SCIENCE AND TECHNOLOGY STATEMENT 1981-82

by

The Minister for Science and Technology
The Honourable David Thomson, M.P.

NOVEMBER 1981

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1981-82

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A statement on the Commonwealth Government sector
prepared by the Department of Science and Technology
on the basis of information provided by
agencies of the Commonwealth Government
23 October 1981

Australian Government Publishing Service
Canberra 1982

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Printed by Authority by the Commonwealth Government Printer

A SPEECH

AT THE TABLING

OF THE SCIENCE AND TECHNOLOGY STATEMENT

FOR 1981-82

BY THE MINISTER FOR SCIENCE AND TECHNOLOGY

25TH FEBRUARY, 1982.

Introduction

I have pleasure in tabling the Science and Technology Statement for 1981-82.

The 1981-82 Statement is a post-budget analysis of Commonwealth expenditure listed by Agency, Ministry and by socio-economic objectives. Its aim is to provide a sound and comprehensive basis for analysing changes and trends, and for formulating policy.

The 1981-82 Statement contains research and development statistics covering four years. Direct Commonwealth funding of research and development increased from $620m in 1978-79 to $940m (projected) in 1981-82. This is about a 10% increase over the four years in real terms.

This significant real growth over the period has been shared over many areas. These include those concerned with energy research, funding directed towards manufacturing objectives, mining, health and agriculture.

These figures, in times of severe financial constraint, demonstrate the Government's continuing commitment to research and development as an essential factor in national economic growth.

Highlights

In the past year there have been a number of important developments in science and technology.

The Department organised a successful biotechnology symposium, concentrating on the commercial applications of recombinant DNA techniques. The symposium brought together international experts and representatives of Australian business, academic and Government communities.

An amended Industrial Research and Development Incentives Act took effect in July. The amended Act incorporates considerable changes and improvements, including higher ceilings for both project and commencement grants.

In December, my Department released a discussion paper "The Bases for Science and Technology" policy which examines the possible roles for Government in this field. The paper is an important step in developing a consensus on the concepts underlying science and technology policy.

On another front, a Technological Change Committee has been established as a standing committee of the Australian Science and Technology Council. This was recommended by the Committee of Inquiry into Technological Change in Australia.

Private Sector R&D

The ratio of private sector to Government funding of research and development remains a matter of concern to the Government. In real terms, RSD expenditure by private enterprise fell by nearly 50% between 1973-74 and 1976-77. There was a small growth of 5% in real terms between 1976-77 and 1978-79. However, in the same period manpower effort devoted to research and development by private enterprise fell by 7%.

Private Sector RSD spending as a percentage of the gross domestic product remains very low compared to other western countries. Since the Statement was prepared, more up-to-date international comparative data has become available. For the information of Honourable Members, I seek leave to incorporate in Hansard a table illustrating the relative roles of the business and government sectors in the fifteen largest RSD performing nations of the OECD.

In my tabling speech for the last Statement, I stated that I would like to see the level of research and development spending by private enterprise more than double in this decade. Such an effort is essential if we are to compete internationally and yet it is a modest goal by the standards of other countries, as the table shows.

As well, I look forward to the Industries Assistance Commission report into the Industrial Research and Development incentives Scheme. I hope the report will enhance Government understanding of the effectiveness of the Scheme and its value to the economy.

In another move, I have asked my Department to examine further ways of increasing the involvement of private industry in government-sponsored research and development.

A nation without innovation succumbs to deterioration and decay. The development of our own capability in industrial innovation must remain a high priority. Our vitality as a nation', and our ability to respond to rapidly changing demands, depend on our success in this task.

Industrial innovation represents a major path by which science and technology can contribute to Australian economic progress. It must be stressed that only those firms who have developed their own R&D capability are able to effectively assess and utilize appropriate new technologies. Australia cannot rely solely on buying new technology from overseas. However it is unreal to expect Australia to generate all its own technology.

Innovation is inherently difficult to foresee. New discoveries and emerging technologies can give rise to major industries in unexpected areas. The impact of the transistor and the growth of the silicon chip industry provide a powerful example. Biotechnology is a more recent case.

OECD NATIONS - 15 LARGEST R&D PERFORMERS RANKED BY GROSS EXPENDITURE ON R&D (GERD) AS A PERCENTAGE OF GDP

Country and GERD (US $m at current prices)	% GERD /GDP	R&D in Sector as % GDP			
		SOURCE OF FUNDS		PERFORMANCE	
		Business	Govt.	Business	Govt.
Large R&D Performers					
U.S.A. (70 765, 1981)	2.49	1.19	1.25	1.73	0.33
F.R. Germany (17 366, 1979)	2.27	1.13	1.06	1.48	0.39
(*Group Median*)	*2.20*	*1.13*	*1.06*	*1.41*	*0.36*
U.K. (6 994, 1978-79)	2.20	0.94	1.06	1.41	0.47
Japan (20 063, 1979-80)	2.04	1.20	0.61	1.18	0.25
France (10 225, 1979)	1.79	0.79	1.00	1.06	n.a.
Medium R&D Performers					
Switzerland (2 329, 1979)	2.45	1.86	0.57	1.86	0.15
Netherlands (2 563, 1979)	1.97	0.93	0.93	1.01	0.42
Sweden (1 500, 1977-78)	1.87	1.11	0.71	1.33	0.16
(Group Median, excluding Australia)	*1.64*	*0.93*	*0.57*	*0.99*	*0.18*
Belgium (1 516, 1979)	1.40	0.92	0.43	0.97	0.13
Australia (1 213, 1978-79)	1.04	0.22	0.80	0.24	0.46
Canada (2 341, 1980-81)	0.95	0.33	0.54	0.41	0.28
Italy (2 669, 1979)	0.82	n.a.	n.a.	0.46	0.19
Small R&D Performers					
Norway (632, 1979)	1.37	0.52	0.82	0.68	0.26
(Group Median)	*2.08*	*0.52*	*0.50*	*0.59*	*0.26*
Finland (449, 1979)	1.08	0.60	0.46	0.59	0.28
Denmark (640, 1979)	0.97	0.43	0.50	0.50	0.21

Source: Derived from OECD Science Resources Newsletter, No. 6, Summer 1981. Swedish figures (natural sciences only) from OECD Paper DSTI/SPR/79.28/24. Australian figures from ABS 8104.0, 8109.0, 8111.0 and 8112.0.

Although sound research and development is a necessary foundation, successful innovation also depends on other complex market factors. Awareness of the role of market forces forms the basis of Government policy. Although Governments are motivated by high ideals, they are not ruled by the fundamental economic laws which guide the entrepreneur and the innovator, industry must take the primary role in the innovation process. The Government's overall priority in encouraging innovation is to ensure an economic climate favourable to investment in research and development.

Innovation and high technology policies must be viewed against the background of these macroeconomic objectives. Within this context, the Government will assist in maintaining a viable infrastructure for science and technology, including support of the free flow of technological information and skills.

Conclusion

Australia's long term industrial future lies with a combination of resource development and the establishment of industries based on appropriate high technology. Microelectronics, robotics, biotechnology, new materials and information technologies are examples.

High technology industries are strong performers in the critical areas of real growth, productivity, prices and employment. A study in the United States has shown that gains in labour productivity were twice those of low technology industries. Yet these gains were not made at the expense of employment. Jobs grew at an annual rate of eight times that of low technology industries. This is an experience Australia should seek to share.

Biotechnology is a direct example of the potential benefits of investment in high technology. Australia conducts world class research in this field and our scientific capability is highly developed. The prospects for biotechnology are revolutionary, and I urge Australian industry to respond to this opportunity.

These challenges are momentous. We must seek to develop effective policies in a climate of informed discussion. There has not been enough progress towards developing a community consensus on the role of science and technology in these complex social and economic issues. The Government has encouraged debate on these questions, believing that without consensus it will be difficult for Australia to meet these challenges adequately.

There is a widely felt need to relate science and technology policies more closely with social, economic and industrial policies. The task is not an easy one.

The Science and Technology Statement is a key component in contributing to the basis for informed discussion on these issues.

I commend the Statement to the House.

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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.

INTRODUCTION

This document is the third in the annual series of Statements informing the Parliament and the public about Commonwealth Government expenditures in science and technology (S&T).

Australia does not have a single centralised science and technology coordinating body nor is there a single budgetary channel for funds in support of research and development (R&D). Such funds are obtained individually by a wide range of Commonwealth, State, higher education and private bodies from Commonwealth and State Governments, the business enterprise sector and private bodies and persons.

The degree of coordination needed for this dispersed funding system is achieved through a well developed S&T advisory structure. At the Commonwealth level this consists of the Department of Science and Technology, the line Departments with functional responsibility for particular sectors, ASTEC, CSIRO and a wide range of advisory committees.

The Statement provides information essential to the effective operation of the advisory and coordination process. It is also aimed at providing data for science policy and economic research.

The first Science Statement(1), tabled in May 1980, brought to fruition a science policy aim of long standing, to have available a consolidated overview of Commonwealth Government support for R&D. The second Statement, tabled in May 1981, was retitled Science and Technology Statement to represent its coverage more accurately, and to take proper account of the association between science and technology in Government policy machinery. Improvements incorporated in the second Statement included a fundamental change in methodology to improve the quality of the data and provide additional information.

The present report documents at the broad program expenditure level the resources devoted by the Commonwealth Government to R&D in the financial years 1978-79 to 1981-82, and to a wider ranger of S&T activities from 1979-80 to 1981-82. A number of improvements relative to the previous Statement have been made to increase further the utility of the document. Because these improvements involve some changes of format, for ease of reference most data presented in the 1980-81 Statement have been represented here. The changes include the following:

- expenditure data presented distinguish between the natural sciences and engineering on the one hand and the social sciences and humanities on the other;
- intramural capital and current expenditures have been presented separately at the agency or program levels rather than the Ministry level;
- there have been major changes of presentation in the Recent Trends section;
- an exploratory attempt has been made to distinguish between various categories of S&T (other than R&D) - the results are presented in Appendix 1; and
- an attempt was also made, with mixed success, to relate the text in the Ministry Activities section more directly to the expenditure data.

In treating R&D and the wider field of S&T, both in this Statement and in the 1980-81 Statement, there has been a consistent effort to maintain compatibility between usage in the Statement and international practice, particularly in relation to the

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(1) Science Statement 1979-80, Australian Government Publishing Service, Canberra, 1980.

terminology and definitions adopted by UNESCO and OECD. One persistent point of confusion to some has been the common usage of "science and technology" as being synonomous 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.

An important stimulus for many of the changes made in this Statement was provided by views expressed at the Science and Technology Statement 1980-81 Workshop conducted in June 1981 by the University of Wollongong with support from the Commonwealth Department of Science and Technology. Commonwealth and State Government, the academic community and the media were represented at the Workshop. (See Appendix 4.)

At the Workshop, the value of the Statement was strongly endorsed, and potential areas for further improvement were discussed. The above changes go some way towards responding to much of the constructive criticism, but only begin to move towards the ideal seen by the Workshop - a comprehensive qualitative and quantitative analytical overview of Commonwealth involvement in science and technology, particularly relating expenditure data to program descriptions, structural trends, and stated Government policy. The Department's aims in this case have been conditioned by the objective of producing this Statement within three months of the Budget without increasing workload. The construction of the Statement has been, and remains, a research process. Each of the three Statements has broken new ground, and it is hoped that some of the better ideas not yet incorporated may be found practicable in future editions.

It should also be emphasised that the Science and Technology Statement is, and will remain, only one source of information on Commonwealth Government involvement in scientific and technological matters. The Department is continuing to explore the development of other elements of a wider package of source material for policy makers, policy advisers, policy analysts and others concerned with S&T. Important steps in this development are the publication at about the same time as this Statement of, firstly, a paper on the bases for science and technology policy(1), and secondly, a directory outlining the functions and interactions of Commonwealth Government advisory, funding, research and service science bodies(2). Section D of the bases paper assesses Government intentions in the field of science and technology by analysing stated S&T and related policies, the Government's responses to recent Committees of Inquiry, Ministerial statements, and other relevant documents.

The Department of Science and Technology wishes to acknowledge the assistance of other departments and agencies in providing information; the supportive role played by ASTEC; and the advice provided by the Australian Bureau of Statistics on the planning of the information collection.

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(1) The Bases for Science and Technology Policy, Department of Science and Technology October 1981.

(2) Directory of Science and Technology in the Commonwealth Sector, Department of Science and Technology, September 1981.

RECENT INITIATIVES

Projected 1981-82 Commonwealth Government expenditures on R&D and other S&T funded through the Budget at least maintain the real levels of total expenditure for these broad classes of activities. Within this broad picture there has been some redistribution of effort, which is discussed further in the section Recent Trends in Commonwealth Funded S&T. Specific changes of note are listed in the present section.

Industry

As part of the Government's response to the report of the Committee of Inquiry into Technological Change in Australia (CITCA) a further five year program of grants under the Industrial Research and Development Incentives Act, 1976 was commenced on 1 July 1981.

The coverage of the incentives scheme has been extended to include research and development related to and carried out at building sites, and some computer software research and development.

A further three year joint Commonwealth/Industry program for the development of the Interscan Microwave Landing System has been approved in principle by the Government.

Technological Change

The Committee of Inquiry into Technological Change in Australia recommended that ASTEC be asked to establish a Standing Committee to monitor technological change at the national level; specifically, to review on a continuing basis the processes and trends in technological change in Australia and elsewhere; and evaluate and report on the direct and indirect effects of technological change at the national level. This recommendation was accepted by the government, and the committee met for the first time on 1 June 1981.

Energy

The Government's decision to consolidate the Commonwealth's non-nuclear energy research activities in CSIRO and the formation of the new Institute of Energy and Earth Resources in CSIRO will allow an expansion of energy research. This will include the extraction and exploitation of coal and oil shale, and the energy efficiency of industrial and transport activities.

Further details are provided under the heading "High Priority Areas for Expansion and Other Initiatives by CSIRO" in the Ministry Activities section,

$2.0m is being provided in 1981-82 for the Bureau of Mineral Resources, Geology and Geophysics (BMR) to conduct a geological framework study relating to the assessment of the petroleum potential of the Bass Basin region.

Health

The Government has allocated $1.85m for the Commonwealth Serum Laboratories Commission (CSL) to conduct research on interferon over the period 1980-81 to 1983-84.

$1.3m is to be provided to the Commonwealth Institute of Health in 1981-82 for a special epidemiological study into the effects of herbicides and other chemicals on Vietnam veterans.

Chemical technology

Funds have been allocated to CSIRO in the 1981-82 Budget for the completion in 1982 of a laboratory complex which will house a new Division of Cellulose Research, an Industrial Microbiology Unit, and a centre for water treatment technology. These will take over work presently carried out by the CSIRO Division of Chemical Technology, which will close in 1982.

Marine sciences

$3.0m has been provided in the CSIRO 1981-82 budget for the construction of its new oceanographic research ship. A laboratory complex costing $10.75m for marine research has been approved by the Government in the 1981-82 civil works program subject to the necessary Parliamentary approvals being obtained. The new complex will be built for the CSIRO Divisions of Fisheries Research and Oceanography at Hobart, Tasmania, and will be known as the CSIRO Marine Laboratories.

Antarctic research

Approval was given in 1980-81 to a ten year re-building program of Antarctic bases, the first stage of which is planned for commencement in 1981-82. To this end the Government has also given approval for an additional supply ship to be chartered for the next three years by the Antarctic Division of the Department of Science and Technology to enable building materials and other supplies to be transported to the Antarctic.

Meteorology

Included in the 1981-82 Budget were allocations of $4.837m for upgrading of the Bureau of Meteorology's central computer system and $1.531m to enable the Australian Landsat station to increase the level of its operations.

Education

The Government has decided to provide $16 m over the 1982-84 triennium to establish Research Centres of Excellence in universities. The amount to be expended in 1981-82 has not yet been determined.

Funds have also been provided in 1981-82 for a Commonwealth contribution towards the estabishment of a national TAFE Research and Development Centre to be based in Adelaide.

International cooperation

The Government has decided to establish an agricultural research centre in Australia concerned with the needs of developing countries. The centre, to be named the Australian Centre for International Agricultural Research (ACIAR), will contract research work to existing Australian institutions, and will seek to involve research and extension workers from developing countries. ACIAR is to be funded through a trust fund with an initial Government commitment of $25m over four years.

The Basic Agreement Between the Government of Australia and the Government of the United Mexican States on Scientific and Technological Cooperation was signed in June 1981. An amount of $44 000 was allocated in 1981-82 for exploratory visits to establish the cooperative program, and a high level scientific delegation visited Mexico in October 1981 for this purpose.

Research Coordination

CSIRO is proceeding with more formalised strategic planning procedures for the allocation of resources to major areas of research. These procedures form the basis for interaction with the CSIRO Advisory Council, a broadly representative body which advises the CSIRO Executive on research priorities. The planning procedures also involve extensive consultation with users and potential users of the results of the Organization's research.

Research Associations

The funding of research associations has been transferred from CSIRO to the Department of Science and Technology. CSIRO will continue to be represented on present and future research associations and a joint Department of Science and Technology and CSIRO Policy Coordination Committee has been formed.

Review of Commonwealth Functions

A number of the decisions taken by the Ministerial Review of Commonwealth Functions announced on 30 April 1981 were concerned with functions within the scope of this Statement. Some decisions involved a Commonwealth withdrawal from functions considered to be more appropriately handled by the States or private enterprise, and others involved a rationalisation of Commonwealth functions.

It was decided that the industrial working environment functions of the Department of Science and Technology were to be scaled down. The Department's productivity development and pilot innovation programs and the Assistance to Inventors Scheme were to be reviewed by an independent committee.

Among other decisions affecting the Department of Science and Technology were:

- Business Information Centres, which had been established on a trial basis, to be closed down.
- The functions of the National Materials Handling Bureau to be transferred to a research organisation funded by the private sector, or failing that, wound up.
- Direct public service executive and support services to the Productivity Promotion Council of Australia to be withdrawn progressively and the future level of Commonwealth funding to be reviewed.

There is to be a major rationalisation of bodies providing advice on Science and Technology. A number of Advisory Committees have been abolished and others are being amalgamated. The Australian Marine Science and Technology Advisory Committee is to report direct to the Minister for Science and Technology rather than to ASTEC. The Office of the Adviser on Science, Technology and the Environment within the Department of Foreign Affairs was abolished as was the Commonwealth Council for Rural Research and Extension in the Ministry of Primary Industry. Direct Commonwealth involvement in rural extension services is to be terminated.

The level of research activity within Government departments and authorities is to be curtailed. Funds are to be withdrawn from Applied Ecology Pty Ltd within the Department of Aboriginal Affairs. A review is to be undertaken into the Australian Institute for Aboriginal Studies. The transport planning and research assistance program of the Department of Transport is to be terminated (except for the Australian Road Research Board and Australian Railways Research and Development Organisation). The work of the Bureau of Transport Economics is to be restricted to major studies. Within the Ministry of the Attorney-General it was decided to abolish the Legislative Drafting Institute and the Commonwealth Legal Aid Commission. Their functions are to be carried out by other means. The Australian Scientific Liaison Offices in London and Washington will be closed.

It was decided to reallocate resources between the Australian Atomic Energy Commission and CSIRO to enable the establishment of a new Institute of Energy and Earth Resources in CSIRO. The Government further decided that the "user pays" principle should be exploited to the maximum extent, as in the payment for services provided by the Australian Atomic Energy Commission. Commonwealth activities in providing a range of laboratory services and facilities will also be reviewed.

Direct Commonwealth involvement in defence science, research and development is to be reduced. The private sector and universities will be encouraged to perform such activities. There may be an increased role for the private sector in the provision of technical advice in the area of housing and construction. The functions of the Experimental Building Station are to be transferred out of the Commonwealth sector.

Contracting out of functions (such as the operation of the Baseline Air Pollution Station and the National Acoustic Laboratories) is to be increased.

Special support for educational research is to be terminated. In-house and contracted research activities of the Department of Education are to be scaled down. The States were asked to meet part of the cost of the Curriculum Development Centre.

There is to be further rationalisation between the Bureau of Labour Market Research and research positions in the Department of Employment and Youth Affairs.

Several proposed capital works were deferred. There is to be no provision for a new university in the Northern Territory. Other examples of deferrals are the proposed new works for the Australian Institute of Criminology, the National Biological Standards Laboratory and the Australian Dental Standards Laboratory.

New procedures have been introduced for computer acquisitions by the Commonwealth sector. CSIRO is now providing, on a cost recovery basis, the main source of technical advice to Government bodies on such acquisitions.

The data collection activities of the Australian Bureau of Statistics are to be rationalised, and in particular the frequencies of the Project SCORE national survey of R&D expenditure and manpower and the energy R&D survey have been reduced from biennial to triennial.

RECENT TRENDS IN COMMONWEALTH FUNDED S&T

Summary

Table 1 presents a broad summary 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 funds". 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 $730m on R&D for 1981-82 shows an increase of nearly 18% relative to the estimated 1980-81 total of $620m. About one third of this rise is due to changed arrangements for superannuation payments by statutory authorities, leaving 12% attributable to inflation and real growth. With projected inflation typically less than 11%, these figures indicate that the Government is maintaining its level of support through the Budget for research and development in real terms. There was however a decline in real terms in the projected R&D expenditure in the Non-Budget sector, where the overall level was maintained at current prices.

Table 1: Summary of trends in identifiable* Commonwealth Government support for S&T, 1978-79 to projected 1981-82.

($ million)	R&D				S&T (including R&D)		
	78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Sector (Table 2)							
Budget sector*	451	519	620	731	903	1062	1224
Non-Budget sector	33	37	47	47	103	121	122
Total* (direct Commonwealth funding)	484	555	668	778	1007	1183	1345
B. Type of Expenditure							
Intramural (Table 7**)							
Capital expenditure	64	92	89	103	121	144	140
Current expenditure	268	287	360	433	618	714	857
Sub total	332	379	449	536	740	858	997
Extramural* (Table 8#)	153	177	218	243	267	325	349
Total* (direct Commonwealth funding)	484	555	668	778	1007	1183	1345

($ million)	R&D				S&T (including R&D)		
	78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
C. Expenditure by Broad Field of Science							
Expenditure on Natural Sciences and Engineering							
Intramural (Table 9)	321	367	434	518	645	732	843
Extramural* (Table 10)	121	144	181	200	223	271	289
Sub-total*	442	511	614	718	868	1003	1131
Expenditure on Social Sciences and Humanities							
Intramural (Table 11)	11	12	15	17	95	126	154
Extramural* (Table 12)	31	32	38	42	43	54	60
Sub-total*	42	44	53	60	138	180	214
Total* (direct Commonwealth funding)	484	555	668	778	1007	1183	1345
D. Expenditure by Major Socio-Economic Objective Group, R&D only (Table 3)							
Expenditure on National Security							
Intramural (Tables 13 & 15)	86	92	106	118			
Extramural (Tables 14 & 16)	0.4	0.4	0.4	0.4			
Expenditure on Economic Development							
Intramural (Tables 13 & 15)	183	214	255	308			
Extramural (Tables 14 & 16)	47	58	79	79			
Expenditure on Community Welfare							
Intramural (Tables 13 & 15)	43	46	52	70			
Extramural (Tables 14 & 16)	17	27	37	49			
Expenditure on Advancement of Knowledge							
Intramural (Tables 13 & 15)	20	26	35	40			
Extramural* (Tables 14 & 16)	87	93	102	114			
Total* (direct Commonwealth funding)	434	555	668	778			

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
E. Commonwealth S&T Expenditure Compared to Commonwealth Outlays and GDP								
Estimated Commonwealth Government Budget sector funds expended on S&T	($m)	451	519	620	731	903	1062	1224
% Total Commonwealth outlays	(%)	1.55	1.64	1.71	1.79	2.85	2.93	3.00
Estimated Commonwealth Government funds expended on R&D (including Non-Budget sector)	($m)	484	555	668	778	1007	1183	1345
% GDP	(%)	0.48	0.49	0.51	0.52	0.88	0.91	0.90
Total Commonwealth outlays	($m)	29012	31660	36274	40862			
GDP	($m)	101660	114348	130030	149000			

* The data shown do not contain estimates for the research components of higher education sector teaching-and-research expenditures - see page 31. If these estimates were added in, totals for Commonwealth-funded R&D would range from about $620m in 1978-79 to $940m (projected) in 1981-82.

