laboratory building has resulted in a substantial increase in capital expenditure.

. National Biological Standards Laboratory (NBSL)

The NBSL is the laboratory arm of a national system of therapeutic goods control jointly administered by Commonwealth and State authorities.

It has the responsibility for ensuring that the therapeutic goods for human and veterinary use available in Australia are of good quality, safe and effective. The activities utilised to this end are:

a the testing of samples for compliance with standards;

b the evaluating of protocols of the chemistry, microbiology, manufacturer's quality control, packaging and labelling of therapeutic goods;

c the developing of new and revised standards;

d inspecting manufacturing practices; and

e providing advisory and consultative services within and without government.

The activities of the NBSL, which include applied research and experimental development activities, are directed towards preventing potentially dangerous products reaching the consumer and, when hazards occur, towards preventing their recurrence.

. National Health and Medical Research Council (NH&MRC)

The NH&MRC is an independent body which advises the Minister for Health on the application of funds from the Medical Research Endowment Fund. The Fund provides assistance to Commonwealth and State Governments engaged in medical research, to universities and other institutions for the purpose of medical research, and to persons engaged in medical research and in the training of persons in medical research. NH&MRC grants form the major proportion of the total Commonwealth funds spent on medical research in Australia.

. Health Services Research and Development Grants

Health Services R&D project grants are awarded to assist government, universities and other organisations and individual research workers to improve, by way of research and demonstration, the techniques and practice of administration, evaluation, planning and delivery of health care in Australia and to provide information which will assist development of health services policy. In 1983-84 this item included funds for the development of aged care assessment systems.

Block grants which were paid to the States on a dollar for dollar basis to assist their health planning and research activities ceased on 30 September 1982.

. Ultrasonic Institute

The Ultrasonics Institute carries out research on the development of instrumentation and techniques for the application of ultrasonic sound waves in medicine. Researchers from the Institute engage in clinical research and development of instrumentation and techniques and work in close cooperation with a number of clinical collaborators. They have maintained a pre-eminent international position in ultrasonic imaging. Recent developments include a pulsed Doppler blood flow measurement system which provides the first quantitative non-invasion measurement of blood flow in the deep lying abdominal and fetal vessels. The most recent new departure is the propagation of sound waves within the

body which may be used to assess the mechanical properties of the tissues through which the sound passes and hence the pathological state of the tissues. A new ultrasonic scanner specifically designed for ultrasonic tissue characterisation has been developed at the Institute and is currently under clinical evaluation. The Institute holds a total of 102 patents on 23 inventions in various countries.

. Family Planning Program

Funds are provided under the Family Planning Program to encourage research into social, medical and demographic aspects of family planning, as one means of advancing the knowledge and practice of family planning to improve the health and quality of life of the community.

. National Diseases Control Program

A component of the National Diseases Control Program provides funds for research into insect vectors and vector borne pathogens that affect humans.

. National Health Technology Advisory Panel

The NHTAP has been established in 1982 with the following terms of reference:

- To establish and maintain a process for identifying emerging medical technologies.
- To examine significant existing medical technologies to determine whether their present application should be reassessed.
- To determine methods of and priorities for assessment, based on criteria such as safety, efficacy, appropriateness of use, cost and social impact.
- To recommend to the Minister for Health specific areas for research that would facilitate the assessment of medical technologies.
- To recommend whether payment of medical benefits for medical technologies should be restricted until assessment is carried out and review results of technology assessment to decide whether the implications of findings require action at Federal or State level.
- To disseminate implications of findings for medical practice to all relevant parties.

Current major activities are a Medical Cyclotron Study and the Nuclear Magnetic Resonance Imaging (NMRI) Project.

. Pathology Laboratories

The department provides high quality Pathology Laboratory services to medical practitioners and hospitals in the regional area served. Laboratories are currently located at Albury, Bendigo, Cairns, Hobart, Launceston, Lismore, Port Pirie, Rockhampton, Tamworth, Toowoomba and Townsville.

. Howard Florey Institute

The Commonwealth provided a grant of $400 000 in 1983-84 to the Institute to ensure that the impetus of its Gene Synthesis Laboratory is maintained. The Laboratory is the most advanced in Australia at present in the fields of biotechnology and genetic engineering. The research work is directed to the synthesising of genes and ensuring that they effectively produce their product when cloned into bacteria, and animal cells.

. Centenary Institute of Cancer Research and Cell Biology - Feasibility Study.

The Commonwealth and NSW Government have jointly funded a feasibility study to establish and build facilities for the Centenary Institute of Cancer Research and Cell Biology. The study was being carried out by Sydney University.

. Dental Health Unit

The Dental Health Unit undertakes science and technology activities in relation to the continuing assessment of dental health of children as part of the determination of dental health of the general community and the fluoridation status of Australian cities and towns.

CAPITAL TERRITORY HEALTH COMMISSION

The Capital Territory Health Commission (CTHC) is responsible for the provision of public health services in the ACT. This covers a wide range of hospital and laboratory services, and community services such as public health surveillance, child and maternal health, mental health, comprehensive geriatric and rehabilitation services, transport (including ambulance services), home nursing, health education etc. The three public hospitals in the ACT work co-operatively to provide a range of thirty-seven separate medical specialist services for residents of the ACT and its surrounds and visitors to the national capital.

Research and development is undertaken throughout the specialist areas. In some cases funding is provided through the NH&MRC and Health Services Research schemes. Projects include:

. Orthopaedic research at Woden Valley Hospital;

. Blood pressure trial in relation to low salt diet;

. Pathogenesis of allergic encephalalgia in immunoglobulin deficient rates at Royal Canberra Hospital;

. Cancer research and control of insulin dependence at Woden Valley Hospital;

. A study of smoking, drinking and vigorous exercise in Canberra schoolchildren and adults;

. Development of new diagnostic test based on enzyme immunoassay and monoclonal antibodies; improvements to the methodology of vaccine production including scale up to fermenters: capacity and development of new vaccines; investigation of pertussis vaccine reactivity; examination of seed lots for bluetongue vaccine.

. Isolation of human and interferon genes into micro-organisms. Clinical studies on the immunogenicity and reactivity of submit and live attenuated influenza vaccine in volunteers. Production of monoclonal antibodies to blood group and antigens, improved methods for protein purification.

THE COMMONWEALTH SERUM LABORATORIES (CSL)

The Commonwealth Serum Laboratories undertake research and development of therapeutic and diagnostic products for human and animal use. Many of the products developed by CSL are designed for and are unique to Australia.

Research activities at present include improvements to the methodology of vaccine production including scale-up of fermenter's capacity and development of new vaccines, development of new diagnostic tests based on enzyme immunoassay and monoclonal antibodies, isolation of human and interferon genes into micro-organisms, and clinical studies on the immunogenicity and reactivity of subunit and live attenuated influenza vaccine in volunteers.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Housing and Construction								
. Central Investigation and Research Laboratories	N(a)	0.100	0.122	0.130	0.110	0.116	0.244	0.258
	N(b)	0.800	0.978	1.020	0.880	0.934	1.956	2.075
. Contributions to								
- Australian Housing Research Council	N(c)	0.067	0.058	0.078	0.049	0.049	0.069	0.100
- Australian Road Research Board	N(c)	0.259	-	-	-	-	-	-
- Australian Uniform Building Regulations Coordinating Council	N(c)	0.031	0.028	0.012	0.050	0.075	0.050	0.075
. Experimental Building Station	N(a)	0.221	0.094	0.053	0.049	0.082	0.057	0.129
	N(b)	1.183	0.681	0.811	0.966	1.033	1.578	1.681
Snowy Mountains Engineering Corporation (SMEC)	N(a)	-	-	-	-	-	0.021	0.011
	N(b)	-	-	-	-		3.979	1.989
Total (Budget Sector)		2.661	1.961	2.104	2.104	2.309	7.934	6.287
B. Commonwealth Non-Budget sector								
Department of Housing and Construction								
. Attributed to past Commonwealth Contributions:								
- Australian Housing Research Council	N(c)	0.067	0.038	0.055	0.019	0.049	0.019	0.049
- Australian Uniform Building Regulations Coordinating Council	N(c)	-	0.011	0.007	-	0.092	-	0.092
Snowy Mountains Engineering Corporation (SMEC) BE	N(a)	-	-	-	-	-	0.229	0.239
	N(b)	0.014	-	-	-	-	43.997	44.761
Total (Non-Budget Sector)		0.081	0.049	0.062	0.019	0.141	44.245	45.141

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
Total (Direct Commonwealth funding, including BE)		2.742	2.010	2.166	2.122	2.450	52.178	51.428
Total (Direct Commonwealth funding, excluding BE)		2.728	2.010	2.166	2.122	2.450	7.952	6.428
C. Expenditure from other sources								
Department of Housing and Construction								
. Experimental Building Station	N(a)	0.028	0.035	0.014	0.012	0.018	0.013	0.021
	N(b)	0.147	0.255	0.217	0.238	0.232	0.277	0.269
. Attributed to State Contribution:								
- Australian Housing Research Council	N(c)	0.121	0.092	0.127	0.068	0.119	0.068	0.119
- Australian Uniform Building Regulations Coordinating Council	N(c)	0.031	0.039	0.019	0.018	0.075	0.018	0.075
Total (Other sources)		0.326	0.421	0.376	0.336	0.444	0.376	0.484
Total (A+B+C)		3.068	2.431	2.542	2.458	2.894	52.554	51.912

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

BE wholly Commonwealth-owned business enterprise.

DEPARTMENT OF HOUSING AND CONSTRUCTION

The Department has responsibility for the planning, execution and maintenance of Commonwealth Government works. In support of these operations, the Department carries out applied research and laboratory testing and provides a comprehensive range of technical services. In many cases these services also directly or indirectly benefit the needs of industry, and the Department contributes to the development of national standards, building regulations and other public interest activities requiring research and other technical services.*

. Australian Uniform Building Regulations Coordinating Council (AUBRCC)

AUBRCC is responsible for the further development of the Australian Model Uniform Building Code as the technical basis for building control in Australian States and Territories. Several research activities are currently being funded by the Council. These are:

- houses in high wind areas;
- resistance of lightweight wall systems to mechanical damage;
- examination of appropriate evacuation times from buildings in respect to fire safety measures; and
- development of a risk model for the analysis of risk to occupants of buildings;
- ventilation of lift and stair shafts.

. Australian Housing Research Council (AHRC)

The AHRC comprises Commonwealth, State and Territory Ministers with responsibility for public housing authorities. Its principal objectives are to provide for research into economic and social problems in housing, dissemination of research results, promotion of collaborative research and the coordination of research, and where necessary to complement research conducted elsewhere.

Recent research programs include continuing studies on multi-cultural housing preferences, employment generating effect on the demand for new dwellings, housing alterations and additions, and Australian housing authority practices. Residents Take Charge, Public Housing & Market Rents in South Australia, Housing Need of Lone Parent Families, Affordable & Available Housing, The Role of the Private Rental Sector.

. Central Investigation and Research Laboratory (CIRL)

CIRL conducts applied research directly concerned with design and construction of departmental projects. Topics include natural and processed materials, building products, processes and systems and operating and environmental conditions.

Projects being undertaken in the various sections of the laboratory include:

- investigation of methods for overcoming the corrosion of steel reinforcement in concrete and appropriate reinstatement of damaged areas;
- development of a programmable microprocessor based functions testing apparatus for repetitive testing of electrical/electronic equipment including fire alarm equipment;
- investigation into the performance of flame detectors with large liquid fuel test fires, to provide information to assist in design of fire detection systems for aircraft hangars and other similar structures;
- an evaluation of the durability, under differing exposure conditions, of established and recently developed long life protective coatings for steelwork and a correlation between determined formulation and exposure results;
- evaluation of the performance of various forms of security devices when subjected to conducted and radiated electromagnetic interference.

The above projects arise from the function of CIRL to provide a scientific service to the Department's design and project architects and engineers in its design, construction and maintenance programmes.

. Experimental Building Station (EBS)

The EBS conducts applied research into the design and construction of buildings and related engineering works, incuding the effective and efficient use of building components and materials, structural features and behaviour of buildings, fire hazards in buildings and fire protection of buildings, functional efficiency of all buildings and codification of research information for use by the building industry through standards and building regulations.

Some research projects proposed for 1983-84 are determination of the maximum potential strength of masonry walling; determination of the fire resistance of elements of vertical construction and of horizontal construction; investigations on the transmission of noise through various types of construction; and examination of the structural and functional sufficiency of windows, doors and wall panels. The EBS also participates in international co-operative research programs related to the International Standards Organisation.

SNOWY MOUNTAINS ENGINEERING CORPORATION

The Snowy Mountains Engineering Corporation is a Commonwealth Government Authority providing specialist engineering consulting services on a commercial basis to government and private organisations both within Australia and overseas.

The fields of practice, stemming from the Corporation's origins in water and power engineering, cover many supportive activities which include civil, electrical and mechanical engineering, road engineering, hydrology and hydraulics, geology and soil and rock mechanics, surveying, estimating, contract supervision, irrigation, agriculture, economics, training, equipment procurement and project management.

The Corporation has also developed special expertise in the areas of hydrology, fluid mechanics and geomechanics and has well established fluid mechanics and geomechanics laboratories.

While continuing to undertake significant work in Australia, the Corporation has become increasingly committed to assisting with engineering development programs in developing countries and by far the largest part of the work is now performed overseas.

* Expenditure classified 'Technical Services' in previous Statements, being a component of the construction/repair/maintenance cost, are now included n the capital or current expenditure of each Department, Authority etc.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Immigration and Ethnic Affairs								
. Studies and Research*	S(b)	0.163	0.117	0.199	0.038	0.091	0.641	0.665
	S(c)	0.363	0.263	0.234	0.140	0.223	0.304	0.445
Australian Institute of Multicultural Affairs	S(a)	-	-	-	-	-	1.416	0.598
	S(b)	-	-	-	-	-	1.877	1.977
	S(c)	-	-	-	-	-	0.502	0.495
Total (Budget Sector)		0.526	0.381	0.432	0.177	0.313	4.739	4.180
B. Commonwealth Non-budget sector								
Department of Immigration and Ethnic Affairs								
. Studies and Research*								
- Attributable to past Commonwealth contributions	S(c)	0.002	0.006	0.021	-	-	0.010	0.042
Australian Institute of Multicultural Affairs	S(a)	-	-	-	-	-	0.004	0.002
	S(b)	-	-	-	-	-	0.006	0.008
Total (Non-Budget Sector)		0.002	0.006	0.021	-	-	0.020	0.052
Total (Direct Commonwealth funding)		0.528	0.386	0.453	0.177	0.313	4.760	4.231
C. Expenditure from other sources								
Department of Immigration and Ethnic Affairs								
. Studies and Research*								
- Attributable to State contributions	S(c)	0.007	0.012	0.034	-	-	0.017	0.075
Total (Other sources)		0.007	0.012	0.034	-	-	0.017	0.075
Total (A+B+C)		0.534	0.398	0.487	0.177	0.313	4.777	4.306

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

* In each year The Commonwealth and States make matching contributions to the Australian Population and Migration Research Program Trust Account. Moneys may be carried over from year to year and the expenditure in any year may derive from accumulated contributions and interest. See Appendix 3.

DEPARTMENT OF IMMIGRATION AND ETHNIC AFFAIRS

The Department of Immigration and Ethnic Affairs develops, undertakes and oversights research projects to increase the Department's awareness on migrant and population issues and to evaluate settlement services and migration policy.

The Department entered into a joint project with the Committee on Economic Development of Australia (CEDA) to study the economic impact of migration. The project is being undertaken over a four year period from 1981-82 to 1984-85.

Activities are also directed to establishing the English language learning needs of migrants, to improving the methodology and content of courses and to evaluating the cost-effectiveness of specific program arrangements.

AUSTRALIAN INSTITUTE OF MULTICULTURAL AFFAIRS

The Australian Institute of Multicultural Affairs is a statutory corporation, located in Melbourne, with its prime activities being advice to government, conducting and commissioning research into multiculturalism and related issues, community education in multiculturalism, and establishing a repository of literature and other material relating to the diverse cultures of members of the Australian community.

In October 1984, the Government announced its intention, based on a review of the activities of the Institute, to introduce legislation to amend the Institute's objects to include a positive affirmation that AIMA should promote a just and equitable society which, firstly, accepts people irrespective of their particular ethnic background, cultural - including linguistic - background or immigrant origin; and secondly, affords the members of the different cultural groups and ethnic communities in Australia an effective opportunity to participate in Australian Society and achieve their own potential.

It is also proposed that the Institute's functions be expanded to include specific statutory functions of co-operation and promoting co-ordination of activities and services, the promotion of community representations and the encouragement of other bodies to conserve materials relating to migrant communities as part of the large collection of the nation.

Most of the Institute's current work has been geared to the conduct and commissioning of studies. Studies being undertaken at present include

- a Review of Manpower Programs and Services for Migrant and Refugee Youth;
- the Migrant Experience - a community education project to include a six part documentary film series, a book and an educational kit;

- a study of the changing demographic characteristics of the Ethnic Aged and the implications for health and welfare services;
- a study of the impact of multicultural television;
- the preparation of a series of demographic profiles of ethnic community groups in Australia;
- the development of an integrated information system for Australian and international multicultural publications.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Industry, Technology and Commerce								
.Bureau of Industry Economics	S(b)	1.047	1.454	1.521	1.918	2.128	1.918	2.128
	S(c)	0.013	0.093	0.099	-	-	0.026	0.040
.Administrative and other costs of technology programs, not elsewhere included	N(a)	-	-	-	-	-	-	0.135
	N(b)	-	-	-	-	-	6.511	7.443
	N(c)	-	-	-	-	-	0.447	0.475
.Commercial Development of Technology								
- InterScan support	N(b)	-	-	-	-	-	0.013	-
	N(c)	2.450	2.068	2.194	2.528	-	2.528	-
- Public Interest Projects	N(b)	-	-	-	-	-	0.540	0.570
	(N(c)	-	-	-	-	-	8.138	11.400
.Grant-in-aid to								
- Industrial Design Council	N(b)	-	-	-	-	-	0.018	0.018
	N(c)	-	-	-	-	-	0.180	0.190
- National Association of Testing Authorities	N(b)	-	-	-	-	-	0.017	0.017
	N(c)	-	-	-	-	-	0.811	0.860
Research Associations	N(b)	-	-	-	0.052	0.052	0.052	0.052
	N(c)	-	1.209	1.341	1.680	1.900	1.680	1.900
.Industrial R&D Grants								
- Commencement Grants	N(c)	9.657	9.700	13.075	14.558	17.765	14.558	17.765
- Project Grants	N(c)	36.056	12.053	34.797	43.243	38.286	43.243	38.286
.Technology Development								
- Assistance to inventors	N(b)	-	-	-	-	-	0.167	0.183
	N(c)	-	-	-	-	-	0.145	0.145
- Materials handling	N(a)	-	-	-	-	-	0.088	0.367
	N(b)	-	-	-	-	-	1.096	1.643
- Technological innovation programs	N(b)	-	-	-	-	-	0.620	0.651
	N(c)	-	-	-		-	1.960	2.55
- Technology Transfer Network	N(b)	-	-	-	-	-	0.048	0.048
	N(c)	-	-	-	-	-	0.980	0.980
.Biotechnology Grants	N(b)	-	-	-	-	-	0.060	0.070
	N(c)	-	-	-	0.720	2.140	0.720	2.140

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
Productivity Promotion Council (admin support)	S(a)	0.009	-	-	-	-	-	-
	S(b)	0.026	0.012	-	-	-	0.041	0.041
	S(c)	0.008	0.016	-	-	-	1.700	1.500
Industries Assistance Commission								
. IMPACT Project	S(a)	0.001	-	-	-	-	-	-
	S(b)	0.209	0.257	0.108	0.090	0.148	0.090	0.148
	S(c)	-	-	0.082	0.090	0.099	0.090	0.099
Total (Budget sector)		49.476	26.861	53.217	64.827	62.466	88.485	91.848
Less recoveries from materials handling and other relevant sources		-	-	-	-	-	(0.929)	(0.930)
Total (Direct Commonwealth funding)		49.476	26.861	53.217	64.827	62.466	87.556	90.918
B. Expenditure from other sources								
Department of Industry, Technology and Commerce								
. Productivity Promotion Council (admin. support – industry contribution)	S(a) S(b) S(c)	0.012 0.011	0.010 0.010	- -	-	-	-	-
Total (Other sources)		0.023	0.020	-	-	-	-	-
Total (A+B)		49.499	26.881	53.217	64.827	62.466	87.556	90.918

N Natural sciences and engineering S Social science s and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure

DEPARTMENT OF INDUSTRY, TECHNOLOGY AND COMMERCE

. Bureau of Industry Economics (BIE)

The BIE is a major centre for research into the manufacturing and commerce sectors. The major objectives of the Bureau are to:

- carry out research work needed to assist the Government in the formation of industrial policy;
- assist the Industries Assistance Commission and other government bodies by making submissions on the results of its research;
- attract a high standard of professional staff and publish its research findings; and
- complement the work of other research agencies and cooperate with universities and colleges in developing research programs.

Areas for research are selected after consideration of the importance of the issues involved and consultation with BIE Council of Advice. Investigations into several areas are underway or have recently concluded. These include:

- structural adjustment of selected industries;
- industrial development policies;
- evaluation of public interest R&D Projects;
- corporate taxation;
- investment behaviour in manufacturing;
- regional development and structural change;
- productivity in Australia's manufacturing sector;
- evolving economic relations between Australia and North-east Asia, and
- small business.

A re-organisation of the Department of Industry, Technology and Commerce has resulted in the establishment within the Bureau of Industry Economics of, inter-alia, a Small Business Research Unit. In undertaking on-going research into the small business sector, the Unit is to identify and find solutions to the problems of small business and to produce annually a report showing the importance of small business to the national economy, monitoring trends in small business activity and problems affecting it.

. Commercial Development of Technology

Major programs developed under the former Department of Productivity are aimed at the commercial development of Australian technology.

- InterScan (Australian Microwave Landing System (MLS)). The commercial development phase of the MLS program has been completed with the Commonwealth having fully discharged its obligations to IAPL. Consequently the Board of the Company has been restricted to reflect the automated role of AIDC in its future management.

- Public Interest Projects. Proposals for assistance under Section 39 of the Industrial Research and Development Incentives Act 1976 are considered in the light of the Government's desire that public interest projects should:

. be of high priority in terms of Government policy objectives;

. have substantial social and economic benefit to the community;

. be of major importance and likely to command widespread public support;

. normally involve the commercial development of the results of research done in the public sector or by non-profit research institutions; and

. not be funded in place of other funding sources.

Only proposals which are of outstanding merit and which meet the above criteria are provided with financial support by the Government. Projects funded under the scheme have included:

. the design, construction and operation of demonstration water treatment plants for three CSIRO invented processes to demonstrate for potential customers their capabilities in relation to large scale economic treatment of low quality waters;

. commercial development of an electronic hearing device invented at the University of Melbourne for the profoundly nerve-deaf who cannot be helped by conventional hearing aids;

. development of techniques in selective laser photochemistry relevant to commercially important chemicals and determination of factors for sealing up of industrial production levels;

. development of appropriate technology and necessary infrastructure to establish an Australian industry to produce and commercialise a range of algal and related products obtained from selected organisms;

. a feasibility study into the commercial opportunities for the development of a subsea manufacturing and service industry primarily for the offshore petroleum exploration and production industry; and

. the establishment by Australian Optical Fibre Research Pty Ltd (AOFR), a Wormald subsidiary, of a research and development facility to produce prototype optical fibre based sensors.

. Grants-in-Aid

The Department is the channel for government support to the Industrial Design Council of Australia, the Standards Association of Australia, the National Association of Testing Authorities and the National Safety Council. The grant to the Design Council is to assist in the promotion of innovative design as an essential factor in the commercial viability, competitiveness, value and quality, and the widening of understanding of industrial design amongst governments, industry and the general public. The grant to the Standards Association is a contribution towards its administrative costs in recognition of the Associations's role in preparing and publishing Australian Standards and to promoting the general adoption of standards relating to structures, commodities, materials, practices, and operations and other matters. The grant to the National Association of Testing Authorities is in recognition of the important support provided by NATA to the government, industry and the community at large, including the technology-based industries through the provision of an independent national laboratory accreditation scheme.

. Support to Applied Industrial Research and Development

Research Associations receive support through the Department of Industry, Technology and Commerce and are associations of firms engaged in applied industrial research and development and technology transfer activities within a particular industry sector or a common technology. The level of grant to each association is determined having regard to income raised from association membership. Associations receiving support are the Bread Research Institute of Australia, Australian Welding Research Association, Sugar Research Institute, Brick Development Research Institute, Radiata Pine Research Institute, Australian Particleboard Research Institute, Australian Timber Research Institute and the Medical Engineering Research Association. Applied industrial research and development is carried out both within the association themselves and through contractural arrangements with publicly funded research institutions including CSIRO, institutes of technology and universities.

. Industrial R&D Grants (Industrial Research and Development Incentives Act 1976)

In addition to funding Public Interest Projects (above) the Industrial R&D Incentives Act provides for grants to encourage Australian industry to increase its spending on industrial R&D as a means of developing new, and improving existing, products and processes. The IR&D Incentives Board administers the two types of grants under the Scheme.

Commencement Grants are aimed at encouraging companies, whose IR&D activities have not yet developed to a stage where major projects are being undertaken, to establish or develop a basic capability in industrial research and development. The commencement grant scheme is to operate until 30 June 1986. Grants are set at 50% of the company's eligible expenditure, with an upper grant limit of $40 000 (taxable) per company. A company's eligibility for commencement grant consideration depends on whether it or any related companies have received grant payments aggregating $200 000 or more, or grant payments in respect of five or more grant years, or whether during the eight grant years prior to that covered by the First commencement grant application, the company incurred IR&D expenditure exceeding $250 000. To be eligible for a grant a company must carry on, or propose to carry on, the manufacture of goods, mining operations, or construction in Australia. Software development is eligible only when it is for computers or similar equipment manufactured by the company or a related company. The commencement grants will be available for expenditure incurred to 30 June 1986.

Funds available for commencement grants were increased to $17.8m (projected) in 1984/85 from $14.6m in 1983/84

Project Grants are aimed at assisting organisations with established IR&D capabilities to undertake specific R&D projects. Applications for these grants are subject to competitive assessment based on specified criteria. Project selected are usually supported on a dollar for dollar basis for up to five years. A company or a group or related companies may obtain support for more than one project at a time but overall support is normally limited to $750 000 (taxable) a year. Eligible expenditure is restricted to costs directly attributable to IR&D activity including salaries of staff, contract expenditure, etc. To be eligible for support a company must carry on, or propose to carry on, manufacturing, mining, construction or software development in Australia. Project grants may also be made to research companies which undertake a project on behalf of two or more companies, at least one of which must be unrelated to the others and at least one of which must be 'eligible'. A project conducted by 'Approved Research Organisations' on behalf of an eligible application may also qualify for grants. Applicants must demonstrate an intention to commercialise the project result. Agreements between the Incentives Board and applicants may be concluded for projects which will commence no later than 1 July 1986, and can cover expenditure up to 30 June 1989.

Funds available for project grants were decreased to $38.3m (projected) in 1984/85 from $43.2m in 1983/84.

. Technology and Innovation Programs

The Technology Division of the Department of Industry, Technology and Commerce undertakes a range of programs in productivity development, technology transfer, technological development, invention and innovation that form essential elements of the Government's industrial development policy. The Division encourages development of:

- programs in consultation and in agreement with industry, employee organisations and government to examine specific industry sector problems, develop solutions and disseminate results;

- technology transfer programs facilitating industries' access to new technology by practical programs which assist:

. development and extension of practical technology transfer mechanisms;

. development and adoption of more effective information handling systems; and

- co-operative technological development programs to develop, demonstrate and promote projects in industry based on industrial processes, techniques and applications to facilitate increased competitiveness of Australian industry;

- new enterprises based on Australian innovation through:

. the Assistance to Inventors Scheme, which provides grants of up to $20 000 where appropriate to assist private inventors in the development of pre-production prototypes;

. supporting innovation centres, to promote greater interaction between individual inventors, financial institutions and manufacturers;

. supporting the enterprise workshop program in innovation and entrepreneurship, for graduates in commercial and technological disciplines, which provide practical experience in the commercial exploitation of Australian inventions;

- programs that raise understanding of the impact of advanced information technologies and of the commercial opportunities generated through them; and

- programs to implement the promotion and development of high technology growth industries, assist with new product development for government procurement, analysis of market opportunities to assist new technology-based firms in the identification and assessment of market opportunities for specific new technologies, demonstration of new technology, improvement of industry awareness of new technology through workshops and seminars in specialised areas, interprogram co-ordination aimed at establishing better co-ordination between those Government programs set up to assist high technology growth industries and a teaching company scheme designed to improve interaction between the research and industrial sectors.

. National Materials Handling Bureau

The Bureau functions as a national development authority with a charter to research, develop and promote the application of improved materials handling including the equipment, systems, standards, methods, management and control aspects involved in the supply, production, movement, packaging, storage and distribution of goods and materials.

. Technology Transfer Council

The TTC is a non-profit company formed in 1980 by the MTIA and CAI with support from the Department to establish and conduct a technology transfer network within the metal manufacturing industry. Centres are located in Melbourne, Sydney, Adelaide, Perth and Brisbane.

Government support for the TTC in 1984/85 is $980 000. TTC also derives earnings from its commercial operations, and has already assisted approximately 2 500 Australian companies. It brings a technology-based, management-oriented approach to manufacturing.

The TTC assists companies to select and apply up to date technology to improve manufacturing performance and create new business opportunities. TTC's primary mission is to help Australian manufacturers access, define and implement the best available technology. Part of its responsibility is to accurately assess the major needs of manufacturers and to develop the most appropriate best technology solutions and mechanisms for ensuring active and effective transfer.

. Biotechnology Research Grants Scheme

This scheme, funded for the first time in 1983-84, is to provide financial support for selected strategic R&D programs holding the greatest promise for commercial development of biotechnology in Australia. Priority areas have been identified as genetic manipulation, cell manipulation and culture, and enzyme applications and fermentation technology. Eight programs, to cost $4.51m over the three year period 1984-1985, have been approved. Funding provided for 1983-84 is up to $1.5 million to cover grant payments in the first half of the 1985 calendar year and administration of the Scheme.

. Productivity Promotion Council of Australia

The Productivity Promotion Council of Australia (PPCA) is a national organisation representing the productivity improvement interests of industry, unions and government. Its programs examine the state and direction of technological advance in Australia and provide advise to both industry and unions on the impact of technology in the workplace. PPCA also promotes an understanding, within the community, of the meaning of and issues associated with productivity improvement and seeks to raise awareness of the social impact of technological change.

In 84/85 the Department provided $1.5 million to support PPCA in these activities and also transferred the AUSLANG program (an inventory identification and cataloguing discipline) to PPCA to assist it to widen the range of services offered to industry.

INDUSTRIES ASSISTANCE COMMISSION (IAC)

The IAC is the coordinating agency for the IMPACT Project. IMPACT is a research project to improve policy analysis of inter-related economic and social issues, particularly in the areas of trade, industry development and manpower. The Project is a cooperative effort involving a number of Commonwealth Agencies (Industries Assistance Commission, Bureau of Agricultural Economics, Bureau of Industry Economics, Bureau of Labour Market Research, Department of Arts, Heritage and Environment and Department of Immigration and Ethnic Affairs) in association with the University of Melbourne, La Trobe University and the Australian National University.

The Project involves the further development and enhancement of analytical frameworks, consisting of economic-demographic models and associated data bases and computing systems, which enable the implications of both policy induced and naturally occurring changes to be studied systematically in an economy-wide perspective.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Local Government Administrative Services								
. Australian Survey Office	N(a)	-	-	-			0.911	1.002
	N(b)	-	0.006	-			14.810	16.291
	N(c)	-	-	-	-	-	1.878	2.066
. Grant-in-aid to Australian Insitute of Urban Studies	S(c)	-	-	-	-	-	0.035	0.035
Albury-Wodonga Development Corporation	N(a)	0.009	0.002	0.006	0.002	0.003	0.003	0.004
	N(b)	0.016	0.028	0.040	0.021	0.022	0.033	0.036
Total (Budget Sector)		0.025	0.036	0.046	0.023	0.025	17.670	19.433
B. Commonwealth Non-Budget sector								
Albury-Wodonga Development Corporation	N(a)	0.010	0.002	0.006	0.002	0.003	0.003	0.004
	N(b)	0.018	0.030	0.042	0.022	0.023	0.033	0.035
	N(c)	0.017	0.015	0.076	0.028	0.020	0.037	0.020
Total (Non-Budget Sector)		0.045	0.047	0.124	0.052	0.046	0.073	0.059
Total (Direct Commonwealth funding)		0.070	0.083	0.169	0.075	0.071	17.743	19.482
C. Expenditure from other sources								
Albury-Wodonga Development Corporation	N(a)	0.022	0.004	0.009	0.003	0.004	0.005	0.006
	N(b))	0.037	0.056	0.063	0.033	0.035	0.054	0.057
Total (Other sources)		0.059	0.060	0.072	0.037	0.039	0.058	0.063
Total (A+B+C)		0.129	0.143	0.242	0.112	0.110	17.801	19.555

N	Natural sciences and engineering	S	Social Science and Humanities
(a)	Intramural capital expenditure	(b)	Intramural current expenditure
(c)	Extramural expenditure		

DEPARTMENT OF LOCAL. GOVERNMENT AND ADMINISTRATIVE SERVICES

. Australian Survey Office

The Australian Survey Office is the Commonwealth's central surveying service authority and is responsible for land, engineering and topographic surveys for Commonwealth purposes. In particular it:

a arranges, subject to certain exceptions, further work required by Commonwealth Departments or authorities and those trading authorities which elect to use it;

b provides professional surveying advice to these Commonwealth departments and authorities;

c maintains an awareness of the capacity and capabilities of the surveying industry in order to ensure that the necessary resources and expertise are and will continue to be available to service Commonwealth survey requests;

d participates and co-operates with other Commonwealth and State government surveying and mapping organisations on matters of mutual interest; confers with overseas organisations and international institutions on survey technology and on advice to developing countries; advises tertiary education institutions in Australia on survey education;

e provides a survey infrastructure in Commonwealth Territories to support mapping, land administration and land information systems.

. Australian Institute of Urban Studies

Support is given to the Australian Institute of Urban Studies (AIUS) which is an independent organisation concerned with urban and regional development in Australia. The stated objectives of the Institute are to promote research on urban matters in Australia and to act as a body to initiate debate on urban issues. This role includes the ability for the Institute to give independent advice to various levels of Government on policy matters relating to urban affairs. The AIUS plans to develop a long term analysis of macro economic, social and demographic trends in Australia and their implications for future urban development and management in both metropolitan and non-metropolitan areas. A major project is to provide advice on urban matters pertaining to ASEAN countries to the Australian Development Assistance Bureau.

ALBURY-WODONGA DEVELOPMENT CORPORATION

The development of Albury-Wodonga is a joint venture of the Commonwealth, New South Wales and Victorian Governments. In 1973 and 1974, legislation was enacted by the three Parliaments to establish the Albury-Wodonga Development Corporation (Commonwealth), the Albury-Wodonga (Victoria) Corporation, and the Albury-Wodonga (New South Wales) Corporation.

The major activities of the corporations have been land acquisition, development of residential, industrial and commercial land and provision of rental housing and factory accommodation. The Commonwealth has also undertaken a research program into the effects of the increased urbanisation of the Albury-Wodonga area on the flora, fauna and chemical quality of the water in River Murray.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Primary Industry								
. Administrative support for S&T, not elsewhere included								
- Library Services	N(a)	-	-	-	-	-	0.126	0.132
	N(b)	-	-	-	-	-	0.229	0.245
- Ministerial Councils	N(b)	--	-	-	-	-	0.163	0.172
- Statutory Research Funds and Special Research Grants	N(b)	-	-	-	-	-	0.853	0.903
. Australian Agricultural Council Sponsored Projects	N(c)	0.055	0.058	0.076	0.181	0.218	0.181	0.218
. Australian Wine Research Institute	N(c)	0.148	0.165	0.255	0.267	0.373	0.267	0.373
. Barley Improvement Schemes (S.A., Vic., W.A.)	N(c)	0.148	-	-	-	-	-	-
. Bureau of Agricultural Economics	S(a)	-	-	-	-	0.155	-	0.830
	S(b)	0.853	1.056	1.309	1.429	1.541	7.326	8.236
. Bureau of Animal Health	N(a)	-	0.029	0.004	0.008	0.002	0.152	0.038
	N(b)	0.192	0.276	0.243	0.259	0.292	1.989	2.557
	N(c)	-	-	0.059	0.080	1.648	1.590	5.962
. Commonwealth Extension Services Grant	N(c)	1.382	-	-	-	-	-	-
	S(c)	0.303	-	-	-	-	-	-
. Commonwealth Special Research Grant	N(b)	-	-	-	-	-	-	0.010
	N(c)	0.248	0.279	0.255	0.255	0.490	0.255	0.490
. Fisheries Service	N(a)	-	-	-	-	-	-	0.213
	N(b)	-	-	-	-	-	1.402	1.436
	N(c)	-	-	-	-	-	1.065	1.388
. Fishery Management (Torres Strait)	N(c)	0.174	0.175	0.275	0.306	0.495	0.306	0.495
. Forestry Council	N(b)	-	-	-	-	-	0.077	0.080
. National Soil Conservation Program	sN(c)	-	-	-	0.341	1.050	0.525	2.261
. Plant Quarantine	N(a)	0.031	0.035	0.030	0.248	0.033	0.248	0.033
	N(b)	0.120	0.097	0.133	0.133	0.142	0.133	0.142
	N(c)	0.020	0.017	-	-	-	-	-

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure (continued)								
. Forestry Research Grants	N(c)	0.033	0.022	0.037	0.040	0.049	0.040	0.049
. Plague Locust Commission	N(a)	0.011	0.015	0.014	0.011	0.008	0.015	0.017
	N(b)	0.052	0.051	0.059	0.046	0.046	0.377	0.427
Sub-total		3.770	2.276	2.748	3.603	6.541	17.318	26.705
. Statutory Rural Industry Research Schemes *								
- Barley	N(c)	-	0.276	0.304	0.345	0.796	0.395	0.910
- Cotton	N(c)	-	-	-	0.269	0.592	0.273	0.600
- Chicken Meat	N(c)	0.183	0.180	0.194	0.205	0.268	0.229	0.301
- Dairying	N(c)	0.305	0.272	0.348	0.426	0.397	0.645	0.600
- Dried Fruit	N(c)	0.066	0.049	0.083	0.108	0.145	0.157	0.210
	S(c)	0.007	0.005	-	-	-	-	-
- Fishing Industry Development #	N(c)	-	-	-	-	-	0.200	0.300
- Fishing Industry Research **	N(c)	0.427	0.458	0.663	1.676	1.335	2.888	2.300
- Honey	N(c)	-	0.022	0.045	0.051	0.079	0.052	0.080
- Meat	N(c)	3.196	3.405	4.123	5.156	4.445	5.629	4.865
	S(c)	0.278	0.290	-	-	-	-	-
- Oilseeds	N(c)	0.275	0.298	0.307	0.282	0.324	0.314	0.360
- Pig Industry	N(c)	0.177	0.193	0.256	0.292	0.328	0.470	0.527
	S(c)	0.010	0.007	0.014	-	-	-	-
- Poultry	N(c)	0.067	0.066	0.131	0.132	0.193	0.150	0.220
- Tobacco	N(c)	0.275	0.197	0.420	0.381	0.327	0.546	0.496
- Wheat	N(c)	2.708	2.845	3.201	2.050	4.950	2.280	5.500
- Wine	N(c)	0.088	0.088	0.088	0.088	0.094	0.088	0.094
- Wool	N(c)	6.611	7.616	7.846	9.220	10.835	9.957	11.711
Sub-total (Commonwealth derived expenditure on rural research schemes)		14.674	16.268	18.023	20.683	25.108	24.273	29.074
Total (Budget Sector)		18.444	18.544	20.771	24.285	31.649	41.591	55.779

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
B. Commonwealth Non Budget Sector								
Department of Primary Industry								
. Statutory Rural Industry Research Schemes * -Fishing Industry Development	N(c)	-	-	-	-	-	-	0.196
Total (Non Budget Sector)		-	-	-	-	-	-	0.196
Total (Direct Commonwealth Funding)		18.444	18.544	20.771	24.285	31.649	41.591	55.975
C. EXPENDITURE FROM OTHER SOURCES								
Department of Primary Industry								
. Bureau of Agricultural Economics ##	S(a)	0.094	0.096	0.141	0.211	0.173	1.129	0.923
	S(b)							
. Bureau of Animal Health	N(c)	0.022	0.017	0.029	0.030	-	24.317	25.150
. Plague Locust Commission (State-contributed funds)	N(a)	0.011	0.015	0.014	0.011	0.008	0.015	0.017
	N(b)	0.052	0.051	0.059	0.046	0.046	0.377	0.427
Sub-total		0.179	0.179	0.241	0.218	0.226	25.838	26.517
. Statutory Rural Industry Research Schemes *								
- Barley	N(c)	-	0.222	0.336	0.427	-	0.489	-
- Cotton	N(c)	-	-	-	0.407	0.438	0.413	0.444
- Chicken Meat	N(c)	0.145	0.193	0.203	0.197	0.269	0.221	0.302
- Dairying	N(c)	0.274	0.309	0.469	0.443	0.588	0.670	0.888
- Dried Fruit	N(c)	0.059	0.049	0.087	0.102	0.147	0.148	0.213
	S(c)	0.007	0.005	-	-	-	-	-
- Fishing Industry Development	N(c)	-	-	-	-	-	0.062	-

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
- Fishing Industry Research	N(c)	-	-	-	-	0.696	-	1.200
- Honey	N(c)	-	0.032	0.044	0.063	0.057	0.064	0.058
- Meat	N(c)	2.870	3.740	5.128	5.261	6.775	5.743	7.419
	S(c)	0.250	0.318	-	-	-	-	-
- Oilseeds	N(c)	0.313	0.275	0.295	0.295	0.324	0.328	0.360
- Pig Industry	N(c)	0.235	0.225	0.264	0.310	0.421	0.498	0.676
	S(c)	0.014	0.007	0.015	-	-	-	-
- Poultry	N(c)	0.050	0.088	0.163	0.187	0.143	0.213	0.162
- Tobacco	N(c)	0.565	0.596	0.461	0.552	0.745	0.791	1.040
- Wheat	N(c)	2.898	2.443	2.923	4.555	5.188	5.063	5.771
- Wool	N(c)	5.578	6.664	8.653	9.220	10.532	9.956	11.382
Sub-total (Industry-derived expenditure on rural research schemes)		13.258	15.169	19.042	22.020	26.323	24.658	29.917
Total (Other sources) ##		13.438	15.348	19.283	22.318	26.549	50.496	56.433
Total (A+B+C) ##		31.881	33.892	40.055	46.603	58.198	92.087	112.409
Less intra-Ministry transfers Total		(0.094)	(0.096)	(0.141)	(0.211)	(0.173)	(1.129)	(0.923)
Total		31.787	33.796	39.914	46.292	58.025	90.958	111.486

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure

($^{a}_{b}$) Intramural expenditure (capital and current (c) Extramural expenditure

* Amounts indicate payments for research made from the Trust Funds concerned, attributable to commonrated appropriation (Table A-B) or industry contribution (Table C). The convention adopted for the reporting of expenditure to and from Research Trust Funds is outlined in Appendix 3. See the table in the body of the text for industry contributions to the Trust Funds.

** Amounts indicate payments made from the Trust Fund. Commonwealth contributions to the Trust Fund were $746 000 (1978-79), $850 000 (1979-80) $820 000 (1980-81), $2 428 000 (1981-82), $1 600 000 (1982-83), $5 298 000 (1983-84) and $3 500 000 (1984-85).

Amounts indicate payments made from the Trust Fund. Commonwealth contributions to the Trust Fund were $300 000 in each year.

The intramural expenditure of the Bureau of Agricultural Economics shown in C is funded by grants from the Meat and Wool Industry Research Schemes. The totals shown for expenditure from other sources are thus overstated. The Total (A+B+C) is adjusted to avoid double-counting for the Ministry as a whole.

DEPARTMENT OF PRIMARY INDUSTRY

A major role of the Department is to provide advice to the Minister for Primary Industry on rural industry policy issues and to implement and administer legislation and government programs for rural industries and their produce. These policy issues by necessity frequently involve a recognition and consideration of scientific and technical factors. The administration of research funds is a function of the Department.

The Bureau of Agricultural Economics (BAE) and the Australian Bureau of Animal Health (ABAH), operate to a certain extent outside the mainstream of the Department's activities, but are responsible to the Secretary.

. Bureau of Agricultural Economics (BAE)

The Bureau's responsibilities include economic research and analysis for the agricultural, pastoral, horticultural, dairying, intensive livestock, forest and fishing industries. The BAE provides government with reports and economic studies necessary for policy formulation and review. To aid decision making by farmers, farmer organisations, industry bodies and others associated with agriculture, the Bureau disseminates analyses and reports of the agricultural situation and prospects.

Subject to its existing commitments and demands for specific investigations, the Bureau is free, indeed expected, to direct its work into economic research and investigation it considers most useful.

The BAE's program has four major components:

- monitoring and forecasting the economic situation on Australian farms and evaluating the farm-level consequences of current and prospective changes in economic conditions and policies;

- evaluating present and future market prices and prospects for rural commodities in domestic and world markets;

- conducting in-depth studies into the economics of agricultural production, marketing, prices and agricultural trade opportunities; and

- servicing departmental, ministerial, administrative and policy needs.

Major BAE activities in 1983-84 included:

- Research into the effects of drought;
- studies on Overseas Trade and Agricultural policies;
- studies on demand projects for dairy products in the ASEAN region;
- papers on issues relating to agricultural protection in the European Community;
- analysis of competitiveness of Lamb and Mutton sales in the Middle East;

- studies on Japanese beef imports;
- work aimed at assessing the export potential of Australian forest projects;
- research on microeconomics forecasting;
- work on agricultural imput in 1983-84
- a workshop on Rural Research and Extension
- an analysis of the impact of alternative taxation resources on soil conservation;
- a task force study of prospects for horticultural projects, the aim being to identify those with longer-term prospects for growth and viability; and
- continuing studies on Resources Management and Conservation, including Fisheries management.

Specific areas to be studied in 1984-85 include:

- EEC agricultural policies;
- international determinants of Australian exchange rates;
- the use of underwriting in Australian agriculture;
- crop insurance and drought policies;
- farm level analysis of government market milk policies in the Australian dairy industry;
- South East Asia as a market for Australian beef;
- evaluation of the US wool promotion campaign;
- economic evaluation of the storage, transport and handling of Australian grain harvest;
- a model of the Mackay sugar industry: the economic effect of regulation;
- changes in the farm labour force;
- Japanese and Korean demand for pulp and pulpwood;
- Japanese market for prawns;
- the effect on farm income of alternative forms of taxation.

. Australian Bureau of Animal Health (ABAH)

The ABAH is responsible for the coordination of national animal health programs for endemic and exotic animal disease. The BAH undertakes research and investigation into the epidemiology of animal disease. A major task at present is the Brucellosis and Tuberculosis Eradication Campaign. The ABAH also provides the secretariat for national committees dealing with animal health and production and international liaison on technical animal health and production issues.

. Australian Plague Locust Commission

The Commission is financed by the States of New South Wales, Victoria, South Australia and Queensland with a matching contribution from the Commonwealth. The Commission engages in operations to combat outbreaks or potential outbreaks of the Australian plague locust and performs research related to this role.

Operations include the collection and collation of data on locust populations, the forecasting of significant changes and developments in locust populations, control operations, the development of improved control measures, the monitoring of all actions and the effects of control operations and the provision of advice to individual States on locust problems.

. Australian Fisheries Service

The Service manages Australian fisheries in cooperation with the States, including:

- interpretation of biological data on available species, sustainable catch rates and environmental aspects;

- application of the most efficient and effective fishing gear and technology;
- interpretation of economic research and analysis, involving costs and earnings (profitability) surveys and ad hoc investigations;
- interpretation of available economic data and the evaluation of the likely impact of fisheries management proposals; and
- procurement of accurate and timely catch, marketing and production statistics and information.

Other activities include the development of legislation affecting the management of fisheries; participation in the education/training of Commonwealth and State fisheries' officers involved in activity under Commonwealth delegation (including the training of professional fishermen, for example in the use of sonar equipment); encouraging the development of the Australian fishing industry by the provision of grants from the Fishing Industry Research Trust Account and the Fisheries Development Trust Account (both administered by the Service); provision of secretariat facilities to sub-committees of the Standing Committee on Fisheries; participation in negotiations within international organisations or with foreign governments on fisheries matters and in the formulation of agreements with foreign governments or corporations; dissemination of information and advice to the industry by the production of monthly Australian Fisheries and other publications; and where possible and consistent with Australia's international aid program, the provision of assistance to developing countries in relation to fisheries matters.

. Management of Torres Strait Fisheries

The Torres Strait Treaty requires cooperative management of commercial fisheries in the Torres Strait area and allocation between Australia and Papua New Guinea of catches taken in the protected zone.

. National Soil Conservation Program

Against the background of an urgent need on one hand to combat land degradation nationally and limited Commonwealth responsibility on the other, in 1983 the Government initiated the National Soil Conservation Program.

The Program aims to develop and implement national policies for the rehabilitation and sustainable utilisation of the nation's soil and land resources. Its broad goals are:

. that all lands in Australia be used within their capability;
. that land use decisions be based on whole catchment/regional land management planning concepts;
. that all land users and levels of government meet their respective responsibilities in achieving soil conservation;
. that effective co-operation and co-ordination occur between all sectors of the communty, disciplines and agencies involved in the use and management of land and water resources; and
. that the whole community adopt a land conservation ethic.

The Program is directed at all sectors of the community with an interest or involvement in land management. Landholders, with whom the main responsibility for erosion control rests, are the major target by community groups, researchers, local government and various

agencies in the State and Federal governments also have important roles to play. The emphasis is on co-operation and co-ordination as the fragmentation of responsibility amongst many government agencies has, in the past, contributed to the present extent of the damage.

Financial assistance, although just one facet of the overall program is an essential ingredient for the support of a range of other policy measures to be employed such as education, training, demonstration, research, publicity, provision of technical assistance and construction of works. Funds have been provided for projects in these broad areas of activity.

Structurally, the Program presently has two components. The first provides funds to State soil conservation agencies to enhance their training, demonstration, research, public awareness, advisory, data collection, design and construction activities. The second component provides funds to other organisations who can contribute to the attainment of the aim of the Program through training, education, innovation, research, program development and liaison or co-ordination activities. Projects of national importance involving State co-operation or national co-ordination are accorded priority.

. Australian Agricultural Council-Sponsored Projects

The Department of Primary Industry provides funds for the Commonwealth contribution to Commonwealth/State projects recommended by the Australian Agricultural Council. Current projects include fresh fruit disinfestation, support for the Fruit Variety Foundation, and the Commonwealth Advisory Laboratory on detergents and sanitizers.

. Rural Industry Research Trust Funds

The Rural Industry Research Trust Funds differ somewhat in regard to their purposes. The general objective of the Funds, however, is to provide money for research and dissemination of information, relating to production improvement, in a broad sense, within the industry. Commonwealth support is in most cases on a 1:1 matching of expenditure to money raised from producers in the form of a levy on their produce.

INDUSTRY CONTRIBUTIONS TO PRIMARY INDUSTRY TRUST ACCOUNTS

($ million)	78-79	79-80	80-81	81-82	82-83	83-84	Projected 84-85
Barley	-	-	0.311	0.472	0.290	1.028	0.993
Chicken Meat	0.189	0.226	0.235	0.216	0.241	0.234	0.240
Cotton	-	-	-	-	0.196	0.254	0.670
Dairying	0.435	0.459	0.422	0.421	0.535	0.565	0.600
Dried Fruit	0.089	0.090	0.119	0.119	0.120	0.093	0.116
Honey	-	-	0.018	0.056	0.045	0.050	0.050
Meat	3.198	3.178	3.297	3.021	4.164	3.608	4.605
Oilseeds	0.349	0.412	0.275	0.299	0.229	0.295	0.310
Pig Industry	0.290	0.288	0.389	0.415	0.401	0.415	0.596
Poultry*	0.138	0.096	0.142	0.146	0.150	0.150	0.162
Tobacco	0.393	0.389	0.378	0.412	0.473	0.546	0.673
Wheat	3.466	3.086	2.012	3.108	1.967	4.650	4.650
Wool	1.932	10.239	7.538	8.766	8.832	10.000	10.700
Totals	10.479	18.463	15.136	17.392	17.643	21.888	24.365

* Estimated proportion of levy attributable to research purposes of Fund.

The Funds promote a degree of self-help through industry involvement in selecting and financing industry specific rural research. Their impact on research priorities is thought to be greater than the level of funding would suggest due to their 'pump-priming' or 'catalytic' effect.

Some of the R&D supported by the funds includes the following:

- For wool five fields of research are supported - production, wool harvesting, distribution, economic and textile research. Production research covers soil deficiences through to research in the chemical structure of the messenger protein controlling wool production. Current programs aim to produce new plants with high resistance to insects, pests and plant diseases, particularly clover starch and root rots. The wool harvesting program is concerned with the development of improved shearing methods for use in traditional and automated shearing. A major project involves the biological defleecing program with very promising work on Epidermal Growth Factor.

- The Meat Research Trust Fund supports continuing research into cattle and sheep diseases: control of buffalo fly, tick control, reproductive problems in Bos indicus cattle in Northern Australia, studies on the nutrition of sheep and cattle and a computerised system of selling cattle. Funds are also provided for research into meat processing technology, ie. various economic studies and promotional and marketing opportunities in the domestic beef industry. Major projects supported include:- sheep blowfly investigation; co-operative research in WA flocks; gene mutation; evaluation of weaning as a management technique in pastoral beef industry; genetic studies; tick resistance; ecology and control of buffalo fly; evaluation of introduced pasture plants; viral bacterial and leptospiral diseases; and control of sex of off-spring in cattle.

- Wheat research programs cover a very wide range of projects including diseases of wheat and pest control, studies of the nitrogen cycle and fertilisation, genetic research, and harvesting methods.

- Payments from the Fisheries Development Trust Account are made within the terms of the Fishing Industry Act 1956 and are intended to finance activities designated to foster the development of the Australian fishing industry. Major projects supported during 1983-84 include:

. monitoring of south-east trawl fishery,

. tuna handling for sashimi markets,

. development of octopus fishery

The Fishing Industry Research Trust Account was established under the Fishing Industry Research Act 1969 to provide research, education, extension and development for the benefit of the Australian fishing industry. Since its inception the scheme has financed a total of 254 projects (including the 1984-85 program).

. Australian Wine Research Institute

The function of the Australian Wine Research Institute is to carry out research into the scientific and technical aspects of wine and spirit manufacture.

In recent years, major research areas have devolved between minor volatile components, pigments and other involatile materials and the complex interactions occurring between all these components and the micro-flora of wines.

Major chemicals work undertaken has included, collection of data on analytical composition of Australian wines and the application of ion-exchange techniques to the stabilisation of wines. Other projects include investigation of cork off-flavours in wine and loss of aroma volatiles during winemaking.

Microbiological group work includes measurement of yeast growth, wine-acid metabolism of yeast in free-run and preserved juice and studies of the effect of lactic acid bacteria found in grape juice and wine.

. Commonwealth Special Research Grant

The purpose of the Grant is to provide Commonwealth Government contributions to rural research outside the scope of the industry specific Commonwealth rural research funding arrangements. Grant funds usually match dollar for dollar basis by the industry contributing to research. Other areas which are eligible for grant support include research not specifically related to a single industry (multi-Industry research) and development of new or infant industries.

Some projects funded in 1984-85 include the study of development and management of tropical fruits, improving goat fibre production and development of farm management models.

. Plant Quarantine Research Program

This Program investigates problems peculiar to Plant Quarantine of an operational nature, including the development and evaluation of techniques to eliminate pests and diseases in imported plants and plant products.

Types of research undertaken at the Plant Quarantine Research Station include the investigation of the penetration of fumigation gases into timber, logs and packing material, investigation of new techniques for the elimination of virus diseases from plant material, and work on aircraft disinfestation.