** Tables 7 to 18 are located at Appendix 1.

Table 8 presents a breakdown of extramural payments by ministry and major granting program. Detail on contracts and grants is provided in Appendix 3.

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. Figure 1, which is confined to the years 1980-81 and (projected) 1981-82, is a visual presentation of the same information but with Budget and Nan-budget sectors combined and expenditure by broad field of science indicated. Further dissections of S&T expenditure by ministry are provided in Part A of Appendix 1.

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 6.

R&D Expenditure by Socio-economic Objective

Table 3, which combines the Budget and Non-budget sectors, shows that Commonwealth R&D expenditures directed towards all the given socio-economic objectives categories except "transport" and "education" have increased at current prices over the four years to 1981-82. In the "economic development" group, which as a whole grew several percent more rapidly than any of the broad deflators shown in Appendix 6, apparent real growth occurred in the objectives "agriculture", "other primary industry", "mining", "manufacturing", "energy", and "economic services". The question of whether there is real growth between 1980-81 and 1981-82 is complicated by changes in arrangements for superannuation payments by some statutory authorities. The total extra appropriation to CSIRO and AAEC for this purpose in 1980-81 is about $35m. Growth in "communications" between 1978-79 and 1980-81 is due to $5.3m expended on buildings by Telecom in 1980-81. Commonwealth R&D expenditure directed towards "communications" and "construction" declined in real terms over the four years. Figure 2 is a visual presentation, for the years 1980-81 and 1981-82 (projected), of the information on R&D contained in Table 3. It also indicates expenditure by type and by broad field of science. Further dissections of R&D expenditure by socio-economic objective are provided in Part B of Appendix 1.

S&T Expenditure by Budget Function (Budget Sector only)

Table 4 shows the trends in R&D and S&T percentages of Commonwealth Government outlays directed towards each Budget function, while Table 5 shows for reference the values of these total outlays. Strong rises are evident for R&D in the Budget functions "health" (0.8 to 1.4%), "urban and regional development n.e.c. and the environment" (0.8 to 6.1%), "labour and employment" (0.1 to 0.3%) and "foreign affairs and overseas aid" (less than 1% to 2.0%). The sharp rise in the percentage for "urban and regional development n.e.c. and the environment" is due both to increased R&D expenditure directed mainly towards the environment aspects of this function and to a decrease in the urban and regional development aspects of the total outlay.

Falls are apparent in the percentages for R&D in the Budget functions "defence" (3.3 to 2.9%), "transport and communications" (0.7 to 0.4%), and "industry assistance and development" (10.6 to 9.0%), the latter decrease being due mainly to strongly increasing total outlays.

Essentially nil percentages are shown for R&D in the budget functions "social security and welfare", "housing", "water supply and electricity", and "legislative services". In the last three cases this is due to the nature of the Budget function classification rather than absence of Commonwealth-supported R&D, but in the case of "social security and welfare" the identifiable Commonwealth-supported R&D is in fact less than 0.05% of the relevant total outlay.

Fig. 1 Estimated Commonwealth Government Funds Expended on S&T by Ministry

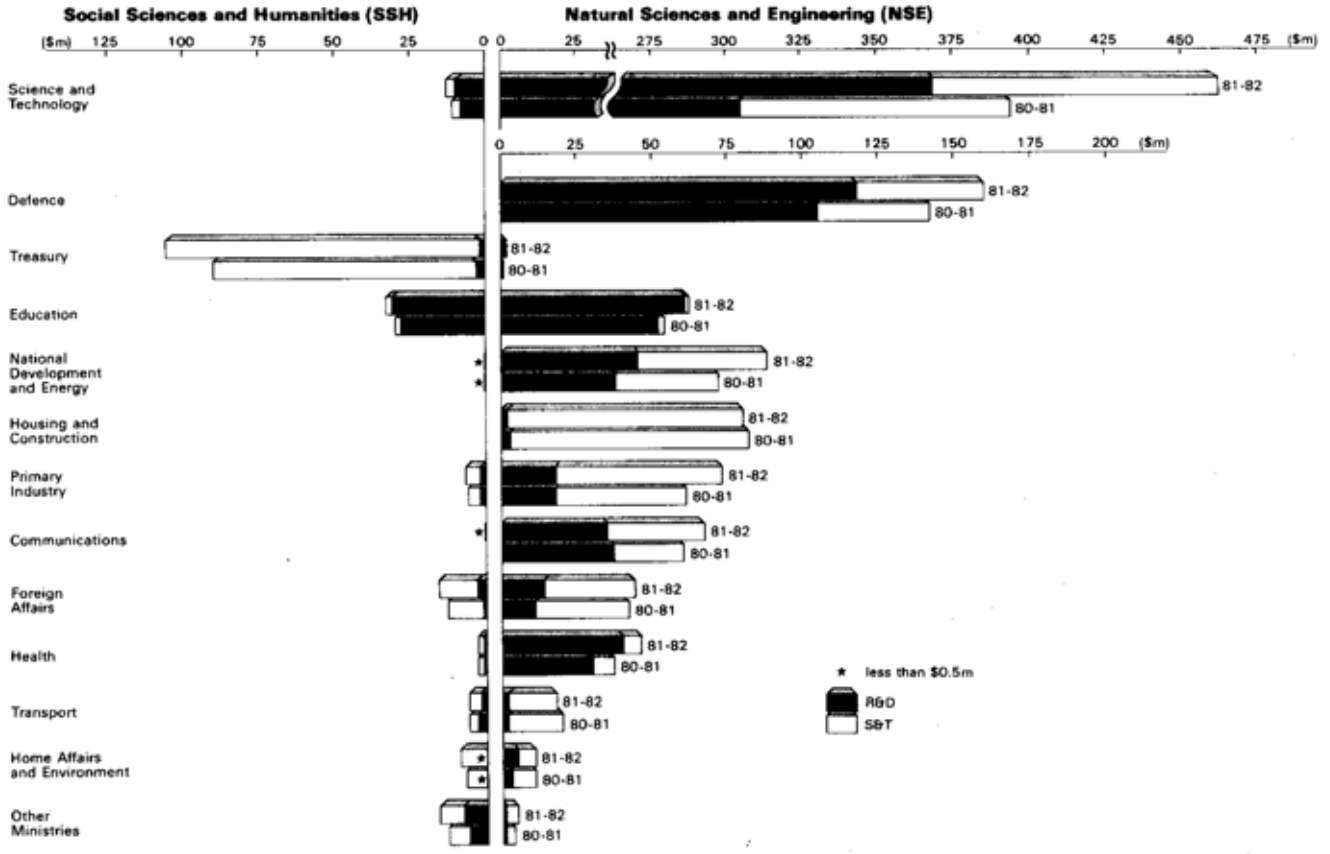

Table 2: Estimated Commonwealth Government funds expended on S&T by ministry with prime responsibility for planning the expenditure*

($ million)	R&D				S&T (including R&D)		
	78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure							
Aboriginal Affairs	1.33	1.19	0.94	0.63	3.09	3.00	2.77
Administrative Services	0.03	0.12	0.19	0.19	0.16	0.25	0.34
Attorney-General's	1.33	1.52	2.20	2.69	2.33	3.15	3.71
Business & Consumer Affairs	0.18	0.16	0.21	0.24	0.16	0.21	0.24
Capital Territory	0.42	0.43	0.31	0.33	4.47	3.80	3.56
Communications	0.05	0.10	0.05	0.05	0.13	0.08	0.25
Defence	85.86	92.33	105.89	118.31	130.25	142.64	160.14
Education	76.3	80.5	87.4	96.2	81.5	88.8	97.9
Employment and Youth Affairs	0.06	0.31	0.60	0.94	0.31	0.98	1.79
Foreign Affairs	0.05**	8.4	12.9	17.7	41.2	56.4	61.5
Health	21.92	24.28	29.21	38.92	31.08	37.11	47.67
Home Affairs and Environment	1.54	2.54	3.94	5.18	17.14	20.53	20.09
Housing and Construction	2.80	3.14	2.69	2.91	34.46	37.43	40.34
Immigration & Ethnic Affairs	0.30	0.45	0.53	0.44	0.90	2.43	3.59
Industry and Commerce	0.61	0.76	1.09	1.51	5.37	6.22	7.26
National Development & Energy	27.19	31.12	37.46	45.88	65.38	73.80	87.17
Primary Industry	14.86	16.12	19.23	19.82	64.13	72.64	80.71
Prime Minister and Cabinet	0.04	0.04	0.06	0.06	0.91	1.16	1.46
Science and Technology	209.17	248.20	307.43	371.46	333.71	396.44	467.46
Social Security	0.23	0.34	0.58	0.56	0.63	1.06	0.94
Transport	4.42	4.62	4.44	3.73	21.47	26.02	23.40
Treasury	1.59	1.86	2.64	2.80	64.13	87.95	111.06
Veterans' Affairs	0.36	0.40	0.40	0.46	0.40	0.40	0.46
Total (Budget sector)	450.5	518.8	620.4	731.0	903.2	1062.5	1223.8
B. Commonwealth Non-Budget sector							
Aboriginal Affairs	0.05	0.03	0.21	-	0.11	0.29	0.08
Attorney General's	0.02	0.02	-	-	0.02	0.02	0.02
Communications	27.4	28.1	37.3	35.1	51.	764.	868.6
Health	0.97	1.25	2.08	1.67	1.25	2.42	1.91
Housing and Construction	0.07	0.04	0.01	0.01	43.13	44.97	40.01
Immigration & Ethnic Affairs	-	-	-	-	-	0.03	-
Science and Technology	3.47	5.72	5.97	7.99	5.77	6.55	8.62
Treasury (Financial Enterprise sector	1.24	1.37	1.62	2.32	1.37	1.77	2.46
Total (Non-Budget sector)	33.2	36.6	47.2	47.1	103.4	120.8	121.7
Total (Direct Commonwealth funding)	483.7	555.4	667.5	778.1	1006.6	1183.3	1345.5

* See part A of Appendix 1 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 36 to 38), but no estimate is at present available for 1978-79, so that totals for that year are understated to that extent.

Fig. 2 Estimated Commonwealth Government Funds Expended on R&D by Socio-Economic Objective

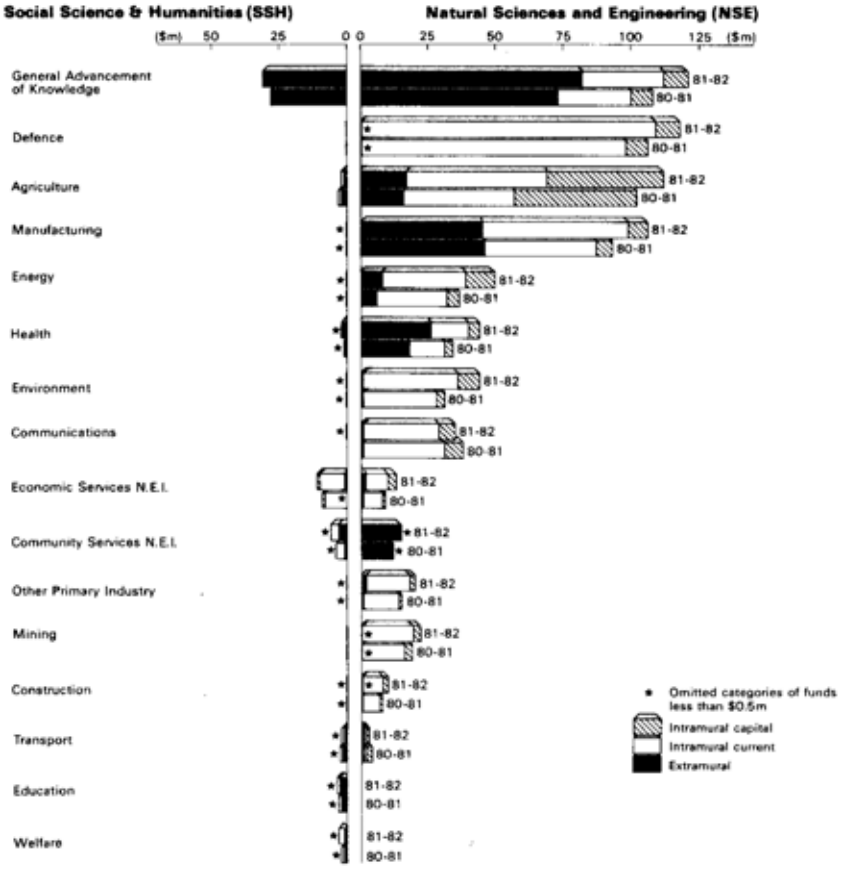

Table 3: Total Commonwealth Government expenditure on R&D by socio-economic objective*

Objective Category	1978-79	1979-80	1980-81	1981-82
		($m)		
National security				
. Defence	85.86	92.35	105.92	118.35
Economic development				
. Agriculture	64.44	87.00	103.77	118.89
. Other primary industries	12.55	14.84	15.15	20.29
. Mining	12.18	12.29	15.89	20.04
. Manufacturing	60.11	69.41	93.11	105.87
. Construction	8.63	8.51	8.11	9.82
. Energy	26.77	31.36	38.83	49.56
. Transport	4.95	5.09	4.93	4.19
. Communications	27.5	28.4	37.4	35.3
. Economic services n.e.i.	12.90	14.98	17.82	23.60
Sub-total	230.5	271.8	335.0	386.9
Community welfare				
. Environment**	26.45	27.12	31.72	44.84
. Health	26.99	30.03	35.54	45.82
. Education#	4.06	4.01	3.90	3.71
. Welfare	0.74	1.29	1.99	2.34
. Community services n.e.i.##	2.33	11.0	16.4	21.7
Sub-total	60.57	73.5	89.5	118.4
Advancement of knowledge				
. General advancement of knowledge	106.7	117.7	137.1	153.8
Total	483.7	555.4	667.5	778.1

* See Part B of Appendix 1 for more detailed dissections of expenditure by socio-economic objective. See Table 20, Appendix 2 for international comparisons of civil R&D expenditure by OECD objective category.

** Includes both "Environment" and "Urban and regional planning" objectives.

\# 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.

Includes overseas development assistance R&D. Note that the figure for 1978-79 is understated. (See second footnote on p. 12.)

Table 4: Percentage of Commonwealth Government Outlays in the Budget sector expended on S&T by Budget function

(%)	R&D				S&T (including R&D)		
	78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Defence	3.3	3.1	3.0	2.9	4.5	4.2	4.0
Education	3.0	3.2	3.0	3.0	3.2	3.0	3.0
Health	0.8	0.8	0.8	1.4	1.0	1.0	1.7
Social Security and Welfare	..	..	..	..	..	..	..
Housing	..	..	..	..	..	..	..
Urban and Regional Development n.e.c. and the Environment	0.8	2.2	3.3	6.1	7.2	10.2	12.5
Culture and Recreation	0.3	0.2	0.1	0.1	1.8	3.8	3.6
Economic Services							
Transport and Communications	0.7	0.6	0.5	0.4	2.7	2.7	2.2
Water Supply and Electricity	-	-	-	-	-	-	-
Industry Assistance and Development	10.6	10.2	10.1	9.0	25.8	19.7	18.2
Labour and Employment	0.1	0.3	0.3	0.3	0.3	0.5	0.6
Other Economic Services	0.7	0.6	0.7	0.7	42.9	52.5	55.3
Total Economic Services	3.4	3.6	3.8	3.4	12.3	10.8	10.3
General Public Services							
. Legislative Services	-	-	-	-	-	-	-
. Law, Order and Public Safety	0.8	0.8	1.1	1.1	1.3	1.6	1.6
. Foreign Affairs and Overseas Aid	n.a.	1.3	1.7	2.0	6.2	7.5	7.0
General and Scientific Research n.e.c.	88.2	87.0	89.8	92.6	100.0	100.0	100.0
Administrative Services	0.4	0.4	0.5	0.4	9.0	13.1	13.7
Total General Public Services	10.8	11.6	12.2	13.3	18.6	20.8	21.7
Not allocated to function	-	-	-	-	-	-	-
Total (Budget sector)	1.6	1.6	1.7	1.8	2.9	3.0	3.0

Table 5: Commonwealth Government Outlays* in the Budget sector, by Budget function

($ million)	1978-79	1979-80	1980-81	1981-82
Defence	2 606	3 008	3 537	4 112
Education	2 529	2 610	2 930	3 255
Health	2 901	3 169	3 650	2 872
Social Security and Welfare	8 095	8 783	9 917	11 357
Housing	382	343	341	399
Urban and Regional Development n.e.c. and the Environment	125	114	110	79
Culture and Recreation	281	321	400	461
Economic Services				
. Transport and Communications	723	807	989	1 100
. Water Supply and Electricity	6	25	54	53
. Industry Assistance and Development	473	594	823	957
. Labour and Employment	332	302	387	459
. Other Economic Services	99	116	127	142
Total Economic Services	1 633	1 844	2 379	2 912
General Public Services				
. Legislative Services	70	79	112	129
. Law, Order and Public Safety	173	200	221	253
. Foreign Affairs and Overseas Aid	608	664	748	877
General and Scientific Research n.e.c.	229	271	314	381
Administrative Services	835	932	1 081	1 207
Total General Public Services	1 915	2 145	2 477	2 847
Not allocated to function	8 544	9 323	10 532	12 710
Total (Budget sector)	29 012	31 660	36 274	40 862

* 1981-82 Budget paper No. 1, Budget Statements 1981-82, Statement No. 6.

Commonwealth Contribution to Gross Domestic Expenditure on R&D

Surveys of R&D performers have shown that Commonwealth Government funding of R&D rose substantially between 1968-69 and 1973-74, and then approximately kept pace with inflation, as measured by some of the broad aggregate price indexes(1) until 1978-79. Gross domestic expenditure on R&D (GERD) fell in real terms after 1973-74 as private enterprise expenditure declined significantly, thereby increasing the Commonwealth percentage of GERD funding from its already high level to over 60% in 1976-77. These features are illustrated in Table 6.

Table 6: Commonwealth Government funding contribution to Australia's gross domestic expenditure on R&D (GERD): 1968-69 to 1978-79

		1968-69	1973-74	1976-77	1978-79
Commonwealth Government funds expended on R&D	($m)	159	346	519	610 *
GERD	($m)	347	613	816	980 *
Commonwealth funding as % GERD	(%)	46	56	64	62 *

	(% rise)		
	(68-69 to 73-74)	(73-74 to 76-77)	(76-77 to 78-79)
Commonwealth Government funds expended on R&D	118 **	50	18 *
GERD	77	33	20 *
GDP implicit price deflator	48	51	17
Government final consumption expenditure implicit price deflator	70	59	15

* These estimates are DST projections. Firm data will be issued by ABS early in 1982. Note that Table 6 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 31.

** Much of this large rise is due to changed funding arrangements for universities.

Sources: Figures are DST estimates based on:

- Project SCORE 1968-69, 1973-74, 1976-77
- Science Statement 1979-80
- Research and Experimental Development - Business Enterprises - 1978-79, ABS Catalogue No. 8104.0
- Research and Experimental Development - General Government - 1978-79 (preliminary), ABS Catalogue No. 8108.0
- Quarterly Estimates of National Income and Expenditure - September Quarter, 1980, ABS Catalogue No. 5206.0.

MINISTRY ACTIVITIES

The following 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. In general, the total S&T figures are not comparable between agencies or between ministries. (See Appendix 6 for further detail).

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, 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.

Unless stated otherwise, sources for the information presented in the tables are the agencies listed.

ABORIGINAL AFFAIRS

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Aboriginal Affairs	S(b)	-	-	0.019	0.014	0.042	0.057	0.066
	S(c)	0.182	0.152	0.073	0.100	0.152	0.073	0.100
Applied Ecology Pty Ltd	N(a)	0.108	0.148	0.142	-	0.148	0.142	-
	N(b)	0.540	0.417	0.220	-	0.417	0.220	-
Australian Institute of Aboriginal Studies (AIAS)	S(a)	-	-	-	-	0.029	0.150	0.135
	S(b)	-	-	-	-	1.372	1.390	1.463
	[n]S(c)	0.497	0.471	0.489	0.511	0.928	0.970	1.002
Total (Budget sector)		1.327	1.188	0.943	0.625	3.088	3.003	2.766

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
B. Commonwealth Non-Budget sector								
Applied Ecology Pty Ltd	N(a)	-	-	0.083	-	-	0.083	-
	N(b)	0.050	0.034	0.127	-	0.034	0.127	-
AIAS	S(a)	-	-	-	-	-	0.008	0.007
	S(b)	-	-	-	-	0.077	0.074	0.076
Total (Non-Budget sector)		0.050	0.034	0.210	-	0.111	0.292	0.083
Total (Direct Commonwealth funding)		1.377	1.222	1.153	0.625	3.199	3.295	2.849
C. Expenditure from other sources								
AIAS	S(a)	-	-	-	-	-	0.007	0.006
	S(b)	-	-	-		0.105	0.061	0.061
Total (Other)						0.105	0.067	0.067
Total (A+B+C)		1.377	1.222	1.153	0.625	3.303	3.362	2.916

N Natural sciences and engineering S Social sciences and humanities

nS Includes some natural sciences and engineering

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

(c) Extramural expenditure

Department of Aboriginal Affairs

Research work supported by the Department of Aboriginal Affairs is undertaken by outside agencies, including some Aboriginal organisations and aims to assist Aboriginal communities and other agencies, including Government departments, to tackle recognised problems hampering Aboriginal development. The Department also attempts to ensure Aboriginal interests are taken sufficiently into account in the research performed by other bodies.

On a biennial basis the Department collects data which are used to provide a general measure of the well being of Aboriginal communities.

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. The Institute disseminates information about Aboriginal culture, both by publishing its own findings and making available material from other sources.

Applied Ecology Pty Ltd

Applied Ecology is a Commonwealth Government sponsored research organisation funded through the Minister for Aboriginal Affairs, which operated in the field of research associated with natural resources capable of development on behalf of Aboriginal and Islander communities throughout Australia. The major R&D areas were saltwater crocodiles, emus, and tropical black-lip oysters as viable resource bases for Australian Aborigines and Islanders.

ADMINISTRATIVE SERVICES

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Administrative Services	$\overset{S}{=}$N(c)	-	-	-	-	0.040	0.022	0.060*
	S(c)	-	-	-	-	.	0.016	0.037*
Australian Federal Police scientific research	N(b)	-	-	-	-	-	0.013	0.044
	N(c)	0.026	0.124	0.194	0.194	0.124	0.194	0.194
Total (Direct Commonwealth funding)		0.026	0.124	0.194	0.194	0.164	0.245	0.335

N Natural sciences and engineering S Social sciences and humanities

$\overset{S}{=}$N Figures for 1978-79 and 1979-80 include a significant proportion of social sciences and humanities

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

* This figure includes grants to conferences of a scientific nature approved for 1981-82 as at 20 October 1981.

Department of Administrative Services

Through appropriations of the Department of Administrative Services the Commonwealth makes contributions to several major international conferences held in Australia some of which are primarily of a scientific nature. The Department is also responsible for such scientific and technological activities as maintenance of a standard for length measures in the A.C.T.

Australian Federal Police

The Australian Federal Police sponsors a program of forensic science research to ensure that recent technology is available to it in the performance of its functions. A current example is the work being undertaken within the Department of Chemistry at the Australian National University, Canberra, in the development of new techniques for making fingerprints visible on such surfaces as Australian banknotes, cheques and other documents.

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Australian Institute of Criminology	S(a)	0.006	0.002	0.016	0.003	0.020	0.028	0.009
	S(b)	0.348	0.400	0.390	0.415	1.083	1.161	1.237
Criminology Research Council*	S(c)	0.030	0.030	0.050	0.050	0.030	0.050	0.050
Commonwealth Legal Aid Council**	S(a)	-	-	0.004	-	-	0.004	-
	S(b)	0.110	0.148	0.165	0.187	0.148	0.165	0.187
	S(c)	0.013	0.021	0.045	0.050	0.021	0.045	0.050
Institute of Family Studies	S(a)	-	-	-	0.117	-	-	0.146
	S(b)	-	0.018	0.243	0.387	0.022	0.296	0.471
	S(c)	-	-	0.230	0.280	-	0.230	0.280
Law Reform Commission	S(b)	0.822	0.900	1.055	1.204	0.900	1.055	1.204
Legislative Drafting Institute	S(B)	-	-	-	-	0.102	0.117	0.075
Total (Budget sector)		1.329	1.519	2.200	2.692	2.326	3.153	3.708
B. Commonwealth Non-Budget sector								
Australian Institute of Criminology	S(b)	-	-	-	-	-	0.018	0.023
Criminology Research Council* . Attributable to past Commonwealth contributions	S(c)	0.020	0.020	-	-	0.020	-	-
Total (Direct Commonwealth funding)		1.349	1.539	2.200	2.692	2.346	3.171	3.731
B. Expenditure from other sources								
Criminology Research Council* . Attributable to State contributions	S(c)	0.050	0.050	0.033	0.050	0.050	0.033	0.050
Total (A+B+C)		1.399	1.589	2.233	2.742	2.396	3.205	3.781

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 6.

** Figures for 1978-79, 1979-80 and 1980-81 are for the Commonwealth Legal Aid Commission.

Australian Institute of Criminology

The Institute commenced operation in 1973 pursuant to arrangements made between the Commonwealth and State Governments for the promotion of criminology research on a national level. These arrangements provided for the establishment of the Institute, funded by the Commonwealth, to engage in research, training and related activities.

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 2 000 million dollars per annum and continues to increase. The Institute sees a growing need at governmental 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, the most recent example of the latter being a second regional conference of correctional administrators held in Bangkok in July 1981 as a followup to the original conference held for such purposes in Hong Kong in 1980.

Criminology Research Council

The Criminology Research Council was established in 1972 to control and administer a Criminology Research Fund and determine the manner in which the expenditure of moneys from the Fund is allocated. The State Governments match the Commonwealth Government's annual contributions to the Fund on a dollar for dollar basis, 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.

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

Legal Aid

The Commonwealth Legal Aid Council was appointed on 17 September 1981. The Council takes over many of the functions of the Commonwealth Legal Aid Commission which was abolished on 30 June 1981. The functions of the Council are to advise and make recommendations to the Attorney General and to undertake research into aspects of legal aid. Research is conducted by Attorney-General's Department staff and externally contracted consultants.

Institute of Family Studies

The Institute of Family Studies was established to conduct and coordinate research into factors affecting marital stability and family life. It also collects, analyses and disseminates information on the impact of government policies and social change on families. In addition, the Institute advises the Attorney-General on the making of grants for purposes related to its functions and supervises the employment of such grants.

The Institute will provide objective data required by governments, the Family Court and those working generally in the family area so that policy making, decision taking and provision of advisory services meet the requirements of family structures and family functioning.

The Law Reform Commission

In its concern to modernise the law, eliminate defects in the law, simplify the law, and adopt more effective methods for administering the law and dispensing justice, the Government established the Law Reform Commission in 1975.

The Commission works pursuant to references received from the Commonwealth Attorney General and is required to make reports to the Attorney General arising out of any review or consideration and in such reports to make such recommendations as the Commission thinks fit. The Commission conducts research into the current operation of Federal and Territory laws, consults widely and then proposes reforms, including draft legislation. A number of proposals have been adopted both at a Federal and State level.

Legislative Drafting Institute

The Institute conducts courses of training and instruction for legislative draftsmen, especially from developing countries. It is also empowered to conduct research into methods and techniques of legislative drafting.

The Institute will be abolished in December 1981 as a result of the Review of Commonwealth Functions.

BUSINESS AND CONSUMER AFFAIRS

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget Sector								
Industries Assistance Commission								
. IMPACT Project	S(a)	-	-	0.001	-	-	0.001	-
	S(b)	0.180	0.156	0.209	0.235	0.156	0.209	0.235
Total (Direct Commonwealth funding)		0.180	0.156	0.210	0.235	0.156	0.210	0.235

N Natural sciences and engineering S Social sciences and humanities

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

Industries Assistance Commission

The IMPACT Project was initiated in 1975 by the Industries Assistance Commission and several other Commonwealth Government agencies in recognition of an increasingly felt need for improved policy analysis of inter-related economic and social issues, particularly in the areas of trade, industry development and manpower. The Project involves the development of an analytical framework, consisting of compatible economic-demographic models and associated data bases and computing systems, which enable the implications of both policy-induced and naturally occuring changes to be studied systematically in an economy-wide perspective.

CAPITAL TERRITORY

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Capital Territory								
	N(a)	0.003	0.004	0.005	0.004	0.595	0.336	0.076
	N(b)	0.293	0.312	0.219	0.235	2.789	2.248	2.452
	N(c)	-	-	-	-	0.120	0.125	0.136
	S(b)	0.096	0.103	0.072	0.091	0.225	0.167	0.206

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
National Capital	N(b)	0.002	0.001	-	-	0.077	0.060	0.070
Development Commission	N(c)	0.027	0.013	0.016	-	0.312	0.286	0.182
	S(b)	-	-	-	-	0.300	0.350	0.350
	S(c)	-	-	-	-	0.050	0.227	0.086
Total (Direct Commonwealth funding)		0.421	0.434	0.312	0.331	4.468	3.800	3.558
B. Expenditure from other sources								
Department of Capital Territory	N(b)	-	0.012	0.002	0.002	0.012	0.002	0.002
Total (A+B)		0.421	0.446	0.315	0.333	4.480	3.802	3.561

N Natural sciences and engineering S Social sciences and humanities

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

Department of Capital Territory

The Department of the Capital Territory is responsible for the management and administration of the Australian Capital Territory and the Jervis Bay Territory.

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 National Botanic Gardens are maintained for the purposes of education, recreation and conservation and as a centre for research and development into the botany and horticulture of the Australian flora.

National Capital Development Commission

The National Capital Development Commission is responsible for the planning, design and construction of the city of Canberra as the National Capital of Australia.

Most of the Commission's scientific studies are directed towards collecting basic data or seeking to find solutions to specific problems. Particular concerns include air quality, water quality, ecology and geology.

COMMUNICATIONS

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Communications	N(a)	0.005	0.015	0.011	-	0.015	0.011	0.200
	N(b)	0.032	0.072	0.027	-	0.106	0.059	-
	N(c)	0.013	0.013	0.013	-	0.013	0.013_	-
	S(b)	-	-	-	0.010	-	-	_0.010
	S(c)	-	-	-	0.040	-	-	0.040
Total (Budget sector)		0.050	0.100	0.051	0.050	0.134	0.083	0.250
B. Commonwealth Non-Budget sector								
Australia Post	N(a)	0.040	0.070	0.130	0.080	0.160	0.230	0.190
	N(b)	0.544	0.565	0.605	0.630	1.099	1.220	1.240
	N(c)	0.040	0.060	0.060	0.080	0.087	0.205	0.240
Overseas Telecommunications Commission, Australia (OTC)	N(a)	-	-	-	-	0.009	0.046	-
	N(b)	-	-	-	-	0.025	0.015	0.034
	N(c)	0.180	0.181	0.195	0.378	0.181	0.195	0.378
Telecom Australia	N(a)	1.9	2.1	7.9	5.8	3.9	10.1	9.1
	N(b)	24.4	24.9	27.7	26.9	46.0	52.1	56.1
	N(c)	0.254	0.269	0.671	1.275	0.269	0.671	1.275
Total (non-Budget Sector)		27.4	28.1	37.3	35.1	51.7	64.8	68.6
Total (Direct Commonwealth funding)		27.4	28.2	37.3	35.2	51.9	64.9	68.8
C. Expenditure from other sources								
Telecom Australia	N(a)	-	-	0.022	0.054	-	0.022	0.054
	N(b)	-	-	0.078	0.246	-	0.078	0.246
Total (Other)		-	-	0.100	0.300	-	0.100	0.300
Total (A+B+C)		27.4	28.2	37.4	35.5	51.9	65.0	69.1

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

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. A major aspect of its R&D activities has been the development of a domestic communications satellite system.

Telecom Australia

Since telecommunications science and technology are continually advancing, there is a need for Telecom Australia to be able to assess new developments against those in use. This can only be achieved on the basis of sound knowledge of developing and developed technology as it is applied to telecommunications systems, equipment, materials and components, and to technical operating and maintenance practices.

The R&D activities of Telecom Australia cover the whole spectrum of telecommunications engineering and science. Projects range from long-term research related to possible but distant innovations in customer services or network systems, to investigatory evaluations and development projects with more definite and shorter term application. Other projects seek to use new or existing science and technology to solve technical problems relating to the systems, equipment, components or materials used in the existing network, or through the development of new engineering practices and procedures, to improve the productivity or efficiency of network operations and maintenance.

Australia Post

The broad objectives pursued by the Australian Postal Commission are to operate Australia's postal services in such a manner as will best meet the social, industrial and commercial needs of the Australian people.

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.

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 radio, submarine cable and satellite technologies, are funded from trading revenues.

The substantial increase in R&D between 1980-81 and 1981-82 arises from deferral of certain work by the recipient private business enterprises from 1980-81 to 1981-82 and also from OTC's anticipated entry into new R&D schemes.

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Defence	N(a)	6.803	9.252	7.796	9.134	23.184	14.542	12.118
	N(b)	78.662	82.705	97.697	108.767	101.013	121.241	134.969
	N(c)	0.397	0.370	0.399	0.411	6.053	6.856	13.057
Total (Direct Commonwealth funding)		85.862	92.327	105.892	118.312	130.250	142.639	160.144
B. Expenditure from other sources								
Department of Defence	N($^{a}_{b}$)	0.859	1.410	1.832	2.009	1.500	1.925	2.097
Total (A+B)		86.721	93.737	107.724	120.321	131.750	144.564	162.241

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

Note

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

- all capital and most current expenditure on the Defence Science and Technology Organisation (DSTO), including salaries of some service personnel; 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:

- other salaries for service personnel and costs borne by the services in support of DSTO establishments;
- production development expenditure classified as "engineering for innovative production" for project funds administered by the DSTO and the Defence Industry Development (ID) Branch;

- a portion of DSTO expenditure not considered as R&D; and

- broad estimates for identifiable elements of the services conducting work classifiable as S&T.

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:

  (1) to the Australian Defence Force in its task of maintaining effective forces in being and for the development of the Force;

  (2) for the acquisition of defence materiel; and

  (3) 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.

DSTO may also undertake departmentally agreed work for others where it has special expertise or equipment not available elsewhere in Australia.

DSTO has a staff of 4 800 including about 1 100 professional scientists and engineers, deployed in 12 Establishments located in the ACT, the Eastern States and South Australia.

Current projects of significance include the JINDALEE over the horizon radar, the WRELADS laser depth sounding system for marine charting and a one year UK/Australia cooperative research program on the Ikara antisubmarine missile.

DSTO participates in international cooperative programs in science and technology, notably the Technical Cooperation Program (UK, USA, Canada, Australia). In the latter, it plays a leading role in a number of areas of interest.

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, as well as tertiary institutions both in Australia and overseas.

DSTO is cooperating in staff exchanges with industry and academic institutions, in addition to arrangements for study leave at DSTO laboratories and staff secondments.

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.

DSTO's modest program of research contracts with tertiary educational institutions has been growing in recent years. Recent research agreements have been arranged in areas of signal processing, strength degradation of brittle ceramics, magnetic materials and aircraft gust loading statistics. DSTO is represented on the Radio Research Board, and will be participating with modest funding in the operation of the Computer Research Board.

Industry Development Branch

Expenditure by the Industry Development Branch, Department of Defence, in industry assists the establishment in Australia of new products or processes, generally embodying advanced technology.

EDUCATION

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Education								
. Australian Council for Educational Research	S(c)	0.275	0.295	0.319	0.370	0.295	0.319	0.370
. Education Planning Group	S(b)	0.052	0.068	0.067	0.079	0.087	0.089	0.103
. Education Research and Development Committee	S(b)	-	-	-	-	0.024	0.076	0.026
	S(c)	1.002	0.963	0.992	0.808	0.963	0.992	0.808
. Education Review and Evaluation Studies	S(c)	0.110	0.139	0.140	0.124	0.139	0.140	0.124
. Postgraduate Awards	SN(c)	8.002	7.583	7.756	8.685	8.480	8.812	9.778
. TAFE National R&D Centre	S(c)	-	-	-	-	-	0.020	0.225
. Transition Program	S(c)	-	-	0.250	0.250	-	0.250	0.250
Tertiary Education Commission								
. Research and Investigation	S(b)	0.179	0.094	0.078	0.035	0.094	0.078	0.035*
Schools Commission	S(c)	0.100	0.114	0.369	0.522	0.114	0.671	0.866
A.C.T. Schools Authority	S(a)	0.001	-	-	-	-	-	-
	S(b)	0.086	0.101	0.118	0.152	0.101	0.118	0.152
Curriculum Development Centre	S(b)	1.428	1.614	1.100	0.870	1.614	1.100	0.870
	S(c)	0.748	0.568	0.361	0.300	0.568	0.361	0.300
Grants to universities**	SN(c)	64.3	69.0	75.8*	84.0*	69.0	75.8*	84.0*
Total (Direct Commonwealth funding)		76.3	80.5	87.3	96.2	81.5	88.8	97.9

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
B. Expenditure from other sources								
Curriculum Development Centre	S(b)	0.121	-	0.060	-	-	0.060	-
Total (A+B)		76.4	80.5	87.4	96.2	81.5	88.9	97.9

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

* Estimated

** See discussion below. The amounts which universities spend on research from their general recurrent grants and equipment grants are a matter for each institution to determine. There is, therefore, no reliable basis for projecting expenditure in advance. The amounts included for 1980-81 and 1981-82 are based on the assumption that the proportion of general recurrent grants and equipment grants expended on research in 1980 is maintained for 1981 and 1982, and take into account the level of the special research grant approved for these years.

Notes on R&D expenditure in tertiary institutions

Total expenditure on R&D in tertiary institutions, principally universities, falls into three categories. These are:

1. Expenditure specifically earmarked for research in universities in the States Grants legislation (known as the Special Research Grant), together with other funds earmarked for research by the universities themselves from grants provided under this legislation, or, in the case of the Australian National University, from its direct appropriation. Only expenditure in Category 1 has been included in the R&D part of the line 'Grants to universities' in the above table.

2. Expenditure specifically allocated to research activities which is funded from sources other than those in Category 1 (e.g. ARGC grants to universities). It is assumed that the Commonwealth components of such funding have been included as extramural expenditure by the departments and authorities concerned.

3. Expenditure on research activities which is part of the general teaching and research expenditure of the university or college but which is not specifically identified. This activity is funded from general recurrent grants provided under the legislation referred to above. While the value of this research cannot be separately identified, an imputed value of $105m was estimated for 1976 in the 1976-77 Project SCORE survey. This figure represents 18 per cent of total grants other than identifiable research grants in that year. If this proportion is applied to these grants in subsequent years, the imputed value of R&D in this category performed by universities would be approximately $120m in 1977, $130m in 1978, $l40m in 1979, $150m in 1980 and $160m in 1981.

For colleges of advanced education the R&D reported to Project SCORE for 1976 was $4m which represented 1 per cent 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 large amounts based on subjective assessments, and are thus subject to some degree of uncertainty.

The Government has decided to provide $16 million over the 1982-84 triennium to establish Research Centres of Excellence, but as there is as yet no basis for estimating the amount to be expended in financial year 1981-82, no entry for this program has been included in the table.

Because accounting in universities and colleges is on a calendar year basis, the R&D figures for 1978-79, 1979-80 and 1980-81 included in 'Grants to universities' in the above table are approximations based on the following actual expenditures:

	($ million)		
	1978	1979	1980
Identifiable research expenditure by universities from Category 1			
. from general funds	50.1	52.2	57.9
. from special research grants	4.5	5.6	6.2
. from equipment grants	8.4	7.7	8.3
Total	63.0	65.5	72.4

Research expenditure from general funds and equipment grants is not yet available for 1981 and 1982. However, for these years the special research grants available have been approved at $7.2m for 1981 and $8.0m for 1982 in estimated average prices for each year.

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.

Grants-in-aid to ACER assist 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.

. Education Planning Group

The Education Planning Group (EPG) is concerned broadly with education at the national level, and with coordination of the Commonwealth Governments' activites in education.

Included amongst the EPG 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.

Education Research and Development Committee (ERDC)

The Committee advises the Minister on educational research priorities and has made education research grants and annual awards as well as arranging dissemination of reports.

The ERDC is to be abolished and its programs are being terminated following the Review of Commonwealth Functions.

Education Review and Evaluation Studies

The studies aim to provide a process within ongoing departmental management to determine the extent to which the departmental programs have achieved their planned goals and to provide feedback information to facilitate program improvements and modifications.

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.

TAFE National Research and Development Centre

The TAFE National Centre for Research and Development Ltd was recently established by the Commonwealth and the State Governments as a Company. Its functions are to carry out or stimulate research aimed at analysing skills required for various occupations and to review and evaluate technical and further education curricula and programs, particularly those with national significance.

Transition Education

The projects are policy orientated and developmental in nature, with a view of extending the concept of and policies for transition education. It is expected that the results of these studies will provide information on the effective use, by both the Commonwealth and State Governments, of the resources available for transition education.

Tertiary Education Commission

The prime function of the Commission under its Act is to inquire into and 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.

The Act also provides that the Commission should:

(a) inquire into and advise the Minister on any other matter relating to tertiary institutions that is referred to it by the Minister or which the Commission considers requires inquiry by it;

(b) perform, on behalf of the Commonwealth, administrative functions in relation to programs of financial assistance for tertiary education;

(c) make recommendations to the Minister as to the institutions and proposed institutions that should be regarded as universities or colleges of advanced education for the purposes of the Act;

(d) where required by the Minister, inquire into and provide advice to him in relation to institutions established or proposed to be established by the Commonwealth for the provision of tertiary education.

The Act specifies that the Commission is to perform its functions with the object of promoting:

(a) the balanced and coordinated development of the provision of tertiary education in Australia; and

(b) the diversifying of opportunities for tertiary education.

Schools Commission

The Commission advises the Minister for Education on the needs of schools in Australia. In addition 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, students in a particular age group, and girls.

A.C.T. 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 assessment of students, evaluation of schools, transition programs (school-to-work), and multicultural education.

Curriculum Development Centre

The Curriculum Development Centre is a national body that has worked on school curricula in cooperation with educational authorities and agencies throughout Australia and overseas. Its activities have included research into curricula and publishing and marketing of curriculum and teaching materials. The States have been asked to meet part of the costs of operating the Centre.

EMPLOYMENT AND YOUTH AFFAIRS

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Employment and Youth Affairs								
. Bureau of Labour Market	S(a)		-	-	0.055	-	-	0.055
Research	S(b)	-	-	0.089	0.188	-	0.445	0.940
	S(c)	-	-	0.006	0.090	-	0.031	0.180

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
. Development of Australian Standard Classification of Occupations	S(b)	0.057	0.307	0.501	0.592	0.307	0.501	0.592
. Office of Youth Affairs	S(c)	-	-	-	0.018	-	-	0.018
Total (Direct Commonwealth funding)		0.057	0.307	0.597	0.943	0.307	0.977	1.785

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 Youth Affairs

. Bureau of Labour Market Research

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

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 Youth Affairs on the Bureau's research program and priorities.

The BLMR is independent and publishes the results of research. Its activity in 1981-82 focuses on research and analysis of the functioning of labour markets (determinants of labour force participation; adjustment mechanisms); particular sectors of the labour market (skilled manpower, youth employment, older workers) and the impact of Government programs and policies on the functioning of the labour market.

. Australian Standard Classification of Occupations (ASCO)

The Department of Employment and Youth Affairs and the Australian Bureau of Statistics are jointly developing a new comprehensive ASCO which will be used by the ABS, State Government departments and authorities, the Commonwealth Employment Service, universities, schools, and private industry for various purposes. In addition to occupational titles and descriptions, ASCO will provide a dictionary of information about occupations in the Australian labour market.

. The Office of Youth Affairs

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.

FOREIGN AFFAIRS

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Foreign Affairs								
. Bilateral Agreements	N(c)	-	-	-	-	0.104	0.141	0.157
	S(c)	-	-	-	-	-	0.065	0.025
. Multilateral Grants	N(c)	0.013	0.012	0.012	0.010	0.464	0.654	0.611
	S(c)	0.040	0.037	0.037	0.031	0.037	0.037	0.031
. Economic Studies	S(c)	-	-	0.332	0.332	-	0.332	0.332
Australian Development Assistance Bureau (ADAB)	N(b)	-	-	-	-	1.1	1.3	1.3
	N(c)	n.a.	8.3	11.2	14.3	30.7	40.5	42.9
	S(b)	-	-	-	-	0.3	0.4	0.4
	S(c)	n.a.	..	1.4	3.0	8.5	12.9	15.7
Total (Direct Commonwealth funding)		0.053*	8.4	12.9	17.7	41.2	56.4	61.5

N Natural sciences and engineering
S Social sciences and humanities
(a) Intramural capital expenditure
(b) Intramural current expenditure
(c) Extramural expenditure
* Because ADAB figures for 1978-79 are not available, this figure underestimates the total for that year.

Department of Foreign Affairs

. Bilateral Agreements

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, United Nations Environment Fund 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 $8m (1980-81) was contributed to the core budgets of these organisations and the United Nations Education, Scientific and Cultural Organisation but 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 Economics 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

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.

The Australian Science, Technology and Research Cooperation (AUSTREC) Program has been developed within bilateral, multilateral and regional aid activities which involve a variety of forms of assistance:

- Institutional Support

  Support is provided for core budget and special projects for international and regional research and training institutions. These include the International Agricultural Research Institutes of the Consultative Group on International Agricultural Research (CGIAR) (for example the International Rice Research Institute), the Regional Cooperative Agreement of the International Atomic Energy Agency, the International Foundation for Science and a special contribution to energy following the UN Conference on New and Renewable Sources of Energy and CHOGRM related energy initiatives.

- Bilateral Projects

  Assistance to bilateral projects totalled $116 million in 1980-81 and is estimated at $145 million in 1981-82. These projects are undertaken in response to requests from developing country governments and many of them have a substantial scientific component. It is Australia's aim to use these projects to build up the development capacity of developing countries so that there is a strong emphasis on technology transfer by the provision of experts, equipment and training.

- Research for Development

  This program has been established specifically to stimulate scientific research for developing countries. It has been used to support a number of scientific seminars and research networks and to provide a range of scientific services including the provision of seeds of Australian trees, pasture seeds, a regional metrology project and a regional animal diseases survey.

- Agricultural Research Centre

  The Government has recently announced its decision to establish an agricultural research centre in Australia concerned with the needs of developing countries. The centre, to be named the Australian Centre for International Agricultural Research (ACIAR), will contract research work to existing Australian institutions, and will seek to involve research and extension workers from developing countries. ACIAR is to be funded through a trust fund with an initial Government commitment of $25 m over four years.