. Commonwealth Forestry Post-Graduate Research Awards

Each year the Department of Primary Industry makes available awards for the degree of Master and/or Doctor of Philosophy at an Australian university. Fields of study are nominated by the Standing Committee of Australian Forestry Council and cover topics of current interest, calling for urgent investigation, mainly for projects not being undertaken by the various State forest services.

. Commonwealth Extension Services Grant

The objectives of the grant were to encourage and facilitate continuing increase in the efficiency of Australian agriculture and the adjustment of agriculture to change. The grant was discontinued from 1981-82 with the States being compensated for the amount involved through Federal/State tax sharing arrangements.

. Barley Improvement Schemes

These schemes were completed in 1980-81. The Commonwealth contributed to the Barley Improvement Plan to match industry contributions. The industry contributions were made by the Australian Barley Board on behalf of growers in South Australia, Victoria and Western Australia and by brewers and maltsters in all States. The Commonwealth now provides funds for the Barley industry through the Barley Research Trust Account.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Prime Minister and Cabinet								
. Office of Youth Affairs	S(b)	-	-	-	0.012	0.010	0.012	0.010
	S(c)	-	0.028	0.012	0.064	0.032	0.077	0.032
Auditor-General's Office	S(a)	-	-	-	-	-	0.028	0.026
	S(b)	-	-	-	-	-	0.308	0.353
	S(c)	-	-	-	-	-	0.031	0.013
Australian Science and Technology Council (ASTEC)	$_{S}$N(b)	-	-	-			1.175	1.243
	$_{S}$N(c)	-	-	-			0.029	0.060
Office of Public Service Board								
. Human resources planning	S(b)	-	-	-	-	-	0.383	0.425
. Postgraduate Awards	S(c)	0.060	0.046	0.063	0.069	0.062	0.154	0.137
Total (Direct Commonwealth funding)		0.060	0.074	0.075	0.145	0.104	2.195	2.298

N Natural sciences and engineering S Social sciences and humanities
$_{S}$N Includes small component of social sciences and humanities
^{n}S Includes significant proportion of natural sciences and engineering. Most R&D expenditure is in the natural sciences and engineering.
(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

AUDITOR-GENERAL'S OFFICE

Audit science and technology activities are conducted by full-time staff of the Office and are directed to:

- developing and implementing new audit methodologies and techniques including those related to ADP applications and efficiency/cost effectiveness audits; and
- reviewing developments in accounting and audit technology from all sources and where appropriate presenting these developments to other areas of the Office.

- assisting national audit institutions in Asian and Pacific countries to develop and implement new audit methodologies and techniques appropriate to their needs.

AUSTRALIAN SCIENCE AND TECHNOLOGY COUNCIL (ASTEC)

Science and technology play an increasingly important part in Australia's development, and are basic to Australia's capacity to meet challenges in areas such as industrial productivity and competitiveness, energy and resource availability, and management of the environment.

The Government has recognised that high-level, high-quality independent science and technology advisory machinery is necessary if good decisions are to be made in formulating objectives, establishing the most effective and appropriate institutional means for achieving them, and assigning priorities on a rational and considered basis. The Government established the Australian Science and Technology Council (ASTEC) in 1977 with these considerations in mind. ASTEC became a statutory body in 1979.

The Council is the Government's principal independent source of advice on issues relating to science and technology, including:

- the advancement of scientific knowledge and the development and application of science and technology in relation to the national well being;
- the adequacy, effectiveness and overall balance of the national effort in science and technology in government, industry, education and other sectors of the community;
- the assessment of gaps and overlaps in science and technology in Australia;
- the identification and support of new ideas of science and technology likely to be of national importance;
- the practical development and application of research discoveries and the fostering of technological innovation in industry; and
- the means of improving efficiency in the use of resources related to science and technology.

The Council is placing increased emphasis on its tactical and strategic roles in assisting the Government to encourage Australian science and technology to meet the nation's needs and objectives. This role is discharged in the following ways:

. provision of briefing to the Government, through the Prime Minister, on any proposal with a significant science and technology content which comes before Cabinet;

. advice to Budget Cabinet on the relative priorities of those proposals brought forward by Ministers which involve science and technology;

. advice to the Government on current issues involving science and technology arising from any portfolio; and

. formal reports on subjects referred to the Council or initiated by ASTEC itself.

The Council has no executive responsibilities, but is able to advise on operational arrangements, and draws on existing departments and agencies for the expertise, knowledge and assistance necessary to enable its functions to be discharged effectively.

During 1983-84 ASTEC conducted a major inquiry, at the request of the Prime Minister, into Australia's role in the nuclear fuel cycle. The report of the inquiry was tabled by the Prime Minister on 31 May 1984.

Other reports completed and tabled during 1983-84 were on 'Technological Change and Employment', 'Incentives for Innovation in Australian Industry', 'Videotex in Australia', 'Operation of National Research Granting Schemes', 'Guidelines for the Operation of National Research Facilities', and 'Technology and Handicapped People'. Further information on ASTEC activities is provided in its Annual Reports and Quarterly Work Reports.

OFFICE OF THE PUBLIC SERVICE BOARD

. Human Resource Planning

Human resource planning is an important aid to personnel management in the Service, particularly in times of tight control such as the present.

The Research and Information Branch of the Public Service Board maintains records of Public Service staff for statistical reporting and human resources for planning purposes. General information and results of analyses are published in the PSB Annual Report and Statistical Yearbook.

In addition, the Branch promotes the development and implementation of human resources planning systems within the Service through research training and the provision of an advisory service to departments on methods and techniques.

. Postgraduate Awards

Each year the Board makes awards for postgraduate study, usually involving research towards a PhD or Masters degree. There are two schemes: one for study in any appropriate field; and one specifically for management studies. In 1983-84 forty-four awards were granted in the general category (14 being taken up at overseas institutions and 30 in Australia) and eight under the management studies scheme (two being taken up overseas and six in Australia).

YOUTH STUDIES

The Office of Youth Affairs was set up by the Commonwealth Government in 1977 with the aim of improving coordination and consultation between Commonwealth Government departments, State and Local government and non-government organisations in relation to Commonwealth programs and policies which affect young people.

Activities for 1983-84 included a workshop on youth sector training; children and young people in institutional care; transition of handicapped young people from school to adult life; and a study of consultation process with the youth sector. Other activities are, consultations on development of Youth policy and conferences on aspects of youth policy.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Resources and Energy								
. Australia/FRG Coal Liquefaction Study	N(c)	0.323	0.008	-				
. Energy Research and Development Division	N(a)	-	-	-	-	-	0.026	0.058
	N(b)	-	-	-	-	-	1.546	1.677
. National Energy Research Development and Demonstration (NERD&D) Program: Energy Trust Account	N(c)	6.282	8.917	-*	12.182	12.990	14.548	15.510
	S(c)	0.069	0.351	-*	0.452	0.480	0.452	0.480
. National Water Programs	N(b)	0.013	0.029	0.076	0.105	0.034	0.116	0.070
	N(c)	0.896	1.371	1.343	0.634	1.064	8.474	8.687
	S(b)	-	-	-	0.018	0.006	0.021	0.006
	S(c)	0.026	0.012	-	-	-	0.025	0.030
. Bureau of Mineral Resources, Geology and Geophysics	N(a)	0.453	0.573	2.006	1.060	4.796	1.095	5.089
	N(b)	9.089	13.056	14.556	15.231	20.221	20.719	26.626
	N(c)	0.010	0.010	0.010	-	-	-	-
. Australian Safeguards Office	N(a)	0.004	0.004	-	-	-	-	-
	N(b)	0.004	0.005	0.025	0.026	0.044	0.026	0.044
	N(c)	-	-	0.003	0.012	-	0.018	-
. Division of National Mapping	SN(a)	-	-	-	-	-	0.585	0.810
	SN(b)	-	-	-	-	-	11.359	12.410
	SN(c)	-	-	-	-	-	0.946	1.320
. LANDSAT Station	N(a)	-	-	-	-	-	0.011	0.140
	N(b)	-	-	-	-	-	0.092	0.156
	N(c)	-	-	-	-	-	2.027	2.210
Australian Atomic Energy Commission	N(a)	0.878	1.632	2.325	1.718	3.944	2.401	5.219
	N(b)	19.113	24.021	27.211	22.394	24.385	34.041	37.217
	N(c)	0.625	0.808	0.651	0.564	0.702	0.564	0.702
Total (Budget sector)		37.785	50.795	48.205	54.396	68.666	99.171	118.461
Less LANDSAT recoveries		-	-	-	-	-	(0.415)	0.600)
Total (Budget sector net expenditure)		37.785	50.795	48.205	54.396	68.666	98.756	117.861

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
Less AAEC Superannuation employer contribution**		-	(2.655)	(2.605)	(2.685)	(3.016)	(4.082)	(4.603)
Total (less Superannuation adjustment)		37.785	48.140	45.600	51.711	65.650	94.674	113.258
. Commonwealth Non-Budget sector								
Department of Resources and Energy								
. NERD&D Program: Energy Research Trust Account	N(c)	-	-	10.875	1.045	-	1.248	-
	S(c)	-	-	0.818	0.039	-	0.039	-
. Australian Atomic Energy Commission	N(a)	-	-	-	-	-	0.123	0.219
	N(b)	-	-	-	-	-	2.095	2.209
Total (Non-Budget sector)		-	-	11.692	1.084	-	3.505	2.428
Total (Direct Commonwealth funding)**		37.785	50.795	57.292	52.795	65.650	98.179	110.830
C. Expenditure from other sources								
Department of Resources and Energy								
. Australian Safeguards Office	N(c)	-	-	-	-	-	0.047	0.150
. CHOGRM Energy Projects	N(b)	-	-	-	-	-	0.001	-
	N(c)	-	-	-	-	-	0.135	-
. Coal Research Trust Account	N(c)	3.793	4.766	3.958	1.893	4.416	2.143	5.000
. Australia/FRG Coal Liquefaction Study	N(c)	0.625	0.026	-	-	-	-	-
. Bureau of Mineral Resources, Geology and Geophysics	N(a)	0.026	0.006	0.027	0.005	0.059	0.005	0.059
	N(b)	0.349	0.214	0.207	0.075	0.226	0.075	0.226
Australian Atomic Energy Commission	N(a)	0.024	0.060	0.083	0.032	0.058	0.193	0.350
	N(b)	0.522	0.821	0.935	0.391	0.387	3.121	3.320
Total (Other sources)		5.339	5.893	5.210	2.396	5.146	5.719	9.105

($ million)	R&D					S&T (including R&D)	
	80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
Total (A+B+C)**	43.124	56.688	62.502	55.191	70.796	103.898	119.935
Less intra- Ministry transfers#	(0.705)	(0.897)	(0.647)	(0.423)	(0.445)	(0.423)	(0.445)
Total	42.419	55.791	61.855	54.768	70.351	103.475	119.490

N Natural sciences and engineering S Social sciences and humanities

sN Includes small component of social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

* Because of a build-up of funds appropriated to the Trust Account in previous years it was not necessary to appropriate funds in 1982-83. Expenditure from the Fund in this year thus appears in the Non-Budget sector.

** A change in the method of funding employees' superannuation has led to an increase in expenditure without any corresponding change in activity or function. As the principal perspective of the Science and Technology Statement is on levels of support for S&T activity rather than expenditure per se, the totals are adjusted for these amounts.

\# Most intramural expenditure of the BMR and the AAEC shown in B is funded by grants under the National Energy Research Development and Demonstration Program. the Total (A+B) is adjusted to avoid double counting for the Ministry as a whole.

DEPARTMENT OF RESOURCES AND ENERGY

. National Energy Research, Development and Demonstration (NERD&D) Program

The National Energy Research, Development and Demonstration Council (NERDDC) was established in 1978 to advise the Minister for Resources and Energy on the development and coordination of a national energy R,D&D program and to recommend support for individual research, development and demonstration projects.

In developing its recommendations for support grants, NERDDC takes into account the existing level of research activity in Australia and identifies those areas where additional support is required to bring Australia's overall energy R,D&D effort into line with established priorities.

Applications for support grants are invited annually by NERDDC. The Council recommends the commissioning of projects where applications are not received in priority technology areas. Since 1978, grants totalling around $128m have been approved on the advice of the Council.

The Energy Research aid Development Division of the Department of Resources and Energy administers the Program and also provides advice to the Minister on energy R&D policy. The Division also provides secretariat and technical support for NERDDC and its seven technical standing committees.

. Australian/Federal Republic of Germany Joint Coal to Oil Study

A joint feasibility study on the conversion of Australian coals into liquid fuels was conducted by Australia and the Federal Republic of Germany. Arrangements for the conduct of the study were agreed to and the instrument was signed on the 10 October 1978. The study examined the feasibility of establishing 3 million tonnes a year liquid fuel plants at sites in New South Wales, Victoria and Queensland. The relevant State Governments contributed three quarters of the cost of Australia's share of the study.

Work on the study started on 1 April 1979 and the final report was presented to the Commonwealth and the three participating States in November 1981.

. National Water Programs

The Water and Development Division of the Department of Resources and Energy administers research grants and activities to support programs and policies concerned with the planning, development and management of Australia's water resources.

Current activities include:

- Federal Water Resources Assistance Program (FWRAP)
- National Water Resources Assessment Program (NWRAP)
- Federal Water Research Program

Under the predecessor National Water Resources Program financial assistance has been provided to the States each year over a six year period ending 30 June 1984 to undertake works of high priority. In recent years this has amounted to over $40m in a year. In 1984-85, the first year of FWRAP, the level of assistance is 64.3 million. Apart from major construction works, a number of studies have been undertaken as part of the program. These include studies into River Murray salinity and drainage control, dryland salinity control in Western Australia and floodplain management.

The National Water Resources Assessment Program was initiated in 1964 as a priority of the Australian Water Resources Council. Under the Program, Commonwealth assistance has been provided to the States to accelerate the collection of basic water resources data covering surface water, groundwater and water quality. A considerable body of data on Australia's water resources has been amassed over a period of almost 20 years.

The Perspective on Water Resources to the Year 2000 Study was completed early in 1983, and, later in that year, the report, WATER 2000, has been published. Consideration of the recommendations of this report led to the development of FWRAP and substantial changes to WRAP.

The AWRC Water Research Program was commenced in 1968 with the aim of filling gaps in current research efforts in areas of direct relevance to the activities of Australian water authorities. Research results are disseminated by reports, workshops and other activities. Information on the results is also available through our on-line national water data base, STREAMLINE. Recently a study to investigate the need for, and a possible role of an Institute of Freshwater Studies was completed and the recommendations are currently under consideration by the Commonwealth Government. It has recommended the establishment of a new independent research advisory council supported by a National Office of Water Research.

. Bureau of Mineral Resources, Geology and Geophysics (BMR)

BMR is a geoscience research organisation which undertakes scientific studies aimed at an integrated, comprehensive, scientific understanding of the geology of the Australian continent, the Australian off-shore area, and the Australian Antarctic Territory to support the fullest development of Australia's mineral and energy resources.

BMR comprises four research divisions (Continental Geology; Petrology & Geochemistry; Geophysics; Marine Geosciences & Petroleum Geology), the Baas Becking Geobiological Laboratory (a joint BMR/CSIRO facility), a Resource Assessment Division, a Special Projects & Geoscience Services Branch, and a Planning & Programs Branch.

BMR's scientific projects are grouped into eight broad programs:

- Fossil Fuels
- Minerals
- Groundwater
- Seismic Monitoring
- National and International Geoscience Maps
- Overseas Programs
- Petroleum and Minerals Resource Assessment
- National Geoscience Database.

Recent developments include:

- BMR has chartered the 1500 tonne Norwegian research vessel Rig Seismic for a program of geological and geophysical research that will focus on the petroleum potential of the sedimentary basins occurring on Australia's continental margins. The vessel underwent refitting in Newcastle and commenced marine studies on the Lord Howe Rise in January 1985. Other areas to be investigated in 1984/85 include the Heard/McDonald sector of the sub-Antarctic, and the Otway Basin. In 1985/86 investigations will concentrate on the Queensland Trough, the Coral Sea Islands region and the Exmouth Plateau. The program of offshore surveys will provide a geoscientific framework designed to promote exploration, provide data for national resource assessment and make a significant contribution towards global scientific studies of continential margin evolution.

- To process the vast amount of geophysical data expected from the program, BMR has established a new Seismic Data Processing Centre. In addition to supporting the new marine program, the Centre will also be able to process seismic reflection data collected by BMR on land.

- As part of the Government's objective of seeking a Comprehensive Test Ban Treaty, BMR is establishing an Australian Nuclear Monitoring Centre (NMC) and associated International Data Centre (IDC). The NMC will be able to detect nuclear explosions larger than 10 kilo-tons within a radius of 10,000 km from the centre of Australia. Associated with the NMC, the IDC will service the southern hemisphere and, linked to similar centres elsewhere, would improve world-wide detection of nuclear explosions and monitor compliance with the proposed Comprehensive Test Ban Treaty.

- So as to encourage an adequate and sustained supply of geoscientists, BMR will establish and administer a new post-doctoral fellowship scheme. The fellowships will be for two years duration and be tenable in Australian institutions. They will be used as a means of developing expertise in selected fields of geoscience, with candidates working on joint research projects with BMR staff. Two awards will be offered each year, a maximum of four Fellows being employed at any one time.

. Division of National Mapping

The prime tasks of the Division of National Mapping (Natmap) are to provide coverage of Australia with topographic maps, to make bathymetric maps of Australia's continental shelf and to make thematic and special purpose maps. The topographical mapping of Australia is a cooperative enterprise shared between the Commonwealth and the States. The Department of Defence contributes to this activity.

Other Activities of Natmap are:

- Co-ordination of Commonwealth activities for Mapping, Charting and Surveying;
- Maintenance of the National Geodetic Network;
- Operation of the Austrlian Landsat Station, to provide Australia with the capability for the reception, processing and analysis of data from Landsat Earth Resources Technology Satellites.

. Australian Safeguards Office

The Australian Safeguards Office operates the national system of accounting for and control of nuclear material as required by the agreement between Australia and the International Atomic Energy Agency (IAEA) for the application of safeguards in connection with the treaty on the non-proliferation of nuclear weapons. It also implements safeguards requirements of Australia's bilateral safeguards agreements and ensures that agreed physical protection measures are applied.

The practical implementation of safeguards in Australia is supported by a program of research and development which included, in 1983-84:

- improvements in the safeguards measures applied to spent fuel from nuclear resarch reactors.
- The application of portable personal computers to international safeguards inspections.
- Study of safeguards approaches for centrifuge enrichment facilities.
- Demonstration of safeguards techniques for small uranium enrichment plants.
- Study of containment/surveillance measures for safeguarding spent fuel storage ponds.
- Provision of a cost free expert to the IAEA.
- Evaluation of advanced statistical techniques in nuclear materials accountacy.
- Quantification of performance of safeguards systems based on extended containment and surveillance.

AUSTRALIAN ATOMIC ENERGY COMMISSION

The Australian Atomic Energy Commission is the principal agency for nuclear R&D in Australia. The Commission also provides technical advice to government on a range of nuclear related matters. Its main research programs cover:

- nuclear waste management, including development of the Synroc process for the immobilisation of high level radioactive wastes;

- providing to departments of nuclear medicine in Australian hospitals locally-produced radiopharmaceuticals and radioisotopes for diagnosis and therapy;

- the use of radioisotopes and radiation for industrial processing, tracing applications, food irradiation and sterilisation;

- environmental science with special reference to the Australian uranium mining industry; and

- supporting research in fields of fusion technology, safeguards, fission and health and safety assessments of nuclear plant and operations.

The commission operates two research reactors: the 10MW High Flux Australian Reactor (HIFAR) and the 100KW Moata reactor. These reactors are used for the commercial production of radioisotopes for use in medicine, industry and research, as well as providing research facilities for the AAEC, universities and other tertiary bodies.

Technical liaison is maintained with a wide range of bodies involved in atomic energy including the International Atomic Energy Agency, the OECD Nuclear Energy Agency, national and international governmental authorities, Australian State government bodies and universities.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Science and Technology (DST)								
. Administrative and other costs not elsewhere included	N(a)	-	-	-	-	-	0.004	0.116
	N(b)	-	-	-	-	-	6.142	6.660
	N(c)	0.007	-	-	-	-	-	0.125
. Antarctic Activities								
- Antarctic Division	N(a)	3.912	2.285	6. 981	6. 501	6. 093	11.579	10.802
	N(b)	8.474	8.796	10. 470	12. 110	14. 919	21.431	25.762
	N(c)	0.028	0.034	0. 017	0. 008	0.017	0.008	0.017
- Antarctic Air Transport Study	N(a)	-	-	-	-	-	1.838	0.079
	N(b)	-	-	-	-	-	0.201	0.020
- Antarctic Ship Design Study	N(b)	-	-	-	-	-	0.156	-
- Scott Polar Research Institute Grant	N(c)	-	-	-	-	-	0.010	0.010
. Australian Government Analytical Laboratories	N(a)	0.025	0.019	0. 025	0. 052	0. 077	0.691	0.645
	N(b)	0.298	0.343	0. 528	0. 630	0. 665	7.065	7.399
. Baseline Air Pollution Monitoring Station	N(a)	-	-	-	-	-	-	0.050
	N(b)	-	-	-	-	-	0.327	0.303
	N(c)	-	-	-	0. 147	0. 155	0.147	0.155
. Bureau of Meteorology	N(a)	-	0.003	0. 031	0. 092	0. 090	1.963	3.319
	N(b)	0.941	1.180	1. 701	1. 647	1.688	42.626	48.352
- International Activities	N(b)	-	-	-	-	-	0.540	0.610
	N(c)	-	-	-	-	-	0.365	0.356
. Grants-in-Aid								
- Academies and ANZAAS	N(c)	-	-	-	-	-	0.451	0.467
	S(c)	-	-	-	-	-	0.143	0.158
- Standards Association	N(b)	-	-	-	-	-	0.024	0.024
	N(c)	-	-	-	-	-	2.583	2.760

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
. International Cooperation								
- Academies' Scientific Exchanges with China	^{S}N(c)	-	-	-	-	-	0.126	0.130
- Association for Science Cooperation in Asia	N(c)	-	-	-	-	-	0.026	0.026
- Bilateral Agreements (India, Japan, Mexico, U.S.A., FRG, URSS)	$_{S}$N(c)	0.072	0.079	0.156	0.147	0.167	0.301	0.519
- Commonwealth Science Council	N(c)	-	-	-	-	-	0.081	0.082
. Ionospheric Prediction Service	N(a)	0.076	0.006	0.009	0.006	0.004	0.046	0.051
	N(b)	0.015	0.085	0.111	0.089	0.102	1.360	1.456
. National NMR Centre	N(b)	0.114	0.093	0.048	-	-	-	-
. Patent Activities								
- Patent Office*	N(a)	-	-	-	-	-	0.148	0.394
	N(b)	-	-	-	-	-	13.914	17.228
	N(c)	-	-	-	-	-	0.110	0.126
- Contributions to international patent bodies	N(c)	-	-	-	-	-	0.265	0.357
. Research Grants and Fellowships								
- ARCS Grants	N(b)	-	-	-	-	-	0.158	0.145
	N(c)	12.123	13.187	14.544	16.766	18.332	16.766	18.332
	S(b)	-	-	-	-	-	0.044	0.041
	S(c)	3.079	3.803	4.193	4.469	4.418	4.469	4.418
- QEII Fellowships	N(b)	-	-	-	-	-	0.020	-
	N(c)	0.560	0.671	0.659	0.780	0.826	0.780	0.826
- Marine Science Grants	N(b)	-	-	-	-	-	0.058	0.070
	N(c)	2.000	1.899	2.125	2.046	3.711	2.046	3.711
- Queen's Marine Science Fellowships	N(c)	0.250	0.336	0.257	0.265	0.356	0.265	0.356
- National Fellowships Scheme	$_{S}$N(c)	-	-	-	0.184	2.196	0.184	2.196
. Space and Upper Atmosphere Activities								
- Space Projects	N(b)	-	-	-	-	-	0.140	0.140
. Commission for the Future	N(b)	-	-	-	-	-	-	0.166

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
Anglo-Australian Telescope Board (AATB)	N(a)	0.679	0.554	0.566	0.406	0.258	0.406	0.258
	N(b)	0.851	1.058	1.227	1.304	1.400	1.304	1.400
	N(c)	-	0.126	0.091	0.059	0.218	0.059	0.218
Australian Institute of Marine Science (AIMS)	N(a)	0.593	0.527	0.581	0.673	0.935	0.673	0.935
	N(b)	4.631	5.195	5.801	6.227	6.415	6.227	6.415
Commonwealth Scientific and Industrial Research Organization (CSIRO)**	N(a)	58.641	70.792	81.305	56.215	41.853	58.946	42.440
	N(b)	157.930	200.976	233.247	253.894	262.225	268.659	275.944
	N(c)	1.892	1.032	1.133	1.435	1.473	1.435	3.296
	S(a)	0.377	0.125	0.174	0.216	0.624	0.216	0.624
	S(b)	1.222	1.488	1.237	2.148	2.342	2.148	2.342
	S(c)	-	0.058	0.052	0.052	0.055	0.052	0.055
National Standards Commission	N(a)	-	-	-	-	-	0.054	0.042
	N(b)	-	-	-	-	-	0.821	0.914
Total		258.882	315.846	367.390	368.588	371.613	480.599	493.835
Less recoveries from patent-related charges*		-	-	-	-		(16.332)	(21.500)
Less other DOS recoveries		-	-	-	-		(0.920)	(0.808)
Total (Budget sector net expenditure)		258.882	315.846	367.390	368.588	371.613	463.347	470.727
Less CSIRO superannuation employer contribution #		-	(24.315)	(25.408)	(27.643)	(29.438)	(29.172)	(30.901)
Total (Less superannuation adjustment)		258.882	291.531	341.982	340.945	342.175	433.910	439.696
B. Commonwealth Non-budget sector								
Anglo-Australian Telescope Board (funds brought forward and other revenue)	N(a)	0.039	-	-	-	-	-	-
	N(b)	0.072	0.016	0.023	0.020	0.027	0.020	0.027

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
Australian Institute of Marine Science (AIMS)	N(a)	-	0.003	0.028	0.026	0.051	0.026	0.051
	N(b)	-	0.034	0.281	0.244	0.353	0.244	0.353
Commonwealth Scientific and Industrial Research Organization (CSIRO)	$_{S}$N(a)	0.960	0.582	1.173	1.830	2.937	1.846	2.946
	$_{S}$N(b)	4.901	9.282	12.014	9.180	18.252	9.320	18.465
National Standards Commission	N($^{a}_{b}$)	-	-	-	-	-	0.252	0.314
Total (Non-Budget sector)		5.972	9.917	13.519	11.301	21.620	11.709	22.156
Less CSIRO superannuation employer Contribution #		-	(0.434)	(0.408)	(0.413)	(0.464)	(0.426)	(0.487)
Total (less superannuation adjustment)		5.972	9.483	13.111	10.888	21.156	11.283	21.669
Total (Direct Commonwealth funding)#		264.854	301.014	355.093	351.833	363.331	463.373	484.603
C. Expenditure from other sources								
Department of Science and Technology								
. Bureau of Meteorology	N(a)	-	-	-	-	-	0.739	0.953
	N(b)	-	-	-	-	-	18.165	18.480
. National NMR Centre	N(b)	0.015	0.044	0.011	-	-	-	-
. Space and Upper Atmosphere Activities								
- Space Projects (U.S.	N(b)	-	-	-	-	-	3.732	3.055
contribution)	N(c)	-	-	-	-	-	10.244	8.742
Anglo-Australian Telescope Board (U.K. contribution	N(a)	0.718	0.554	0.566	0.406	0.258	0.406	0.258
and other revenue)	N(b)	0.923	1.074	1.250	1.324	1.427	1.324	1.427
	N(c)	-	0.126	0.091	0.059	0.218	0.059	0.218
Commonwealth Scientific and Industrial Research Organization**	$_{S}$N(a)	1.947	1.838	2.668	5.715	4.677	5.753	4.699
	$_{S}$N(b)	21.140	25.377	29.382	27.594	34.140	28.063	34.630
Total (Other sources)		24.743	29.012	33.968	35.098	40.720	68.485	72.462

($ million)	R&D					S&T (including R&D)	
	80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
Less CSIRO Superannuation employer contribution	-	-	(2.085)	(2.182)	(2.552)	(2.225)	(2.604)
Total (less Superannuation adjustment)	24.743	29.012	31.883	32.916	38.168	66.483	70.119
Total (A+B+C)#	289.596	330.026	386.976	384.749	401.498	511.718	532.149

N Natural sciences and engineering S Social sciences and humanities
$_{S}$N Includes some social sciences and humanities

$_{s}$N Includes small component of social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

* The activities of the Patent Office result in revenue to the Commonwealth. This amounted to $9.221m in 1979-80, $11.026m in 1980-81, $12.710m in 1981-82, $14.514m in 1982-83, and $16.7m for 1983-84.