- Development training

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

  Training can be offered to meet special needs. Within Australia funds are provided to Australian educational institutions to run Australian Development Assistance Courses (ADACS).

  These courses may be intensive practical or formal postgraduate programs, addition governments may nominate candidates to attend regular courses at Australian tertiary institutions.

  While the main 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 1981 it is expected that 3 300 individuals will be sponsored under this program, a ten per cent increase on 1980.

HEALTH

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Health								
. Australian Radiation LaboratoryN(		1.260	0.550	0.190	0.370	0.800	0.285	0.460
	N(b)	1.040	1.325	1.590	1.760	1.765	2.380	2.640
. Building grants to W. & E. Hall Institute	N(c)	-	0.100	0.294	2.172	0.100	0.294	2.172
. Commonwealth Institute of Health	N(a)	0.215	0.170	0.476	0.255	0.170	0.476	0.255
	N(b)	0.252	1.491	1.715	1.962	2.236	2.572	2.943
. National Acoustics LaboratoriesN(		0.062	0.196	0.126	0.874	0.481	0.320	1.920
	N(b)	0.732	0.608	0.619	0.651	1.758	1.448	1.580
. National Biological Standards Laboratory	N(a)	0.050	0.059	0.171	0.056	0.126	0.786	0.214
	N(b)	1.633	1.807	2.116	2.235	3.789	4.273	4.556
	N(c)	-	-	-	-	0.008	0.003	0.004

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
. National Health and Medical Research Council	sN(c)	13.175	14.000	18.698	23.800	14.000	18.698	23.800
. Health Services R&D Grants Program	N(c)	-	-	-	-	1.810	1.880	1.880
. Ultrasonics Institute	N(a)	0.125	0.227	0.194	0.305	0.227	0.194	0.305
	N(b)	0.455	0.492	0.530	0.275	0.492	0.530	0.275
	N(c)	0.034	0.022	0.007	-	0.022	0.007	-
. Other*	N(a)	0.068	0.061	0.589	1.937	0.061	0.589	1.937
	N(b)	0.565	0.411	0.363	0.308	0.474	0.453	0.388
	sN(c)	0.370	0.516	0.306	0.226	0.516	0.331	0.226
Commonwealth Serum Laboratories	N(a)	0.097	0.046	0.040	0.116	0.046	0.082	0.118
	N(b)	1.784	2.203	1.103	1.431	2.203	1.429	1.814
	N(c)	-	-	0.083	0.184	-	0.083	0.184
Total (Budget sector)		21.917	24.284	29.211	38.917	31.083	37.114	47.671
B. Commonwealth Non-Budget sector								
Commonwealth Serum Laboratories	N(a)	0.050	0.026	0.074	0.125	0.026	0.106	0.127
	N(b)	0.919	1.222	2.004	1.541	1.222	2.254	1.778
Total (Direct Commonwealth funding)		22.886	25.532	31.288	40.583	32.331	39.473	49.575
C. Expenditure from other sources								
Department of Health								
. Commonwealth Institute of Health	N(b)	0.021	-	-		-	-	
. National Biological Standards Laboratory	N(a/b)	-	-	-	-	-	0.058	-
. Other*	N(a/b)	0.048	0.038	0.059	0.033	0.038	0.059	0.033
Total (Other sources)		0.069	0.038	0.059	0.033	0.038	0.107	0.033
Total (A+B+C)		22.955	25.570	31.347	40.615	32.369	39.590	49.607

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

* "Other" covers R&D expenditure by the Dental Health Branch, Institute of Child Health, Health Facilities Branch, Public Health Division, Therapeutics Division and the Plant Quarantine Branch.

Department of Health

. 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 addition, block grants are paid to the States on a dollar for dollar basis to assist their health planning and research activities.

. National Biological Standards Laboratory (NBSL)

Many of the therapeutic goods used in Australia for the prevention and treatment of disease in man and animals are very potent pharmacologically and many, such as vaccines, are very complex and potentially hazardous. The consequences of errors in content of active principles, and of contaminations of products with micro-organisms capable of producing disease in individuals or epidemics in populations, pose a serious threat to the community.

The NBSL's scientific and technical activities are directed towards preventing potentially dangerous products reaching the consumer and, where potential hazards are realised, towards preventing their recurrence.

. Ultrasonics Institute

The Ultrasonics Institute undertakes research and development in the use of ultrasonic radiation in the diagnosis and treatment of disease.

. 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.

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

. Australian Radiation Laboratory (ARL)

ARL undertakes research and development, mostly in radiation physics and chemistry, on topics 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 the levels of radioactivity in the Australian environment.

. 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 Institute's academic and research functions are under the direction of the University of Sydney, whilst its various training, consultative and professional service roles are funded by the Commonwealth Department of Health.

The Institute has an important role as a resources and data collection centre for the nation. The Institute is endeavouring to promote health and a better understanding of health care and its delivery throughout Australia and neighbouring countries.

. 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 to provide 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.

. Community Health Program

The Commonwealth is no longer involved in the administration of the Community Health Program projects.

. National Drug Education Program

This Program, conducted jointly by the Commonwealth and the States, aims at assisting people to develop attitudes and behaviour towards the use of drugs which will be most beneficial to themselves and others.

In particular, two current projects undertaken as part of the program are:

- Project to Reduce Drug Use During Pregnancy

  Titled 'The Pregnant Pause' Campaign, this is a pilot project being undertaken in N.S.W. to investigate and reduce excessive or inappropriate drug use during pregnancy. It is an innovative program within the National Drug Education Program which focuses on the social situation of pregnancy, including in its target group not only the pregnant woman, but also her family, friends, and the professionals who provide her health services. Investigation involves surveys to gauge attitudes to and levels of drug use in pregnancy. Using the knowledge gained from this investigation, community education programs are designed and applied to reduce drug misuse.

- Project to Establish a Data Archive Unit

  The Australian National university Survey Research Centre is undertaking this project to assist in the compilation of a data bank of statistical indicators, as recommended by the Australian Royal Commission of Inquiry into Drugs.

. Plant Quarantine Research Program

This Program investigates problems peculiar to Plant Quarantine not covered by other research programs.

. Family Planning Program

This Program aims to provide family planning information, education and training programs at professional and community levels and to undertake research into family planning and related activities.

. Insect Vector Control

This program provides grants to institutions for research into arbovirus infections and Australian encephalitis.

. Institute of Child Health

The Institute of Child Health is involved in Undergraduate teaching and does research into child health with the view to lessening illness in children and hastening recovery through:

- basic biochemical research;
- prevention of rheumatic fever recurrences and management of rheumatoid arthritis; and
- child psychiatric problems.

The Institute will cease to operate as a Commonwealth body in December 1981.

. Health Facilities Branch

The Health Facilities Branch is developing a Facility Planning System (FPS) to provide a framework for the organisation and control of the planning process to reduce both construction and operating costs. This is a joint development by the Departments of Health and Housing and Construction in association with State health and construction authorities as appropriate.

In conjunction with the FPS the Branch has developed a Health Facilities Information File (HIF) which is a national computer-based reference and referral system designed to provide highly specific recall on any aspect of health facility planning.

. Dental Health Branch

The Dental Health Branch undertakes science and technology activities in connection with the School Dental Scheme and its role in providing a secretariat to Dental Councils and their Committees.

The Commonwealth Serum Laboratories (CSL)

The Commonwealth Serum Laboratories were established in 1916. They undertake research, development, manufacture and sale 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.

The Government has allocated $1.85m for CSL to conduct research on interferon over the period 1980-81 to 1983-84.

HOME AFFAIRS AND ENVIRONMENT

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Home Affairs and Environment								
. Bureau of Flora and Fauna	N(b)	0.004	0.003	0.008	0.022	0.054	0.110	0.201
	N(c)	0.032	0.023	0.133	0.160	0.192	0.646	0.840
. Environmental Activities	N(b)	-	-	-	-	1.365	2.001	2.772
	N(c)	-	-	-	-	3.551	3.209	0.371
Australian Film and Television School	S(a)	0.003	0.004	-	0.030	0.004	-	0.030
	S(b)	0.120	0.061	0.089	0.080	0.090	0.125	0.115
	S(c)	0.024	0.036	0.009	0.006	0.036	0.010	0.006
Australian National Parks and Wildlife Service (ANPWS)	N(c)	0.336	0.193	0.198	0.140	0.292	0.338	0.279
Great Barrier Reef Marine Park Authority	N(b)	0.034	0.056	-	-	0.065	0.007	0.016
	S N(c)	0.052	0.057	0.066	0.078	0.103	0.107	0.131*
	S(c)	.	.	0.008	0.010	.	0.085	0.108*
National Library of Australia	N(a)	-	-	-	-	0.861	1.140	1.154
	N(b)	-	-	-	-	0.589	0.386	0.400
	S N(c)	-	-	0.009	0.008	-	0.009	0.008
	S(a)	-	-	-	-	1.232	1.406	1.351
	S(b)	-	-	-	-	6.602	7.533	7.658
Office of the Supervising Scientist for the Alligator Rivers Region	N(a)	0.279	0.400	0.972	1.700	0.400	0.972	1.700
	N(b)	0.531	1.281	2.062	2.570	1.281	2.062	2.570
	N(c)	0.125	0.420	0.384	0.380	0.420	0.384	0.380
Total (Direct Commonwealth funding)		1.540	2.535	3.938	5.183	17.137	20.529	20.090
B. Expenditure from other sources								
Australian Film and Television School	S(b)	0.011	-	0.001	-	-	0.001	-
Total (A+B)		1.551	2.535	3.940	5.183	17.137	20.530	20.090

N Natural sciences and engineering S Social sciences and humanities

$\underline{S}$N includes small proportion of social sciences and humanities for 1978-79 and 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

* Estimated distribution between natural sciences and engineering and social sciences and humanities. Decisions in relation to disbursement of some funds had not been taken at the time of going to press.

Department of Home Affairs 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 largely 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.

An increase in funds in 1981-82 will allow expansion of programs of the Australian Biological Resources Study including the computer-based Australian Biotaxonomic Information System.

. Environmental Activities

The Environment Division provides the focus for Commonwealth responsibilities in environmental matters and for communication with international environmental agencies, particularly united Nations Environment Program 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.

Major recent policy developments have included legislation which will enable Australia to ratify the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters (London Dumping Convention) and the proclamation of the Whale Protection Act. An interim notification scheme for industrial chemicals has been introduced. The scheme will enable identification of new industrial chemicals and enable the Commonwealth and State governments to assess the potential hazards to health and the environment which may be associated with these chemicals before they are marketed in Australia.

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.

Other activities 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. Particular attention has been given to the environmental aspects of energy related policies.

Under the marine quality assessment program, which includes pollution monitoring and marine bio-indicator studies, demonstrations have been conducted of a computer-based model for predicting the spread of oil-spills at sea. Activities in the hazardous chemicals area have, in addition to the Interim Notification Scheme, been directed towards implementing the national action plan on environmentally hazardous chemicals and in particular, the safe disposal of environmentally hazardous chemical wastes.

The main thrust of air quality activities have involved participation in development of a long term strategy for control of motor vehicle emissions. Environmental control of the nuclear industry has been assisted by the preparation of a code of practice and guidelines on radiation protection. Codes of practice on transport of radioactive materials and on management of radioactive wastes from mining and milling of uranium are being developed.

A task force has been established to coordinate the preparation of a National Conservation Strategy. Development of the Strategy will involve all States and the Northern Territory, and a wide range of community and industry organisations.

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.

The Australian Film and Television School

The School's Research and Survey Unit conducts an on-going program of research into the radio, film, and television industries as an aid to the formulation of School training policies, to locate and index historical data to provide teaching material for students of media studies in all tertiary institutions, and background information to the industry.

Australian National Parks and Wildlife Service

The Australian National Parks and Wildlife Service is the principal adviser to the Commonwealth Government on national nature conservation and wildlife policies.

Science and technology aspects of the Service's role include developing research, survey, inventory and monitoring for nature conservation activities of national significance.

Great Barrier Reef Marine Park Authority

The Great Barrier Reef Marine Park 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.

As part of its task of identifying priorities, the Authority has developed a series of documents on the responsibilities, functions, needs, programs and objectives for research projects undertaken by and for the Authority. Ten research areas have been identified relating to the managment of multiple uses consistent with conservation of the Great Barrier Reef. These are:

- oceanography of the Great Barrier Reef;
- marine geosciences and geomorphology;
- marine chemistry;
- bathymetry and survey;
- marine biology;
- analysis of use;
- management strategies;
- environmental design;
- Great Barrier Reef data bank; and
- mechanisms of information transfer.

In cooperation with AIMS and CSIRO, the Authority has developed a major paper detailing research needs for physical oceanography of the Great Barrier Reef.

National Library of Australia

The National Library of Australia has a statutory responsibility:

(i) to maintain and develop a national collection of library materials in all areas of science and technology;

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

(iii) to 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.

These functions are carried out by:

- providing a reference enquiry service;
- publicising the Library's holdings of scientific and technological material and providing a rapid loan and photocopy service;
- developing expertise in using computer data bases in Australia and the USA in batch and on-line mode, providing services from these data bases and training others to use computer based services;
- creating and helping to create computer based networks such as MEDLINE, AUSINET, ABN and AUSTRE (Australian Scientific and Technological Reports);
- developing and participating in user awareness projects;
- assisting other organisations to develop needed data bases, e.g. Australian Mineral Foundation, Department of Transport, Department of National Development and Energy;

- liaising with Government departments, trade associations, professional societies and industry to ascertain needs for information sources and methods to meet these needs; and

- examining new technology (e.g. videotext and videodisc) potentially useful for information transfer.

Office of the Supervising Scientist for the Alligator Rivers Region

The Government's announcement in August 1977 that uranium mining would proceed in this region was accompanied by a number of requirements including:

- the appointment of a Supervising Scientist to oversee environmental protection measures;

- the establishment of a Research Institute managed by the Supervising Scientist; and

- setting up a coordinating committee of interested parties.

The Alligator Rivers Region Research Institute has commenced twenty hydrology and aquatic projects.

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, with the Supervising Scientist coordinating and supervising the activities of both the mining companies and the Northern Territory Supervising Authorities.

HOUSING AND CONSTRUCTION

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Housing and Construction								
. Central Investigation and Research Laboratories	N(a)	0.115	0.140	0.100	0.110	0.200	0.222	0.244
	N(b)	0.900	1.100	0.800	0.880	1.600	1.778	1.956
. Contributions								
- Australian Housing Research Council	N(c)	0.100	0.100	0.100	0.100	0.100	0.100	0.100
- Australian Road Research Board	N(c)	0.259	0.259	0.259	0.259	0.259	0.259	0.259
- Australian Uniform Building Regulations Coordinating Council	N(c)	-	-	0.031	0.050	-	0.031	0.050
. Experimental Building Station	N(a)	0.189	0.197	0.221	0.192	0.207	0.238	0.200
	N(b)	1.238	1.339	1.183	1.321	1.795	2.077	2.133

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
. Technical Services	N(a)	-	-	-	-	0.874	0. 930	0.990
	N(b)	-	-	-	-	28.088	30.050	32.150
	N(c)	-	-	-	-	1.340	1.740	2.260
Total (Budget sector)		2.801	3.135	2.694	2.912	34.463	37.425	40.342
B. Commonwealth Non-Budget sector								
Snowy Mountains Engineering Corporation (SMEC)	N(a)	-	-	-	-	16.900	14.791	8.000
	N(b)	0.073	0.042	0.014	0.010	25.260	29.271	31.010
	N(c)	-	-	-	-	0.969	0.906	1.000
Total (Non-Budget sector)		0.073	0.042	0.014	0.010	43.129	44.968	40.010
Total (Direct Commonwealth funding)		2.874	3.177	2.708	2.922	77.592	82.393	80.352
C. Expenditure from other sources								
Department of Housing and Construction								
. Experimental Building Station	N(a)	-	-	0.028	0.019	-	0.028	0.019
	N(b)	0.141	0.157	0.147	0.131	0.157	0.147	0.131
Australian Housing Research Council	N(c)	0.100	0.100	0.100	0.100	0.100	0.100	0.100
Australian Uniform Building Regulations Coordinating Council	N(c)	-	-	0.031	0.050	-	0.031	0.050
Total (Other sources)		0.241	0.257	0.306	0.300	0.257	0.306	0.300
Total (A+B+C)		3.115	3.434	3.014	3.222	77.849	82.698	80.652

N Natural sciences and engineering S Social sciences and humanities

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

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 carried 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.

Central Office and Regional Technical Services

In addition to specific purpose establishments (EBS and CIRL), work is also conducted with Central Office and Regional Offices by specialist engineering and architectural branches on the development of design techniques and methods of analysis, the development of technical standards and the evaluation of components and systems. The work is more concerned with new and improved technology than with specific projects.

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.

The functions of the EBS are to be transferred out of the Commonwealth Government sector.

Expenditure for the EBS shown in the table differs from that reported in the 1980-81 Science and Technology Statement because of a reassessment of overheads applicable to S&T activities.

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.

Expenditure shown in the table for the CIRL differs from that reported in the 1980-81 Science and Technology Statement because of a reassessment of overheads applicable to S&T activities.

Australian Housing Research Council (AHRC)

The main objectives of AHRC are to provide for research into housing, dissemination of research results, promotion of collaborative research and the coordination of research, and where necessary to complement research conducted elsewhere.

Australian Uniform Building Regulations Consultative Committee (AUBRCC)

AUBRCC is responsible for the further development of the Australian Uniform Building Code, and current research activity includes the computerisation of the Code, the development of requirements for the provision of access to buildings by the disabled, and a review of the impact of regulations on energy conservation in buildings.

Snowy Mountains Engineering Corporation

The Snowy Mountains Engineering Corporation is a 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 mechanics, surveying, estimating, contract supervision, irrigation, agriculture, economics, training, equipment procurement, and project management.

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 larger part of the work is now performed overseas.

IMMIGRATION AND ETHNIC AFFAIRS

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Immigration and Ethnic Affairs								
Studies and Research	S(b)	0.103	0.121	0.163	0.123	0.409	0.604	0.744
	S(c)	0.200	0.333	0.364	0.313	0.333	0.364	0.328
Australian Institute of Multicultural Affairs	S(a)	-	-	-	-	-	0.221	0.580
	S(b)	-	-	-	-	0.154	0.919	1.440
	S(c)	-	-	-	-	0.006	0.317	0.495
Total (Budget sector)		0.303	0.453	0.527	0.435	0.902	2.424	3.587
B. Commonwealth Non-Budget sector								
Australian Institute of Multicultural Affairs	S(c)	-	-	-	-	-	0.028	-
Total (Direct Commonwealth funding)		0.303	0.453	0.527	0.435	0.902	2.452	3.587
C. Expenditure from other sources								
Department of Immigration and Ethnic Affairs	S(b)	-	-	-	0.001	-	-	0.001
	S(c)	–	-	0.007	0.035	-	0.007	0.035

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Australian Institute of Multicultural Affairs	S(c)	-	-	-	-	-	-	0.100
Total (Other sources)		-	-	0.007	0.036	-	0.007	0.136
Total		0.303	0.453	0.534	0.470	0.902	2.460	3.722

N Natural sciences and engineering S Social sciences and humanities

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

(c) Extramural expenditure

Department of Immigration and Ethnic Affairs

In May 1981, the Australian Council on Population and Ethnic Affairs took over the activities of three councils - the Australian Population and Immigration Council, the Australian Refugee Advisory Council and the Australian Ethnic Affairs Council.

The activities of the new Council include advising the Minister on the monitoring of research into population change in Australia and overseas, the implications of population change, and ways in which immigration intakes can be planned to complement other national policies.

The Coordination and Research Division conducts policy research into immigration issues, investigatory research into migrant settlement and develops the Departmental research program. The Population Branch of this Division provides a forum for broader population issues.

Following the implementation of the report of the Review of Post-Arrival Programs and Services for Migrants (Galbally Report), there has been an increase in research of an investigatory nature. Emphasis has been placed on English language and information needs of migrants, and the development of studies relating to migrant settlement. Some research into the economic aspects of migration has also been undertaken.

Australian Institute of Multicultural Affairs

The Australian Institute of Multicultural Affairs is a statutory corporation, located in Melbourne, with its prime activities being policy advice, 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. Most of the Institute's current work has been geared to the conduct and commissioning of policy oriented research.

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Industry and Commerce								
. Bureau of Industry Economics	S(b)	0.561	0.722	1.047	1.374	0.722	1.047	1.374
	S(c)	-	-	0.013	0.099	-	0.027	0.136
. Munitions Supply	N(a)	-	-	-	-	1.062	0.586	0.915
	N(b)	-	0.027	0.032	0.035	3.537	4.524	4.820
	N(c)	-	-	-	-	0.030	0.023	0.017
. Ship Design	N(a)	0.002	0.001	-	-	0.003	0.005	-
	N(b)	0.044	0.015	-	-	0.019	0.011	-
Total (Direct Commonwealth funding)		0.607	0.764	1.092	1.508	5.373	6.223	7.262
B. Expenditure from other sources								
Department of Industry and Commerce								
. Aircraft Guided Weapons and Electronics Supply	N(b)	1.953	1.849	2.255	1.900	1.849	2.255	1.900
. Munitions Supply	N(a)	-	-	-	-	0.902	0.323	0.585
	N(b)	-	-	-	-	2.982	2.858	3.435
Total (Other)		1.953	1.849	2.255	1.900	5.733	5.436	5.920
Total (A+B)		2.560	2.614	3.346	3.408	11.104	11.659	13.182

N Natural sciences and engineering S Social sciences and humanities

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

Department of Industry and Commerce

. Bureau of Industry Economics (BIE)

The BIE is charged with conducting economic research to enable formulation of industry policy to be based upon an adequate information base. Areas for research are selected after consideration of the importance of the issues involved and consultation with the BIE Council of Advice.

. Ship Design Group

As a result of the Review of Commonwealth Functions, the Ship Design Group ceased operations during October 1981. This Group's role was to conduct scientific and technological programs in respect of the specialised areas of ship design and marine technology.

. Aircraft, Guided Weapons and Electronics Supply Division

The Division is responsible for policy advice to the Minister for Industry and Commerce on the capacity, efficiency and technological capability of the Australian aero-space industry. It is responsible also for implementing programs for improving the structure and efficiency of the industry, and for the development and acquisition of new technologies. The Division manages Government aerospace production facilities concerned with the design, development, manufacture, maintenance and export of aircraft and guided missiles.

. Munitions Supply Division

The Division oversights and coordinates the management of the Government munitions factories including design, development and re-equipment programs. It also conducts feasibility studies on major capital projects, product improvements and new manufacturing technology.