** Most of the scientific and technological service activities undertaken by CSIRO are integral with the Organization's research programs and have been included under the heading R&D. The following activities have, however, been identified as S&T (other than R&D) for the purposes of these tables: information, library, editorial, patenting, science communications, overseas aid and the servicing of Australia's standards of physical measurement.

\# A change in the method of funding employees' superannuation has led to an increase in expenditure without any corresponding change in activity or function. As the principal perspective of the Science and Technology Statement is on levels of support for S&T activity, rather than expenditure per se, the totals are adjusted for these amounts.

DEPARTMENT OF SCIENCE

The Department has a bread policy role in relation to science and has administrative and operational responsibilities across a wide span of research, scientific, and service activities. These are described in detail under the following headings.

. Antarctic Activities

The importance of Antarctica to Australia lies in the data base it forms for meteorological and pollution studies, in the critical role the ice sheet plays in southern hemisphere and global atmospheric and oceanic circulations, in its marine life and potential mineral resources, and in the fact that Australia claims sovereignity over nearly one half of the continent's land mass.

The Antarctic Division of the Department of Science and Technology conducts research and administers, organises and provides logistic support for the Australian National Antarctic Research Expeditions (ANARE) which operate from three stations on the Antarctic continent and one on Macquarie Island. The stations support programs of scientific research in upper atmospheric physics, cosmic ray physics, glaciology, biology, medical science, geology and geophysics.

The R&D activity expenditure reflects the continuing commitment to rebuilding all three Australian Antarctic stations.

. Australian Government Analytical Laboratories (AGAL)

AGAL provides essential services in analytical chemistry and microbiology which enable client government departments and agencies to meet their responsibilities to protect public health, collect revenue on imported goods, enforce laws against importing illicit drugs of abuse and protect the good name of export foodstuffs. AGAL's operational laboratories are supported by a research and development group which is responsible for the development of new methods, quality assurance programs, the issuing of reference chemicals and the provision of specialist technical services.

. Baseline Air Pollution Station (Cape Grim, Tasmania)

The station is part of a worldwide baseline monitoring network sponsored by the united Nations and guided and coordinated by the World Meteorological Organization. The object is to monitor changes in atmospheric constituents to determine whether man-made pollution is changing the atmosphere on a global scale and whether this in turn is changing the world's weather and climate. Since January 1984 the station has been operated by the Bureau of Meteorology.

. Bureau of Meteorology

The Bureau of Meteorology provides the national meteorological service. This covers a broad spectrum of activities including observing and forecasting the state of the atmosphere throughout Australia and adjacent territories; issuing warnings of hazardous weather events; and publishing and promoting use of meteorological information. It also undertakes the research needed to maintain it as a viable modern service. Research undertaken by the Bureau is directed toward the following objectives:

- to increase knowledge of those aspects of the meteorology and hydrology of the Australian region and the southern hemisphere which bear directly on the provision of services by the Bureau;

- to solve practical scientific problems relating to the development, provision and improvement of Bureau services;

- to develop new and improved techniques and systems for the provision of services and the overall operation of the Bureau; and,

- to provide a core of expertise and achievement in the main specialist areas of meteorology.

. Grants in Aid

The Department disburses government grants-in-aid to a number of bodies. The grant to the Australian and New Zealand Association for the Advancement of Science (ANZAAS) assisted nineteen young Australian scientists to attend the 53rd Congress in August 1983. The grants to the four learned academies contribute toward the costs of their affiliations with overseas and international organisations, and general administration, i.e. Australian Academy of the Humanities, Australian Academy of Science, Academy of the Social Sciences in Australia and Australian Academy of Technological Sciences. These grants have also assisted academies to participate in exchange programs with their Chinese counterparts. A special grant of up to $20 000 is to be made to the Australian Academy of Science in 1983-84 for a feasibility study on the establishment of an Australian Prize for Scientific Achievement promoting the welfare of the peoples of the world.

. International cooperative arrangements in science and technology

Bilateral international agreements are an important source of support for the development of science and technology in Australia. There is considerable activity under six agreements administered by the Department: the United States-Australia Agreement for Scientific and Technical Co-operation, the Federal Republic of Germany-Australia Science and Technology Agreement, the India-Australia Science and Technology Agreement, the Japan-Australia Science and Technology Agreement, the China-Australia Science and Technology Agreement and the Mexico-Australia Science and Technology Agreement. Activities supported meter the agreements include short-term visits (usually up to six months) to plan or participate in cooperative research, seminars and workshops, and information exchange projects. Activities under The USSR-Australia Science and Technology Agreement are under consideration. (see Appendix 3).

The Department is responsible for managing Australia's involvement in the Association for Science Cooperation in Asia (ASCA). The Association exists to encourage scientific and technical co-operation among member countries with a view to promoting development in the region. Australia has been involved in a number of ASCA projects including a study of marine resources throughout the Indo-Pacific region, and a Science and Technology Information Registry on policy and planning.

Australia contributes 17.8% of the budget for the Commonwealth Science Council, a liaison body formed in 1946 to facilitate collaboration and exchange of information between Commonwealth scientists. Two fields in which Australia has been actively involved have been the management of water hyacinths and solar cooling for food preservation.

The Department administers special grants to the learned academies for exchange programs with institutions of the Peoples Republic of China.

. Ionospheric Prediction Service

The Ionospheric Prediction Service provides assistance and advice to radio communicators through the distribution of long-term operational and planning radio predictions, and to radio communicators, geophysicists and other users of the earth-space environment through short-term forecasts of the state of the sun, the earth's upper atmosphere and magnetic field.

IPS is concerned with two broad areas of research:

- studies of the Earth's upper atmosphere, ionosphere, and radio wave propagation through them. This is fundamental to radio communications, navigation and radio direction finding;

- knowledge of the development of solar activity regions, the propagation of solar disturbances through interplanetary space, and the effects of such disturbances on terrestrial communication, navigation and geophysical systems. This knowledge is central to the forecasting of terrestrial effects of solar activity.

Current research projects include:

- assessment of the effect of ionospheric inhomogeneities on the quality of radar imaging from satellites;

- evaluation of ionospheric absorption on radio communications;

- development of a remotely controlled ionospheric monitoring network;

- assessment of the effect of changing solar features on the space environment near the earth.

. National Nuclear Magnetic Resonance Centre

The Centre was established in 1975 as an independent national research facility located within the grounds of the Australian National University. It helped Australian Research Grants Scheme grantees and other scientists to achieve results of national significance in the fields of chemistry, biochemistry, biology, geochemistry and medicine. Projects assisted include the manufacture of proteins, oil-from-coal research and development of new therapeutic drugs. The agreement between the Government and the A.N.U. terminated on 31 December 1982. Tenders were called for sale of the Centre's equipment and on 1 January 1983 ownership passed to A.N.U.

. Patent, Trade Marks and Designs Office

The Office:

- oversights and administers Australian industrial property systems for the protection of inventions, trade marks and industrial designs;

- investigates all applications for letters patent of invention and for the registration of designs and trademarks;

- issues Deeds of letters patent and certificates of registration and publishes details of successful applications;

- acts as a Receiving Office, International Searching Authority and an International Preliminary Examining Authority under the Patent Co-operation Treaty;

- provides and further develops patent information services to facilitate diffusion of technology by enabling access by research, manufacturing and industrial concerns to information contained in patent specifications; and

- contributes advice and expertise to other areas of the Department concerned with encouraging invention and technological innovation.

The Office also contributes advice and expertise to other government departments and agencies concerned with invention and technological innovation. In addition it provides policy advice to the Minister in relation to the development and administration of industrial property laws, practices and procedures so that they may encourage innovation and creative activity for the national benefit. It is responsible for administering Australian participation in bilateral and multilateral international agreements in industrial property and ensuring that Australia's responsibilities under these agreements are discharged in a proper manner. The costs of operating the Office are balanced by revenue from fees charged for activities under the Patents, Trade Marks and Designs Acts, and international industrial property agreements, the sale of publications and from fees for the provision of services to members of the public and industry.

. Research Grants and Fellowships

- Australian Research Grants Scheme (scientific research)

The Australian Research Grants Scheme (ARGS) supports high level research by individuals and research teams in universities and other non-government institutions. Grants are provided on the basis of the quality of the proposed research and the ability of the investigators. Scientific excellence is the sole criterion. Total amounts of $19.25m and $22.42m were allocated to individual research scientists and research teams for the calendar years 1983 and 1984 respectively under the ARCS. By making a smaller number of larger grants, the scheme now places greater emphasis to those basic and applied research projects of exceptionally high quality. Grants are awarded in eight disciplines - biological sciences (molecular), biological sciences (plant and animal), chemical sciences, earth sciences, engineering and applied sciences, physical sciences, social sciences and humanities, and economics.

- National Research Fellowships

This new scheme will provide 50 three-year post-doctoral fellowships commencing in 1984. Fellowships will be awarded on the basis of recommendations from an advisory committee and allocated to priority areas of national interest, industry based research and fundamental research.

- Queen Elizabeth II Fellowships (post doctoral fellowships)

Up to ten awards are made in each year to young scientists of exceptional promise and proven capacity for original research in the physical and biological sciences. The fellowships are for two years tenable at Australian research institutions.

- Queen's Fellowships in marine science

Each year about three or four Queen's Fellowships in marine science are awarded to young scientists of exceptional promise and proven capacity for original work, for two years' full-time post-doctoral research at an Australian marine research institution. The scheme also provides for the appointment of senior Queen's Fellows - eminent marine scientists from overseas who come to Australia for periods up to one year to give lectures and seminars and to conduct research.

- Marine Sciences and Technologies Research Grants Scheme (marine research)

Funds are provided for research projects in the marine sciences and technologies in those priority areas which are determined by the Minister for Science on the advice of the Australian Marine Sciences and Technologies Advisory Committee (AMSTAC).

- Space and Upper Atmosphere Activities

Space Projects. The Department plays a central role in Australian space activities and provides vital communications support for the United States National Aeronautics and Space Administration (NASA) through the operation of deep space and earth satellite tracking stations in Australia. The Department is also the cooperating agency for a European Space Agency tracking station operated by the Overseas Telecommunications Commission (OTC), located at Carnarvon, Western Australia.

ANGLO-AUSTRALIAN TELESCOPE BOARD (AATB)

The Anglo-Australian Telescope Board, jointly funded by the U.K. and Australia, maintains the 3.9 metre Anglo-Australian Telescope at Siding Spring, N.S.W. and associated facilities in Sydney. The Telescope is regarded world-wide as one of the most technically advanced optical telescopes, particularly in respect of its tracking accuracy and electronic data acquisition and processing facilities. Refinements to the original installation, new instrumentation development, and scientific and technical support staff of the highest quality have maintained its place in the forefront of astronomical research. The Telescope is available to leading astronomers, principally from Australia and the United Kingdom, to carry out research relating to all fields of astrophysics.

AUSTRALIAN INSTITUTE OF MARINE SCIENCE (AIMS)

The Australian Institute of Marine Science carries out research towards a predictive understanding of the systems and processes of the marine environment. The mandate granted to the Institute does not limit the topics or regions which may be the subject of its research. However, for the foreseeable future emphasis is placed on research on mangrove dominated coastlines, the Great Barrier Reef and adjacent waters. The Institute is situated near Townsville.

Organisationally, the search for understanding and predictive capability is administered under five major, co-operative, interdisciplinary programs whose details have been recently developed in an extensive set of research proposals. The programs are:

. The Mangrove Program, which includes studies on the development of mangrove forests through time and the development of techniques for the determination of the age of forests.

. The Nearshore Environment Program, which seeks to understand the processes and trophic interactions within the nearshore environment.

. Energy Flows, Resource Cycling and their consequences within Reef Ecosystems. This program will provide the means to assess how coral reefs respond to, and are controlled by their environments.

. Patterns, Abundances and Relationships in Reef Systems. This program is directed to characterising the patterns of coral reef communities in space and time, elucidating the factors which determine those patterns and to the production of explanatory and predictive models of the ecosystem and its components.

. The Shelf Sea of the Great Barrier Reef Region. This research program aims to elucidate the major abiotic and biotic factors which influence the distribution and abundance of organisms within the Shelf Sea of the Great Barrier Reef Region; to evaluate the mechanisms governing the dispersal and recruitment of reef dwelling animals and to describe the responses of different systems within the region to temporal variations of nutrient concentrations in order to determine the importance of upwelling events.

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION (CSIRO)

CSIRO was established as an independent statutory corporation by the Science and Industry Research Act 1949. It succeeded the former Council for Scientific and Industrial Research established in 1926. The Act was substantially amended in 1978.

The main role of the Organization is to plan and execute a comprehensive program of general scientific research on behalf of the Commonwealth for the benefit of Australian industry and the community.

Research is carried out mainly in the physical and biological sciences, with the emphasis on strategic research. Strategic research is undertaken to achieve practical results and is characterized by its orientation towards the basic research end of the research and development spectrum.

The transfer of research results into commercial use or other applications is a principal aim of CSIRO. Other activities are undertaken to the extent that they can be carried out conveniently in conjunction with the Organization's main research and technology transfer activities.

CSIRO's statutory functions, in summary form, are:

- to carry out scientific research relevant to Australian industry, the community, national objectives, national or international responsibilities, or for any other purpose determined by the Minister;
- to encourage and facilitate the application and utilisation of research results;
- to liaise with other countries in matters of scientific research;
- to train research workers;
- to make grants and award fellowships and studentships relevant to the Organization's research;
- to recognise, cooperate with and make grants to industrial research associations;
- to establish, and promote the use of, standards of measurement of physical quantities;
- to collect, interpret and disseminate scientific and technical information; and
- to publish scientific and technical reports, periodicals and papers.

The Organisation is funded primarily by direct appropriations from the Commonwealth Parliament. Decisions on research priorities are made by CSIRO in the light of advice received from the CSIRO Advisory Council, government departments and other interested bodies.

CSIRO is governed by an Executive comprising three full-time members, one of whom is Chairman, and five part-time members. The Chairman is the chief executive of the Organization and is assisted in this role by the other two full-time members of the Executive.

The research work of the Organization is carried out in five Institutes, each headed by a Director. Institutes are groupings of Divisions and Units with related research interests. The latter are headed by Chiefs and Officers-in-Charge respectively.

Divisions and Units are each responsible for coherent sets of research programs, with Units generally being responsible for narrower fields of research and having fewer staff than Divisions.

Support services are provided as follows:

-	Planning	Assistance in setting research priorities and allocating resources.
-	Scientific Services	Technology transfer, computing services, information services and international aid.
-	Office of the Executive	Corporate policies, coordination and development.
-	Finance and Administration	Budget, works, administrative services and systems.
-	Personnel	Policy advice and operational assistance in all staff matters.

On 30 June 1984, CSIRO had a total staff of 7 276 in more than 100 locations throughout Australia. About one-third of the staff were professional scientists, with the others providing technical, administrative or other support.

The CSIRO Advisory Council is supported by six State Committees and a Northern Territory Committee. The Council comprises the chairman of its State and Territory Committees, senior representatives of Commonwealth agencies with interests in science and technology, and persons representing industry, tertiary education and community interests. ASTEC, the Australian Science and Technology Council, has observer status on the CSIRO Advisory Council.

CSIRO also has direct formal consultative links with Commonwealth ministries having major interests in science and technology, with industry bodies, and with the tertiary education sector.

The broad objectives, fields of research and composition of the five CSIRO research institutes are as follows:

. Institute of Animal and Food Sciences

The Institute comprises the following Divisions and Units:

Division of Animal Health
Division of Animal Production
Division of Fisheries Research
Division of Food Research
Division of Tropical Animal Science
Division of Molecular Biology
Wheat Research Unit
Australian National Animal Health Laboratory.

The Institute conducts scientific and technological research aimed at improving the efficiency of livestock production, the management and productivity of Australia's fisheries resources, the conservation of its marine ecosystems, and the quality and safety of human foods; and at obtaining a better understanding of the relationships between human diet and health.

The Institute's activities include research on:

- control of indigenous and exotic animal diseases;
- nutrition, reproduction, genetics and management of livestock;
- marine ecosystems and the ecology and population dynamics of the ocean's harvestable resources;
- methods of processing, handling and storing meat, fish, dairy foods, fruit, vegetables and grain;
- identification of nutritive imbalances and deficiencies in the diets of Australians and investigation of their effects on human health; and
- molecular and cellular biology and its application in the livestock and pharmaceutical industries.

. Institute of Biological Resources

The Institute comprises the following Divisions and unit:

Division of Entomology
Division of Forest Research
Division of Horticultural Research
Division of Plant Industry
Division of Soils
Division of Tropical Crops and Pastures
Division of Water and Land Resources
Division of Wildlife and Rangelands Research
Centre for Irrigation Research.

The Institute conducts scientific and technological research aimed at improving the management and productivity of Australia's land, soil, water, agricultural, pastoral and forestry resources, and the management and conservation of Australian ecosystems.

The Institute's activities include research on:

- application of the plant sciences to the management and utilisation of crops, pastures, forests and native ecosystems;
- introduction, selection and breeding of plant material as a basis for developing new and improved varieties of crop and pasture plants and forest trees;
- control of insect pests of plants and animals, and of weeds and plant diseases, with particular emphasis on research aimed at reducing dependence on chemical control;
- biology of native and introduced animals in the context of conservation and pest control; and
- assessment and management of land, soil and water resources in agricultural, pastoral, forested and near-urban areas.

. Institute of Energy and Earth Resources

The Institute comprises the following Divisions and Units:

Division of Energy Chemistry
Division of Energy Technology
Division of Fossil Fuels
Division of Geomechanics
Division of Groundwater Research
Division of Mineral Chemistry
Division of Mineral Engineering
Division of Mineral Physics
Division of Mineralogy and Geochemistry

The Institute conducts and fosters scientific and technological research aimed at contributing to the better definition, use and management of Australia's mineral, energy and groundwater resources with due recognition of the environmental consequences of these activities.

The Institute's activities include research on:

- locating, evaluating, defining and characterising Australia's energy and earth resources; and
- planning their recovery, development and effective use, consistent with the minimization of environmental stresses.

. Institute of Industrial Technology

The Institute comprises the following Divisions:

Division of Applied Organic Chemistry
Division of Building Research
Division of Chemical and Wood Technology
Division of Manufacturing Technology
Division of Protein Chemistry
Division of Textile Industry
Division of Textile Physics.

The Institute conducts scientific and technological research and development aimed at increasing the efficiency, competitiveness and scope of Australian industry in relation to both national and international markets.

In the resource-based industries, the Institute's activities include research on:

- properties, processing and use of wool and leather;
- protein science;
- preservation and properties of wood;
- forest products, pulp and paper;
- utilisation of lignocellulose resources;
- agricultural engineering;
- chemicals from coal;
- substitute liquid fuels.

In the technology-based industries, activities include research on:

- industrial microbiology;
- biologically active materials;
- specialty polymers and resins;
- building materials;
- metals fabrication;
- automated production technology;
- building and construction;
- safety and comfort in domestic, industrial and commercial buildings;
- purification of water and waste-water.

. Institute of Physical Sciences

The Institute comprises the following Divisions and Units:

Division of Applied Physics
Division of Atmospheric Research
Division of Chemical Physics
Division of Environmental Mechanics
Division of Information Technology
Division of Materials Science
Division of Mathematics and Statistics
Division of Oceanography
Division of Radiophysics

The Institute conducts scientific and technological research in the physical, chemical and mathematical sciences aimed at meeting the needs of Australian industry and the community generally. The research includes work directed to increasing understanding of the physical environment, and undertaken both in the national interest and in accord with the Organization's obligation to contribute to the discharge of Australia's international scientific responsibilities in areas such as astronomy, oceanography and the atmospheric sciences.

The Institute's activities include research on:

- application of the physical sciences to industrial problems;
- maintenance of the national standards of measurement;
- development of scientific and industrial instrument techniques;
- properties of industrial materials and development of improved materials and chemical and physical processes;
- climate, weather and atmospheric transport of pollutants and other entities;
- physics of interactions between soil, water, plants and atmosphere;

- radiophysics and its application to astronomy, navigation and communication;
- the physical and chemical oceanography of the Australian marine environment, including air-sea interaction;
- application of mathematics and statistics to problems in industry and science; and
- development and application of advanced techniques in information technology.

. Distribution of Research Effort

In the table which follows, CSIRO research is grouped under a number of socio-economic headings. In previous years, no attempt had been made to apportion research programs which contributed to more than one objective, but for 1983-84 a new system was introduced by CSIRO which allowed the splitting of programs among up to three headings. Programs are classified on the basis of the purpose for which the research is undertaken or the direct Australian beneficiary. The emphasis on the basis for classification has shifted slightly from previous years where the basis had tended to be the type of process or product under investigation. The combined effect of these two changes on the classification system has resulted in small movements in the balance of CSIRO's research recorded against the socio-economic headings. Full details of these changes are described in the CSIRO Annual Report for 1984-85. Against these socio-economic headings, the actual expenditure (or projected expenditure for 1984-85) is set out. These figures reflect all the funds which were spent by CSIRO, or on its behalf, by other agencies, in each financial year.

These total expenditure figures, which are made up of funds from a variety of sources, include:

- Budget appropriations to CSIRO for salaries, operating expenses and minor capital works.
- Funds received for research from Government departments and agencies (e.g. National Energy Research, Development and Demonstration Council).
- Funds raised by a levy on various primary producer groups and distributed by the Commonwealth Department of Primary Industry together with matching financial support (i.e. Rural Industry Research Funds).
- Other contributory funds for supporting particular research work in CSIRO.
- Capital and related expenditure on behalf of CSIRO by the Department of Housing and Construction and the Department of Local Government and Administrative Services (including the $157m Australian National Animal Health Laboratory).

. Comparisons of Annual Expenditure Figures

When comparing expenditures for various years account must be made for changes in the structure of funding which have occurred. In 1981-82 CSIRO became liable for the employer's share of superannuation ($26m in 1981-82, $29m in 1982-83, $32m in 1983-84 and $33m in 1984-85) and for salary expenditure for an additional payday which fell in that year. Some sections of the Australian Atomic Energy Research Establishment at Lucas Heights transferred to CSIRO during 1981-82 and CSIRO provided associated expenditure for four months of that year. From 1983-84, funds which were previously appropriated to Commonwealth departments for capital works, repairs and maintenance, and acquisitions on behalf of CSIRO, have been directly appropriated to CSIRO. Caution must also be exercised in making comparisons between years up to 1982-83 because small changes to the activities

within a program ray lead to the entire program being classified under a different heading. From 1983-84, the system of proportional allocation referred to above removes the need for such caution but the revised basis on which classifications are made may complicate yearly comparisons across the 1982-83/1983-84 interval.

CSIRO EXPENDITURE

($ million)	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	Projected 1984-85
A. Rural Industries							
Agriculture - Plants							
. Plant Improvement	3.605	4.089	5.360	6.228	7.927	11.582	12.492
. Plant Physiology & Biochemistry	4.195	4.547	4.171	7.393	8.255	11.312	13.004
. Soils & Plant Nutrition	4.169	4.939	5.987	6.812	9.776	12.268	12.734
. Crop & Pasture Pests & Diseases	5.645	6.222	6.592	12.609	13.147	9.940	10.960
Total (Agriculture - Plants)	17.614	19.797	22.110	33.042	39.105	45.102	49.189
Agriculture - Animals							
. Livestock Production	11.661	16.586	17.138	15.524	18.648	17.805	17.824
. Livestock Health (1)	19.842	31.055	45.537	54.945	59.494	33.178*	24.996*
. Wool Textiles (2)	-	-	-	-	-	9.266*	7.465*
Total (Agriculture - Animals)	31.503	47.641	62.675	70.469	78.142	60.249	50.285
Agriculture Systems							
. Agricultural Systems	7.670	8.210	6.727	8.197	9.660	8.990	12.451
. Agricultural Engineering	.586	.741	.675	-	-	-	-
Total (Agriculture Systems)	8.256	8.951	7.402	8.197	9.660	8.990	12.451
Forestry							
. Forest Science	6.960	7.694	8.052	10.118	11.237	10.104	9.578
Total (Forestry)	6.960	7.694	8.052	10.118	11.237	10.104	9.578

($ million)	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	Projected 1984-85
Fishing							
Mineral, Energy and Water Resources							
.Resource Assessment	4.410	6.411	7.223	-	-	-	-
.Fisheries Biology	-	-	-	7.505	8.291	12.777	8.462
.Marine Biology	-	-	-	2.829	3.878	6.955	2.054
Total (Fishing)	4.410	6.411	7.223	10.334	12.169	19.732	10.516
Total - Rural Industries	68.743	90.494	107.462	132.160	150.313	144.178	132.019
Mineral resources							
.Exploration	4.095	4.290	6.130	7.712	10.200	9.188	10.521
.Mining and Beneficiation	5.611	5.986	6.313	8.359	9.994	-	-
.Mining	-	-	-	-	-	2.748	3.659
.Mineral Beneficiation	-	-	-	-	-	7.066	6.657
Total (Mineral resources)	9.706	10.276	12.443	16.071	20.194	19.001	20.567
Energy resources							
.Coal	3.813	4.018	5.344	8.109	8.806	8.483	9.970
.Petroleum, Gas and Oil Shale	.434	.651	.996	2.139	1.694	4.180	4.047
.Substitute Liquid & Gaseous Fuels	4.330	6.379	6.893	10.038	16.071	10.407	10.328
B.Energy Storage and Conservation . and Renewable Energy	2.221	2.968	5.725	6.969	7.466	8.392	7.472
TOTAL (Energy resources)	10.798	14.016	18.958	27.255	34.037	31.462	31.817
Water resources							
. Water Management	2.689	3.293	3.842	5.242	6.080	10.564	10.927
. Water Technology	1.027	.997	1.670	2.597	2.297	1.964	2.102
	3.716	4.290	5.512	7.839	8.377	12.528	13.029
Total - Mineral, Energy and Water Resources	24.220	28.582	36.913	51.165	62.608	62.991	65.412

($ million)	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	Projected 1984-85
C. Manufacturing Industries							
Resource-based Manufacturing Industries							
. Food Processing	10.322	11.078	11.875	14.677	16.157	12.681	11.940
. Textiles and Leather (3)	10.679	10.709	11.976	15.224	18.427	8.378*	8.792*
Cellulose & Forest Products	2.391	2.667	3.515	7.797	6.659	6.887	7.176
. Basic Metal Products	2.175	2.360	2.703	3.274	3.748	-	-
. Industrial Mineral Processing & Basic Metal Products	-	-	-	-	-	5.533	5.947
Total (Resource-based Manufacturing Industries)	25.567	26.814	30.069	40.972	44.991	33.480	33.855
Technology-intensive industries							
. Instruments & Electronic Equipment	2.870	3.157	3.524	7.923	11.072	13.544	15.372
. Advanced Materials and Specialty Polymers (4)	2.093	3.301	3.722	7.558	9.027	18.593*	21.126*
. Agricultural Chemicals, Pharmaceutical & Veterinary Products (5)	3.454	4.394	4.833	6.169	7.105	13.778*	14.755*
. Materials Fabrication	2.266	2.207	2.940	7.642	8.030	6.343	9.486
Total (Technology-intensive industries)	11.683	13.059	15.019	29.292	35.234	52.258	61.188
Standards and Measurement							
. Standards : Industrial Measurement	9.346	9.945	10.805	7.712	7.594	5.019	5.563
Total (Standards)	9.346	9.945	10.805	7.712	7.594	5.019	5.563
TOTAL – Manufacturing Industries	46.596	49.818	55.893	77.976	87.819	90.757	100.606

($ million)	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	Projected 1984-85
D. Knowledge and Management of the Natural Environment							
Flora and Fauna							
. Fauna	5.673	6.170	7.087	7.189	8.585	8.940	8.421
. Flora	1.471	1.621	1.656	2.189	1.521	3.685	4.185
Total (Flora and Fauna)	7.144	7.791	8.743	9.378	10.106	12.625	12.606
Land, Ocean, Atmosphere							
. Land (6)	8.676	9.239	11.478	13.257	14.034	6.464*	6.111*
. Oceans	3.089	2.406	2.613	4.737	10.925	9.271	9.918
. Atmosphere	4.296	4.488	5.024	5.414	5.966	6.598	6.925
Total (Land, Ocean, Atmosphere)	16.063	16.133	19.115	23.408	30.925	22.333	22.954
Environmental Protection and Rehabilitation							
. Environmental Protection and Rehabilitation	3.445	3.312	3.796	4.793	4.545	5.225	3.911
Total (Environmental Protection and Rehabilitation)	3.445	3.312	3.796	4.793	4.545	5.228	3.911
Extra-terrestrial							
. Astronomy	4.973	5.480	5.986	7.301	7.077	9.589	15.242
Total (Extra-terrestrial)	4.973	5.480	5.986	7.301	7.077	9.589	15.242
Total - Knowledge and Management of the Natural Environment	31.625	32.716	37.640	44.880	52.653	49.774	54.713

($ million)	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	Projected 1984-85
E. Information and Services Industries							
Information							
. Mathematics and Statistics	3.317	3.473	4.120	4.950	5.447	2.000	2.373
. Information, Communications and Computing Services (7)	4.256	5.888	6.073	4.442	3.104	12.016*	13.908*
Total - (Information Services & Technologies)	7.573	9.361	10.193	9.392	8.551	14.016	16.282
Building and Construction							
. Building and Construction	6.323	5.941	6.455	7.742	8.512	6.624	7.905
Total - (Building and Construction)	6.323	5.941	6.455	7.742	8.512	6.624	7.905
Public Health							
. Public Health	3.439	3.896	3.643	3.517	3.955	8.098	8.504
Total - (Public Health)	3.439	3.896	3.643	3.517	3.955	8.098	8.504
TOTAL – Information and Service Industries	17.345	19.198	20.291	20.651	21.018	28.378	32.691
CSIRO Total	188.519	220.808	258.199	326.832	374.411	376.438	385.441
Type of Expenditure							
Intramural Capital							
- indirect	19.931	33.804	44.938	57.546	58.014	-	-
- direct	12.905	16.994	17.369	16.380	27.875	66.760	50.709
Intramural Current							
- indirect	3.239	4.221	4.851	4.381	5.001	-	-
- direct (salaries)	110.896	118.697	138.289	191.128	215.144	227.576	245.044
- direct (other)	39.627	45.258	50.784	56.229	67.124	80.614	86.338
Extramural	1.921	1.834	1.968	1.168	1.253	1.487	3.351

* Notes on the changes in the detailed CSIRO classification made from 1983-84 onwards:

Prior to 1983-84 each CSIRO program was allocated to only one area. The revised classification scheme allocates expenditure to a maximum of three research areas (eg plant improvement, wool textiles etc) according to the purpose for which the research is conducted, or the nature of the direct Australian user or beneficiary.