NATIONAL DEVELOPMENT AND ENERGY

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of National Development and Energy								
. Energy Research, Development and Demonstration Program	N(a)	-	-	-	-		0.029	-
	N(b)	-	-	-	-	1.013	1.251	1.318
	N(c)	3.998*	5.190*					
	S(c)			0.069	0.076		0.069	0.076
. Australia/FRG Coal Liquefaction Study	N(c)	-	0.109	0.323	0.017	0.109	0.323	0.017
. National Water Resources Assessment Program	N(b)	-	-	-	-	-	0.013	0.004
	N(c)	0.390	0.449	0.922	1.339	9.578	10.410	10.827
	S(c)			0.026	0.033		0.026	0.033
. Bureau of Mineral Resources, Geology and Geophysics	N(a)	0.303	0.318	0.452	0.864	0.530	0.695	1.436
	N(b)	7.117	7.470	8.758	12.001	12.536	14.588	18.585
	N(c)	0.200	0.200	0.010	0.010	0.247	0.065	0.075
. Grant-in-aid to Australian Institute of Urban Studies	S(c)	-	-	-	-	0.050	0.050	0.035

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
. Division of National Mapping	N(a)	-	-	-	-	0.310	0.343	0.711
	N(b)	-	-	-	-	7.123	9.517	10.188
	N(c)	-	-	-	-	0.378	0.350	0.364
Australian Atomic Energy Commission	N(a)	0.915	1.029	0.878	1.026	1.456	1.574	1.506
	N(b)	13.690	15.704	19.113	22.803	26.083	26.794	33.250
	N(c)	0.581	0.649	0.625	0.805	0.778	0.772	1.120
Total (Direct Commonwealth funding)		27.194	31.118	37.457	45.884	65.381	73.797	87.165
B. Expenditure from other sources								
Department of National Development and Energy								
. Energy Research, Development and Demonstration Program**	N(c)	2.869	5.471	3.793	4.172	5.471	4.424	4.866
. Australia/FRG Coal Liquefaction Study	N(c)	0.007	0.726	0.625	0.033	0.726	0.625	0.033
. Bureau of Mineral Resources, Geology and Geophysics	N(a)	-	-	0.027	0.012	-	0.027	0.012
	N(b)	-	0.096	0.348	0.222	0.096	0.348	0.222
Australian Atomic Energy Commission	N(a)	-	-	0.024	0.057	-	0.024	0.057
	N(b)	0.003	0.291	0.522	1.258	0.291	0.522	1.258
Total (Other sources)		2.879	6.583	5.339	5.753	6.583	5.970	6.447
Total (A+B)		30.073	37.702	42.796	51.637	71.964	79.767	93.613
Less intra- Ministry transfers*		(0.003)	(0.387)	(0.705)	(1.434)	(0.387)	(0.705)	(1.434)
Total		30.070	37.315	42.091	50.203	71.577	79.062	91.179

N Natural sciences and engineering S Social sciences and humanities

$\overline{S}$N includes small component of social sciences and humanities for 1978-79 and 1979-80

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

* Includes some demonstration projects

** Expenditure funded from accounts accruing to the Coal Research Trust Account

\# 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 National Development and Energy

. National Energy Research, Development and Demonstration Program

The Government's energy policy aims at ensuring secure and stable supplies of energy, reducing Australia's dependence on imported oil and developing in the long-term a diversified energy base. An integral part of this policy is a substantial expansion of Australia's energy research, development and demonstration effort.

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

In developing its recommendations and support grants, NERDDC takes into account the existing level of research activity in Australia and identifies those areas for which 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. Where appropriate applications are not received in priority technology areas, the Council recommends the commissioning of projects.

The Energy Research and Development Division in the National Energy Office of the Department of National Development 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 eight technical standing committees.

. Australian/FRG Coal to Oil Study

Under an arrangement with the Federal Republic of Germany (FRG), Australia and the FRG are carrying out a joint study to examine the conversion of Australian coals to liquid fuels. It will report on the feasibility of establishing 3.0 million tonnes a year liquid fuel plants at sites in Nsw South Wales, Victoria and Queensland. The State Governments are contributing 3/4 of Australia's share of the cost of the study.

. National Water Resources Assessment Program

The Water and Development Division of the Department of National Development and Energy administers research grants and activities to support programs and policies concerned with the planning, development and management of Australia's water resources, including support for initiatives developed through the Australian Water Resources Council.

Activities include:

- River Murray Salinity and Drainage Control.
- Dryland Salinity Control, Collie River.
- Payments to States for Assessment of Surface and Underground Water Resources.
- Water Research Program.

The National Water Resources Assessment Program was initiated in 1964 as a first priority of the Australian Water Resources Council. The Program was established as the basis for Commonwealth assistance to the States to accelerate the collection of basic water resources data.

The Program is intended to stimulate additional water research while complementing water research being carried out by Australian research institutions. Individual project grants are approved by the Minister for National Development and Energy, the recipient institutions providing supervision, overhead and, where appropriate, the use of equipment.

Under the National Water Resources Program, the Division administers funds to the States for research and investigation activities relating to salinity and drainage control in the Murray Valley and for dryland salinity control in the southwest of Western Australia.

. 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 Australia Antarctic Territory to support the fullest development of our mineral and energy resources. The activities of BMR include detailed field and laboratory research, fossil fuel and mineral resources assessments, and the development of national geoscience data storage and retrieval systems.

Commencement of the Bass Basin Marine Geophysical Project has resulted in an increase of $2m over 1980-81 expenditure.

. Grants to Australian Institute of Urban Studies

The Australian Institute of Urban Studies sponsors applied research into major problems in urban development and government. It disseminates research findings and provides administrative resources to stimulate and coordinate research activity.

. 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.

The 1980-81 increase in actual expenditure has been due to greatly increased bathymetric survey activities.

Australian Atomic Energy Commission

The Australian Atomic Energy Commission (AAEC) is the principal agency for nuclear activities in Australia. Its functions fall into two broad areas: the development and operation of a nuclear industry, and the mining, treatment and disposal of uranium. Within these broad areas, the Commission undertakes research on matters associated with uranium and nuclear energy, and operates nuclear research reactors providing facilities for its own research, research by universities and other outside bodies, and for production of radionuclides.

Through the AAEC, the Commonwealth supports an active nuclear research and development effort, the exchange of information with other countries, and technical assistance to other countries, while taking due account of relevant elements of Government policy including its non-proliferation and nuclear technical assistance policies.

Following the decision to transfer a large proportion of AAEC scientific and technical staff to CSIRO the depth and scope of these programs is currently under review.

The projected expenditure for 1981-82 for the AAEC includes programs which will be modified as a result of this review.

PRIMARY INDUSTRY

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Primary Industry								
. Administrative support for S&T, not elsewhere included								
- Commonwealth Council for Rural Research and Extension	N(b)	-	-	-	-	0.141	0.157	0.003
- Library Services	N(b)	-	-	-	-	0.252	0.275	0.288
- Ministerial Councils	N(b)	-	-	-	-	0.064	0.072	0.080
- Statutory Research Funds, Commonwealth Extension Services and Special Research Grants	N(b)	-	-	-	-	0.499	0.563	0.527
. Australian Agricultural Council Sponsored Projects	N(c)	-	0.053	0.055	0.058	0.127	0.156	0.208
. Australian Wine Research Institute Grant	N(c)	0.100	0.099	0.148	0.165	0.099	0.148	0.165
. Barley Improvement Schemes (S.A., Vic., W.A.)	N(c)	0.142	0.145	0.148	-	0.145	0.148	-
. Bureau of Agricultural Economics	S(a)	-	-	-	-	0.041	0.027	0.055
	S(b)	0.879	0.843	0.853	0.958	4.651	5.381	6.022
. Bureau of Animal Health	N(a)	-	-	-	0.025	-	-	0.506
	N(b)	0.156	0.184	0.192	0.248	37.401	41.385	51.138
. Commonwealth Extension Services Grant	N(b)	-	-	-	-	0.003	-	-
	N(c)	3.763	1.884	1.382	-	4.997	4.684	-
	S(c)	.	.	0.303	-	.	0.303	-
Commonwealth Special Research Grant	N(b)	-	-	-	-	0.003	-	-
	N(c)	0.217	0.237	0.248	0.279	0.240	0.248	0.279
. Fisheries Division	N(b)	-	-	-	-	0.703	0.990	1.052
	N(c)	-	-	-	-	0.455	0.871	0.790
. Fishery Management (Torres Strait)	N(c)	-	-	-	-	0.100	0.175	0.175

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
. Forestry Research Grants	N(c)	0.041	0.031	0.033	0.033	0.031	0.033	0.033
. Lucerne Aphid Assistance	N(c)	-	-	-	-	0.143	-	-
. Plague Locust Commission	N(a)	0.005	0.011	0.011	0.004	0.020	0.041	0.020
	N(b)	0.040	0.042	0.052	0.057	0.253	0.276	0.322
Sub-total		5.343	3.529	3.425	1.827	50.357	55.933	61.663
. Statutory Rural Industry Research Schemes *		-	-	-	-	0.041	0.027	0.055
- Barley	N(c)	-	-	-	0.274	-	-	0.292
- Chicken Meat	N(c)	0.151	0.162	0.196	0.210	0.175	0.203	0.225
- Dairying	N(c)	0.428	0.363	0.485	0.500	0.431	0.560	0.584
- Dried Fruit	N(c)	0.033	0.054	0.066	0.079	0.054	0.071	0.083
	S(c)	.	.	0.007	0.009	.	0.007	0.009
- Fishing Industry Research **	N(b)	-	-	-	-	0.017	-	-
	N(c)	0.472	0.552	0.741	1.015	0.716	0.792	1.098
- Fishing Industry Development #	N(a)	-	0.027	-	-	0.027	-	-
	N(b)	0.124	0.227	0.416	0.284	0.227	0.416	0.284
	N(c)	0.086	0.175	0.068	0.090	0.175	0.068	0.090
	S(c)	.	.	0.008	0.010	.	0.008	0.010
- Honey	N(c)	-	-	-	0.025	-	-	0.025
- Meat	N(c)	2.676	2.916	3.196	3.565	3.565	3.450	3.877
	S(c)	.	.	0.278	0.310	.	0.289	0.323
- Oilseeds	N(c)	0.062	0.217	0.275	0.353	0.233	0.285	0.376
- Pig Industry	N(c)	0.252	0.262	0.249	0.347	0.302	0.273	0.382
	S(c)	.	.	0.010	0.014	.	0.010	0.014
- Poultry	N(c)	0.121	0.084	0.131	0.128	0.096	0.142	0.146
- Tobacco	N(c)	0.467	0.323	0.275	0.287	0.404	0.363	0.348
- Wheat	N(C)	1.490	2.143	2.708	2.978	2.263	2.800	3.095
- Wine	N(c)	0.054	0.082	0.088	0.088	0.082	0.088	0.088
- Wool	N(c)	3.100	5.000	6.611	7.427	5.000	6.880	7.700
Sub-total (Commonwealth derived expenditure on rural research schemes)		9.516	12.587	15.808	17.993	13.767	16.705	19.045
Total (Direct Commonwealth funding)		14.859	16.116	19.233	19.821	64.133	72.637	80.711

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
B. Expenditure from other sources								
Department of Primary Industry								
. Bureau of Agricultural Economics ##	S(a/b)	0.111	0.094	0.094	0.110	0.521	0.597	0.698
. Bureau of Animal Health	N(c)	-	0.010	0.022	0.038	20.412	19.874	20.038
Plague Locust Commission (State-contributed funds)	N(a)	0.005	0.011	0.011	0.004	0.020	0.041	0.020
	N(b)	0.040	0.042	0.052	0.057	0.253	0.276	0.322
Sub-total		0.156	0.157	0.179	0.209	21.206	20.788	21.078
. Statutory Rural Industry Research Schemes *								
- Barley	N(c)	-	-	-	0.280	-	-	0.300
- Chicken Meat	N(c)	0.160	0.175	0.156	0.181	0.190	0.162	0.193
- Dairying	N(c)	0.427	0.489	0.435	0.476	0.581	0.503	0.556
- Dried Fruit	N(c)/S	0.045	0.053	0.059	0.057	0.053	0.063	0.060
	S(c)	.	.	0.007	0.006	.	0.007	0.006
- Honey	N(c)	-	-	0.010	0.025	-	0.010	0.025
- Meat	N(c)/S	2.446	2.815	2.870	3.552	3.441	3.098	3.863
	S(c)			0.250	0.309		0.259	0.322
- Oilseeds	N(c)	0.071	0.208	0.313	0.319	0.224	0.325	0.342
- Pig Industry	N(c)/S	0.243	0.231	0.330	0.347	0.265	0.361	0.382
	S(c)	.	.	0.014	0.014	.	0.014	0.014
- Poultry	N(c)	0.096	0.116	0.099	0.128	0.133	0.107	0.146
- Tobacco	N(c)	0.467	0.368	0.565	0.729	0.460	0.698	0.885
- Wheat	N(c)	1.647	2.343	2.898	2.759	2.474	2.996	2.861
- Wool	N(c)	8.568	7.383	5.578	6.882	8.314	5.807	7.134
Sub-total (Industry-derived expenditure on rural research schemes)		14.169	14.182	13.584	16.064	16.135	14.410	17.089
Total (Other sources) ##		14.325	14.340	13.763	16.274	37.341	35.197	38.169
Total (A+B) ##		29.184	30.456	32.997	36.095	101.624	107.834	118.880
Less intra-Ministry transfers		(0.111)	(0.094)	(0.094)	(0.110)	(0.521)	(0.597)	(0.698)
Total		29.073	30.362	32.903	35.985	100.103	107.237	118.182

N Natural sciences and engineering S Social sciences and humanities

$^{S}_{=}N$ Figures for 1978-79 and 1979-80 include a significant component of social sciences and humanities

$^{=}_{S}N$ includes small component of social sciences and humanities for 1978-79 and 1979-80

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

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

* The convention adopted for the reporting of expenditure to and from Research Trust Funds is outlined in Appendix 6. See the table in the body of the text for industry contributions to the Trust Funds.

** Amounts indicate payments for research made from the Trust Fund. Commonwealth contributions to the Trust Fund were $746 000 (1978-79), $850 000 (1979-80) and $820 000 (1980-81).

\# Amounts indicate payments for research made from the Trust Fund. Commonwealth contributions to the Trust Fund were $400 000 in each year.

The intramural expenditure of the Bureau of Agricultural Economics shown in B 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) 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 are important functions of the Department.

The Bureau of Agricultural Economics (BAE) and the Bureau of Animal Health (BAH), 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 undertakes a continuing program of investigation and reporting on the economic aspects of agriculture in the broadest sense. It also aims to meet the wider needs of the Australian community as a whole for economic research and reporting on agriculture and the inter-relationships between agriculture and the general economy.

The Bureau'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.

. Bureau of Animal Health

The Bureau of Animal Health is responsible for the Australian export meat inspection service, supervision of livestock export health testing, and coordination of national animal health programs for endemic and exotic animal disease. The Bureau undertakes research and investigation into the epidemiology of animal disease; it provides the secretariat for national committees dealing with animal health and production and international liaison on technical animal health and production issues.

. Fisheries Division

The functions of the Division include:

- management of 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,
  - . economic analysis, involving costs and earnings (profitability) surveys and ad hoc investigations, and
  - . procurement of accurate and timely catch, marketing and production statistics and information;
- to direct fish export inspection operations, including the creation and maintenance of standards relating to the export of fish (and fish products) and export establishments;
- develop legislation affecting the management of fisheries;
- participate in the education/training of Commonwealth and State fisheries officers involved in activity under Commonwealth delegation. In recent years the education function has been more widely interpreted to include the training of professional fishermen, e.g. in use of sonar equipment;
- encourage 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 these trust accounts are administered by the Fisheries Division;
- provide secretariat facilities to committees of the Standing Committee on Fisheries;
- participate in negotiations within international organisations or with foreign governments on fisheries matters and in the formulation of agreements with foreign governments or corporations;
- disseminate 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, provide assistance to developing countries in relation to fisheries matters.

. 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.

. 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 of money raised from producers in the form of a levy on their produce.

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.

Industry Contributions to Primary Industry Trust Accounts

($ million)	78-79	79-80	80-81	81-82
Barley	-	-	0.311	0.472
Chicken Meat	0.189	0.226	0.235	0.250
Dairying	0.435	0.459	0.422	0.416
Dried Fruit	0.089	0.090	0.119	0.082
Honey	-	-	0.018	0.050
Meat	3.198	3.178	3.297	3.073
Oilseeds	0.349	0.412	0.275	0.325
Pig Industry	0.290	0.288	0.389	0.420
Poultry*	0.138	0.096	0.142	0.146
Tobacco	0.393	0.389	0.378	0.348
Wheat	3.466	3.086	2.012	3.060
Wool	1.932	10.239	7.538	8.750
Totals	10.479	18.463	15.136	17.392

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

. 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 tax sharing arrangements.

. Commonwealth Special Research Grant

The purpose of the Grant is to provide Commonwealth Government contributions to rural research outside the scope of other Commonwealth rural research funding arrangements. This includes support for research associated with industries not covered by specific statutory and non-statutory research schemes. In these instances Grant funds are normally matched on a dollar for dollar basis by the industry concerned. Other areas which are eligible for Grant support include research not specifically related to a single industry (multi-industry research) and development of new and infant industries.

. 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 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.

. Lucerne Aphid, Assistance to State Programs

The Department of Primary Industry provided assistance to the South Australian Department of Agriculture over the three year period 1977-78 to 1979-80 to enable research work to be undertaken on the lucerne aphid.

. 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.

. Australian Agricultural Council Sponsored Projects

The Department of Primary Industry provides the Commonwealth's share, on a 50/50 basis, of joint Commonwealth/State research-related projects approved by the Australian Agricultural Council.

PRIME MINISTER AND CABINET

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Auditor-General's Office	S(b)	-	-	-	-	0.116	0.099	0.137
Australian Science and Technology Council (ASTEC)	$_{S}$N(b)	-	-	-	-	0.404	0.577	0.788
	$_{S}$N(c)	-	-	-	-	0.009	0.005	0.040
Office of Public Service Board								
. Manpower planning	S(b)	-	-	-	-	0.227	0.270	0.282
	S(c)	-	-	-	-	-	0.008	-
. Postgraduate Awards	^{n}S(c)	0.043	0.044	0.060	0.062	0.150	0.205	0.210
Total (Direct Commonwealth funding)		0.043	0.044	0.060	0.062	0.905	1.163	1.457

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 research activity is conducted by full-time staff of the Office and is directed to:

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

Australian Science and Technology Council (ASTEC)

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

The Government has recognised that high-level, high-quality independent science and technology advisory machinery is necessary if correct 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 1978.

The functions of ASTEC are to advise the Government on 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 has a strategic role in assisting the Government to encourage Australian science and technology to meet the nation's needs and objectives. It 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.

Office of the Public Service Board

. Manpower Planning

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

The Planning, Research and Information Branch (PR&I) of the Public Service Board maintains records of Public Service staff. These records are largely kept on computer-based files, the major one being the Continuous Record of Personnel. Information from these records is made available to the Board and departments for planning purposes. This information is used to provide estimates of future recruitment and development requirements, using techniques such as computerised modelling and analysis.

In addition, the Branch promotes the development and implementation of appropriate planning systems within the Service through training activities and the provision of a consultancy service on methods and techniques.

. Postgraduate Awards

Each year the Board makes awards for postgraduate study, usually involving research towards a Ph.D. or Masters degree. There are two schemes: one for study in any appropriate field; and one specifically for management studies. In 1980-81 twenty-two awards were granted in the general category (thirteen being taken up at overseas institutions and nine in Australia) and five under the management studies scheme (all in Australia).

SCIENCE AND TECHNOLOGY

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Science and Technology (DST)								
. Administrative and other costs not elsewhere included	N(a)	-	-	-	-	-	0.032	-
	N(b)	-	-	-	-	10.670	11.958	14.202
	N(c)	-	-	0.007	-	0.106	0.104	0.056
Antarctic Activities								
- Antarctic Division	N(a)	1.910	4.438	5.561	5.438	8.656	7.503	7.261
	N(b)	5.279	7.337	11.028	12.442	11.570	15.133	15.875
	N(c)	0.026	0.024	0.028	0.034	0.024	0.028	0.034
- Antarctic Air Transport Study	S(c)	-	-	-	-	-	0.003	0.025
- Antarctic Ship Design Study	N(c)	-	-	-	-	0.038	0.048	0.009
- Scott Polar Research Institute Grant	N(c)	-	-	-	-	0.002	0.010	0.010
. Australian Government Analytical Laboratories	N(a)	-	-	-	-	4.645	5.714	0.613
	N(b)	-	-	-	-	3.960	4.682	5.337

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
. Baseline Air Pollution Monitoring Station	N(a)	-	-	-	-	0.447	0.721	0.046
	N(b)	-	-	-	-	0.032	0.187	0.265
. Bureau of Meteorology	N(a)	0.003	-	-	-	1.358	1.566	4.467
	N(b)	0.277	0.256	0.377	0.425	28.340	30.043	35.396
. Commercial Development of Technology								
- Interscan support	N(c)	-	-	-	-	3.702	2.450	2.118
- Public Interest Grants	N(c)	-	-	-	-	3.999	4.996	6.000
. Grants-in-Aid								
- Academies and ANZAAS	$\overset{S}{=}$N(c)	-	-	-	-	0.470	0.406	0.406
	S(c)	-	-	-	-	.	0.109	0.109
- Industrial Design Council	N(b)	-	-	-	-	-	0.025	-
	N(c)	-	-	-	-	0.420	0.450	0.140
- National Association of Testing Authorities	N(c)	-	-	-	-	0.708	0.767	0.767
- National Safety Council	N(c)	-	-	-	-	0.160	0.160	0.160
- Research Associations	N(c)	-	-	-	1.231	-	-	1.231
- Standards Association of Australia	N(c)	-	-	-	-	2.354	2.460	2.460
. Industrial R&D Grants								
- Commencement Grants	N(c)	6.000	7.000	9.657	10.500	7.000	9.657	10.500
- Project Grants	N(c)	16.501	22.950	36.056	32.680	22.950	36.056	32.680
. International Cooperation								
- Academies' Scientific Exchanges with China	^{S}N(c)	-	-	-	-	0.075	0.120	0.120
- Association for Science Cooperation in Asia	N(c)	-	-	-	-	0.018	0.021	0.025
- Bilateral Agreements (India, Japan, Mexico, U.S.A., West Germany)	$_{S}$N(c)	0.137	0.138	0.135	0.166	0.138	0.135	0.166
. Inventions and Innovation								
- Assistance to inventors	N(b)	-	-	-	-	0.107	0.104	0.092
	N(c)	-	-	-		0.076	0.076	0.076
- Pilot Programs in innovation	N(b)	-	-	-	-	0.222	0.249	0.207
	N(c)	-	-	-	-	0.449	0.300	0.300
. Ionospheric Prediction Service	N(a)	0.009	0.005	0.076	0.082	0.128	0.194	0.152
	N(b)	0.089	0.100	0.015	0.016	0.892	0.914	1.033
. National NMR Centre	N(a)	0.013	-	-	-	-	-	-
	N(b)	0.086	0.094	0.114	-	0.094	0.114	-
. Patent Activities	N(a)	-	-	-	-	-	0.263	0.198
- Patent Office*	N(b)	-	-	-		8.434	9.506	11.020
	N(c)	-	-	-	-	-	0.055	0.160

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
- Contributions to international patent bodies	N(c)	-	-	-	-	0.233	0.255	0.229
. Productivity Improvement								
- Human Relations and related programs	S(b)	-	-	-	-	0.850	0.150	0.075
	S(c)	-	-	0.021	0.029	0.013	0.021	0.029
- Industry productivity improvement program	N(b)	-	-	-	-	1.589	1.969	1.939
	N(c)	-	-	-	-	1.123	1.060	0.650
- Physical distribution and MATPAK	N(c)	-	-	-	-	0.187	0.328	0.338
- Physical environment standards	N(a)	-	-	-	-	-	0.006	-
	N(b)	0.090	0.110	0.193	0.196	0.340	0.483	0.490
	N(c)	-	-	0.007	-	-	0.167	0.160
- Productivity Promotion Council (admin. support)	S(a)			0.009	0.008	-	0.009	0.008
	S(b)	0.023	0.028	0.026	0.027	0.125	2.046	2.227
	S(c)	0.008	0.008	0.008	0.016	0.008	0.008	0.016
- Research activities	N(b)	0.035	-	-	-	-	-	-
- Technology Transfer Network	N(b)	-	-	-	-	0.042	0.018	0.035
	N(c)	-	-	-	-	0.200	0.400	0.400
. Research Grants and Fellowships								
- ARGC Grants	S=N(c)	12.300	12.800	11.553	13.187	12.800	11.553	13.187
	S(c)	.	.	2.934	3.803	.	2.934	3.803
- Fellowships	N(c)	0.376	0.503	0.560	0.671	0.503	0.560	0.671
- Marine Science Grants	N(c)	-	0.394	2.000	1.899	0.394	2.000	1.899
- Marine Science Fellowships	N(c)	0.162	0.245	0.250	0.336	0.245	0.250	0.336
Space and Upper Atmosphere Activities								
- Balloon Launching Station	N(b)	-	-	-	-	0.293	0.160	-
- LANDSAT Station	N(a)	-	-	-	-	0.468	0.560	0.195
	N(b)	-	-	-	-	1.790	1.035	1.597
- Space Projects	N(b)	-	-	-	-	0.140	0.140	0.140
Anglo-Australian Telescope Board (AATB)	N(a)	0.326	0.188	0.679	0.737	0.188	0.679	0.737
	N(b)	0.714	0.846	0.851	1.001	0.846	0.851	1.001
Australian Institute of Marine Science (AIMS)	N(a)	0.687	0.476	0.593	0.522	0.476	0.593	0.522
	N(b)	2.115	3.100	4.631	5.200	3.100	4.631	5.200
Commonwealth Scientific and Industrial Research Organization (CSIRO) **	S=N(a)	30.738	47.954	58.693	70.577	48.386	59.054	70.950
	S=N(b)	129.344	137.376	157.878	207.588#	144.905	165.762	217.684#
	S=N(c)	1.921	1.834	1.892	1.275	1.834	1.968	1.353
	S(a)	.	.	0.397	0.291	.	0.397	0.291
	S(b)	.	.	1.202	1.028	.	1.202	1.028
	S(c)	.	.	-	0.050	.	-	0.050

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Metric Conversion Board	N(b)	-	-	-	-	0.235	0.179	-
National Standards Commission	N(a)	-	-	-	-	0.056	0.026	0.026
	N(b)	-	-	-	-	0.513	0.528	0.693
Total		209.167	248.203	307.434	371.453	344.126	409.301	481.671
Less recoveries from patent-related charges*		-	-	-	-	(9.221)	(11.026)	(12.308)
Less other DST recoveries##		-	-	-	-	(1.197)	(1.837)	(1.903)
Total (Budget sector net expenditure)		209.167	248.203	307.434	371.453	333.708	396.438	467.460
B. Commonwealth Non-budget sector								
Anglo-Australian Telescope Board (funds brought forward and other revenue)	N(a)	-	-	0.039	-	-	0.039	-
	N(b)	-	-	0.069	0.025	-	0.069	0.025
Australian Institute of Marine Science (AIMS)	N(a)	-	-	-	0.008	-	-	0.008
	N(b)	-	-	-	0.085	-	-	0.085
Commonwealth Scientific and Industrial Research Organization (CSIRO)	N(a)	.	.	0.148	0.193	.	0.160	0.204
	N(b)	.	.	1.672	2.175	.	2.128	2.695
	S(a)	0.274	0.538	0.790	0.910	0.538	0.790	0.910
	S(b)	3.200	5.186	3.251	4.596	5.186	3.251	4.596
National Standards Commission	N(a,b)	-	-	-	-	0.047	0.108	0.100
Total (Non-budget sector)		3.474	5.723	5.968	7.992	5.770	6.544	8.623
Total (Direct Commonwealth funding)		212.641	253.926	313.402	379.445	339.478	402.982	476.083
C. Expenditure from other sources								
Department of Science and Technology								
. Bureau of Meteorology	N(a)	-	-	-	-	-	0.384	1.644
	N(b)	0.010	-	-	-	11.013	13.976	13.874

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
. Commercial Development of Technology (InterScan)	N(c)	-	-	-	-	-	0.200	0.200
. National NMR Centre	N(b)	0.016	0.007	0.015	0.137	0.007	0.015	0.137
. Productivity Promotion								
- Productivity Promotion Council (admin.	S(a/b)	0.008	0.009	0.012	0.017	0.029	0.322	0.479
support - industry contribution)	S(c)	0.012	0.012	0.011	0.010	0.012	0.011	0.010
. Space and Upper Atmosphere Activities								
- Balloon Launching Station	N(a)	-	-	-	-	0.007	-	-
	N(b)	-	-	-	-	0.104	0.098	-
- Space Projects (U.S. contribution)	N(b)	-	-	-	-	11.485	12.620	13.480
Anglo-Australian Telescope Board (U.K. contribution	N(a)	0.326	0.188	0.718	0.737	0.188	0.718	0.737
and other revenue)	N(b)	0.714	0.846	0.920	1.026	0.846	0.920	1.026
Commonwealth Scientific and Industrial Research Organization**	$\overset{s}{=}$N(a)	1.251	1.875	1.852	2.262	1.875	1.861	2.262
	$\overset{s}{=}$N(b)	14.488	17.981	20.995	25.313	18.085	21.386	25.313
	S(a)	.	.	0.047	0.040	.	0.047	0.040
	S(b)	.	.	0.193	0.201	.	0.193	0.201
National Standards Commission	N(b)	-	-	-	-	-	-	0.006
Total (Other sources)		16.824	20.918	24.762	29.743	43.652	52.750	59.409
Total (A+B+C)		229.465	274.844	338.164	409.188	383.130	455.732	535.492

N Natural sciences and engineering S Social sciences and humanities

$\overset{s}{=}$N Includes significant proportion of social science and humanities for 1978-79 and 1979-80

^{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 $9.22lm in 1979-80, $11.026m in 1980-81 and $12.308m (estimated) for 1981-82.

** 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.

Some $29m of the increase in CSIRO's total budget for 1981-82 is due to changed superannuation arrangements. See pages 82 and 86.

For 1981-82 major items of revenue are expected to include $554 000 in relation to MATPAK and the National Materials Handling Bureau, and $540 000 from the sale of LANDSAT imagery.

Department of Science and Technology

The Department was established in November 1980 by amalgamating the policy and operational divisions of the former Department of Science and the Environment with the Patent Office and the Productivity Development and Working Environment Divisions of the former Department of Productivity. The Department has a broad policy role in relation to science, technology, the productivity of industry and the development of innovation. It has administrative and operational responsibilities across a wide span of scientific, technological and industrial activities.

. 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 sovereignty 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 departments 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.

. 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. On the recommendation of the Review of Commonwealth Functions, the Government has decided that the operation of the Station is to be contracted out.

. 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. This is achieved through a separate Research Branch and by maintaining appropriate expertise in other areas of the Bureau.

There is a substantial increase in the Bureau's capital expenditure in 1981-82, to enable upgrading of its central computer system.

. Commercial Development of Technology

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

- 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 of outstanding merit are selected, and projects meeting the above criteria are then provided with financial support by the Government.

- InterScan (Australian Microwave Landing System (MLS)): The program holds promise of considerable benefits in production orders if Australian industry can meet the challenge of providing competitively priced products with acceptable reliability and maintainability. The formation of InterScan Australia Pty Ltd and industry participation in the company are important innovations in the development of industry-government cooperation to exploit Australian technology commercially.

. 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 assisted forty young Australian scientists to attend the 51st Congress in Brisbane in May 1981. The grants to the four learned academies contribute toward the costs of their affiliations with overseas and international organisations, and general administration.

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 Standards Association is a contribution towards its administrative costs. This Associations's chartered objectives are to prepare and publish Australian Standards and to promote the general adoption of standards relating to structures, commodities, materials, practices and operations. The grant to the National Association of Testing Authorities is in recognition of the need for an independent registration system for laboratories.

Research associations were formerly supported by the Government through CSIRO, but from 1981-82 receive grants through the Department of Science and Technology. They are associations of persons or firms engaged in industrial research and development and concerned with a particular industry sector or a common technology. Grants to recognised associations are made on an agreed basis related to other income raised for IR&D purposes. The Government announced a policy of increased support for research associations in its response to the CITCA report. The associations currently recognised are the Bread Research Institute, Australian Welding Research Association, Sugar Research Institute, the Brick Development Research Institute, and the Radiata Pine Research Institute (recognised from 1981-82). All the research associations operate in close co-operation with CSIRO.

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

- Commencement Grants are aimed at encouraging companies, whose IR&D activities have not yet developed to the 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.

- Project Grants are aimed at encouraging established companies to undertake IR&D projects to develop new or substantially improved processes and products. Project grants up to $750 000 (taxable) per annum per company or group of related companies may be paid by the Australian Industrial Research and Development Incentives Board in support of specific projects submitted by companies. A project grant has definite objectives, a specified time scale and in general it is not intended to cover open ended or ongoing research and development tasks. Agreements between the Board and applicant companies may be concluded up to 30 June 1989 for projects which will commence not later than 1 July 1986. Successful applicants for project grants are required to undertake to exploit the results of IR&D concerned (assuming the project is successful) for the benefit of the Australian economy.

. 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 the 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 under 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. See also Appendix 5.

The Department is responsible for managing Australia's involvement in the Association for Science Cooperation in Asia (ASCA). Australia is presently involved in ASCA projects which include a study of improved sun drying of food, a study of marine resources throughout the Indo-Pacific region, and a Science and Technology Information Registry on policy and planning.

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

. Invention and innovation

The Department encourages development of new enterprises based on Australian innovation through:

- the Assistance to Inventors Scheme, which provides grants of up to $10 000 where appropriate to assist private inventors in the development of pre-production prototypes;

- supporting innovation centres, to promote greater interaction between individual inventors and manufacturers;

- sponsoring adventure workshops in innovation and entrepreneurship, for graduates in commercial and technological disciplines, which provide practical experience in the commercial exploitation of Australian inventions; and

- assisting the formation of new technology-based firms, using guidance committees to develop corporate strategies and to bring together financial and complementary skills.

. Ionospheric Prediction Service

The Ionospheric Prediction Service provides assistance and advice in support of planning and maintaining HF radio communications mainly through the distribution of long-term operational radio predictions and short-term forecasts of the state of the sun, the earth's upper atmosphere and magnetic field. Eight ionospheric stations and three solar observatories, radio and optical, record and analyse data from which future radio communications conditions can be forecast. The Service is responsible for exchanging solar-terrestrial data with international organisations and, in particular, exchanges data by agreement with the USA and the Peoples Republic of China. IPS is also joint manager of the US-Australia solar observatory at Learmonth, W.A.

. National Nuclear Magnetic Resonance Centre

The Centre, established in 1975, is an independent national research facility located within the grounds of the Australian National University. It has 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.

. Patent, Trade Marks and Designs Office

The Patent 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 patent application and renewal fees, from fees for the registration of trade marks and designs, and from the sale of publications.

. Productivity Improvement

The Productivity Development Division of the Department of Science and Technology undertakes a range of programs in productivity development, technology transfer, technological development and innovation that form essential elements of the Government's industrial development policy. They include:

- programs aimed at bringing together representatives of industry, trade unions and government to examine industry sector problems and develop solutions;

- general programs aimed at developing the role of Industry Associations, improving occupational safety, and improving management techniques;

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

  . development and extension of practical technology transfer mechanisms;

  . development and adoption of more effective information handling systems;

  . use of a common technical cataloguing language (AUSLANG);

  . improvement in quality control; and

- physical distribution programs aimed at improving efficiency in the distribution of products and materials. (The National Materials Handling Bureau provides advice to industry on packaging and materials handling, and arranges an annual exhibition and seminars (MATPAK) in conjunction with industry).

The Department's Working Environment Division aims to stimulate the development of a working environment in which people contribute to optimal productivity performance through deriving job satisfaction in occupations for which they are effectively trained, in surroundings that are attractive, healthy and safe. Through policy development, research, publication, dissemination, training programs and advisory activities, the Division seeks to raise awareness and stimulate positive action designed to improve both productivity and quality of work life and to encourage organisational effectiveness and adaptability.

- The Human Relations Program covers research, documentation and advisory activities in the fields of personnel practices, advanced management systems and employee participation.

- The Physical Working Environment Program covers engineering and architectural aspects of the working environment, including uniform standards and uniform safety policies in collaboration with State Labour Departments.

Following decisions of the Review of Commonwealth Functions the Division's activities are to be scaled down and those remaining are to be transferred to the Department of Industrial Relations.

. Productivity Promotion Council of Australia (PPCA)

The Department provides executive and program support services to PPCA in raising awareness in the community of the meaning and importance of productivity, the development and implementation of training programs and projects including extension and development of the Productivity Groups Networks, and the provision of information and advisory services. Following decisions of the Review of Commonwealth Functions, Departmental support services to the PPCA are to be progressively withdrawn and the future level of Commonwealth funding of the Council is to be reviewed.

. Research Grants and Fellowships

- Australian Research Grants Scheme (scientific research)

Total amounts of $16 million and $17.98 million were allocated to individual research scientists for the calendar years 1981 and 1982 respectively under the Australian Research Grants Scheme. The Government agreed to maintain the existing level of operation of the Scheme which operates under the Department's administration to stimulate basic and applied research of the highest excellence in non-government institutions.

- Queen Elizabeth II Fellowships (post doctoral fellowships)

About 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.

- Queen's Fellowships (post doctoral fellowships in marine science)

About three or four junior fellowships are awarded each year. These are tenable for two years. There is also provision for short-term support of senior fellows.

- Marine Sciences and Technologies Research Grants Scheme (marine research)

The Government has decided to make particular provision for research in the marine sciences and technologies. The decision to provide these funds stemmed from government consideration of a report by ASTEC entitled 'Marine Sciences and Technologies in Australia - Immediate Issues'.

. Space and Upper Atmosphere Activities

- Balloon launching: The Department previously maintained the Australian Balloon Launching Station at Mildura, Victoria. Experiments conducted during balloon flights are designed to perform a range of atmospheric sampling, infrared and gamma ray astronomy and cosmic particle detection. The Station has now been closed.

- Landsat station: The Australian Landsat Station consists of the Data Acquisition Facility (DAF) located at Alice Springs, which receives and records data from NASA's Landsat series of earth resources satellites, and the Data Processing Facility (DPF) at Canberra where this data is sent for processing into images and computer compatible tapes for clients.

- 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.

. Technology Transfer Network

The Technology Transfer Council (TTC) has been established as a private company, initially funded by the Government, to assist companies to select and apply technology which is up-to-date and appropriate to their needs.

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 galactic and extra-galactic phenomena.

Australian Institute of Marine Science (AIMS)

At this stage in its development AIMS is concentrating its studies on fundamental research on the Great Barrier Reef province. The importance of the Great Barrier Reef is widely recognised in Australia and internationally. It is unique in size, in the diversity of organisms and in the complexity of its ecosystem. Australia's policy is directed towards high priority research on the overall dynamics of the reef system and the waters which influence it.

Commonwealth Scientific and Industrial Research Organization (CSIRO)

CSIRO was established as a statutory corporation under the Science and Industry Research Act 1949, succeeding the Council for Scientific and Industrial Research which was formed in 1926. The Act was last amended in 1978, following consideration by the Government of a report based on a major independent public inquiry.

In summary, the functions of the Organization 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 responsible for CSIRO;
- to encourage and facilitate the application and utilisation of its 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, develop, maintain, 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.

. Main Role

The main role of CSIRO is to plan and execute a comprehensive program of general scientific research on behalf of the Commonwealth. By convention, CSIRO does not undertake defence research in peacetime and, since the creation of a separate Australian Atomic Energy Commission, it has not undertaken research in direct support of the possible establishment of a nuclear power industry in Australia. Further, the Organization's research aimed at promoting human health does not include work in clinical medicine. With these main exceptions, however, the research work of CSIRO includes all fields of the physical and biological sciences, and their applications.

The types of research undertaken range from fundamental studies through to experimental development, with the main concentration being in "strategic mission-oriented" research. This was the term used by the Independent Inquiry into CSIRO to describe research undertaken for a national purpose and involving work at the boundaries of scientific knowledge. It includes both fundamental work in areas of major importance to the Australian economy and to Australia's national and international obligations, and the application of advanced scientific knowledge and techniques to the solution of defined national problems. The transfer to potential users in Australia of results is seen as an essential component of each CSIRO research program.

. General Policies

The Commonwealth's role in scientific research tends to be concentrated towards work of broad application and hence towards the fundamental end of the research and development spectrum. It does not perform research and development in support of economic growth which could and should be undertaken by industry. Instead it has, through CSIRO, concentrated its efforts on infrastructure support for industry, such as research relating to physical standards, plant and animal biology, physical and chemical processes, and properties of materials. Research is aimed at benefiting wide sections of industry and, as such, tends not to be of a kind which could be undertaken profitably by individual companies.

. Consultative Mechanisms

An Independent Advisory Council comprising senior representatives of industry, government, tertiary education, and community interests, advises the Executive of CSIRO.

The Advisory Council is assisted in this task by committees in each State which include representatives of State Governments.

ASTEC, the Australian Science and Technology Council, has a responsibility to provide advice which will assist the Government in encouraging Australian science and technology to meet the nation's needs and objectives, but it has no executive responsibilities. Advice from ASTEC is a valuable input to CSIRO's planning processes, and helps particularly in the identification of national needs and their relative priorities. ASTEC 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.

. Organization

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, headed respectively by Chiefs and Officers-in-Charge. Divisions and Units are each responsible for a coherent set of research programs, the Units being responsible for narrower fields of research and having fewer staff.

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 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, the quality and safety of human foods, and at obtaining a better understanding of the relationships between human health and diet.

The Institute's activities include research on:

. control of 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.

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 Human Nutrition
Division of Tropical Animal Science
Project for Animal Research and Development
Molecular and Cellular Biology Unit
Wheat Research Unit.

- Institute of Biological Resources

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 utilization 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.

The Institute comprises the following Divisions:

Division of Entomology
Division of Forest Research
Division of Horticultural Research
Division of Irrigation Research
Division of Land Use Research
Division of Land Resources Management
Division of Plant Industry
Division of Soils
Division of Tropical Crops and Pastures
Division of Wildlife Research.

- The Institute of Energy and Earth Resources

The Institute conducts scientific and technological research relating to the more effective definition, utilization and management of Australia's energy and earth resources.

The Institute's activities include research on:

. locating, evaluating, defining and characterizing Australia's energy and earth resources; and

. planning their recovery, development and effective use consistent with the minimisation of environmental stresses.

The Institute comprises the following Divisions and Units:

Division of Applied Geomechanics
Division of Energy Chemistry
Division of Energy Technology
Division of Fossil Fuels
Division of Mineral Chemistry
Division of Mineral Engineering
Division of Mineral Physics
Division of Mineralogy
Physical Technology Unit.

- Institute of Industrial Technology

The Institute conducts scientific and technological research and development aimed at increasing the efficiency, competitiveness and scope of Australian secondary and tertiary industries in relation to both national and international markets.

The Institute's activities include research on:

. purification of water and waste waters;

. industrial microbiology;

. substitute liquid fuels;

. novel processes and products for application in industry and agriculture;

. utilisation of forest and other lignocellulose resources;

. building and design of urban communities;

. safety and comfort in both domestic and industrial environments;

. properties and usefulness of wool as a textile fibre; and

. new and improved technology in metals manufacturing.

The Institute comprises the following Divisions:

Division of Applied Organic Chemistry
Division of Building Research
Division of Chemical Technology*
Division of Manufacturing Technology
Division of Protein Chemistry
Division of Textile Industry
Division of Textile Physics.

- Institute of Physical Sciences

The Institute conducts scientific and technological research in the physical, chemical and mathematical sciences aimed at meeting the needs of Australian industry and increasing understanding of the physical environment.

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 communications;

. the physical and chemical oceanography of the Australian marine environment, including air-sea interaction;

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* The Division of Chemical Technology will close in 1982 and a Division of Cellulose Research and an Industrial Microbiology Unit will be formed.

. application of mathematics and statistics to problems in industry and science; and

. development of advanced computer operating systems and the provision of a central computing service.

The Institute comprises the following Divisions and Units:

Division of Applied Physics
Division of Atmospheric Physics
Division of Chemical Physics
Division of Cloud Physics
Division of Computing Research
Division of Environmental Mechanics
Division of Materials Science
Division of Mathematics and Statistics
Division of Oceanography
Division of Radiophysics
Australian Numerical Meteorology Research Centre.

A Bureau of Scientific Services, headed by a Director, provides a range of services which include:

- providing scientific and technical information and publishing, library and data base services for CSIRO and the community;

- communicating information about CSIRO and its research to a variety of audiences, both technical and non-technical;

- encouraging the adoption of CSIRO technical know-how, inventions and technology in industry by the use of patents and licences, contracting out of Research and Development, making grants and arranging technical conferences; and

- planning, coordinating and evaluating CSIRO's involvement in technical assistance programs in developing countries.

The Bureau comprises the following units:

- Central Information, Library and Editorial Section (CILES);

- Centre for International Research Co-operation (CIRC);

- Commercial Group; and

- Science Communication Unit.

. Finance

Following the Independent Inquiry into CSIRO, the Government decided in 1978 that CSIRO should continue to be financed, in the main, by a specific Government vote, and that research of general interest to the Commonwealth Government should be funded, as far as possible, through the budgetary appropriation to CSIRO. It also decided that the Organization should not have as its principal aim the generation of revenue, either to support its research or as a direct return for results achieved in research. CSIRO should continue to compete for Rural Industry Research Funds, provided they did not become a major component of support for research relating to the particular rural industries concerned.

. Distribution of Research Effort

In the table which follows, CSIRO research is grouped into a number of socio-economic headings. *The* classification accords with the primary purpose for which the research was carried out and no attempt has been made to apportion programs which contribute to more than one objective. Against these socio-economic headings, the actual expenditure (or project expenditure for 1981-82) 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. Caution must be exercised in making comparisons between years because the classification system is still being developed and, more importantly, expenditure on major capital facilities can radically affect apparent priorities.

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 Administrative Services (including the $118 million Australian National Animal Health Laboratory).

. Estimates 1981-82

In projecting 1981-82 figures, allowance has been made for CSIRO's liability for employer's share of superannuation (commencing in 1981-82 with provision for $29 million), and for salary expenditure for an additional pay day which falls in that year. Some sections of the Australian Atomic Energy Commission Research Establishment at Lucas Heights will transfer to CSIRO during 1981-82 but projected expenditure for these groups has not been included in CSIRO's figures and remains in the Commission's entry under the Ministry of National Development and Energy.