Notes on some apparent trends, most of which are effects of the classification changes, areas follows:

(1) Decrease from 1983-84 due to reduction in capital expenditure on the Australian National Animal Health Laboratory as building program nears completion.

(2) Textile reseach of direct benefit to Australian wool growers, was classified under manufacturing industry prior to 1983-84.

(3) From 1983-84, some textiles research classified under Rural Industries.

(4) Increases from 1983-84 due to reclassification of some research elements, in particular parts of catalysis research previously included under Energy Resources.

(5) The increase from 1983-84 is due to the inclusion of parts of many programs previously wholly included under Rural Industries.

(6) The decrease from 1983-84 is due to the reclassification of parts of programs to other research areas.

(7) Increases from 1983-84 are due to the inclusion of parts of many programs previously wholly classified elsewhere.

The Executive periodically designates areas of research where growth will be specifically encouraged. Resources for this growth come mainly through redeployment of existing resources either specifically by limiting resources in one area to support growth in another, or less specifically through the redirection of vacancies arising out of the normal processes of staff turn-over.

For 1984-85, the nominated growth areas are:

- biotechnology;
- advanced materials;
- generic manufacturing technologies;
- information technologies;
- water and soils;
- plant diseases; and
- oceanography.

For 1985-86, the Executive has included the areas space science and technology, raw materials processing and human nutrition in the designated growth area, while oceanography and advanced materials have been moved into a protected category where real resources will be maintained at current levels. In oceanography the planned growth has been completed, while in advanced materials the Executive is awaiting receipt of a subject review before deciding on its future as an area for growth.

. Biotechnology

Biotechnology covers the use of biological organisms in industrial processes and the genetic modification of organisms to produce new plants and animals. It is aimed at more effective production techniques and new products in areas as diverse as food, fuels, pharmaceuticals, chemical feedstocks, waste recycling and pollution control. Recombinant DNA and cell manipulation techniques have provided the major impetus for the expansion of biotechnology. They are used in a number of CSIRO research programs and are applicable to others. A variety of agricultural applications of biotechnology are being researched; for example, animal cell growth and development, gene technology, and the biological defleecing of sheep through the use of epidermal growth factor. Other areas in which biotechnology research is continuing include animal breeding, the molecular basis of plant improvement, understanding the mechanisms involved in the production of cell mutations, the manufacture of vaccines, hormones and rare proteins, the conversion of lignocellulosic materials to high value chemicals and products, and the use of micro-organisms in industrial processes.

. Advanced Materials

Research on a wide range of advanced materials has been expanded. This includes research on zircon-based materials, which takes two main forms. Work on the engineering ceramic, partially-stabilized zirconia (PSZ), has been stepped up to consolidate earlier work and to protect Australia's present lead in this technology. Several techniques for processing zircon to the high-purity zirconia required for PSZ are also being investigated. Both these activities are at a stage of advanced collaboration with industrial partners.

Other advanced materials that are the subject of an increased research effort include specialist polymers and composites for a range of applications. There is also an increased emphasis on glassy metals and very high temperature properties of solids.

. Generic Manufacturing Technologies

Worldwide there are moves in the industrialised countries to automate, integrate and control manufacturing processes in the continuing search for greater efficiency, accuracy and speed in manufacture. Underlying these moves are a number of advanced technologies which are applicable to many industries and which are collectively called generic manufacturing technologies. They include such technologies as robotics, local area networks, computer-aided design and sensing systems. An integrated manufacturing system encompasses the range of activities through design and planning to the actual manufactuing processes, and such a system might embrace one or more of the generic technologies.

CSIRO research in this area is growing rapidly. Ten additional positions were allocated during 1983-84 and a further twelve have been provided for 1984-85. The research is concentrated in the Division of Manufacturing Technology based in Melbourne. New research groups are being established in Adelaide and Sydney. Current research programs include robotics and related technologies, machine tool set-up and control, mechanical design and analysis aided by computer and local area networks.

. Information Technology

Information technology is emerging, not only as the basis of entirely new major industries, but also as an essential future component of those existing industries likely to survive past the end of the decade. CSIRO has a scientific and technological base in information technology in many of its Divisions. CSIRO is planning to redeploy additional resources to this area for at least the next few years and an information technology program has been established. This program has three components: the collaborative projects between Australian industry, universities and other tertiary educational institutions and CSIRO Divisions, and the support of information technology related projects throughout CSIRO. This information technology program will result in co-ordinated effort in the areas of software technology and related hardware, man-machine interface, device and systems hardware technologies, information management and computer networking.

. Water and Soils

Australia has a larger proportion of shallow, infertile soils than any other continent, as well as generally low and variable rainfall. CSIRO is conducting research on plant/soil/water relationships to develop principles for applications in both dry land and irrigated agriculture, forestry, hydrology, engineering and conservation. Within CSIRO there has recently been a redeployment of resources from research of lower priority to water resources research. Salinity and other aspects of water quality, groundwater and catchment hydrology have been identified as areas for expanded research effort. Other work includes testing of specially-adapted plant species; the requirements for and effects on water of industrial development; and water and waste-water treatment and purification processes.

. Plant Diseases

Plant diseases result in losses of potential production ranging from plant death and crop failure to non-specific reduction in plant performance. Where chemicals are used for control, costs are high and in some cases there are health risks. Overall, production losses and treatment costs are major factors in farm profitability. Following a recent review of research needs in this area, and taking into account the work of other research organisations, principally in State departments of agriculture, CSIRO has identified the following areas of emphasis for the coming years:

Molecular biology approaches

Root diseases

Tropical plant diseases

Biological control of weeds, and,

Strategic research on crop loss assessment and epidemiology.

Fields under investigation within these areas include plant viruses particularly in pastures and annual crops, soil-borne diseases, diseases of forest and woodland trees, breeding of disease, pest and herbicide resistant plants, and diseases in new crops including those suitable for tropical areas.

. Oceanography

The CSIRO Divisions of Oceanography and Fisheries Research together form the largest research group working in marine science in Australia. Research into the physical oceanography of the four major ocean systems which front the Australian coastline is being significantly increased. These systems influence Australia's weather patterns, fish population dynamics, commercial shipping, leisure activities, waste disposal, and the cost of offshore gas, oil and mineral exploration and production. The Divisions are beginning to occupy a marine laboratory complex being established in Hobart at a cost of $12.9m, and a 55-metre oceanographic vessel is to be built at a cost of $12.2m for operation by CSIRO as a national facility.

. Other Initiatives

- a new CSIRO Office of Space Science and Applications has been established to develop and maintain a coordinated space research program in CSIRO and support the developing space industry in Australia.

- CSIRO's computing network and service, CSIRONET, has been established as an autonomous unit operating on a full cost-recovery basis and responsible to the Executive through a Board of Management. The Board is structured to include members from both the private sector and the public sector outside CSIRO, and the Chief Executive of CSIRONET.

- SIROTECH, the independent company established to assist in the task of stimulating awareness of industry requirements in CSIRO Divisions and of promoting CSIRO inventions and technology in industry, was incorporated in November 1984 and is now open for business.

- The Government has approved the development of design work for improvements to the CSIRO site at Floreat Park, Perth. At an estimated cost of $7m the improvements will provide new accommodation for the Organisation’s Laboratory for Rural Research and refurbishing of existing laboratories for the Division of Mineralogy and Geochemistry and the Division of Groundwater Research.

- Resources have been redeployed towards overcoming major occupational health and safety deficiencies following the Executive's decisions on the CSIRO Occupational Health and Safety Review.

NATIONAL STANDARDS COMMISSION (NSC)

The National Standards Commission is responsible for establishing uniform units and standards of measurement of physical quantities. The Commission operates the Pattern Examination Laboratory for these purposes and for the examination and approval of patterns of measuring instruments used for trading purposes in Australia.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Social Security								
. Benefit Support Section	S(b)	-	-	-	-	-	0.087	0.090
. Welfare Research	S(c)	0.409	0.550	0.594	0.678	0.678	0.678	0.678
Total (Direct Commonwealth funding)*		0.409	0.550	0.594	0.678	0.678	0.765	0.768

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

DEPARTMENT OF SOCIAL SECURITY

Through its Benefits Support Section, the Department carries out S&T activity in the following fields:

. Survey of Aboriginal Access to DSS Services

- to ascertain the level of services delivered to Aboriginals and Torres Strait Islanders;
- to obtain data on service delivery needs, including staffing, training, information dissemination, program revisions and support resources.

. Review of Commonwealth Programs of Services and Aged Migrants

- to examine the needs of aged migrants;
- to assess the extent to which needs are met by existing programs;
- to review migrants' accessibility to the programs;
- to examine the scope for improving liaison among Commonwealth Agencies and coordination.

. Survey of Utilisation of Staff Language Resources

- to ascertain the nature and extent of language skills of DSS staff;
- to assess the extent and nature of their utilisation;
- to recommend changes to incentive and utilisation procedures.

. Welfare Research

The Department also funds a Social Welfare Research Centre in the University of NSW. A new Agreement provides for continuation of the Centre for 5 years from 1 January 1985. Objectives of the Centre are:

- to undertake and sponsor research on important aspects of social welfare research work in Australia;
- to identify groups whose needs are especially great;
- to study options for relieving those needs; and
- to evaluate the effectiveness and efficiency of arrangements to meet those needs.

SPECIAL MINISTER OF STATE

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of the Special Minister of State								
. Support for International Congresses and Other Grants-in-Aid	N(c)	-	-	-	-	-	0.120	0.031
	S(c)	-	-	-	-	-	0.082	0.078
. Inquiry into Commonwealth Laboratories	N(b)	-	-	-	-	-	0.271	-
National Police Research Unit	$_{S}$N(a)	-	-	0.029	0.023	0.003	0.023	0.003
	$_{S}$N(b)	-	-	0.040	0.132	0.187	0.132	0.187
	$_{S}$N(c)	-	-	-	0.006	0.020	0.006	0.020
Australian Federal Police								
. Forensic research	N(a)	-	0.018	0.327	0.051	0.043	0.051	0.043
	N(b)	-	0.011	0.010	0.073	0.044	0.118	0.093
	N(c)	0.194	0.194	0.105	0.122	0.136	0.122	0.136
Total (Direct Commonwealth Funding)		0.194	0.223	0.512	0.407	0.432	0.926	0.590
B. Expenditure from other sources								
. National Police Research Unit (State funding)	N(a)	-	-	0.059	0.046	0.005	0.046	0.005
	N(b)	-	-	0.081	0.265	0.373	0.265	0.373
	N(c)	-	-	-	0.012	0.039	0.012	0.039
Total (Other sources)		-	-	0.139	0.323	0.418	0.323	0.418
Total (A+B)		0.194	0.223	0.651	0.730	0.850	1.248	1.008

N Natural sciences and engineering S Social sciences and humanities

$_{S}$N Includes small proportion of social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

DEPARTMENT OF THE SPECIAL MINISTER OF STATE

Through appropriations to the Department of the Special Minister of State, the Commonwealth provides grants to national organisations and international conferences held in Australia, some of which are of a scientific or technical nature. During 1983-84 about $120 000 was granted for this purpose.

. Inquiry into Commonwealth Laboratories

The Department had servicing responsibilities for the Inquiry into Commonwealth Laboratories which was established in January 1982. The Inquiry has been completed and the report was tabled in Parliament 2nd March 1984. S&T activities were directed towards rationalising Commonwealth laboratory facilities and services.

NATIONAL POLICE RESEARCH UNIT (NPRU)

An agreement to set up the NPRU was signed by members of the Australian Police Ministers' Council in May 1982. The agreement provides for the Commonwealth to pay one-third of the costs of the NPRU and the other two thirds to be paid by the participating States and Territories. The Unit's objectives are to undertake, coordinate and sponsor research into methods, equipment and techniques to assist participating forces to meet their functions of protecting life and property, preventing crime, detecting criminal offenders and preserving the peace.

AUSTRALIAN FEDERAL POLICE (AFP)

. Scientific Research Directorate

The AFP sponsors a program of forensic science research to ensure that recent technology is available, to it in performance of its functions. The program includes research conducted by commissioning work to external agencies possessing specialist expertise and resources and by conducting some projects 'in house'.

Current research activity includes, the 'Latent Fingerprint Development Techniques' project; the 'Arson and Physical Evidence' project; investigation on the analysis of explosive residues and the scientific investigation of bomb scenes, and in-house research on 'Digital Signal Processing' for the enhancement of police operational photographs.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Territories								
. National Botanic Gardens	N(a)	0.005	0.002	0.010	0.005	0.006	0.355	1.285
	N(b)	0.184	0.194	0.232	0.349	0.358	2.977	3.115
. Other	N(a)	-	0.001	-	-	-	0.046	0.049
	N(b)	-	0.022	-	-	-	0.956	1.046
	S(b)	0.072	0.092	0.103	0.119	0.133	0.304	0.320
National Capital Development Commission	N(b)	-	0.003	0.002	0.003	0.003	0.068	0.064
	N(c)	0.016	0.009	0.020	0.020	0.020	0.241	0.169
	S(b)	-	-	-	-	-	0.400	0.425
	S(c)	-	-	-	-	-	0.062	0.089
Total (Budget sector)		0.277	0.323	0.367	0.496	0.520	5.903	7.138
B. Commonwealth Non-Budget Sector								
Department of Territories								
. A.C.T. Forestry Trust Account	N(b)	0.035	0.030	0.010	0.035	0.070	0.212	0.270
	N(c)	-	-	-	-	-	0.003	0.004
Total (Non-budget sector)		0.035	0.030	0.010	0.035	0.070	0.215	0.274
Total (Direct Commonwealth funding)		0.312	0.353	0.377	0.531	0.590	6.117	7.412
C. Expenditure from other sources								
Department of Territories								
. National Botanic Gardens	N(b)	0.002	0.007	0.007	0.009	0.018	0.009	0.018
Total (Other sources)		0.002	0.007	0.007	0.009	0.018	0.009	0.018
Total (A+B+C)		0.315	0.361	0.384	0.540	0.608	6.126	7.430

N	Natural sciences and engineering	S	Social sciences and humanities
(a)	Intramural capital expenditure	(b)	Intramural current expenditure
(c)	Extramural expenditure		

DEPARTMENT OF TERRITORIES

The Department of Territories is responsible for the administration of the Australian Capital Territory, the Jervis Bay Territory, the Territory of Cocos (Keeling) Islands, the Territory of Christmas Island, the Coral Sea Islands Territory and the Territory of Ashmore and Cartier Islands, and of Commonwealth responsibilities on Norfolk Island. The Department's involvement in science and technology is mainly limited to management oriented activities such as the management of wildlife populations, forests, parks, nature reserves and rural land.

The Conservation and Agriculture Branch is responsible through the ACT Conservation Service for planning, development and management of nature reserves and rural land in the ACT and for conducting research into the wildlife population. Current programs include the survey of plant and animal species which occur in the ACT and Jervis Bay Territory, including the aquatic organisms of regional waters, and a vegetation map and related report for Tidbinbilla Nature Reserve. A total of $14 000 has been allocated to the Branch for 1984-85.

A total of $134 600 has been allocated to the Weight and Measures Office in 1984-85. The Office inspects and verifies all weighing and measuring instruments in use for trade purposes and checks the quantitites of all pre-packaged articles sold or packed in the ACT.

The Department's Welfare Branch compiles statistics on various social welfare activities for management purposes, policy formulation, monitoring of activities, provision of information, research and investigation purposes, and also for inclusion in the WELSTAT project (standardisation of welfare statistics) conducted by the Department of Community Services, State and Territory Welfare Departments and ABS on an Australian-wide basis. A total of $54 000 is projected expenditure for 1984-85.

The Housing Branch administers the Government's rental housing and housing finance assistance schemes in the ACT and carries out research to identify housing needs of the ACT population. A total of $265 000 is projected for expenditure during 1984-85.

. Horticultural Services Unit

Canberra as a planned city is renowned for its tree-lined streets and a substantial provision of public open space including landscaped parks, school grounds and sportsfields. Despite the harshness of the environment, Canberra probably has the largest range of urban tree species of any major city in the world. This has required a high standard of horticultural practice in development and maintenance. With increasing recreational activity and increasing labour costs, maintenance of this standard has only been possible as a result of increased efficiencies and the use of improved materials. This has necessitated a City Parks Administration commitment to an ongoing programme in the areas of plant introduction, plant breeding, plant propagation, pest and disease control, turf selection and management and aquatic weed growth and management aimed at the development and/or selection of new plant species, machinery and procedures suited to the horticultural and parks management situation to be found in Canberra. The Unit has allocated $815 000 for S&T in 1984-85.

. National Botanic Gardens

The National Botanic Gardens has assembled, and continues to develop, a national collection of Australian and related floras for the purpose of education and display, scientific study, recreation and conservation.

The Gardens is a centre for research into the botany and horticulture of the Australian flora. Current projects include germination and cultivation of Australian terrestrial orchids with emphasis on endangered species, in-vitro micropropagation and the introduction and propagation of rare and endangered species.

. Australian Capital Territory Forestry Trust Account

The ACT forests are administered by the Forestry Branch of the Department. Forest activities are run as a business undertaking with commercial, conservation and amenity objectives and are funded by the ACT Forestry Trust Account. The Branch is researching environmental factors affecting plantation development and the effects of fire on catchment management. The 1984-85 projected expenditure is $200 000.

. Stream and Sewer Gauging

The Department of Teritories has appropriated, in 1984-85 approximately $425 000 for monitoring level and flow in streams, sewers and other water bodies in the ACT.

NATIONAL CAPITAL DEVELOPMENT COMMISSION (NCDC)

The NCDC is responsible for the planning, design and construction of the city of Canberra as the National Capital of Australia.

Most of the Commission's studies are directed towards collecting basic data or seeking to find solutions to specific problems. Particular concerns include air quality, water quality, ecology, geology and economic evaluation. Activities planned for 1984-85 include the continuation of monitoring and analysis of water and air quality and traffic noise levels; a survey of sites of ecological significance in the ACT; ornithological surveys of areas of interest associated with land use planning and development; various environmental impact statements for specific projects; preparation of information for environmental data base, soil; geology and hydro-geology mapping; provision of economic, demographic and social information for development environment and forecast.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Transport								
. Marine Navigational Aids	N(a)	-	-	0.002	-	-	0.023	0.016
	N(b)	-	-	0.013	-	-	0.018	0.010
	N(c)	-	-	-	-	-	0. 001	0.001
. Office of Road Safety:								
- Emissions research	N(a)	0.005	0.005	0.008	0.005	0.112	0. 050	1.120
	N(b)	0.007	0.007	0.012	0.017	0.021	0. 174	0.209
- Road Safety	S(b)	0.029	0.060	0.150	0.301	0.314	0. 301	0.314
	S(c)	0.268	0.149	0.208	0.233	0.366	0. 254	0.705
. Transport Statistics and Related Information	S(b)	-	-	-	-	-	0. 247	0.260
. Grants for Transport Planning and Financial Assistance	N(c)	0.500	0.308	0.264	-	0.100	0. 440	0.481
	nS(c)	2.000	1.320	1.591	0.198	0.200	1. 989	2.000
Bureau of Transport Economics	S(a)	-	-	-	0.007	0.001	0. 160	0.032
	S(b)	0.019	-	-	0.124	0.138	2. 851	3.182
	S(c)	-	-	-	-	-	0. 079	0.100
	N(b)	0.052	-	-	-	-	-	-
	N(c)	0.006	0.010	0.004	-	-	-	-
Total (Direct Commonwealth Funding)		2.886	1.859	2.251	0.885	1.252	6. 587	8.431

N Natural sciences and engineering
S Social sciences and humanities
(a) Intramural capital expenditure
(b) Intramural current expenditure
(c) Extramural expenditure

DEPARTMENT OF TRANSPORT

. Grants to Transport Research Bodies

- Australian Rail Research and Development Organisation (ARRDO)

  ARRDO is a national railway research organisation established in 1977 under the auspices of the Australian Transport Advisory Council, and is jointly supported by the Commonwealth and State Government-owned rail systems of Australia. ARRDO's work program concentrates on the financial, operational and managerial problems of Australian railways. The aim is to provide a basis on which a "national corporate plan" for railways can be developed.

- Australian Road Research Board (ARRB)

  ARRB was established in 1960 by the National Association of Australian State Road Authorities as a national centre for road research. ARRB research covers "hardware" aspects of roads such as the suitability and economy of construction materials and methods, as well as the broader fields of road design, traffic engineering, transport planning and safety.

. Marine Navigational Aids

The Department has an obligation to provide marine navigational aids in accordance with the requirements of enabling legislation, as described in a Forward Five-Year Plan endorsed by the Maritime Services Advisory Committee-Navigational Aids and in response to obligations under the Australian Heritage Commission Act 1975. Research and development functions are undertaken to ensure the provision, review and upkeep of the most effective visual, audio and electronic aids, preparation of tidal prediction for shipping channels and associated activities.

. Road Safety Division

The Road Safety Division conducts and sponsors research and disseminates research findings, literature and data. It develops road safety counter measures for consideration by the Australian Transport Advisory Council (ATAC) and road safety organisations throughout Australia. The Division also operates and maintains a Vehicle Emission Laboratory which conducts testing and research programs to enable the development of emission and energy policy. It is currently engaged in developing a data base on unleaded petrol and procedures for vehicle emission control.

. Transport Statistics and Related Information

The Department collects and compiles various statistics and other information relating to sea transport activities and port labour usage and disputation. The aim of these collections is to provide an effective information base to assist the port, shipping and stevedoring industries, their customers and governments, in policy and management decision-making. Statistics relating to non-government railways are also collected.

BUREAU OF TRANSPORT ECONOMICS (BTE)

The BTE is a professional research body which reports directly to the Federal Minister for Transport on its program of research work. For administrative purposes the Bureau is attached to the Department of Transport. The Bureau is responsible for independent economic research into Australian transport systems. Work is undertaken in such areas as applied economics, engineering, system analysis, sociology and other social or physical sciences.

The BTE analyses the nature, capacity, performance and financing of transport systems. It also investigates the economic and resource allocation implications of such systems.

Further, the BTE undertakes:

- analysis of the effects of specific pricing and regulatory policies, (including methods of rate and fare setting);
- evaluation of transport investment proposals and programs;
- collection, analysis and dissemination of information relating to transport activities;
- development of economic evaluation methods, transport planning procedures and operations research techniques; and
- application of inter-disciplinary approaches to analysis of transport problems.

The BTE has a secondary function of assisting State and local governments, Commonwealth and State instrumentalities and the private sector to identify and address transport problems.

Other functions of the BTE cover research into all modes of transport. The types of topics addressed by the organisation range widely in both nature and scope. Accordingly, it is common for the Bureau's research program at any particular time to exhibit a high degree of diversity. Although the research program can be analysed in a number of ways, the major practical division relates to the sources of particular projects. In this context, the work of the BTE tends to fall into four general categories:

. major projects referred to the BTE by the Minister for Transport;

. projects developed by the BTE in consultation with the Department of Transport and the Department of Aviation, other Commonwealth departments and other agencies (such as Commonwealth-State councils and industry advisory bodies);

. ongoing commitments to information collection and dissemination. BTE-sponsored conference, workshops and similar activities; and

. mainstream internally-generated background studies aimed at providing the technical basis for the above activities.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of the Treasury								
. Balance of Payments	S(a)	-	0.002	0.001	-	-	-	-
	S(b)	-	0.020	0.005	-	-	0.003	0.003
. Econometric Modelling	S(b)	0.092	0.083	0.074	0.060	0.072	0.060	0.072
Australian Bureau of Statistics	nS(a)	0.229	0.128	0.402	0.083	0.483	1.922	10.085
	nS(b)	2.316	3.758	5.678	4.250	4.886	97.815	105.904
Total (Direct Commonwealth funding, excluding FE)		2.637	3.991	6.160	4.393	5.441	99.799	116.064
(Less recoveries from ABS charge)		-	-	-	-	-	1.300	0.967
Total (less ABS recoveries)		2.637	3.991	6.160	4.393	5.441	98.499	115.097
B. Financial Enterprises sector								
Commonwealth Bank FE	N(c)	0.007	0.018	0.018	-	-	-	-
	S(a)	-	-	-	-	-	0.520	0.750
	S(b)	-	-	-	-	-	0.017	0.025
	S(c)	-	-	-	-	-	0.003	-
Reserve Bank of Australia FE								
. Grant Schemes								
- Rural Credits	N(c)	1.260	1.990	1.721	2.509	2.700	2.509	2.700
- Economic and Financial Research	S(c)	0.124	0.155	0.178	0.204	0.333	0.204	0.333
. Studies of Australian financial system	S(b)	0.240	0.304	0.175	0.190	0.228	0.409	0.474
. Special Projects		-	-	-	4.227	1.993	4.227	1.993
Total (Financial Enterprises sector)		1.631	2.467	2.092	7.130	5.254	7.888	6.275
Total (Direct Commonwealth funding including FE)		4.268	6.458	8.252	11.523	10.695	107.687	122.339

($ million)	R&D					S&T (including R&D)	
	80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
C. Expenditure from other Sources							
Commonwealth Bank FE N(c)	--			0.008	0.013	0.015	0.020
Total (Other Sources)				0.008	0.013	0.015	0.020
Total (A+B+C)	4.268	6.458	8.252	11.531	10.709	107.702	122.359

N Natural sciences and engineering
S Social sciences and humanities
(a) Intramural capital expenditure
(b) Intramural current expenditure
(c) Extramural expenditure
FE Commonwealth financial enterprise

DEPARTMENT OF THE TREASURY

. Balance of Payments Section

Investigates issues related with the balance of payments, exchange rate, current account balance and international competitiveness.