CSIRO Expenditure

($ million)	1978-79	1979-80	1980-81	Projected 1981-82
A. RURAL INDUSTRIES				
Agriculture				
. Plant Improvement	3.605	4.089	5.360	6.717
. Plant Physiology & Biochemistry	4.195	4.547	4.171	5.289
. Soil Fertility & Plant Nutrition	4.169	4.939	5.987	7.513
. Agricultural Systems	7.670	8.210	6.727	9.729
. Management of Crop & Pasture Pests & Diseases	5.645	6.222	6.592	9.158

($ million)	1978-79	1979-80	1980-81	Projected 1981-82
. Livestock Production	11.661	16.586	17.138	19.014
. Livestock Health	19.842	31.055	45.537	50.325
. Agricultural Engineering	.586	.741	.675	-
TOTAL (Agriculture)	57.373	76.389	92.187	107.745
Forestry				
. Production	3.547	3.756	4.133	5.299
. Management	2.930	3.271	3.316	4.743
. Harvesting	.483	.667	.603	.768
TOTAL (Forestry)	6.960	7.694	8.052	10.810
Fishing				
. Resource Assessment	4.410	6.411	7.223	10.464
TOTAL - RURAL INDUSTRIES	68.743	90.494	107.462	129.019
B. MINERAL, ENERGY AND WATER RESOURCES				
Mineral resources				
. Exploration	4.095	4.290	6.130	7.797
. Mining and Beneficiation	5.611	5.986	6.313	8.081
. Environment	.753	.737	1.068	1.377
TOTAL (Mineral resources)	10.459	11.013	13.511	17.255
Energy resources				
. Coal	3.813	4.018	5.344	6.507
. Petroleum and Oil Shale	.434	.651	.996	1.216
. Substitute Liquid Fuels	4.330	6.379	6.893	9.962
. Renewable Energy	1.424	1.911	3.604	4.477
. Energy Storage and Conservation	.797	1.057	2.121	2.591
TOTAL (Energy resources)	10.798	14.016	18.958	24.753

($ million)	1978-79	1979-80	1980-81	Projected 1981-82
Water resources				
. Water Management	2.689	3.293	3.842	4.876
. Water Technology	1.027	.997	1.670	3.438
TOTAL (Water resources)	3.716	4.290	5.512	8.314
TOTAL - MINERAL, ENERGY AND WATER RESOURCES	24.973	29.319	37.981	50.322
C. MANUFACTURING INDUSTRIES				
Resource-based manufacturing industries				
. Food Processing	10.322	11.078	11.875	14.611
. Textiles	10.232	10.189	11.087	14.055
. Hides and Leather	.447	.520	.889	1.128
. Forest Products	2.391	2.667	3.515	6.231
. Basic Metal Products	2.175	2.360	2.703	3.426
TOTAL (Resource-based manufacturing industries)	25.567	26.814	30.069	39.451
Small technology-intensive industries				
. Electrical & Electronic Equipment and Instruments	2.870	3.157	3.524	4.441
. Advanced Materials	1.920	2.391	2.852	3.524
. Specialty Polymers	1.173	.910	.870	1. 086
. Chemical, Pharmaceutical and Veterinary Products	3.454	4.394	4.833	6.073
TOTAL (small technology-intensive industries)	9.417	10.852	12.079	15.124
Industrial machinery and equipment				
. Materials Processing Technology	2.266	2.207	2.940	3.481
Standards				
. Physical & Mechanical Quantities	2.130	2.349	2.574	3.270
. Electrical Quantities	2.998	3.189	3.366	4.260
. Thermal and Optical Quantities	2.376	2.462	2.793	3.542

($ million)	1978-79	1979-80	1980-81	Projected 1981-82
. Properties of Solids, Liquids and Gases	1.842	1.945	2.072	2.642
TOTAL (Standards)	9.346	9.945	10.805	13.714
TOTAL – MANUFACTURING INDUSTRIES	46.596	49.818	55.893	71.770
D. COMMUNITY INTERESTS				
Knowledge and management of the natural environment				
. Fauna	5.673	6.170	7.087	8.817
. Flora	1.471	1.621	1.656	2.102
. Land	8.676	9.239	11.478	14.689
. Oceans	3.089	2.406	2.613	7.684
. Atmosphere	4.298	4.488	5.024	6.516
. Environmental Protection	2.692	2.575	2.728	3.525
. Astronomy	4.973	5.480	5.986	7.765
TOTAL (Knowledge and management of the natural environment)	30.872	31.979	36.572	51.098
Tertiary industry				
. Building and Construction	6.323	5.941	6.455	8.200
. Mathematics and Statistics	3.317	3.473	4.120	5.245
. Computing	3.947	5.547	5.825	7.031
. Information Services	.309	.341	.248	.310
TOTAL (Tertiary industry)	13.896	15.302	16.648	20.786
Public health				
. Human Nutrition	2.897	3.202	2.988	3.551
. Industrial Hygiene	.542	.694	.655	1.031
TOTAL (Public health)	3.439	3.896	3.643	4.582
TOTAL - COMMUNITY INTERESTS	48.207	51.177	56.863	76.466

($ million)	1978-79	1979-80	1980-81	Projected 1981-82
CSIRO TOTAL	188.519	220.808	258.199	327.577
TYPE OF EXPENDITURE				
Intramural Capital				
- indirect	19.931	33.804	44.938	52.200
- direct	12.905	16.994	17.369	22.459
Intramural Current				
- indirect	3.239	4.221	4.851	4.700
- direct (salaries)	110.896	118.697	138.289	183.823*
- direct (other)	39.627	45.258	50.784	62.992
Extramural	1.921	1.834	1.968	1.403

. High Priority Areas for Expansion and Other Initiatives by CSIRO

CSIRO is withdrawing resources selectively from areas of lower priority in order to undertake new initiatives; increasing its effort in areas designated as having high priority for expansion; and maintaining its activities in other areas. The rate at which this redeployment can proceed is determined by the rate at which resources can be freed from lower priority areas.

Priority areas for expansion are:

- oceanography;
- energy;
- manufacturing technology;
- land and water;
- biotechnology; and
- plant pathology.

Short notes on each of these priority areas are set out below.

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 will be 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 production. A marine laboratory complex is being established in Hobart at a cost of $10.75 million, and a 50 metre oceanographic vessel is to be built for operation by CSIRO as a national facility.

* Some $29m of the increased provision for salaries is due to a change in funding arrangements for the Commonwealth superannuation scheme.

Energy

A review of CSIRO's energy program in 1981 led to a revision of the statement of energy research policy. Top priority continues to be accorded to research which will delay the predicted fall in the supply of indigenous petroleum or alleviate its effect in the shorter term, and to research which will reduce in the longer term Australia's dependence on natural petroleum. The Government's decision to consolidate the Commonwealth's non-nuclear energy research activities in CSIRO led to the transfer, starting in September 1981, of the non-nuclear research activities and resources of the Atomic Energy Commission's Research Establishment. This move, together with internal rearrangements in CSIRO, has resulted in the formation of two new Divisions to spearhead the Organization's work in energy research: the Division of Energy Chemistry, and the Division of Energy Technology. The Division of Energy Chemistry will concentrate on chemical research directed towards the development of energy resources particularly relevant to Australia, such as the extraction of oil from shale and the exploitation of deep coal reserves. The Division of Energy Technology will concentrate on engineering aspects of energy research aimed at ensuring a balanced utilisation of Australia's energy resources. Initially this will cover the improvement of heat utilisation in industrial processes so as to reduce the use of liquid fuels for heat generation, and improving the engineering efficiency and mobility of Australia's surface transport systems.

Manufacturing Technology

A variety of measures have been introduced to increase the interaction between CSIRO and manufacturing, to encourage CSIRO staff to work more closely with the industry and to increase the likelihood of CSIRO research results being taken up by industry. In particular, CSIRO is enhancing its support for metal products manufacturing which accounts for some 45% of Australia's manufacturing industry - an area in which technological input can have a significant impact on a firm's competitive position. Other research being expanded to support manufacturing includes the development of advanced materials, more efficient welding equipment and robotics.

Land and Water

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 in order to improve the economics of the long-term use of these soils. This research will also assist with the proper management of scarce water resources, which is fundamental in meeting the multiplicity of agricultural, urban, industrial, mining and recreational demands placed upon them. The work includes the measurement, prediction and interpretation in water catchments; agricultural water management, including salinity, erosion and other problems typified by the River Murray; 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.

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 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, particularly the genetic improvement of plants and animals. Almost $4.5 million is being spent on this area at present. The first result of a new assessment of biotechnology has been the formation of a new Industrial Microbiology Unit as part of the Institute of Industrial Technology. This unit will concentrate on industrial rather than agricultural applications, in particular, microbial genetics, gene technology and industrial fermentations in relation to the utilisation of renewable raw materials and the treatment of wastes.

Plant Pathology

CSIR, the predecessor to CSIRO, was active in plant pathology research until state authorities developed their own research capacities in this field. But now, as more intractable problems arise from intensive agricultural practices, CSIRO has decided to expand its research on disease control in plants. Research approaches include novel disease identification methods, the introduction of new sources of disease resistance into breeding programs, disease management strategies and the study of disease organisms as components of complex ecological systems. Fields under investigation include plant viruses particularly in pastures and annual crops, soil-borne diseases, diseases of forest and woodland trees and diseases in new crops including those suitable for tropical areas.

Other initiatives

- VLSI (Very Large Scale Integrated Circuits)

The VLSI program is conducting research in the structured design of very large scale integrated electronic circuits, which have 100 000 devices per chip. Initial funding for the program is $1.5 million to allow it to be equipped to international standards. The objective is to establish within 3 years a state-of-the-art capability in VLSI design and applied microsystem architecture; as well as to demonstrate that VLSI chips can be designed locally, and fabricated remotely, in almost state-of-the-art technology.

- Project Aquarius

In September 1980 the Prime Minister announced that CSIRO would undertake a study to evaluate the use of aircraft for forest fire control.

CSIRO subsequently developed a program for the study named Project Aquarius, its objectives being to examine:

- the effectiveness of bombing fires of varying intensities with both water and fire retardent chemicals;
- the effectivess of conventional fire-fighting techniques under similar conditions; and
- a cost benefit analysis of forest and bushfires suppression in Australia.

The project, estimated to cost $3 million, is to be staged over three summers beginning in 1981-82. The final results of the project will be available in 1984 and should enable authorities to decide whether or not to employ aerial suppression techniques under a range of conditions. They will also be provided with data relevant to the performance and selection of aircraft appropriate to control bushfires in Australia.

- Australian National Animal Health Laboratory (ANAHL)

ANAHL is being built at Geelong in Victoria at an estimated cost of $118 million. Construction started' in March 1978 and following a Government decision to accelerate construction by one year, at a cost of $7 million, is due to be completed by March 1983. The facility is presently about two thirds complete.

ANAHL is a high security laboratory in which it will be possible to manipulate exotic diseases of animals without risk to Australian livestock. Its broad objective is to complement existing State and Commonwealth resources for the diagnosis, control and eradication of these diseases. Following its demonstration of full microbiological security in mid-1984, the Laboratory should be ready to meet any outbreak of exotic disease in Australia.

Metric Conversion Board (MCB)

The Metric Conversion Board's charter was to plan, guide and facilitate Australia's progressive conversion to the sole use of the metric system of measurement. Australia's metric conversion program is now substantially complete for the majority of activities, and the Board was consequently dissolved from 30 June 1981. Residual functions in relation to metric conversion are now shared between the Department of Science and Technology and the National Standards Commission.

National Standards Commission (NSC)

The National Standards Commission exists to establish the use of uniform units and standards of measurement of physical quantities. The Commission is responsible for the operation of the Pattern Examination Laboratory, which controls the quality of measuring instruments used for trading purposes in Australia.

SOCIAL SECURITY

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Social Security								
. Office of Child Care	S(c)	0.022*	0.053*	0.052	0.037	0.298*	0.386	0.279
. Studies on rehabilitation and services for the handicapped	S(c)	0.096	0.096	0.096	-	0.142	0.144	0.048
. Welfare research	S(b)	-	-	-	-	-	0.075	0.091
	S(c)	0.108	0.188	0.429	0.519	0.188	0.453	0.525
Total (Direct Commonwealth funding)		0.226	0.337	0.577	0.556	0.628	1.058	0.943

N Natural sciences and engineering
S Social sciences and humanities
(a) Intramural capital expenditure
(b) Intramural current expenditure
(c) Extramural expenditure
* estimated

Department of Social Security

The Department of Social Security provides grants to universities and other bodies for research into aspects of social welfare, including rehabilitation, services for the handicapped and child care.

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Transport								
. Airways facilities research	N(a)	0.600	0.700	0.800	0.700	0.700	2.400	2.100
	N(b)	0.200	0.220	0.240	0.270	0.220	0.720	0.810
	N(c)	0.125	0.110	0.100	0.235	0.110	0.100	0.235
. Regulation of air transport - Environment and security	S(b)	0.123	0.129	-	-	0.431	0.055	0.060
	S(c)	-	-	0.027	0.010	-	0.027	0.010
- Aviation medicine	N(c)	0.029	0.035	0.043	0.067	0.035	0.043	0.067
- Airworthiness	N(b)	0.020	0.020	0.020	0.020	0.020	0.020	0.020
	N(c)	0.045	0.060	0.069	0.061	0.060	0.074	0.061
. Major projects	N(b)	-	-	-	-	0.316	0.321	0.375
	N(c)	-	-	-	-	0.009	0.012	0.015
. Marine navigational aids	N(a)	0.023	0.050	-	-	0.050	-	-
	N(b)	0.095	0.110	-	-	0.110	0.040	0.014
	N(c)	-	-	-	-	-	0.001	0.001
. Office of Road Safety: Road safety and emissions research	S(b)	0.173	0.150	0.297	0.357	0.150	0.297	0.357
	S(c)	0.350	0.300	0.268	0.322	0.300	0.268	0.322
. Provision of meteoro-logical services	N(c)	-	-	-	-	9.010	11.889	12.912
. Transport evaluation and planning	S(b)	-	-	-	-	0.160	0.164	0.182
. Transport statistics and related information	S(b)	-	-	-	-	0.723	0.754	0.813
	S(c)	-	-	-	-	-	-	0.020
. Grants for transport planning and financial assistance	N(c)			0.500	0.326		4.250	0.810
	nS(c)	2.600	2.700	2.000	1.302	6.900	2.000	1.302
. Bureau of Transport Economics	S(a)	0.001	0.001	-	-	0.039	0.012	0.005
	S(b)	0.029	0.037	0.019	0.024	2.026	2.451	2.793
	S(c)	0.002	0.002	-	-	0.105	0.064	0.073
	N(b)	-	-	0.052	0.033	-	0.052	0.033
	N(c)	-	-	0.006	0.007	-	0.006	0.007
Total (Direct Commonwealth funding)		4.415	4.623	4.441	3.734	21.474	26.020	23.397

N Natural sciences and engineering S Social sciences and humanities

nS Includes significant component of natural sciences and engineering for 1978-79 and 1979-80

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

Department of Transport

. Airways facilities research

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 transport needs. This is exemplified by the Department's involvement in the development of the InterScan microwave landing system.

. 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 coordinates protective security and 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 a major research project into "crash protection" and a proposed program of research into catering for the capacities of colour defective observers without loss of safety, especially in respect of night flying.

- 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, engine failure and pilot fatigue.

. Major Projects

Major projects include studies on major airport needs in the Sydney region and Port Phillip district.

. 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.

. Transport evaluation and planning

Evaluation and planning activities include financial and economic assessment of airport/airway infrastructure investment proposals.

Transport Statistics and related information

The Department collects and compiles various statistics and other information relating to both air and sea transport activities in Australia.

. Office of Road Safety

The Office of Road Safety 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 Office of Road Safety also operates and maintains a Vehicle Emission and Energy Laboratory and conducts testing and research programs to enable the development of emission and energy policy.

. 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.

. Grants for transport planning and financial assistance

The Transport Planning and Research (Financial Assistance) Act 1977 provided for Commonwealth assistance to the States on a dollar for dollar basis for approved transport planning and research projects. Following the Review of Commonwealth Functions, the Commonwealth Government decided to discontinue the specific purpose assistance to the States for transport planning and research as from 30 June 1981. However, the Commonwealth is providing direct grants to the Australian Road Research Board (ARRB) and the Australian Railway Research and Development Organisation (ARRDO) in 1981-82 in lieu of the Commonwealth assistance previously provided through the States under the Transport Planning and Research Program.

Bureau of Transport Economics

The Bureau of Transport Economics (BTE) was established as a professional research body attached to the Department of Transport to undertake independent studies and investigations to assist the Commonwealth Government in the formulation of policy.

The BTE advises on the economic, technical and financial aspects of transport. Work undertaken to provide this advice includes:

- analysis of the nature, capacity, performance and financing of transport systems and their economic resource allocation implications;
- analyses of the effects of specific pricing and regulatory policies, including methods of rate and fare setting;
- evaluation of investment proposals and programs;
- collection, analysis and dissemination of information relating to transport activities; and
- development of transport planning and operations research techniques, analytical and evaluation methodology and inter-disciplinary approaches.

Increases in current expenditure reflect major project activity in road studies, the Transport Outlook Conference, and transport research information systems.

TREASURY

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of the Treasury								
. Econometric forecasting	S(b)	0.045	0.050	0.092	0.101	0.070	0.132	0.150
. Quantitative Studies	S(b)	-	-	-	-	0.023	0.016	0.018
. Australian Bureau of Statistics	S	0.004	0.010	0.229	0.092	0.527	11.130	4.205
	S(b)	1.545	1.796	2.316	2.605	63.514	76.669	106.690
Total (Budget sector)		1.594	1.855	2.637	2.798	64.134	87.947	111.063
B. Financial Enterprises sector								
Reserve Bank of Australia								
. Grant Schemes (Rural Credits and Economic and Financial Research)	SN(c)	1.065	1.199	1.149	1.965	1.199	1.149	1.965
	S(c)	.	.	0.235	0.135	.	0.235	0.135
. Studies of Australian financial system	S(b)	0.170	0.169	0.240	0.220	0.169	0.390	0.360
Total (Financial Enterprises sector)		1.235	1.368	1.624	2.320	1.368	1.774	2.460
Total (Direct Commonwealth funding)		2.829	3.223	4.261	5.117	65.502	89.721	113.522

N Natural sciences and engineering S Social sciences and humanities

SN Includes some social sciences and humanities for 1978-79 and 1979-80

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

Department of the Treasury

The Quantitative Studies Section undertakes economic analysis of such issues as:

- the likely effects on the consumer price index of specified changes in industry price, indirect taxes and tariffs;

- availability of skilled workers and other labour market matters;
- aspects of resource development;
- investment and profitability measures; and
- influences on wage and productivity growth.

The Forecasting Unit is developing the National Income Forecasting Econometric (NIF) model 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 the statistical operations of official bodies to ensure the attainment of statistical compatibility and integration, the avoidance of duplication, the compliance with standards, and the maximum utilisation of information, and to provide advice and assistance on statistical matters.

All ABS activities are regarded as S&T activities (predominantly data collection in the social sciences). In particular the ABS has the responsibility for the conduct of triennial general R&D surveys in support of the Department of Science and Technology's Project SCORE and the triennial energy R&D survey.

The movement in capital expenditure reported by the ABS is due to the purchase of new computer equipment. The strong increase in current expenditure is due mainly to expenditures associated with the processing of the 1981 Census of Population and Housing between 1980-81 and 1981-82.

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, most of this work being carried out in Australian universities; and
- 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 being universities, state departments of agriculture and the CSIRO.

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
A. Commonwealth Budget sector net expenditure								
Department of Veterans' Affairs								
. Central Development Unit	N(b)	0.115	0.127	0.129	0.142	0.127	0.129	0.142
Central Medical Research Advisory Committee	N(a)	0.038	0.029	0.042	0.040	0.029	0.042	0.040
	N(b)	0.205	0.244	0.232	0.274	0.244	0.232	0.274
Total (Direct Commonwealth funding)		0.358	0.400	0.402	0.456	0.400	0.402	0.456

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. Research proposals supported by the Department must have a potential value in the tracing of causes and nature of disability, assessing incapacity and providing or modifying treatment.

. Central Development Unit

The Unit follows a continuous program of research into methods 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.

FURTHER DISSECTIONS OF AGGREGATE EXPENDITURES

A. Expenditure by Ministry

Table 7: Intramural Commonwealth Government expenditure on S&T by ministry, showing agencies with major R&D performance

($ million)	R&D				S&T (including R&D)		
	78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Aboriginal Affairs	0.70	0.60	0.59	0.01	2.12	2.25	1.75
Administrative Services	-	-	-	-	-	0.01	0.04
Attorney-General's	1.29	1.47	1.87	2.31	2.28	2.84	3.35
Business & Consumer Affairs	0.18	0.16	0.21	0.24	0.16	0.21	0.24
Capital Territory	0.39	0.42	0.30	0.33	3.99	3.16	3.15
Communications							
. Telecom	26.3	27.0	35.6	32.7	49.9	62.2	65.2
. Other	0.62	0.72	0.79	0.76	1.41	1.58	1.67
Defence	85.47	91.96	105.49	117.90	124.20	135.78	147.09
Education	1.75	1.88	1.36	1.14	1.92	1.46	1.19
Employment and Youth Affairs	0.06	0.31	0.59	0.84	0.31	0.95	1.59
Foreign Affairs	-	-	-	-	1.4	1.7	1.8
Health							
. Aust. Radiation Lab.	2.30	1.88	1.78	2.13	2.57	2.67	3.10
. Commonwealth Inst. of Health	0.47	1.66	2.19	2.22	2.41	3.05	3.20
. Commonwealth Serum Lab.	2.85	3.50	3.22	3.21	3.50	3.87	3.84
. National Biol. Standards Lab.	1.68	1.87	2.29	2.29	3.92	5.06	4.77
. Other	2.01	2.00	2.42	4.35	3.49	3.53	6.40
Home Affairs and Environment							
. Supervising Scientist	0.81	1.68	3.03	4.27	1.68	3.03	4.27
. Other	0.16	0.13	0.10	0.13	10.86	12.71	13.70
Housing and Construction	2.57	2.82	2.32	2.51	74.92	79.36	76.68
Immigration & Ethnic Affairs	0.10	0.12	0.16	0.12	0.56	1.74	2.76
Industry and Commerce	0.61	0.77	1.08	1.41	5.34	6.17	7.11
National Development & Energy							
. AAEC	14.61	16.73	19.99	23.83	27.54	28.37	34.76
. BMR	7.42	7.79	9.21	12.87	13.07	15.28	20.02
. Other	-	-	-	-	8.45	11.14	12.22
Primary Industry	1.20	1.33	1.52	1.58	44.29	49.58	60.30
Prime Minister and Cabinet	-	-	-	-	0.91	0.95	1.21
Science and Technology							
. AATB (Australian funds only)	1.04	1.03	1.64	1.76	1.03	1.64	1.76
. Antarctic Division	7.19	11.78	16.59	17.88	20.23	22.64	23.14
. AIMS	2.80	3.58	5.22	5.82	3.58	5.22	5.82
. CSIRO	163.56	191.05	224.03	287.36	199.02	231.15	298.36
. Other	0.62	0.55	0.81	0.75	54.66	62.57	66.67
Social Security	-	-	-	-	-	0.08	0.09
Transport	4.67	4.88	1.43	1.40	4.95	7.29	7.56
Treasury							
. ABS	1.55	1.81	2.55	2.70	64.04	87.80	110.89
. Other	0.22	0.22	0.33	0.33	0.26	0.54	0.53
Veterans' Affairs	0.36	0.40	0.40	0.46	0.40	0.40	0.46
Total (Direct Commonwealth funding of intramural expenditure)	332.0	378.8	449.1	535.5	739.8	858.1	996.6

Table 8: Extramural Commonwealth Government expenditure on S$T by ministry, showing major R&D grants programs

($ million)	R&D				S&T (including R&D)		
	78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Aboriginal Affairs	0.68	0.62	0.56	0.61	1.08	1.04	1.10
Administrative Services	0.03	0.12	0.19	0.19	0.16	0.23	0.29
Attorney-General's	0.06	0.07	0.33	0.38	0.07	0.33	0.38
Business & Consumer Affairs	-	-	-	-	-	-	-
Capital Territory	0.03	0.01	0.02	-	0.48	0.64	0.40
Communications	0.49	0.52	0.94	1.77	0.55	1.08	1.93
Defence	0.40	0.37	0.40	0.41	6.05	6.86	13.06
Education							
. Post-graduate awards	8.00	7.58	7.76	8.69	8.48	8.81	9.78
. Special Research Grants	64.3	69.0	75.8	84.0	69.0	75.8	84.0
. Other	2.24	2.08	2.43	2.37	2.08	2.75	2.94
Employment and Youth Affairs	-	-	0.01	0.11	-	0.03	0.20
Foreign Affairs							
. ADAB	n.a.	8.3	12.5	17.3	39.2	53.5	58.6
. Other	0.05	0.05	0.38	0.37	0.61	1.23	1.16
Health							
. NH&MRC	13.18	14.00	18.70	23.80	14.00	18.70	23.80
. Other	0.40	0.64	0.61	2.40	2.46	2.60	4.47
Home Affairs and Environment	0.57	0.73	0.81	0.78	4.59	4.79	2.12
Housing and Construction	0.36	0.36	0.39	0.41	2.67	3.04	3.67
Immigration & Ethnic Affairs	0.20	0.33	0.36	0.31	0.34	0.71	0.82
Industry and Commerce	-	-	0.01	0.10	0.03	0.05	0.15
National Development & Energy							
. Energy R, D&D grants	4.00	5.19	6.35	6.99	5.19	7.00	7.70
. Other	1.17	1.41	1.91	2.20	11.14	11.99	12.47
Primary Industry	1.20	1.33	1.52	1.58	44.29	49.58	60.30
. Rural Research	9.39	12.33	15.39	17.71	13.50	16.29	18.76
. Other	4.26	2.45	2.32	0.54	6.33	6.77	1.65
Prime Minister and Cabinet	0.04	0.04	0.06	0.06	0.16	0.22	0.25
Science and Technology							
. AIRDIB	22.50	29.95	45.71	43.18	29.95	45.71	43.18
. AMSTAC-FAP	-	0.39	2.00	1.90	0.39	2.00	1.90
. ARGC	12.30	12.80	14.49	16.99	12.80	14.49	16.99
. Research Association grants	0.87	0.78	0.88	1.23	0.78	0.88	1.23
. Other	1.76	2.01	2.03	2.58	16.31	16.51	17.04
Social Security	0.23	0.34	1.61	1.31	0.63	1.68	1.36
Transport	3.15	3.21	3.01	2.33	16.53	18.73	15.84
Treasury							
. Reserve Bank grants	1.07	1.20	1.38	2.10	1.20	1.38	2.10
Veterans' Affairs	-	-	-	-	-	-	-
Total (Direct Commonwealth funding of extramural expenditure)	151.7	176.6	218.4	242.6	266.7	325.1	348.8