. Forecasting Section

The Section is developing and validating an econometric model of the Australian economy which is intended for use in short-term forecasting and policy analysis within the Treasury. Treasury's interest in forecasting is directly related to its macroeconomic policy advising role and is thus concerned with all aspects of the aggregate economy.

THE AUSTRALIAN BUREAU OF STATISTICS (ABS)

The ABS is the central statistical authority for Australia. It provides statistical services for the Government and private sectors by collecting, compiling, analysing and disseminating social, demographic and economic statistics and related information. In addition, the ABS coordinates statistical operations of official bodies to ensure attainment of statistical compatibility and integration, avoidance of duplication, compliance with standards, and maximum utilisation of information. The Bureau also provides advice and assistance on statistical matters.

All ABS activities are regarded as S&T activities (predominantly data collection in the social sciences). In 1983-84 the R&D expenditure showed a decrease largely as a result of completion of the R&D component of the development of the integrated set of employer based sample surveys.

COMMONWEALTH BANKING CORPORATION

The Commonwealth Banking Corporation was established under legislation enacted by the Australian Parliament and comprises the Commonwealth Trading Bank of Australia, the Commonwealth Savings Bank of Australia and the Commonwealth Development Bank of Australia and their subsidiary and associated companies. Current research projects are directed towards collection and interpretation of regional data relating to land, water, human resources and the economic structure and performance, with special emphasis on agricultural activities.

RESERVE BANK OF AUSTRALIA

The Reserve Bank of Australia is involved in the following scientific and technological activities:

- research into the Australian financial system using econometrics and other analytical methods;
- through its Economic and Financial Research Fund, the Bank assists post-graduate research outside the Bank into economic and financial topics relevant to Australia;
- grants are awarded from the Rural Credits Development Fund for research, development or extension projects directed towards the promotion of primary production. The main recipients of grants are universities, State departments of agriculture and the CSIRO. Sixty grants totalling about $2.4m have been allocated in 1984-85 from the Rural Credits Development Fund for projects to be undertaken over the next three years. They included projects associated with salinity, the application of electronics to the management of animal production, new fishing and crop industries and animal and plant genetics;
- A project (CNRD) has been initiated, aimed at developing a more secure and cost-effective banknote.

($ million)		R&D					S&T (including R&D)	
		80-81	81-82	82-83	83-84	Projected 84-85	83-84	Projected 84-85
A. Commonwealth Budget sector net expenditure								
Department of Veterans' Affairs								
. Central Development Unit	N(a)	-	-	-	-	-	0.005	0.015
	N(b)	-	-	-	-	-	0.170	0.182
. Central Medical Research Advisory Committee	N(a)	0.042	0.040	0.040	0.048	0.050	0.048	0.050
	N(b)	0.232	0.280	0.357	0.324	0.394	0.324	0.394
. Repatriation Hospitals Pathology Services	N(a)	-	-	-	-	-	0.200	0.225
	N(b)	-	-	-	-	-	10.450	11.430
Total (Direct Commonwealth funding)		0.273	0.320	0.397	0.373	0.443	11.197	12.296

N Natural sciences and engineering S Social sciences and humanities

(a) Intramural capital expenditure (b) Intramural current expenditure
(c) Extramural expenditure

DEPARTMENT OF VETERANS' AFFAIRS

. Medical Research Grants

To encourage, facilitate, assess and coordinate medical research in the Department a Central Medical Research Advisory Committee (CMRAC) has been established. Based on the recommendations of this committee and subject to the required ethical safeguards being observed, the Department provides financial support to medical research proposals submitted by Departmental Officers. The objectives of the various research projects broadly cover three areas - establishment of techniques for medical investigative procedures, comparative studies of alternative treatment regimes and evaluation of rehabilitative methods.

. Central Development Unit

The Unit follows a continuous program of improving artificial limbs and surgical appliances. The program includes assessment of materials and components use, testing of new materials and components, development of improved methods of fitting artificial limbs, evaluation and adoption of the results of overseas research, dissemination of information, education and treatment of problem cases.

. Pathology Laboratories

As part of its service to veterans and their dependants, the Department of Veterans' Affairs operates Pathology Laboratories to provide pathology services for its Repatriation General Hospitals. Expenditure for this activity rose from about six million in 1979-80 to a projected eleven and half million in 1984-85.

DISSECTIONS OF AGGREGATE EXPENDITURES

A. R&D Expenditure by Socio-economic Objective

Table 14: Intramural Commonwealth Government expenditure on R&D in the natural sciences and engineering by socio-economic objective

Objective Category		1978-79	1979-80	1980-81	($m) 1981-82	1982-83	1983-84	Projected 84-85
National security								
. Defence	(a)	6.87	9.40	7.93	8.27	15.74	17.75	23.53
	(b)	72.36	75.65	89.73	94.38	97.64	102.55	106.62
Economic development								
. Agriculture	(a)	15.81	31.71	41.83	45.91	48.21	17.52	9.45
	(b)	34.20	39.14	42.94	48.67	53.03	65.29	69.15
. Other primary industries	(a)	1.15	1.55	0.74	1.85	2.69	6.28	1.34
	(b)	9.53	10.97	11.71	13.19	14.38	16.00	16.67
. Mining	(a)	1.89	1.51	2.19	2.90	2.79	2.94	2.53
	(b)	12.37	10.78	13.72	18.17	16.08	17.62	19.34
. Manufacturing	(a)	5.32	5.99	5.89	9.65	8.76	6.49	8.71
	(b)	31.18	32.33	40.43	45.76	50.39	40.75	43.51
. Construction	(a)	1.16	0.76	0.53	0.51	0.55	0.51	0.76
	(b)	6.12	6.06	6.08	6.38	6.96	6.93	7.36
. Energy	(a)	2.86	3.55	4.30	5.50	7.98	7.55	13.33
	(b)	19.65	22.35	27.76	33.81	44.20	41.14	42.26
. Transport	(a)	0.62	0.76	0.81	0.71	0.39	0.41	0.51
	(b)	0.34	0.38	0.32	0.30	0.37	0.35	0.35
. Communications	(a)	1.9	2.2	8.1	6.3	4.8	4.84	3.95
	(b)	24.5	25.1	27.7	31.6	37.1	36.7	40.8
. Economic services n.e.i.	(a)	0.55	0.59	1.01	1.75	1.36	5.21	2.85
	(b)	5.20	5.04	5.99	7.77	9.68	10.21	11.05
Sub-total	(a)	31.3	48.6	65.4	75.0	77.5	51.7	43.4
	(b)	143.1	152.1	176.7	205.6	232.2	235.0	254.5
Community welfare								
. Urban & regional planning	(a)	0.18	0.11	0.08	0.06	0.10	0.13	0.14
	(b)	0.96	1.33	1.08	1.41	1.67	1.89	2.00
. Environment	(a)	2.29	3.16	2.82	3.74	6.15	3.50	2.17
	(b)	11.80	14.19	14.88	17.97	26.92	24.68	26.86
. Health	(a)	2.97	2.67	2.45	1.67	2.81	3.84	3.27
	(b)	10.27	12.53	13.57	14.41	18.39	19.52	21.85
. Education		-	-	-	-	-	-	-
. Welfare		-	-	-	-	-	-	-

Objective Category		1978-79	1979-80	1980-81	($m) 1981-82	1982-83	1983-84	Projected 84-85
. Community services n.e.i.	(a)	0.01	0.01	-	0.02	0.41	0.11	0.11
	(b)	0.21	0.24	0.22	0.22	0.66	0.71	0.78
Sub-total	(a)	5.45	5.95	5.34	5.48	9.45	7.58	5.68
	(b)	23.24	28.29	29.75	34.01	47.65	46.81	51.49
Advancement of knowledge								
. Earth, ocean and atmosphere	(a)	2.02	1.86	1.74	3.15	9.61	12.89	7.96
	(b)	16.44	16.03	22.86	25.02	28.36	31.01	34.31
. General advancement of knowledge	(a)	2.87	5.63	5.26	4.54	9.39	10.64	14.32
	(b)	12.22	14.68	17.42	18.47	26.64	37.82	42.91
Sub-total	(a)	4.89	7.48	7.00	7.69	19.00	28.11	22.28
	(b)	28.66	30.71	40.28	43.49	55.00	59.58	77.22
Total	(a)	48.5	71.4	85.6	96.5	121.2	100.6	94.9
	(b)	267.3	286.8	336.4	377.5	432.5	453.2	489.8

Table 15: Extramural Commonwealth Government expenditure on R&D in the natural sciences and engineering by socio-economic objective

Objective Category	1978-79	1979-80	1980-81	($m) 1981-82	1982-83	1983-84	Projected 84-85
National security							
. Defence	0.40	0.37	0.40	0.74	1.05	0.91	1.09
Economic development							
. Agriculture	12.59	14.37	17.24	18.22	19.87	22.84	30.37
. Other primary ind.	0.59	0.69	0.93	0.82	1.20	2.31	2.19
. Mining	0.12	0.11	0.16	0.18	0.15	0.20	0.21
. Manufacturing	25.75	34.62	49.24	25.38	51.83	63.10	60.48
. Construction	0.12	0.18	0.25	0.15	0.18	0.14	0.31
. Energy	3.94	5.20	6.81	9.16	10.96	13.49	13.96
. Transport	0.47	0.48	0.99	1.84	2.01	0.50	0.69
. Communications	0.5	0.5	0.9	1.2	1.6	1.8	2.6
. Economic services n.e.i.	0.12	0.10	0.10	0.09	0.10	0.04	0.41
Sub-total	44.2	56.3	76.7	57.0	87.9	104.5	110.6
Community welfare							
. Urban & reg. planning	0.11	0.10	0.04	0.02	0.08	0.03	0.02
. Environment	0.66	0.82	1.09	1.10	0.93	1.17	1.64
. Health	13.22	14.65	19.16	28.12	33.46	42.12	51.18
. Education*	-	-	-	-	-	-	
. Welfare	-	-	-	-	-	-	
. Community services n.e.i.							
- Overseas development assistance	11.34	11.19	12.49	16.04	25.00	27.24	32.00
- Other services	0.05	0.15	0.23	0.22	0.12	0.15	0.17
Sub-total	25.38	26.91	33.01	45.50	59.58	70.69	85.00
Advancement of knowledge							
. Earth, ocean and atm.	0.62	1.37	3.19	3.65	3.77	2.97	5.14
. General advancement knowledge	61.5	65.1	74.0	80.8	95.4	110.6	118.2
Sub-total	62.1	66.5	77.2	84.4	99.2	106.6	112.6
Total	132.1	150.0	187.2	187.6	247.7	282.7	320.0

* R&D funded by the Minister for Education for the purpose of producing qualified researchers or for supporting normal academic activities has been included in "General advancement of knowledge". Only research mainly directed towards education processes or education administration has been included in the "Education" objective.

Table 16: Intramural Commonwealth Government expenditure on R&D in the social sciences and humanities by socio-economic objective

Objective Category		1978-79	1979-80	1980-81	1981-82 ($m)	1982-83	1983-84	Projected 84-85
National security								
. Defence			-	-	-	-	-	
Economic development								
. Agriculture	(a)		-	-	-	-	-	0.16
	(b)	0.88	0.84	0.86	1.06	1.31	1.49	1.54
. Other primary industries		-	-	-	-	-	-	-
. Mining		-	-	-	-	-	-	-
. Manufacturing	(a)	-	0.01	-	-	-	-	-
	(b)	0.02	0.02	-	-	-	-	-
. Construction	(a)	-	..	0.01	-	-	-	-
	(b)	0.05	0.13	0.15	-	-	-	-
. Energy	(a)	-	-	..	..	-	-	0.03
	(b)	0.01	-	0.04	0.04	0.13	0.07	0.26
. Transport	(a)	..	..	0.02	0.01	-	0.01	0.01
	(b)	0.49	0.43	0.24	0.35	0.36	0.54	0.60
. Communications	(a)	0.05	0.06	0.08	0.10	0.11	0.10	0.10
	(b)	0.71	0.74	0.85	0.99	0.98	1.14	0.94
. Economic services n.e.i.	(a)	1.08	1.45	1.27	0.30	0.24	0.27	0.90
	(b)	4.61	6.19	6.91	7.56	6.52	6.13	7.04
Sub-total	(a)	1.13	1.51	1.38	0.41	0.35	0.38	1.19
	(b)	6.77	8.35	9.05	10.01	9.31	9.36	10.37
Community welfare								
. Urban & regional planning	(a)		-	-	..	0.40	..	0.03
	(b	0.06	0.06	0.07	0.11	0.50	0.32	0.40
. Environment		-	-	-	-	-	-	-
Health	(a)	-	..	-	..	-	-	
	(b)	0.08	0.15	0.13	0.11	0.08	0.07	
. Education	(a)	..	-	..	0.01	-	0.01	0.05
	(b)	1.21	0.95	1.06	1.02	0.61	1.01	1.13
. Welfare	(a)	0.01	0.01	0.03	0.02	-	-	0.01
	(b)	0.72	1.02	1.56	2.38	2.94	1.72	1.82
. Community services n.e.i.	(a)	0.01	0.01	0.08	0.03	0.14	0.23	0.24
	(b)	1.87	2.00	2.65	3.02	3.31	4.71	6.12
Sub-total	(a)	0.03	0.02	0.12	0.06	0.54	0.24	0.33
	(b)	3.94	4.18	5.37	6.53	7.36	7.76	9.46

Objective Category		1979-80	1980-81	1981-82	1982-83	1983-84	84-85	Projected
					($m)			
Advancement of knowledge								
. Earth, ocean and atmosphere	(b)	-	-	-	-	-	0.01	..
. General advancement of knowledge	(a)	-	-	-	0.01	-	-	0.01
	(b)	0.04	-	-	0.17	0.03	0.11	0.12
Sub-total	(a)	-	-	-	0.01	-	-	0.01
	(b)	0.04	-	-	0.17	0.03	0.12	0.12
Total	(a)	1.16	1.53	1.50	0.47	0.89	0.62	1.53
	(b)	10.75	12.53	14.38	16.71	16.70	17.24	19.94

Table 17: Extramural Commonwealth Government expenditure on R&D in the social sciences and humanities by socio-economic objective

Objective Category	1978-79	1979-80	1980-81 ($m)	1981-82	1982-83	Projected 1983-84	84-85
National security							
. Defence	-	-	-	-	-	-	
Economic development							
. Agriculture	0.91	0.59	0.60	0.30	0.01	0.01	0.09
. Other primary industries	-	-	-	-	-	-	-
. Mining	-	-	-	-	-	-	-
. Manufacturing	0.01	0.01	-	-	-	-	-
. Construction	-	-	-	-	-	-	-
. Energy	0.09	0.07	0.07	0.35	0.82	0.49	0.48
. Transport	2.95	3.00	2.30	0.32	0.40	0.43	0.57
. Communications	-	0.03	0.01	0.18	-	-	
. Economic services n.e.i.	0.12	0.12	0.49	0.55	0.82	0.68	0.86
Sub-total	4.08	3.81	3.47	1.70	2.05	1.61	2.00
Community welfare							
. Urban & regional planning	-	-	-	-	-	-	-
. Environment	-	-	0.01	-	-	0.04	-
. Health	-	0.02	0.23	0.41	0.31	3.34	0.35
. Education*	2.36	2.16	2.88	2.67	1.77	1.96	0.25
. Welfare	0.32	0.65	0.93	1.13	1.30	1.41	2.14
. Community services n.e.i.#							
- Overseas development assistance	1.17	1.28	2.78	4.03	5.37	5.16	5.25
- Other services	0.24	0.23	0.06	0.27	0.11	0.12	0.13
Sub-total	4.09	4.34	6.88	8.49	8.86	9.04	11.11
Advancement of knowledge							
. Earth, ocean & atm.	0.02	0.02	0.03	0.01	-	-	-
. General advancement of knowledge	24.59	25.86	27.56	33.28	38.34	41.73	46.92
Sub-total	24.6	25.9	27.59	33.39	38.34	41.73	46.92
Total	32.8	34.0	37.9	43.5	49.3	52.4	60.0

* R&D funded by the Minister for Education for the purpose of producing qualified researchers or for supporting normal academic activities has been included in "General advancement of knowledge". Only research mainly directed towards education processes or education administration has been included in the "Education" objective.

B. Commonwealth Contracts and Grants in Support of S&T

In addition to the normal difficulties for respondents associated with R&D/S&T surveys, there are particular problems associated with collecting good quality information on contracting. For example, there is sometimes confusion between intramural "other current" expenditure and extramural contracting. Some respondents are also unclear on the classification of the organisations to which contracts are let and, occasionally, contracts are classed as grants and vice versa. For all these reasons, data presented in successive Science and Technology Statements have been subject to progressive revision and refinement.

The data presented in Tables 18 to 21, which represent the best estimates available at present, should therefore be utilised with some caution. As in other parts of the Statement care has been exercised to ensure consistent reporting from year to year within organisations.

Table 18: Commonwealth contracting in the natural sciences and engineering (NSE)

($ million)		R&D					S&T (including R&D)			
					Projected					Projected
		80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Arts, Heritage and Environment	CW	0.03	0.04	0.06	0.08	0.19	0.18	0.95	0.57	0.65
	PE	0.01	0.05	0.02	0.04	0.14	0.12	0.51	0.58	0.58
	HE	0.42	0.36	0.23	0.28	0.37	0.38	0.31	0.49	0.43
	OR	0.09	0.05	0.07	0.05	0.08	0.18	0.28	0.32	0.59
Aviation	CW	0.05	0.07	0.06	0.11	0.18	12.99	15.83	15.58	15.86
	PE	0.02	0.01	-	0.04	0.03	0.01	0.13	0.14	0.04
	HE	0.10	0.27	0.27	0.34	0.38	0.51	0.27	0.34	0.38
	OR	0.04	-	-	-	-	-	-	-	-
Communications	CW	0.02	0.04	0.04	0.04	0.11	0.08	0.08	0.08	0.15
	PE	0.53	0.72	1.18	1.11	1.53	5.85	6.51	9.58	13.70
	HE	0.23	0.17	0.22	0.40	0.67	0.17	0.22	0.40	0.83
Defence	CW	0.40	0.43	0.55	0.57	0.54	0.98	4.80	0.57	0.54
	PE	-	-	-	-	-	16.08	14.10	21.43	20.54
	PE	-	0.31	0.50	0.34	0.55	0.31	0.50	0.34	0.55
Employment and Industrial Relations	HE	0.01	-	-	-	-	-	-	-	0.20
Foreign Affairs	CW	2.76	2.34	2.44	3.74	5.87	5.05	8.49	8.89	12.17
	PE	0.05	0.62	0.49	..	..	19.99	26.92	48.92	50.45
	HE	1.22	2.77	4.38	6.22	6.76	3.76	5.20	9.06	9.76
	OR	0.21	0.21	0.71	1.68	2.20	19.18	20.26	16.20	13.81
Health	PE	0.01	-	-	-	-	0.01	-	0.03	0.25
	HE	0.08	0.22	0.22	0.14		0.22	0.22	0.27	-
	OR	-	-	-	-	-	-	0.01	0.02	0.04
Housing and Construction	PE	0.03	0.03	0.04	0.08	0.10	1.22	1.84	0.08	0.10
	HE	0.10	0.09	0.10	0.01	0.12	0.09	0.10	0.01	0.12
	OR	0.03	0.02	0.02	0.03	0.07	0.02	0.02	0.03	0.07
Industry,	CW	-	-	-	0.05	-	..	-	0.01	0.02
Technology and	PE	0.01	0.01	-	-	-	2.44	4.22	9.52	13.14
Commerce	HE	-	0.01	-	-	-	0.96	1.99	3.85	3.86
	OR	2.45	2.07	2.19	2.48	-	2.07	2.19	2.48	0.09
Local Govt	CW	0.01	-	0.07	-	-	-	0.07	0.01	-
& Administrative	PE	0.01	0.01	..	0.03	0.02	1.39	1.46	1.91	2.09
Services	HE	-	-	..	-	-	-	..	-	-
	OR	-	0.01	-	-	-	0.01	-	-	-
Primary Industry	CW	0.17	0.18	0.28	0.33	2.11	0.18	0.28	0.35	2.53
	PE	-	-	-	-	-	-	-	-	-
	OR	-	-	0.04	0.05	0.09	0.67	0.96	2.62	5.40
Prime Minister and Cabinet	PE	-	-	-	-	-	0.01	0.01	-	0.02
	HE	-	-	-	-	-	-	..	..	-
Resources and Energy	CW	0.14	0.02	0.09	0.05	0.15	0.02	0.11	0.38	0.92
	PE	0.06	0.11	.28	0.04	0.14	1.77	1.97	1.86	2.64
	HE	0.36	0.35	0.42	0.14	0.10	0.40	0.56	0.14	0.01
	OR	0.47	0.32	0.20	0.08	0.21	0.36	0.35	0.99	0.96

($ million)		R&D					S&T (including R&D)			
		80-81	81-82	82-83	83-84 Projected	84-85 Projected	81-82	82-83	83-84 Projected	84-85 Projected
Science	CW	0.34	0.34	0. 37	0.50	0.51	0.35	0.37	0.50	2.33
	PE	0.16	0.16	0. 33	0.41	0.43	0.21	0.67	0.52	0.64
	HE	0.03	0.09	0. 02	0.04	0.19	0.15	0.07	0.04	0.23
	OR	-	0.06	0. 02	..	-	0.06	0.02	0.03	0.04
Special Ministry of State	CW	-	..	-	-	-	..	-	-	-
	PE	0.05	-	-	-		-	-	-	
	HE	0.10	0.17	0. 11	0.11	0.12	0.17	0.11	0.11	0.12
	OR	0.05	0.02	-	0.02	0.03	0.02	-	0.02	0.03
Territories	CW	-	0.01	-	0.02	0.02	0.03	0.04	0.07	0.06
	PE	-	..	0. 02	-	-	0.05	0.04	0.17	0.11
	HE	0.02	-	-	-	-	0.01	0.01	-	-
	OR	-	-	-	-	-	-	-	-	-
Transport	CW	-	-	-	-	-	..	0.01	-	-
	PE	..	0.01	..	-		0.11	0.10	-	-
	HE	..	-	-	-		0.03	0.04	..	..
	OR	-	-	-	-	-	0.02	0.06	-	-
Total (Direct Commonwealth funding, all NSE contracts)		10.86	12.73	16.02	19.61	23.99	99.84	122.52	159.51	176.93

CW Contracts to other Commonwealth agencies
PE Contracts to private bus. enterprise
HE Contracts to institutions of higher education
OR Contracts to other bodies.

Table 19: Commonwealth contracting In the social sciences and humanities (SSH)

($ million)		R&D					S&T (including R&D)			
			Projected							Projected
		80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Aboriginal Affairs	CW	-	-	-	-	0.02	-	-	-	0.02
	PE	-	-	-	0.01	0.05	-	-	0.01	0.05
	HE	-	-	-	0.09	0.10	-	-	0.09	0.10
Arts, Heritage and Environment	CW	-	-	-	-	-	0. 01	-	-	-
	PE	0.01	0.01	0.02	-	-	0. 01	0.02	0.02	0.03
	HE	-	0.03	0.01	-	-	0. 05	0.03	0.03	0.02
	OR	-	-	-	-	-	-	-	-	-
Attorney-General's	PE	0.15	0.07	0.04	0.06	0.08	0. 07	0.04	0.05	0.08
	HE	0.09	0.06	0.17	0.04	0.07	0. 06	0.17	0.05	0.07
	OR	0.04	0.14	0.06	0.01	0.11	0. 14	0.06	0.01	0.24
Aviation	CW	0.03	0.01	-	-	-	0. 01	-	-	-
	PE	-	..	-	-	-	0. 02	0.15	-	
Communications	PE	-	0.17	-	-	-	0. 20	0.03	0.04	0.09
	HE	-	0.01	-	-	-	0. 01	-	-	-
Community Services	CW	-	-	-	-	-	0. 05	-	-	-
	PE	-	0.05	0.12	-	0.25	0. 22	0.12	..	0.26
	HE	0.15	0.11	0.29	-	-	0. 15	0.30	0.40	0.47
	OR	-	0.08	0.05	0.08	0.33	0. 08	0.07	0.21	0.48
Education	CW	-	0.02	-	0.01	-	0. 02	-	0.17	0.16
	PE	-	..	-	0.13	0.16	..	0.50	0.22	0.25
	HE	0.45	0.34	0.28	0.48	0.60	0. 60	0.61	0.62	0.84
	OR	0.19	0.15	0.27	0.25	0.33	0. 17	0.42	0.63	0.71
Employment and Industrial Relations	PE	0.01	0.02	-	-	-	0. 08	0.01	0.04	0.12
	HE	0.01	0.03	0.01	-	-	0. 03	0.11	0.02	-
	OR	-	-	-	0.13	0.27	-	-	0.13	0.27
Foreign Affairs	CW	-	0.03	0.07	0.46	0.75	0. 05	0.41	0.74	1.10
	PE	0.03	0.04	0.01	0.02	0.02	0. 78	2.12	2.93	3.09
	HE	-	-	0.01	..	-	0. 70	1.02	1.10	0.56
	OR	-	-	0.12	0.08	0.02	0. 13	0.62	0.45	0.43
Health	HE	-	-	-	--		-	0.01	-	-
Immigration and Ethnic Affairs	CW	-	-	0.02	-	-	0. 10	0.10	0.20	0.06
	PE	0.05	0.12	0.14	0.10	0.15	0. 46	0.34	0.46	0.70
	HE	0.26	0.11	0.07	0.04	0.03	0. 13	0.18	0.15	0.15
	OR	0.05	0.03	0.03	-	0.05	0. 04	0.03	0.03	0.08
Industry, Technology and Commerce	CW	-	-	-	-	-	-	-	-	-
	PE	0.01	0.08	0.09	-	-	0. 09	0.09	..	-
	HE	0.01	-	0.01	-	-	-	0.01	-	0.03
	OR	-	0.02	..	-	-	0. 02	..	0.02	0.01
Prime Minister and Cabinet	CW	-	-	-	-	-	-	-	0.01	-
	PE	-	0.02	0.01	0.03	-	0. 04	0.02	0.08	0.05
	HE	-	0.01	..	0.04	0.03	0. 01	..	0.04	0.03

($ million)		R&D					S&T (including R&D)			
		Projected								Projected
		80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Resources and Energy	CW	-	-	-	-	-	..	0.01	-	-
	PE	-	-	-	-	-	0.01	0.02	-	-
	HE	0.03	0.01	-	-	-	0.03	0.05	-	-
	OR	-	-	-	-	-	0.02	0.06	-	-
Science	PE	-	-	-	-	-	-	-	-	-
	HE	-	-	-	-	-	-	-	-	-
Social Security	CW	-	-	-	-	-	-	-	-	-
	PE	-	-	-	-	-	-	-	-	-
	HE	-	-	-	-	-	-	-	-	-
	OR	-	0.08	0.05	0.09		0.08	0.07	0.09	
Territories and Local Government	CW	-	-	-	-	-	-	-	-	-
	PE	-	-	-	-	-	0.01	0.05	0.06	0.09
Transport	CW	-	-	-	..	-	0.06	-	..	-
	PE	0.17	0.10	0.13	0.14	0.24	0.17	0.19	0.22	0.60
	HE	0.04	0.02	0.03	0.07	0.02	0.03	0.05	0.09	0.05
	OR	0.05	0.03	0.04	0.02	0.11	0.03	0.04	0.03	0.15
Treasury	OR	-	-	-	-	-	-	-	-	-
Total (Direct Commonwealth funding, all SSH contracts)		1.82	1.91	2.92	2.28	3.78	4.86	8.07	9.32	11.43

CW Contracts to other Commonwealth agencies
PE Contracts to private business enterprise
HE Contracts to institutions of higher education
OR Contracts to other bodies.

Table 20: Commonwealth grants in the natural sciences and engineering (NSE)

($ million)		R&D					S&T (including R&D)			
						Projected				Projected
		80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Aboriginal Affairs	PE	-	..	-	-	-	..	-	-	-
	HE	-	..	-	-	-	..	-	-	-
	OR	-	-	-	-	-	0.13	0.13	0.08	0.07
Arts, Heritage and Environment	PE	0.01	-	-	0.07	0.08	0.05	0.05	0.12	0.13
	HE	0.14	0.24	0.21	0.19	0.15	0.34	0.28	0.30	0.24
	OR	0.23	0.25	0.19	0.29	0.45	0.55	0.54	1.27	1.70
Communications	HE	0.03	0.04	0.09	0.09	0.10	0.04	0.09	0.09	0.10
	OR	0.11	0.19	0.05	0.21	0.24	0.19	0.05	0.21	0.24
Education	HE	56.0	61.0	72.8	76.5	86.9	61.0	72.8	76.5	86.9
	OR	4.8	5.1	6.6	8.6	9.5	5.4	7.0	9.1	9.9
Employment and Industrial Relations	PE	-	-	-	-	0.13	-	-	-	0.13
	HE	-	-	-	-	0.13	-	-	-	0.13
	OR	-	-	-	-	0.13	0.16	0.16	0.16	0.30
Foreign Affairs	PE	-	-	-	-		..	..	..	
	HE	1.76	2.07	3.14	1.47	1.83	10.81	15.46	20.86	25.91
	OR	6.49	8.04	13.86	14.14	15.34	22.77	36.54	39.72	42.51
Health	HE	9.62	13.17	15.17	23.23	27.09	13.17	15.17	23.23	27.09
	OR	9.44	14.71	18.06	18.75	24.09	14.71	18.06	18.75	24.09
Housing and Construction	OR	0.26	-	-	-		-	-	-	
Industry, Technology & Commerce	PE	45.71	22.96	49.21	59.62	58.22	24.29	50.78	60.57	59.34
	HE	-	-	-	0.15	0.46	-	-	0.15	0.46
	OR	-	-	-	0.44	1.30	-	-	0.44	1.30
Local Govt & Admin Services	HE	..	..	-	-	-	..	-	-	-
Primary Industry	PE	0.24	0.25	0.85	1.15	1.46	0.26	0.32	0.56	1.86
	HE	3.59	4.03	4.52	4.82	6.38	4.33	4.88	5.22	6.78
	OR	12.59	12.23	13.29	15.67	19.18	14.02	17.65	18.68	23.74
Prime Minister and Cabinet	OR	0.05	0.03	0.03	0.02	0.02	0.03	0.06	0.05	0.06

($ million)		R&D					S&T (including R&D)			
		80-81	81-82	82-83	83-84	Projected 84-85	81-82	82-83	83-84	Projected 84-85
Resources and Energy	PE	2.40	3.31	4.56	6.82	6.70	3.77	5.20	7.66	7.53
	HE	1.99	2.72	3.37	3.39	3.33	3.02	4.05	4.07	4.00
	OR	2.72	4.29	3.96	3.93	4.12	14.37	14.69	12.72	12.28
Science	PE	0.08	-	-	0.01	0.39	2.46	2.58	2.59	3.15
	HE	13.54	14.68	16.20	18.40	22.40	14.73	16.29	18.43	22.42
	OR	2.95	2.13	2.15	2.44	2.88	3.45	3.86	3.79	4.56
Special Ministry of State	HE	-	-	-	-	-	-	-	-	-
	OR	-	-	-	..	..	0.06	0.08	0.12	0.03
Transport	OR	0.50	1.47	1.66	1.40	1.50	1.91	2.39	2.23	2.28
Treasury	HE	0.73	0.72	0.72	0.98	2.70	0.72	0.74	0.98	2.70
	OR	0.53	1.29	1.02	1.53	-	1.29	1.02	1.53	-
Total grants to higher educ.		87.4	98.7	116.2	129.2	151.5	108.1	129.7	149.8	176.7
Total grants to private enterprise		48.36	26.53	54.62	67.66	67.08	30.83	59.94	72.51	72.13
Total grants to others		40.63	49.74	60.87	67.44	78.73	79.07	102.18	108.84	122.99
Total (Direct Commonwealth funding, all NSE grants)		176.4	174.9	231.7	264.3	297.3	218.0	291.9	331.2	371.9

PE Grants to private enterprise or in support of industry

HE Grants to institutions of higher education

OR Grants to other bodies

Table 21: Commonwealth grants in the social sciences and humanities (SSH)

($ million)		R&D					S&T (including R&D)			
					Projected				Projected	
		80-81	81-82	82-83	83-84	84-85	81-82	82-83	83-84	84-85
Aboriginal Affairs	PE	0.02	0.02	0.02	-	-	0.02	0.02	-	-
	HE	0.06	0.07	0.04	0.17	0.15	0.07	0.04	0.17	0.15
	OR	0.49	0.53	0.47	0.17	0.15	0.68	0.73	0.75	0.68
Arts, Heritage	HE	0.01	-	-	0.04	-	..	..	0.04	0.02
and Environment	OR	..	-	-	0.01	-	-	-	0.01	-
Attorney-General's	HE	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.04	0.04
	OR	0.03	0.04	0.05	0.03	0.03	0.04	0.05	0.03	0.03
Communications	OR	0.01	-	-	-	-	-	-	-	-
Community Services	PE	-	-	-	0.07	0.10	-	-	0.07	0.10
	OR	-	-	-	-	-	0.31	0.25	0.46	0.42
Education	PE	-	..	-	-	-	..	-	-	-
	HE	22.1	26.3	29.3	31.0	35.2	26.4	29.4	31.2	35.4
	OR	4.1	4.8	5.6	6.9	7.4	5.6	6.8	8.6	9.4
Employment and Industrial										
Relations	PE	-	..	-	-	-	..	-	-	-
	HE	0.01	..	0.05	0.26	0.26	..	0.05	0.26	0.26
	OR	-	0.06	-	-	-	0.06	-	-	-
Foreign Affairs	HE	1.34	1.47	2.29	1.68	0.92	11.29	14.35	12.14	11.76
	OR	1.42	2.48	2.88	3.08	3.55	12.35	17.52	12.47	12.38
Health	HE	0.02	0.19	0.27	0.22	0.14	0.99	0.18	0.89	0.69
	OR	0.21	0.22	0.04	0.13	0.21	0.97	0.40	0.72	0.95
Industry, Technology and Commerce	HE	-	-	0.08	0.09	0.10	-	0.08	0.09	0.10
Local Govt & Admin Services	OR	-	-	-	-		0.04	0.04	0.04	0.04
Primary Industry	PE	-	-	-	-	-	-	-	0.01	-
	HE	0.10	0.06	-	0.01	0.09	0.06	-	0.08	0.15
	OR	0.50	0.24	0.14	-	-	0.25	0.14	-	0.05
Prime Minister and Cabinet	OR	0.02	0.01	0.04	0.05	0.04	0.13	0.09	0.09	0.08
Resources and Energy	PE	0.05	-	-	-	-	-	-	-	-
	HE	0.02	0.15	0.64	0.42	0.41	0.15	0.64	0.42	0.41
	OR	-	0.20	0.18	0.08	0.07	0.52	0.57	0.10	0.10
Science	PE	-	-	-	0.01	0.17	-	-	0.01	0.17
	HE	3.04	3.76	4.08	4.40	4.72	3.76	4.08	4.40	4.73
	OR	0.04	0.10	0.17	0.15	0.24	0.25	0.34	0.35	0.44

($ million)		R&D					S&T (including R&D)			
		80-81	81-82	82-83	83-84 Projected	84-85 Projected	81-82	82-83	83-84 Projected	84-85 Projected
Social Security	HE	.41	.55	0.59	0.68	0.68	0.55	0.59	0.68	0.68
	OR	-	-	-	-	-	-	-	-	-
Special Minister of State	OR	-	-	-	-	-	0.06	0.05	0.08	0.08
Transport	OR	2.00	0.16	0.19	0.20	0.20	0.16	0.19	0.20	0.20
Treasury	HE	0.12	0.16	0.18	0.20	0.33	0.16	0.18	0.20	0.33
	OR	-	-	..	-	-	..		..	-
Total grants to private enterprise		0.07	0.02	0.02	0.07	0.27	0.02	0.02	0.08	0.27
Total grants to higher educ.		27.3	32.8	37.6	39.2	43.1	43.4	50.7	50.5	54.7
Total grants to other bodies		8.78	8.80	9.57	10.82	11.93	21.41	27.02	23.87	24.81
Total (Direct Commonwealth funding, all SSH grants)		36.1	41.6	47.2	50.1	55.2	64.9	77.7	74.5	79.8

PE Grants to private enterprise or in support of industry

OR Contract to other bodies

HE Grants to institutions of higher education

REVIEW OF BILATERAL SCIENCE AND TECHNOLOGY COOPERATION AGREEMENTS

The Department of Science operates bilateral science and technology agreements with the USA (1968), India (1975), the Federal Republic of Germany (FRG) (1976), Japan (1980), China (1980) and Mexico (1981). Activities under the agreements have included short term research visits, seminars, workshops, and exchanges of policy delegations. The operation of the Agreement with the USSR is being reviewed following the change in policy by the new Government.

Applications under each of the agreements are sought from the research community. Additionally proposals in specific fields are developed in collaboration with the partner country following identification of priority areas. Program selection is on the basis of scientific or technological merit together with the likely contribution of proposals to the economic development of Australia and the other country concerned. Generally the agreements are not intended as a primary source of research funds. It is expected that the collaborating institutions provide the bulk of the necessary funding while the agreements provide support for airfares, living allowances and the running of seminars and workshops.

The following table shows funds outlayed under the Agreements for the 1978-79 to 1984-85 fiscal years disaggregated by subject area.

Table 22: Summary of Australian support for bilateral science and technology cooperation agreements

US/Australia Agreement for Scientific and Technical Cooperation	1978-79 $	1979-80 $	1980-81 $	1981-82 $	1982-83 $	1983-84 $	Projected 84-85 $
Physical and Chemical Sciences	14 294	15 254	16 194	22 793	19 377	28 685	6 015
Engineering and Applied Science	21 207	9 794	11 269	5 200	7 255	20 189	43 655
Biological and Agricultural Sciences	30 014	41 276	43 200	28 400	21 568	27 716	103 055
Earth Sciences	2 249	14 506	-	9 474	28 401	12 500	36 640
Social Sciences	1 176	9 428	4 331	11 050	2 875	26 612	6 500
Sub-total	68 940	90 258	74 994	76 917	79 476	105 702	195 865
India/Australia Science and Technology Agreement							
Physical and Chemical Sciences	-	-	-	10 856	1 672	2 328	-
Engineering and Applied Sciences	1 990	1 584	2 105	1 200	-	1 600	-
Biological and Agricultural Sciences	8 953	25 239	12 775	2 790	800	2 800	-
Earth Sciences	13 471	3 395	18 082	23 160	10 422	7 560	1 390
Social Sciences	-	-	-	-	-	-	-
Sub-total	24 414	30 218	32 962	38 006	12 894	14 288	1 390

FRG/Australia Science and Technology Agreement	1978-79 $	1979-80 $	1980-81 $	1981-82 $	1982-83 $	1983-84 $	Projected 84-85 $
Physical and Chemical Sciences	-	9 526	4 324	2 700	3 930	-	10 000
Engineering and Applied Science	20 442	-	-	1 300	2 994	-	13 900
Biological and Agricultural Sciences	1 900	4 278	4 775	7 975	21 999	16 195	-
Earth Sciences	10 266	11 428	15 900	9 000	8 070	-	12 040
Social Sciences	-	-	-	-	-	-	20 100
Sub-total	32 608	25 282	24 999	20 975	36 993	16 195	56 040
Japan/Australia Science and Technology Agreement							
Physical and Chemical Sciences	-	-	-	-	13 400	-	-
Engineering and Applied Science	-	-	28 140	7 483	50 009	33 500	37 050
Biological and Agricultural Sciences	-	-	27 400	21 700	67 002	38 757	52 975
Earth Sciences	-	-	-	-	2 300	23 800	39 825
Social Sciences	-	-	-	-	-	-	
Other	-	-	-	6 035	1 207	28 736	17 400
Sub-total	-	-	55 540	35 318	133 918	124 793	147 250
Mexico/Australia Science and Technology Agreement							
Physical and Chemical Sciences	-	-	-	-	3 000	-	-
Engineering and Applied Science	-	-	-	2 854	3 000	-	10 440
Biological and Agricultural Sciences	-	-	-	-	25 436	7 269	18 265
Earth Sciences	-	-	-	-	-	-	-
Social Sciences	-	-	-	-	-	-	-
Other (Senior Scientific Delegations)	-	-	-	22 030	711	12 617	-
Sub-total	-	-	-	24 884	32 147	19 886	28 705

	1978-79 $	1979-80 $	1980-81 $	1981-82 $	1982-83 $	1983-84 $	Projected 84-85 $
China/Australia Science and Technology Agreement							
Physical and Chemical Sciences	-	-	-	-	-	-	
Engineering and Applied Sciences	-	-	-	-	-	-	18 190
Biological and Agricultural Sciences	-	-	-	-	-	960	-
Earth Sciences	-	-	-	-	2 820	-	-
Social Sciences	-	-	-	-	-	-	-
Other (Senior Scientific Delegations)	-	-	-	19 000	752	34 165	35 560
Sub-total	-	-	-	19 000	3 572	35 185	53 750
USSR/Australia Science and Technology Agreement							
Other (Senior Scientific Delegations)	-	-	-	-	-	-	30 000
Sub-total	-	-	-	-	-	-	30 000
Not assigned to a specific Agreement	-	-	-	-	-	2 815	3 000
GRAND TOTAL	125 962	145 753	188 225	215 000	299 000	318 804	516 000

TECHNICAL NOTES

Background

The concepts and methodology employed in this Statement are based on or developed from international standard practices developed for science and technology statistics. The first Statement in this series, Science Statement 1978-79 was modelled on similar publications issued regularly by several other countries, including Canada, the Netherlands, and the United States. Appendix 6 of Science and Technology Statement 1981-82 outlines the development of the Statement prior to 1982-83. The remainder of the present Appendix describes the current concepts and methodology. Tables for the statement are prepared by the Indicators and Resource Analysis Section (IRAS) of the Department of Science. Further information is available from IRAS.

Definitions and concepts

. Research and development (R&D)

The definition adopted by the Organization for Economic Co-operation and Development (OECD)(1) was used in the information collection:

> Research and experimental development (R&D) comprise 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.

To clarify this definition the information collection guidelines included the following:

> Any activity classified as R&D should contain an appreciable amount of novelty, it should have investigation as a primary objective, and should have a potential to produce results that are sufficiently general for mankind's stock of knowledge (theoretical and/or practical) to be recognisably increased. The concept of novelty is not associated with the actual creation of something which, although new, is made by artistry or by application of techniques that have already been established for that class of object. For example, devising and validating a new econometric model is R&D, whereas the econometric modelling of economic systems for policy purposes, using established techniques, is not R&D.
>
> R&D ceases when work is no longer experimental. Once its primary objective is no longer investigation, an activity can no longer be considered as R&D even though it could be regarded as an important part of the total innovative process.
>
> Note that R&D extends to substantial modifications to existing processes, systems, services and products.

The above definition and guidelines are also used in the Project SCORE R&D survey(2).

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(1) The Measurement of Scientific and Technical Activities: Proposed Standard Practice for Surveys of Research and Experimental Development, "Frascati Manual" 1980 OECD Paris June 1980.

(2) Research and Experimental Development, All Sector Summary, Australia, 1981-82, Australian Bureau of Statistics Cat. No. 8112.0, February 1984, Appendix A, ppl-2.

Science and technology (S&T)

The activities to be included, in addition to R&D, as science and technology were presented in the guidelines in the form of a descriptive list as follows:

Interpretation of S&T activities (other than R&D)

- Demonstration of both technical and commercial viability: Demonstration projects and production and operation of pilot plant or equipment aimed at demonstrating both the technical and commercial viability of specific innovatory products or processes.

- Design for innovative production or service: Design engineering and 'tooling-up', often following either an experimental development or a successful demonstration phase, and aimed at establishing innovatory products or processes on a routine production basis or at providing an innovatory service. Includes products, processes or services new to Australia, regardless of whether or not these are well developed elsewhere.

- Technology transfer, extension services, other active diffusion of scientific and technological skills and know-how: Regular routine work on advising clients, including other sections of an organisation and independent users, to promote use of scientific, technological and management information. This activity includes extension and advisory services organised for farmers and for industry. It involves the transfer of skills, capabilities and 'know-how' to clients.

- Advanced scientific or engineering services: Consulting services to provide clients, including other sections of an organisation and independent users, with technologically advanced designs, products or processes, or with reports based on advanced scientific or technological analysis. Engineering feasibility studies are included in this category, except where they involve econometric techniques and/or operations research. The provision of products relying on advanced technology (e.g. isotopes) is also included.

- Policy-related studies using advanced techniques: Policy-related studies using operations research and/or econometric techniques. This category includes feasibility studies involving such techniques.

- Testing, standardisation, metrology and quality control: Regular routine work on the analysis, checking and testing, by recognised methods, of materials, products, devices and processes, together with the setting up and maintenance of standards, including standards of measurement.

- Patenting and licensing: Activities relating to patents and licenses: systematic work of a scientific, legal and administrative nature on patents and licences.

- Data collection in the natural sciences: Topographical, geological and hydrological surveying (including prospecting and related activities designed to locate and identify oil and mineral resources); routine astronomical, meteorological and seismological observations; surveying of soils and of plants, fish and wildlife resources; routine soil, atmosphere and water monitoring and the routine monitoring of radioactivity levels.

- Data collection in the social sciences: The gathering of information on human, social, economic and cultural phenomena, usually for the purpose of compiling routine statistics, e.g. population censuses, production, distribution and consumption statistics, market studies, social and cultural statistics etc.

- Scientific and technological information and documentation: S&T services provided by libraries, archives, information and documentation centres, reference departments, scientific congress centres, data banks and information-processing departments. Such services include S&T bibliographic searches, provision of S&T documents, provision of access to organised S&T information systems and the management of any associated data bases. Support for S&T conferences is included in this category. Systematic work on the translation and editing of S&T books and periodicals (except for textbooks used in school and university courses) is also included.

- Services associated with scientific and technological collections: S&T services provided by museums of science and/or technology, botanical and zoological gardens and other S&T collections.

- Scientific and technical education and training: Specialised non-university higher education and training, higher education and training leading to a university degree (except research training of (post) graduate students which is regarded as part of R&D), and organised lifelong training for scientists and engineers.

- Administration of S&T activities, policy, planning and other studies of S&T, n.e.i.: Administrative, policy, planning and related activities concerned with S&T which are not an integral part of one of the other defined S&T activities. The Australian Science and Technology Council (ASTEC) and the Policy Division of the Department of Science are examples falling in this category.

This list was compiled as an amalgamation of the following classes of activities:

. Promotion of science and technology.(3)
This class encompasses the first three of the activities on the above list i.e. demonstration of both technical and commercial viability; design for innovative production or service; technology transfer, extension services, and other active diffusion of scientific and technological skills and 'know-how'. The first two of these activities, which are of strong interest to the Department of Science and Technology and to ASTEC, are not included in the UNESCO Recommendation concerning the International Standardization of Statistics on Science and Technology (4). The titles and descriptions of these activities were formulated by the Department in consultation with ASTEC. The third category is included in the UNESCO recommendation as a "scientific and technological service". (See below).

. Scientific and technological services (STS).
This class is defined in the UNESCO Recommendation as "activities concerned with research and experimental development and contributing to the generation, dissemination and application of scientific and technical knowledge". Examination of the activities listed in the Recommendation in this class

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(3) The classes within the "Promotion of science and technology" group were modified in the Project SCORE context during the 1983-84 review of R&D surveys conducted jointly by the then Department of Science and Technology and the Australian Bureau of Statistics, to permit more comprehensive collection of data on the innovative process. Subsequent Statements are therefore likely to incorporate changes in these classes of technological activities.

(4) United Nations Educational, Scientific and Cultural Organisation (UNESCO) Recommendation concerning the International Standardization of Statistics on Science and Technology, adopted by the General Conference at its twentieth session, Paris, 27 November 1978.

(essentially those listed above from "advanced scientific or engineering consulting services" to "services associated with scientific and technological collections", inclusive) shows that the phrase "concerned with research and experimental development" in the UNESCO definition may be misleading. The relationship of these activities to R&D is that they often (but not necessarily) occur in organisations which also perform R&D, giving rise to difficulty in measuring R&D. For this reason the OECD Frascati Manual(5) refers to them as "Related Activities" to be excluded from R&D measurements. Two categories ("advanced scientific or engineering consulting services" and "policy-related studies using advanced techniques") taken with minor modification from the Frascati Manual's list of related activities are used to augment the list proposed by UNESCO. One category placed by UNESCO in this class has been included here under "promotion of science and technology". (See above).

. Scientific and technical education and training (STET).
This class is defined in the UNESCO Recommendation as "all activities comprising specialised non-university higher education and training, higher education and training leading to a university degree, post-graduate and further training, and organised lifelong training for scientists and engineers. These activities correspond broadly to ISCED(6) levels 5, 6 and 7". It is not clear from this definition whether UNESCO intends this class to apply to all higher education or only to the higher education of scientists and engineers. It was agreed between the Tertiary Education Commission and the Department of Science and Technology that the Statement would exclude expenditures on these activities where these were part of the formal education system. It is clear in any case that to include the total expenditure for the higher education sector would not be useful for the purposes of the Science and Technology Statement. Training activities in the field of science and technology sponsored by other Government agencies have value for the Statement, and have accordingly been included.

. Administration of S&T activities, policy, planning and other studies of S&T n.e.i..
This class is not contained in the UNESCO Recommendation. It may be argued that in some areas there are significant overheads relating to administration or policy work concerning S&T which cur guidelines would otherwise exclude. Inclusion of this category has the advantage that the total expenditures of the Department of Science and Technology and of ASTEC appear in a Statement concerned with Commonwealth S&T activities.

Some respondents to the information collection for the 1980-81 Statement were concerned that the guidelines did not provide a definition of S&T analogous to that given for R&D. The explanation of this apparent anomaly is that the Department is not aware of any definition of S&T that is operationally useful for statistical purposes. The definition given in the UNESCO Recommendation, and quoted with attribution to UNESCO in the most recent version of the OECD Frascati Manual, is:

> Scientific and technological activities (STA): systematic activities which are closely concerned with the generation, advancement, dissemination, and application of scientific and technical knowledge in all fields of science and technology. These include such activities as R&D, scientific education and training (STET), and the scientific and technological services (STS), defined (as above).

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(5) Op cit.
(6) International Standard Classification of Education, UNESCO, Paris, 1976 (COM. 75/WS/27)

The interpretation of this definition hinges on what is considered to be "scientific and technical knowledge" and "all fields of science and technology". The UNESCO Recommendation lists the following broad fields under the heading "fields of science and technology": natural sciences; engineering and technology; medical sciences; agricultural sciences; social sciences and humanities; and other fields. This list of fields accords with the dictionary definition of science(7) as "systematic and organised knowledge".

Although some grants for humanities research are provided through the Australian Research Grants Scheme administered by the Minister for Science and Technology, the main thrust of the ministry responsibilities and activities lies in a narrower spectrum, and hence in a narrower interpretation of the boundaries of science. Thus, the activities listed in the information collection guidelines for this Statement as S&T constitute an implicit, though somewhat fuzzy, operationally useful definition for the purposes of the collection. Although a few countries, and in particular Canada, have collected data for some time on a range of S&T activities, the collection of such data in Australia, and in most other OECD countries, must be regarded as experimental. The Science and Technology Statement 1980-81 Workshop (see Appendix 5 of Science and Technology Statement 1981-82) discussed this question. While agreeing that further work is required, the Workshop itself did not produce clearer guidelines.

Subsequent to the collection of data for the 1983-84 Statement, the Department adopted a definition of "technology" formulated by the US National Academy of Science:

> "Technology is a perishable resource comprising knowledge, skills, and the means of using and controlling factors of production for the purpose of producing, delivering to users, and maintaining goods and services for which there is an economic and/or social demand."

However adoption of this definition does not remove the need to list individual classes of activities to be included in the data collection.

The nature of S&T data included in Science and Technology Statements from 1982-83 onwards

In Statements prior to 1982-83, S&T (other than R&D) was collected for all or most agencies on a different basis from R&D (8). In collecting data for the 1982-83 Statement this difference was removed. S&T data shown in this Statement should therefore in principle embody estimates of the S&T components of programs, rather than simply include or exclude total programs on the basis of whether there is or is not a preponderance of S&T activity.

While this change should make comparisons between Ministries more meaningful, caution must still be exercised in view of the lack of a statistically satisfactory definition of S&T and the corresponding wide discretion as to whether particular activities should be included. Reporting of these activities (other than R&D) for the present Statement remains uneven, particularly in the social sciences, where agencies often see their activities as having little or no relevance to a Statement on science and technology.

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(7) See for example The Concise Oxford Dictionary.

(8) Research and Experimental Development, All Sector Summary, Australia, 1981-82, Australian Bureau of Statistics Cat. No. 8112.0, February 1984, Appendix A, p5.

Broad field of science

Some users of the first two Statements, including PSTEC, highlighted a need to distinguish between activities in the natural sciences and engineering (NSE) and those in the social sciences and humanities (SSH). This is common practice in R&D statistics, where the data are collected from R&D performers, but is more difficult when data are collected from R&D funding agencies. Nevertheless, it proved possible to make reasonable estimates of the expenditures on NSE and SSH for nearly all agencies and programs. The guidelines used were as follows:

(a) for R&D

R&D reported should be classified as either natural sciences and engineering (NSE) or social sciences and humanities (SSH) according to the field of science in which the R&D is performed, as follows:

Natural Sciences and Engineering (NSE) includes:

- Agricultural sciences and forestry, biological sciences, chemical sciences, earth sciences, engineering and applied sciences, mathematical sciences, medical sciences, and physical sciences.

Social Sciences and Humanities (SSH) includes:

- Accounting; anthropology (social and cultural) and ethnology; demography; economics; education and training; geography (human, economic and social); information science; law; linguistics; management; political sciences; psychology; sociology; organisation and methods; miscellaneous social sciences and interdisciplinary, methodological and historical activities relating to subjects in this group. (Note that physical anthropology, physical geography and psycho-physiology should normally be classified with the natural sciences and engineering.)

- Arts (history of the arts and art criticism, but excluding artistic activity itself); languages (ancient and modern languages and literature); philosophy (including the history of science and technology); prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeology, etc.; music; religion; other fields and subjects pertaining to the humanities and interdisciplinary, methodological, historical and other activities relating to the subjects in this group.

(b) for S&T (other than R&D)

Each of these S&T activities (other than R&D) may also be further classified, according to the purpose of the activity, as NSE-supporting and SSH-supporting. For activities concerned with the promotion of innovation or knowledge, such classification is determined by the field of the innovation or knowledge. For service activities it depends on the field of the major professional group relying on the service.

In many cases the NSE and SSH activities falling within a given S&T category are reasonably clear by analogy. To help clarify cases which are less clear the following examples were given:

- "Trialing" of a new educational curriculum is an example of SSH in the category "demonstration of both technical and commercial viability";

- A study using operations research and/or econometric techniques specifically related to the siting of a chemical plant is an example of NEE in the category "policy - related studies using advanced techniques";

- Services for anthropological and archeological collections are normally to be classified as SSH.

The division of S&T activities (other than R&D) into NSE-supporting and SSH-supporting categories is, as far as the Department is aware, an innovation in international practice. It is considered to be a useful distinction for policy purposes and in practice there was little difficulty for respondents in this aspect of the survey.

Expenditure definitions and guidelines

Definitions and guidelines used in the collection of financial data for this Statement are in harmony with those used in the Project SCORE R&D survey(7). Some key items are presented in this section.

. Intramural expenditure is expenditure for R4D or other S&T activities undertaken by the respondent organisation. Intramural expenditure is separated into the two categories, capital and current:

Capital expenditure includes expenditure for:

- Land, buildings and other structures (including major alterations but excluding repairs and maintenance, which are reported as "Other current expenditure"); includes relevant capital expenditures by the Departments of Housing and Construction and Administrative Services on behalf of each agency;

- Vehicles, plant, machinery and equipment (expenditure incurred in the financial year on the acquisition (less disposal) of fixed tangible assets, either new or second-hand, with an expected life greater than one year. A proportion of expenditure on assets used partly for R&D should be included, but no such allowance should be included for other S&T).

Current expenditure includes expenditure for:

- Wages, salaries and other labour costs (these refer to gross earnings before taxation and other deductions. Overtime earnings, shift allowances, penalty rates, bonuses and commission payments to employees, holiday pay, payments to employees absent on long service leave, sick pay and similar payments, and employer contributions to superannuation and pension schemes are included. The employer contributions to superannuation and pension schemes where the contributions are paid by another organisation are excluded).

- Other current expenditure (includes expenditure on items such as materials, fuels, rent and leasing, repairs and maintenance, data processing, reference materials and special services in support of the R&D, e.g. payments to outside organisations for use of specialised testing facilities); includes relevant expenditure by the Department of Housing and Construction and Administrative Services on behalf of each agency.

. Extramural expenditure is expenditure for R&D or other S&T activities funded by the respondent organisation but undertaken (i.e. performed) by other organisations. Extramural expenditure was classified by type of payment into the two categories, "contracts and commissions" and "grants and donations":

Contracts and commissions refer to funds disbursed specifically under contract or commission arrangements to other organisations to perform specified tasks. Totals for "contracts and commissions" to other Commonwealth agencies, private enterprise, and tertiary education institutions were separately reported.

Grants and donations refer to funds disbursed without contractual obligation on the part of the receiving organisation to perform specified tasks on behalf of the funding organisation (other than provision of a report describing the work performed). Totals for "grants and donations" to private enterprise and tertiary education institutions were separately reported.

For both intramural and extramural expenditure, respondents were asked to report the sources of funds to enable expenditures to be allocated to the "Commonwealth Budget sector", the "Commonwealth Non-budget sector", and "Other sources of expenditure". The reporting categories were as follows:

Own funds refers to funds available for use by the respondent Department or Authority, and may be received:

- via the Budget sector (consisting of all transactions relating to the Public Account i.e. the Consolidated Revenue Fund, Trust Fund and Loan Fund, as reported in the Budget Statements(9). All transactions of departments are recorded in the Public Account and are accordingly part of the Budget sector); and

- via the Non-Budget sector (consisting of all transactions of authorities which do not pass through the Public Account).

Other sources relate to funds other than "Own funds" which are only available for the specified activity, and include, for example, any levy component from Research Trust funds, and funding provided by other Commonwealth departments and authorities, State government departments and authorities, and private enterprises.

Sources of expenditure from Research Trust Funds

There are a number of possible ways of presenting information on support for S&T resulting from the operation of research trust funds. There are four figures for expenditure which should be considered:

R, the total R&D (or S&T) expenditure from the trust fund account in the particular year;

C, the Commonwealth contributions to the trust fund account in that year in respect of the Commonwealth's support for research;

A, any Commonwealth appropriation to the trust fund account in respect of industry (or other) contributions to the Consolidated Revenue Fund for the purposes of the particular trust fund; and

I, the industry (or other) contribution in that year (usually a levy or tax).

In presenting information on trust fund support for S&T in the Science and Technology Statement, it has been our aim to seek a reporting method which, at least over a period of years, will tend to represent accurately the total of those components of expenditure from the find which are attributable to Commonwealth contributions. A

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(9) See for example 1984-85 Budget Paper No. 1, Appendix, p407.

corollary of this is that we seek a similarly accurate representation with respect to industry (or other non-Commonwealth) contributions. The major classes of trust funds dealt with in the Statement were treated as follows.

1. Funds where Commonwealth support is matched to the level of expenditure from the trust account.

   (i) Commonwealth Budget sector net expenditure.
   C only is shown. (N.B. A is omitted since Commonwealth net expenditure only is sought).

   (ii) Commonwealth Non-budget sector.
   There is no expenditure shown in this sector.

   (iii) Other.
   R-C is shown since this expenditure can be attributed to industry (or other) contributions.

2. Funds where Commonwealth contributions are not matched to the level of expenditure from the trust account.

   (i) Commonwealth Budget sector net expenditure.
   C only is shown, unless the Commonwealth component of R is less than C - in this case only that component is shown (e.g., where the Commonwealth contribution to the find matches other contributions $:$, R/2 is shown).

   (ii) Commonwealth Non-budget sector.
   Expenditure is shown (if any) which is attributable to Commonwealth contributions in previous years (e.g., where the Commonwealth contribution to the fund matches other contributions $:$, 1/2 (R-C-I) is shown).

   (iii) Other.
   The amount shown here is the remainder after subtracting any amounts shown under (i) and (ii) from R.

Where the details of trust fund expenditure have been published in the annual Report of the Auditor-General upon Financial Statements prepared by the Minister for Finance, we have drawn on the Report to derive the figures for R, C, and I.

Allocation of expenditures by Budget function

The Budget functional classification(10) brings together outlays directed towards like objectives or purposes. The basic aim of the classification is the same as that of the classification by socio-economic objective, namely to reveal the allocation of Government outlays to the broad purposes for which they are undertaken. However, the Budget functional classification is designed for general financial overview purposes, and to meet constraints imposed by the need to monitor and report monthly on actual outlays and receipts on a basis consistent with the annual estimates. As such, it does not provide an adequate functional statement for S&T policy purposes, but it is included in this Statement to show the location of the identified R&D and S&T expenditures in the Budget classification, to enable their relationship to broader economic aggregates to be evaluated.

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(10) See 1984-85 Budget Paper No. 1, Appendix, pp 411-415 for detailed description of the classification. For treatment of individual items, see 'Program presentation of appropriations and outlays - Departmental estimates 1984-85' an exploratory presentation of information on Commonwealth programs tabled on a trial basis in association with the Budget papers.

Allocation of expenditure by socio-economic objective

The socio-economic objective classes used in the Statement represent an amalgamation of those used in the Project SCORE R4D survey, as follows:

Science and Technology Statement	Project SCORE
Defence	Defence
Agriculture	Agriculture - Animal - Plant - Other agriculture
Other primary industries	Forestry Fisheries
Mining	Prospecting & resource assessment techniques - metallic minerals (other than uranium)
	Prospecting & resource assessment techniques - non-metallic minerals (other than coal, oil, gas)
	Extraction techniques - metallic minerals (other than uranium)
	Extraction techniques - non-metallic minerals (other than coal, oil, gas)
	Prospecting & resource assessment techniques - uranium
	Prospecting 4 resource assessment technqiues - coal
	Prospecting & resource assessment techniques - oil, gas, oil shale and tar sands
	Extraction techniques – uranium
	Extraction techniques - coal
	Extraction techniques - oil, gas, oil shale and tar sands
Manufacturing(11)	Food Beverages and malt Tobacco Textiles and textile products Clothing and footwear Wood, wood products and furniture Paper and paper products Printing and allied industries Chemical fertilisers

(11) Promotion of industry aspects only e.g. funding of development of transport equipment for Australia's transport system is included under "Transport".

	Industrial gases Synthetic resins and rubber Organic industrial chemicals n.e.c. Inorganic industrial chemicals n.e.c. Paints Pharmaceuticals Veterinary products Pesticides Other chemicals, petroleum and coal products Glass and glass products Clay products and refractories Cement and concrete products Other non-metallic mineral products Basic iron and steel Basic non-ferrous metals and products Structural and sheet metal products Other fabricated metal products Motor vehicles and parts Ships and boats Railway rolling stock and locomotives Aircraft Transport equipment n.e.c. Photographic, professional and scientific equipment Radio and T.V. receivers; audio equipment Computers and electronic calculating machines Other electronic equipment n.e.c. Refrigerators and household appliances Other electrical machinery and equipment n.e.c. Agricultural machinery Construction machinery Materials handling equipment Other industrial machinery and equipment Leather and leather products Rubber products Plastic and related products Other manufacturing
Construction	Construction
Energy	Production and utilisation of energy from - Oil and gas - Coal - Solar - Nuclear - Other primary sources Production and utilisation of synthetic fuels from - Coal conversion - Biomass Conservation of energy

	Other energy R&D (including supporting technologies such as electricity transmission and distribution, energy storage, energy systems analysis etc.)
Transport	Road accidents & safety Other road Railway Water transport Air transport Multimodal transport Intermodal materials handling Other transport
Communications	Telecommunications & broadcasting Postal Other communications
Economic Services n.e.i.	Wholesale & retail trade Banking, finance & insurance Economy n.e.i. Overseas trade Productivity n.e.i. Industrial relations Water supply Sewage Other waste ADP systems n.e.i. Other information media n.e.i. Information indexing and retrieval systems Information reproduction n.e.i. General statistical methodology Other information technology Fire protection
Environment	Protection and rehabilitation of natural environment Protection of man-made environment
Urban & regional planning	Urban & regional planning Housing
Health	Health - Medical - Public
Education	Education
Welfare	Unemployment/unemployed Aboriginal welfare Migrant welfare Aged persons Youth/child welfare Social services n.e.i.

Community services n.e.i.	Consumer affairs Public administration Law reform Law enforcement Corrective services Sport Culture Parks Other recreation International relationships R&D primarily for the benefit of other countries
Earth, ocean & atmosphere	Geology Geophysics Geochemistry Cartography Geomechanics Hydrology Other earth Coastal & ocean engineering Biological marine science n.e.i. Other ocean Meteorology Other atmosphere Remote sensing
General advancement of knowledge	General advancement of knowledge

Some particular cases requiring special note are:

All grants by the Department of Education, and those recommended by the Tertiary Education Commission, for research in the higher education sector have been allocated to the socio-economic objective "General advancement of knowledge". This accords with international practice as embodied in the biennial International Survey of the Resources Devoted to Research and Experimental Development by OECD Member Countries, where the guidelines for the 1979 survey include the following:

> "Please include in General Advancement of Knowledge all R&D financed by general public university grants from the Ministry of Education although, in certain Member countries, some of these programs may be relevant to other objectives. This is a convention dictated by the difficulty of distributing these funds by objective in many Member countries."

Should a distribution of these grants over other socio-economic objectives be required, the Project SCORE data may be used as a rough guide. Percentages of Commonwealth funded higher education sector R&D expenditures by broad socio-economic objective category reported for 1981 were Advancement of knowledge, 48%; Community welfare, 28%; and Economic development 24%.

In Science Statement 1979-80, the Project SCORE mining objectives relating to energy minerals were included in the category "Mining". In subsequent Statements, as noted above, they are included in the category "Energy".

In Science Statement 1979-80, expenditures of Commonwealth Serum Laboratories (CSL) were classified to the objective "Manufacturing" in accordance with the location of "Pharmaceuticals" in the classification scheme. In subsequent Statements, taking account of the objectives of CSL, these expenditures have been classified in the category "Health".

Distinction between "advancement of knowledge" and basic research

Some readers of the Science Statement 1979-80 assumed a correspondence between the socio-economic objective category "advancement of knowledge" and the type of activity "basic research". A broad summary of General Government sector (i.e. Commonwealth plus State) intramural R&D expenditure data from the 1981-82 SCORE survey illustrates the difference.

Table 23 R&D in the General Government Sector 1981-82 - Objective category by type of activity

($ million)	Type of activity			
Objective category	Basic research	Applied research	Experimental development	Total
National security	10.6	70.6	31.9	113.2
Economic Development	132.6	255.8	67.5	455.9
Community welfare	28.3	35.8	5.4	70.5
Advancement of knowledge	48.0	12.3	8.4	68.7
Total	219.6	375.5	113.3	708.3

The basic research performed in objective categories other than "advancement of knowledge" is classified as basic because it has no "particular application or use in view" but satisfies the SCORE definition of strategic basic research, namely "research 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."

Valid entries in the type of activity classes "applied research" and "experimental development" in the objectives category "advancement of knowledge" would be associated with developments which" could ultimately contribute to several specific objectives in ways that do not allow one such objective to be selected as predominant".

On theoretical grounds, the figure for "basic research" in the objectives category "advancement of knowledge" should be an estimate of expenditure on "pure basic research", defined in Project SCORE as "research which is carried out without looking for long term economic or social benefits other than advancement of knowledge". In fact, two thirds of the $21.6m in this category was reported as "pure basic research", and $5.2m of "pure basic research" was reported outside the category.

The Statement does not attempt to distinguish between basic research, applied research, and experimental development.

Estimation of trends in real terms

Expenditures in Statements prior to 1983-84 were presented only in current prices i.e. in actual money terms. It is of course desirable to examine trends in real terms, taking account of changes in prices. The most acceptable presentation is to provide estimates of all expenditures at constant prices(12). In the absence of known price variations for all goods and services purchased, it is usual for such estimates to be constructed using price indices for various broad categories of expenditure and quantity weights representing the relative contributions of these categories to the total expenditure.

Implicit price deflators are obtained by dividing aggregate flows of goods and services measured at current prices by the corresponding estimates at constant prices. Thus they are derived measures (hence the term 'implicit') and are not direct measures of price changes by which current price estimates are converted to estimates at constant prices. When calculated from the major national accounting aggregates, such as expenditure on gross domestic product (giving the GDP implicit price deflator), implicit price deflators relate to a generally broader scope of goods and services in the economy than that represented by any of the individual retail and wholesale price indexes that are published by the Australian Bureau of Statistics. The usefulness of implicit price deflators as indicators of price change is greatly limited by a number of factors(12). Nevertheless, because of the difficulty of constructing accurate R&D deflators, the GDP implicit price deflator has been the deflator most commonly used for this purpose.

There is an extensive literature on this subject and readers are cautioned that while studies have shown that at the national and broad sector levels the GDP implicit price deflator has often given acceptable estimates of constant price R&D expenditures, there are many examples where it has not. In these cases the estimated R&D price deflators have usually increased more rapidly than the GDP implicit price deflator. At the individual program and ministry levels, there can be marked variations from the price rises indicated by one or more of the broad aggregate deflators, due both to phasing of expenditures and the phasing and magnitudes of individual price changes of the goods and services actually purchased.

A major inhibiting factor in the presentation of estimated constant price expenditures in earlier Statements was the absence of a fully satisfactory salaries index appropriate to Commonwealth research personnel. A simple research scientists and engineers salaries index was constructed for the Statement on a basis adequate for establishing trends using data at two- or three-year intervals, but this index (which took salaries at a fixed time in each year) did not adequately account for variations in the timing of new awards from year to year and was unsuitable for use with data at annual intervals. Using Public Service Board data on the timing of all salary adjustments for selected grades since 1976, we have developed a Commonwealth research salary payment index as a replacement. This is based on the total annual salary payments attributable to a fixed 'basket' of personnel relevant to a research organisation. The personnel grades selected, and the weighting given to each in the construction of the index, were based on a study of the staff structure of CSIRO. This index, and others used in the derivation of constant price estimates used in this Statement, are presented in Table 24. Table 9 illustrates the application of the deflators to expenditure classified according to socio-economic objectives.

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(12) Australian National Accounts, National Income and Expenditure 1976-77, Australian Bureau of Statistics, Catalogue No. 5204.0, pp 109-112.

TABLE 24: Deflator series relevant to Commonwealth-funded R&D

Price index or deflator	Index values for year (1979-80 = 100)								
	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85
A. GDP implicit price deflator(IPD)	77.4	83.4	90.0	100.0	110.3	121.5	134.6	144.9	not estimated
B. Gross non-farm IPD	78.8	85.3	91.1	100.0	110.4	123.3	136.9	147.2	155.8 est*
C. Government final consumption expenditure IPD	79.4	86.0	91.5	100.0	112.3	127.1	139.7	147.7	157.3 est*
D. Consumer price index[1]	76.7	83.9	90.8	100.0	109.4	120.8	134.7	144.0	149.0 est*
E. Commonwealth research salary payment index[2]	82.7	88.4	92.9	100.0	114.0	133.4#	145.2	152.3	159.9 est*
F. Private other non-dwelling construction	77.5	84.2	90.5	100.0	112.2	126.6	143.9	151.3	160.1 est*
G. Private enterprise intramural R&D expenditure IPD[4]	74.4	82.2	90.9	100.0	114.4	130.8	145.3[B]	156.3[B]	165.4 est*
H. Universities aggregate price deflator[5]	80.9	87.1	92.2	100.0	114.2	126.9	139.8	147.8[C]	157.5 est*
I. ABS R&D other capital expend. deflator [6]	73.6	81.0	86.0	100.0	103.5	117.6	130.9[L]	138.2[L]	143.5 est*
J. ABS R&D non-salary current expenditure deflator[6]	79.2	84.9	91.5	100.0	110.2	128.2	140.8[C]	149.0[C]	158.6 est*
K. Commonwealth extramural R&D payments deflator [7]	n.a.	n.a.	92.0	100.0	112.0	130.9	142.9	150.7	158.6 est*
L. Private Equipment IPD[8]	72.7	82.4	90.8	100.0	108.8	117.5	130.3	138.1	143.4 est*

Sources : Budget papers, ABS bulletins and unpublished data, Commonwealth Tertiary Education Commission data, Department of Science unpublished data based on Public Service Board salaries information.

* DOS estimates based on relevant trends over the four quarters to December 1984 and taken from ABS Catalogue No 5206.0.

\# Takes account of an additional pay period falling during 1981-82 in that application of this value also adjusts deflated expenditure to a 26-pay period basis. (Australian Public Service salaries are paid on a fortnightly basis and at eleven or twelve year intervals there are 27 payments rather than 26.) For applications where the adjustment is not desired use 128.4.

B Estimate based on increase in index B.
C Estimate based on increase in index C.
L Estimate based on increase in index L.

1 Figures derived by DOS from original series having a 1980-81 base.

2 This index is based on the total annual salary payments attributable to a fixed 'basket' of personnel relevant to a research organisation. The personnel grades selected, and the weighting given to each in the construction of the index, were based on a study of the staff structure of CSIRO.

3 A public other non-dwelling construction deflator is available to 1981-82 in unpublished working estimates of the ABS. The private construction deflator (which differs little from the public one) is used here as figures are available, or readily estimated, after 1981-82 and the quarterly publication of the series facilitates estimation for the current year.

4 Estimated by DOS using the current constant 1979-80 price figures for the years 1976-79 and 1981-82 published by ABS (Catalogue No 8104.0) with interpolation of the deflator for missing years on the basis of constant annual percentage changes between the given years. In addition to noting the uncertainty introduced by using an interpolated figure for the base year, 1979-80, readers should be aware that the ABS sees the constant price estimates in Cat. No. 8105.0 as less reliable than most published ABS constant price data.

5 This deflator is based on indices maintained by CTEC for adjusting recurrent grants to higher education institutions for cost increases. See Appendix 11, Vol. 4 of the CTEC Report for the 1982-84 triennium.

6 These series are unpublished working estimates made available by ABS.

7 Used to deflate extramural payments made by agencies to other Commonwealth bodies. Based on weighting factors derived from an analysis of CSIRO 'Other Source' (ie, excluding Budget and Non-budget) expenditure and applied to other indices.

8 Derived from ABS Catalogue No 5206.0.

Outline of the application of indices in the derivation of the constant price estimates

. For capital land and building expenditure - series F.

. For capital equipment expenditure - series I.

. For wages and salaries - series E.

. For other current expenditure - series J.

. For extramural expenditures - series B, D, G, H or K were used according to the destination of the funds.

Treatment of taxation concessions associated with R&D

Revenue forgone by the Commonwealth as a result of taxation concessions relating to R&D expenditure may be regarded as a form of Commonwealth funding of R&D. Estimates of costs borne by the revenue in respect of R&D performed by business enterprises can vary widely according to the viewpoint adopted and the timescale considered, because in the longer term industrial R&D is a profitable investment at the sector level, and may therefore be expected to increase taxation revenue in the future. Because of the difficulty of estimating appropriate amounts, no allowances for taxation concessions have been included in the tables presented in this Statement.

In years subsequent to 1983-84 the operation of the Management and Investment Companies Act 1983 will provide substantial taxation concessions to promote a private sector venture capital market that will encourage formation and development of Australian businesses which utilise innovative technology, have potential for rapid growth, are skill intensive, export oriented, internationally competitive, and significant generators of employment in Australia. The considerations discussed in the paragraph above also apply to revenue foregone by the Commonwealth under this scheme.

(a)	Intramural Capital Expenditure
AAEC	Australian Atomic Energy Commission
AAECP	Asean Australian Economic Co-Operation Program
AATB	Anglo-Australian Telescope Board
(ab) or $\binom{a}{b}$	Total Intramural Expenditure
ABC	Australian Broadcasting Commission
ABAH	Australian Bureau of Animal Health
ABN	Australian Bibliographic Network
ABRS	Australian Biological Resources Study
ABS	Australian Bureau of Statistics
ABT	Australian Broadcasting Tribunal
ACC	Australia-China Council
ACER	Australian Council for Educational Research
ACIAR	Australian Centre for International Agricultural Research
ACT	Australian Capital Territory
ADAS	Australian Development Assistance Bureau
ADACS	Australian Development Assistance Courses
ADP	Automatic Data Processing
AEC	Australian Education Council
AFP	Australian Federal Police
AGAL	Australian Government Analytical Laboratories
AHRC	Australian Housing Research Council
AIAS	Australian Institute of Aboriginal Studies
AIMS	Australian Institute of Marine Science
AIRDIB	Australian Industrial Research and Development Incentives Board
AIRDIS	Australian Industrial Research and Development Incentives Scheme
AIUS	Australian Institute of Urban Studies

AMSTAC	Australian Marine Sciences and Technologies Advisory Committee
ANAHL	Australian National Animal Health Laboratory
ANARE	Australian National Antarctic Research Expeditions
ANMRC	Australian Numerical Meteorology Research Centre
ANPWS	Australian National Parks and Wildlife Service
ANU	Australian National University
ANZAAS	Australian New Zealand Association for the Advancement of Science
ARGC	Australian Research Grants Committee (Since 1981 incorporated in QEFARGC)
ARCS	Australian Research Grants Scheme
ARL	Australian Radiation Laboratory
ARRB	Australian Road Research Board
ARRDO	Australian Railway Research and Development Organisation
ASCA	Association for Science Cooperation in Asia
ASCO	Australian Standard Classification of Occupations
ASEAN	Association of South-East Asian Nations
ASTEC	Australian Science and Technology Council
ATAC	Australian Transport Advisory Council
AUBRCC	Australian Uniform Building Regulations Coordinating Council
AUSINET	Australian Information Network (Data Base Network)
Australia Post	Australian Postal Commission
AUSTRE	Australian Scientific and Technological Reports (data base)
AUSTREC	Australian Science, Technology and Research Co-operation (ADAB)
AWRC	Australian Water Research Council
(b)	Intramural Current Expenditure
BAE	Bureau of Agricultural Economics
BE	In this Statement Refers to Wholly Owned Commonwealth Business Enterprises
BERD	Total Intramural R&D Expenditure in the Business Enterprise Sector
BIE	Bureau of Industry Economics
BLMR	Bureau of Labour Market Research

BMR	Bureau of Mineral Resources, Geology and Geophysics
BMRC	Bureau of Meteorology Research Centre
BTE	Bureau of Transport Economics
(c)	Extramural Expenditure
CAD	Computer Assisted Design
CAM	Computer Assisted Manufacture
CCAMLR	Convention on the Conservation of Antarctic and Marine Living Resources
CCRD	Consultative Committee on R&D (ADAB)
CEDA	Committee on the Economic Development of Australia
CERI	OECD Centre for Educational Research and Innovation
CDC	Curriculum Development Centre
CHOGRM	Commonwealth Heads of Government Regional Meeting
CILES	Central Information, Library and Editorial Section (CSIRO)
CIRC	Centre for International Research Cooperation (CSIRO)
CIRL	Central Investigation and Research Laboratory
CITCA	Committee of Inquiry into Technological Change in Australia
CGIAR	Consultative Group on International Agricultural Research
CMRAC	Department of Veterans' Affairs Central Medical Research Advisory Committee
COST	ASEAN Committee on Science and Technology
CPI	Consumer Price Index
CSIRO	Commonwealth Scientific and Industrial Research Organization
CSIRONET	National Computer Network Operating within Australia
CSL	Commonwealth Serum Laboratories
CTEC	Commonwealth Tertiary Education Commission
CTHC	Capital Territory Health Commission
CWLTH	Commonwealth Government (i.e., Australian Federal Government)
DAF	Data Acquisition Facility
DITAC	Department of Industry, Technology and Commerce
DOS	Department of Science

DNA	Deoxyribonucleic Acid
DPF	Data Processing Facility
DPI	Domestic Product of Industry
DST	Department of Science and Technology
DSTO	Defence Science and Technology Organisation
EBS	Experimental Building Station
ELD	Education and Local Development Project
EPG	Education Planning Group
ERDC	Education Research and Development Committee
FE	Commonwealth Financial Enterprise
FM	Frequency Modulation
FPS	Facility Planning System
FRG	Federal Republic of Germany
FWRAP	Federal Water Resources Assistance Program
GATT	General Agreement of Trade and Tariffs
GBRMPA	Great Barrier Reef Marine Park Authority
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
HACBSS	Homestead and Community Broadcast Satellite Service
HF	High Frequency
HIAF	Heavy Ion Analytical Facility
HIF	Health Facilities Information File
HIFAR	High Flux Australian Reactor
IAC	Industries Assistance Commission
IAEA	International Atomic Energy Agency
ICAO	International Civil Aviation Organisation
ID	Defence Industry Development Branch
IEA	International Association for the Evaluation of Educational Achievement
INMARSAT	International Maritime Satellite Organisation

INTELSAT	International Telecommunications Satellite
IOC	International Oceanographic Commission
IPS	Ionospheric Prediction Service
IRAS	Indicators and Resource Analysis Section. (Department of Science and Technology)
IR&D	Industrial Research and Development
ISCED	International Standard Classification of Education
kW	Kilowatt
Landsat	NASA Remote Sensing Satellite
LINAC	Electronic Linear Accelerator
Ltd	Limited Liability
MARC	Machine Readable Cataloging
MATPAK	Materials Handling Program
MCB	Metric Conversion Board
MEDLINE	U.S. National Library of Medicine (Database Network)
MERLCO	Minerals (Exploration) Research Liaison Committee
MICs	Licenced Management and Investment Companies
MLS	Australian Microwave Landing System (INTERSCAN)
MPC	Multi-Project Silican Wafer Chip
MW	Megawatt
N	Natural Sciences and Engineering
n.a.	not available
NAL	National Acoustic Laboratory
NASA	United States National Aeronautics and Space Administration
NATA	National Association of Testing Authorities
NMR	Nuclear Magnetic Resonance
NATmap	Division of National Mapping (Department of Resources and Energy)
NBSL	National Biological Standards Laboratory
NCDC	National Capital Development Commission

n.e.c.	not elsewhere classified
n.e.i.	not elsewhere included
NERD&D	National Energy Research, Development and Demonstration
NERDDC	National Energy Research, Development and Demonstration Council
NH&MRC	National Health and Medical Research Council
NIF	National Income Forecasting Model
$_{S}$N	Includes a small component of social sciences
NT	Northern Territory (of Australia)
NL	No Liability
NPRU	National Police Research Unit
NSC	National Standards Commission
NSE	Natural Sciences and Engineering
NWRAp	National Water Resources Assessment Program
OECD	Organization for Economic Co-operation and Development
OTC	Overseas Telecommunications Commission (Australia)
PhD	Doctor of Philosophy
PPCA	Productivity Promotion Council of Australia
PR&I	Planning Research and Information Branch (Public Service Board)
PSZ	Partially-Stabilized Zironia
Pty	Proprietary
QEFARGC	Queen Elizabeth II Fellowships and Australian Research Grants Committee
QFMRAAC	Queen's Fellowships and Marine Research Allocations Advisory Committee
RAN	Royal Australian Navy
RAPT	Review and Progress Test in Mathematics
RCF	(Ministerial) Review of Commonwealth Functions (April 1981)
R&D	Research and (Experimental) Development
R,D&D	Research, Development and Demonstration
S	Social Sciences and Humanities
^{n}S	Includes some Natural Science and Engineering

SA	South Australia
S&T	Science and Technology
SCORE	Survey and Comparison of Research Expenditure
SMEC	Snowy Mountains Engineering Corporation
SSH	Social Sciences and Humanities
STA	Scientific and Technological Activities
STET	Scientific and Technical Education and Training
STIU	OECD Science and Technology Indicators Unit
STS	Scientific and Technological Services
TAFE	Technical and Further Education
Telecom	Australian Telecommunications Commission
TTC	Technology Transfer Council
UHF	Ultra High Frequency
UK	United Kingdom of Great Britain and Northern Ireland
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US	United States (of America)
USA	United States of America
USSR	Union of Soviet Socialist Republics
Vic.	Victoria (Australia)
W.A.	Western Australia
VLSI	Very Large Scale Integrated Circuits
WELSTAT	Welfare Statistics Project
..	Figure non-zero, but insignificant for purposes of presentation.
.	Figure non-zero but not separately available is included elsewhere.

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