Table 9: Intramural Commonwealth Government expenditure on S&T by ministry, natural sciences and engineering

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Aboriginal Affairs	(a)	0.11	0.15	0.23	-	0.15	0.23	-
	(b)	0.59	0.45	0.35	-	0.45	0.35	-
Administrative Services	(a)	-	-	-	-	-	-	-
	(b)	-	-	-	-	-	0.01	0.04
Attorney-General's		-	-	-	-	-	-	-
Business & Consumer Affairs		-	-	-	-	-	-	-
Capital Territory	(a)	..	..	0.01	..	0.60	0.34	0.08
	(b)	0.30	0.31	0.22	0.24	2.87	2.31	2.52
Communications	(a)	1.9	2.2	8.0	5.9	4.1	10.4	9.5
	(b)	24.98	25.54	28.35	27.48	47.23	53.42	57.33
Defence	(a)	6.80	9.25	7.80	9.13	23.18	14.54	12.12
	(b)	78.66	82.71	97.70	108.77	101.01	121.24	134.97
Education		-	-	-	-	-	-	-
Employment and Youth Affairs		-	-	-	-	-	-	-
Foreign Affairs	(a)	-	-	-	-	-	-	-
	(b)	-	-	-	-	1.1	1.3	1.3
Health	(a)	1.93	1.33	1.86	4.04	1.94	2.93	5.34
	(b)	7.38	9.56	10.04	10.16	13.84	15.38	15.97
Home Affairs and Environment	(a)	0.28	0.40	0.97	1.70	1.26	2.11	2.85
	(b)	0.57	1.34	2.07	2.59	3.35	4.57	5.96
Housing and Construction	(a)	1.30	0.34	0.32	0.30	18.18	16.18	9.43
	(b)	2.21	2.48	2.00	2.21	56.74	63.18	67.25
Immigration & Ethnic Affairs		-	-	-	-	-	-	-
Industry and Commerce	(a)	..	..	-	-	1.06	0.59	0.92
	(b)	0.04	0.04	0.03	0.04	3.56	4.52	4.82
National Development and Energy	(a)	1.22	1.35	1.33	1.89	2.30	2.64	3.65
	(b)	20.81	23.17	27.87	34.80	46.76	52.16	63.35
Primary Industry	(a)	0.01	0.04	0.01	0.03	0.04	0.04	0.53
	(b)	0.31	0.43	0.62	0.56	39.54	44.09	53.67
Prime Minister and Cabinet	(a)	-	-	-	-	-	-	-
	(b)	-	-	-	-	0.40	0.55	0.75
Science and Technology	(a)	36.76	57.01	65.79	77.56	64.57	77.11	85.38
	(b)	138.89	145.71	176.83	229.15	208.75	251.30	315.44
Social Security		-	-	-	-	-	-	-
Transport	(a)	0.62	0.75	0.80	0.70	0.75	2.44	2.11
	(b)	0.32	0.35	0.31	0.32	0.67	1.11	1.24
Treasury		-	-	-	-	-	-	-
Veterans' Affairs	(a)	0.04	0.03	0.04	0.04	0.03	0.04	0.04
	(b)	0.32	0.37	0.36	0.42	0.37	0.36	0.42
Total (Direct Commonwealth funding)		321.5	366.7	433.9	518.2	644.8	732.4	843.0

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

Table 10: Extramural Commonwealth Government expenditure on S&T by ministry, natural sciences and engineering

($ million)	R&D				S&T (including R&D)		
	78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Aboriginal Affairs	-	-	-	-	0.09	0.10	0.10
Administrative Services	0.03	0.12	0.19	0.19	0.15	0.22	0.25
Attorney-General's	-	-	-	-	-	-	-
Business & Consumer Affairs	-	-	-	-	-	-	-
Capital Territory	0.03	0.01	0.02	-	0.43	0.41	0.32
Communications	0.49	0.52	0.94	1.73	0.55	1.08	1.89
Defence	0.40	0.37	0.40	0.41	6.05	6.86	13.06
Education	50.7	53.8	58.7	65.1	54.3	59.4	65.8
Employment and Youth Affairs	-	-	-	-	-	-	-
Foreign Affairs	0.01	8.3	11.2	14.4	31.3	41.3	43.7
Health	12.94	13.88	18.62	25.53	15.70	18.62	25.53
Home Affairs and Environment	0.56	0.72	0.79	0.77	4.52	4.69	2.01
Housing and Construction	0.36	0.36	0.39	0.41	2.67	3.04	3.67
Immigration & Ethnic Affairs	-	-	-	-	-	-	-
Industry and Commerce	-	-	-	-	0.03	0.02	0.02
National Development & Energy	5.12	6.53	8.16	8.97	16.22	18.85	19.60
Primary Industry	13.40	14.16	17.10	17.90	19.19	22.44	20.06
Prime Minister and Cabinet	0.03	0.03	0.05	0.05	0.03	0.05	0.09
Science and Technology	34.94	43.33	62.14	61.97	57.49	76.47	76.27
Social Security	-	-	-	-	-	-	-
Transport	0.72	0.75	0.72	0.70	13.96	16.38	14.11
Treasury	0.88	1.00	1.15	1.83	1.00	1.15	1.83
Veterans' Affairs	-	-	-	-	-	-	-
Total (Direct Commonwealth funding)	120.8	145.6	180.5	200.0	223.6	271.1	288.7

Table 11: Intramural Commonwealth Government expenditure on S4T by ministry, social sciences and humanities

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Aboriginal Affairs	(a)	-	-	-	-	0.03	0.16	0.14
	(b)	-	-	0.02	0.01	1.49	1.52	1.61
Administrative Services		-	-	-	-	-	-	-
Attorney-General's	(a)	0.01	..	0.02	0.12	0.02	0.03	0.16
	(b)	1.28	1.47	1.85	2.19	2.25	2.81	3.20
Business & Consumer Affairs	(a)	-	-	..	-	-	..	-
	(b)	0.18	0.16	0.21	0.24	0.16	0.21	0.24
Capital Territory	(a)	-	-	-	-	-	-	-
	(b)	0.10	0.10	0.07	0.09	0.53	0.52	0.56
Communications	(a)	-	-	-	-	-	-	-
	(b)	-	-	-	0.01	-	-	0.01
Defence		-	-	-	-	-	-	-
Education	(a)	..	-	-	-	-	-	-
	(b)	1.75	1.88	1.36	1.36	1.92	1.46	1.19
Employment and Youth Affairs	(a)	-	-	-	0.06	-	-	0.06
	(b)	0.06	0.31	0.59	0.78	0.31	0.95	1.53
Foreign Affairs	(a)	-	-	-	-	-	-	-
	(b)	0.05	0.05	-	-	0.3	0.4	0.4
Health		-	-	-	-	-	-	-
Home Affairs and Environment	(a)	..	..	-	0.03	1.24	1.41	1.38
	(b)	0.13	0.06	0.09	0.08	6.69	7.66	7.77
Housing and Construction		-	-	-	-	-	-	-
Immigration & Ethnic Affairs	(a)	-	-	-	-	-	0.22	0.58
	(b)	0.10	0.12	0.16	0.12	0.56	1.52	2.18
Industry and Commerce	(a)	-	-	-	-	-	-	-
	(b)	0.56	0.72	1.05	1.37	0.72	1.05	1.37
National Development and Energy		-	-	-	-	-	-	-
Primary Industry	(a)	-	-	-	-	0.04	0.03	0.06
	(b)	0.89	0.87	0.90	0.99	4.68	5.42	6.05
Prime Minister and Cabinet	(a)	-	-	-	-	-	-	-
	(b)	-	-	-	-	0.34	0.40	0.46
Science and Technology	(a)	0.44	0.78	1.20	1.21	0.77	1.20	1.21
	(b)	3.11	4.49	4.48	5.65	5.15	6.65	7.93
Social Security	(a)	-	-	-	-	-	-	-
	(b)	-	-	-	-	-	0.08	0.09
Transport	(a)	..	..	-	-	0.04	0.01	0.01
	(b)	0.33	0.32	0.32	0.38	3.49	3.72	4.21
Treasury	(a)	..	0.01	0.23	0.09	0.53	11.13	4.20
	(b)	1.76	2.02	2.65	2.93	63.78	77.21	107.22
Veterans' Affairs		-	-	-	-	-	-	-
TOTAL (Direct Commonwealth funding)		10.54	12.07	15.19	17.49	95.0	125.8	153.8

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

Table 12: Extramural Commonwealth Government expenditure on S&T by ministry, social sciences and humanities

($ million)	R&D				S&T (including R&D)		
	78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Aboriginal Affairs	0.68	0.62	0.56	0.61	0.99	0.95	1.00
Administrative Services	-	-	-	-	0.02	0.02	0.04
Attorney-General's	0.06	0.07	0.33	0.38	0.07	0.33	0.38
Business & Consumer Affairs	-	-	-	-	-	-	-
Capital Territory	-	-	-	-	0.05	0.23	0.09
Communications	-	-	-	-	-	-	-
Defence	-	-	-	-	-	-	-
Education	23.8	24.8	27.3	29.9	25.2	28.0	30.9
Employment and Youth Affairs	-	-	0.01	0.11	-	0.03	0.20
Foreign Affairs	0.04	0.1	1.8	3.4	8.5	13.5	17.2
Health	0.64	0.76	0.77	0.85	0.76	2.67	2.73
Home Affairs and Environment	0.01	0.01	0.02	0.02	0.07	0.10	0.11
Housing and Construction	-	-	-	-	-	-	-
Immigration & Ethnic Affairs	0.20	0.33	0.36	0.31	0.34	0.71	0.82
Industry and Commerce	-	-	0.01	0.10	-	0.03	0.14
National Development & Energy	0.05	0.07	0.10	0.11	0.12	0.15	0.14
Primary Industry	0.25	0.63	0.61	0.34	0.66	0.62	0.36
Prime Minister and Cabinet	0.01	0.01	0.02	0.02	0.13	0.17	0.16
Science and Technology	2.50	2.61	2.97	3.90	2.74	3.11	4.07
Social Security	0.23	0.34	0.58	0.56	0.63	0.98	0.85
Transport	2.43	2.46	2.30	1.63	2.57	2.36	1.73
Treasury	0.18	0.20	0.24	0.27	0.20	0.24	0.27
Veterans' Affairs	-	-	-	-	-	-	-
Total (Direct Commonwealth funding)	31.0	32.9	37.8	42.5	43.1	54.0	60.2

B. R&D Expenditure by Socio-economic Objective

Table 13: Intramural Commonwealth Government expenditure on R&D in the natural sciences and engineering by socio-economic objective

Objective Category		1978-79	1979-80	($m) 1980-81	1981-82
National security					
. Defence	(a)	6.80	9.25	7.80	9.13
	(b)	78.66	82.73	97.73	108.80
Economic development					
. Agriculture	(a)	23.24	45.74	41.83	42.55
	(b)	26.96	25.30	42.87	56.43
. Other primary industries	(a)	1.77	2.07	0.86	2.02
	(b)	10.01	11.89	13.22	16.93
. Mining	(a)	2.62	1.81	2.20	2.81
	(b)	9.35	10.28	13.53	17.11
. Manufacturing	(a)	7.21	7.55	5.90	8.06
	(b)	29.28	30.87	40.39	52.78
. Construction	(a)	1.94	0.98	0.59	0.57
	(b)	6.42	7.18	7.13	9.00
. Energy	(a)	3.51	4.24	4.30	5.85
	(b)	19.00	21.54	27.60	36.36
. Transport	(a)	0.62	0.75	0.80	0.70
	(b)	0.41	0.42	0.31	0.32
. Communications	(a)	1.9	2.2	8.1	6.0
	(b)	25.07	25.64	28.37	27.50
. Economic services n.e.i.	(a)	1.75	2.08	1.12	2.56
	(b)	5.59	6.34	7.11	9.36
Sub-total	(a)	44.6	67.4	65.7	71.1
	(b)	132.09	139.46	180.53	225.78
Community welfare					
. Environment*	(a)	4.22	5.09	3.63	8.68
	(b)	21.50	21.16	27.17	35.23
. Health	(a)	3.47	3.10	2.44	4.62
	(b)	9.74	12.09	13.57	14.68
. Education		-	-	-	-
. Welfare		-	-	-	-
. Community services n.e.i.	(a)	..	..	..	..
	(b)	0.16	0.18	0.29	0.28
Sub-total	(a)	7.69	8.19	6.07	13.30
	(b)	31.40	33.43	41.03	50.19
Advancement of knowledge					
. General advancement of knowledge	(a)	3.82	6.44	7.60	7.77
	(b)	16.43	19.82	27.46	31.96
Total	(a)	62.9	91.3	87.2	101.3
	(b)	258.58	275.44	346.75	416.74

* Includes both "Environment" and "urban and regional planning" objectives.

Table 14: Extramural Commonwealth Government expenditure on R&D in the natural sciences and engineering by socio-economic objective

Objective Category	1978-79	1979-80	($m) 1980-81	1981-82
National security				
. Defence	0.40	0.37	0.40	0.41
Economic development				
. Agriculture	13.59	14.72	17.52	18.56
. Other primary industries	0.76	0.87	1.01	1.38
. Mining	0.21	0.20	0.16	0.12
. Manufacturing	23.62	30.99	46.78	44.98
. Construction	0.22	0.22	0.24	0.17
. Energy	4.21	5.54	6.81	7.24
. Transport	0.99	1.01	0.99	0.97
. Communications	0.49	0.52	0.94	1.73
. Economic services n.e.i.	0.46	0.504	1.04	1.42
Sub-total	44.55	54.57	75.49	75.87
Community welfare				
. Environment*	0.69	0.82	0.91	0.93
. Health	13.17	14.09	18.62	25.53
. Education* *	-	-	-	-
. Welfare	-	-	-	-
. Community services n.e.i.#	0.06	8.4	11.4	14.6
Sub-total	13.92	23.3	30.9	41.1
Advancement of knowledge				
. General advancement of knowledge	61.9	66.0	73.7	82.0
Total	120.8	144.2	180.5	200.0

* Includes both "Environment" and "Urban and regional planning" objectives.

** 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.

\# Includes overseas development assistance R&D

Table 15: Intramural Commonwealth Government expenditure on R&D in the social sciences and humanities by socio-economic objective

($m)

Objective Category		1978-79	1979-80	1980-81	1981-82
National security					
. Defence		-	-	-	-
Economic development					
. Agriculture	(a)	-	-	-	-
	(b)	0.88	0.84	0.86	0.96
. Other primary industries	(a)	-	-	-	-
	(b)	-	-	0.04	0.03
. Mining		-	-	-	-
. Manufacturing	(a)	-	-	0.01	0.01
	(b)	-	-	0.03	0.03
. Construction	(a)	-	-	0.01	..
	(b)	0.05	0.13	0.15	0.09
. Energy	(a)	-	-	..	..
	(b)	0.01	-	0.04	0.04
. Transport	(a)	..	..	0.02	0.01
	(b)	0.48	0.43	0.51	0.56
. Communications	(a)	-	-	-	0.01
	(b)	-	-	-	0.04
. Economic services n.e.i.	(a)	0.56	0.69	1.27	1.23
	(b)	4.47	5.31	6.91	8.47
Sub-total	(a)	0.56	0.69	1.30	1.26
	(b)	5.89	6.71	7.64	10.19
Community welfare					
. Environment*	(a)	-	-	-	-
	(b)	0.03	0.04	-	-
. Health	(a)	-	..	0.01	0.01
	(b)	0.08	0.15	0.13	0.13
. Education	(a)	..	-	..	0.01
	(b)	1.77	1.89	1.40	1.27
. Welfare	(a)	-	..	0.03	0.07
	(b)	0.31	0.56	1.02	1.34
. Community services n.e.i.	(a)	0.01	0.01	0.08	0.17
	(b)	1.84	1.96	2.67	3.06
Sub-total	(a)	0.01	0.01	0.12	0.25
	(b)	4.03	4.60	5.22	5.80
Advancement of knowledge					
. General advancement of knowledge	(a)	-	..	-	-
	(b)	0.05	0.06	-	-
Total	(a)	0.57	0.70	1.45	1.51
	(b)	9.97	11.37	13.74	15.98

* Includes both "Environment" and "Urban and regional planning" objectives.

Table 16: 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	1981-82
		($m)		
National security				
. Defence	-	-	-	-
Economic development				
. Agriculture	0.27	0.40	0.69	0.40
. Other primary industries	0.01	0.01	0.02	0.02
. Mining	-	-	-	-
. Manufacturing	-	-	0.01	0.02
. Construction	–	-	-	-
. Energy	0.04	0.06	0.07	0.08
. Transport	2.45	2.47	2.30	1.63
. Communications	-	-	-	0.04
. Economic services n.e.i.	0.07	0.40	0.40	0.59
Sub-total	2.84	3.00	3.46	2.75
Community welfare				
. Environment*	0.01	0.01	0.01	0.01
. Health	0.53	0.60	0.77	0.85
. Education* *	2.29	2.12	2.50	2.46
. Welfare	0.43	0.73	0.94	0.93
. Community services n.e.i.#	0.26	0.36	1.9	3.6
Sub-total	3.52	3.82	6.1	7.8
Advancement of knowledge				
. General advancement of knowledge	24.6	25.4	28.2	31.8
Total	31.0	32.3	37.8	42.5

* Includes both "Environment" and "Urban and regional planning" objectives.

** 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.

\# Includes overseas development assistance R&D

C. Categories of S&T

Table 17: Commonwealth S&T expenditure in the natural sciences and engineering, by category of S&T activity.

S&T Category		$m 80-81	81-82
R&D	(ab)	434	518
	(c)	181	200
Promotional S&T			
. Demonstration of both technical and commercial viability	(ab)	7	9
	(c)	9	9
. Design for innovative production	(ab)	24	27
	(c)	8	14
. Technology transfer, extension services, other active diffusion of S&T skills and know-how	(ab)	9	9
	(c)	13	8
Sub-totals	(ab)	40	45
	(c)	31	31
S&T Services			
. Advanced scientific or engineering services	(ab)	70	68
	(c)	8	8
. Policy-related studies using advanced techniques	(ab)	2	2
	(c)	2	0.4
. Testing, standardisation, metrology and quality control	(ab)	79	86
	(c)	5	4
. Patenting and licensing	(ab)	6	7
	(c)	0.3	0.3
. Data collection in the natural sciences	(ab)	67	76
	(c)	27	27
. Scientific and technological information and documentation	(ab)	16	19
	(c)	1	1
. Services associated with scientific and technological collections	(ab)	2	2
	(c)	0.1	0.2
Sub-totals	(ab)	242	260
	(c)	44	41
Administration of S&T activities, policy, planning and other studies of S&T, n.e.c.	(ab)	28	32
	(c)	2	2
Scientific and technical education and training	(ab)	1	1
	(c)	14	15
Less recoveries		(13)	(14)
TOTAL		1003	1131

(ab) Intramural expenditure (capital and current) (c) Extramural expenditure

Tables 17 and 18 represent the first attempt to present information for individual categories of S&T (other than R&D). However, this aspect of the data must still be regarded as experimental and apparent trends between the years for particular categories may not be real. See Appendix 6 for a more detailed description of the categories.

For S&T activities (other than R&D) respondents were asked to indicate the proportion of their expenditure which could be attributed to particular categories. In a few cases, where respondents had failed to do so, estimates were made by the Department of Science and Technology on the basis of whatever information was available. Some cautionary considerations are as follows:

There is a particular demarcation problem between the first two categories of Promotional S&T, so that the figures for these categories may be better considered in aggregation. Similarly, Administration of S&T activities, etc. is overstated, as several respondents could have better distributed what are essentially overhead activities to particular categories.

In Table 18, the figures for policy-related studies and data collection in the social sciences are likely to be considerable understatements of the level of Commonwealth activity in these areas (particularly in relation to financial data collection) since the guidelines for inclusion of S&T activities (other than R&D) provided, in general, that such activities were only included where the total S&T activity accounted for the majority of costs of the organisational unit or program. See Appendix 6 for further details.

Table 18: Commonwealth S&T expenditure in the social sciences and humanities, by category of S&T activity.

S&T Category		$m 80-81	81-82
R&D	(ab)	15	17
	(c)	38	42
Promotional S&T			
. Demonstration of both technical and commercial viability		-	-
. Design for innovative production		-	-
. Technology transfer, extension services, other active diffusion of S&T skills and know-how	(ab)	2	2
	(c)	0.2	0.2
Sub-totals	(ab)	2	2
	(c)	0.2	0.2
S&T Services			
. Advanced services in the social sciences	(ab)	1	1
	(c)	0.1	0.3
. Policy-related studies using advanced techniques	(ab)	3	4
	(c)	1	2
. Testing, standardisation, metrology and quality control		-	-
. Patenting and licensing		-	-
. Data collection in the social sciences	(ab)	89	113
	(c)	1	1
. Scientific and technological information and documentation	(ab)	12	12
	(c)	0.5	0.5
. Services associated with scientific and technological collections		-	-
Sub-totals	(ab)	105	130
	(c)	3	3
Administration of S&T activities, policy, planning and other studies of S&T, n.e.c.	(ab)	3	4
	(c)	0.3	0.3
Scientific and technical education and training	(ab)	0.5	0.5
	(c)	13	14
TOTAL		180	214

(ab) Intramural expenditure (capital and current) (c) Extramural expenditure

INTERNATIONAL COMPARISONS AND TRENDS[1]

Figure 3 shows the source of funds and sector of performance of R&D expenditure of OECD member countries for 1977 (or nearest 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 private business enterprise in Australia. Figure 3 indicates that only in New Zealand, Portugal and Iceland does the private business enterprise sector contribute a lower proportion of GERD as a percentage of GDP.

Figure 4 shows the variation over time of GERD as a percentage of GDP. It can be seen that in comparison with other OECD countries, Australia's position on this scale has been close to the median but that 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. The latest survey information indicates that the decline in Australian private business enterprise R&D had been arrested by 1978-79(2).

An area of strong interest for S&T policy is the extent to which governments fund R&D performed by business enterprises. Table 19 presents this information for OECD member countries, and indicates by comparison with Sweden, Switzerland and Japan that the low level of performance of R&D in business enterprise in Australia is not to be attributed primarily to low government funding. It should also be noted that the percentage of business enterprise R&D funded by Government in Australia has increased considerably since 1976-77, and is now probably in the region of 15-20 per cent.

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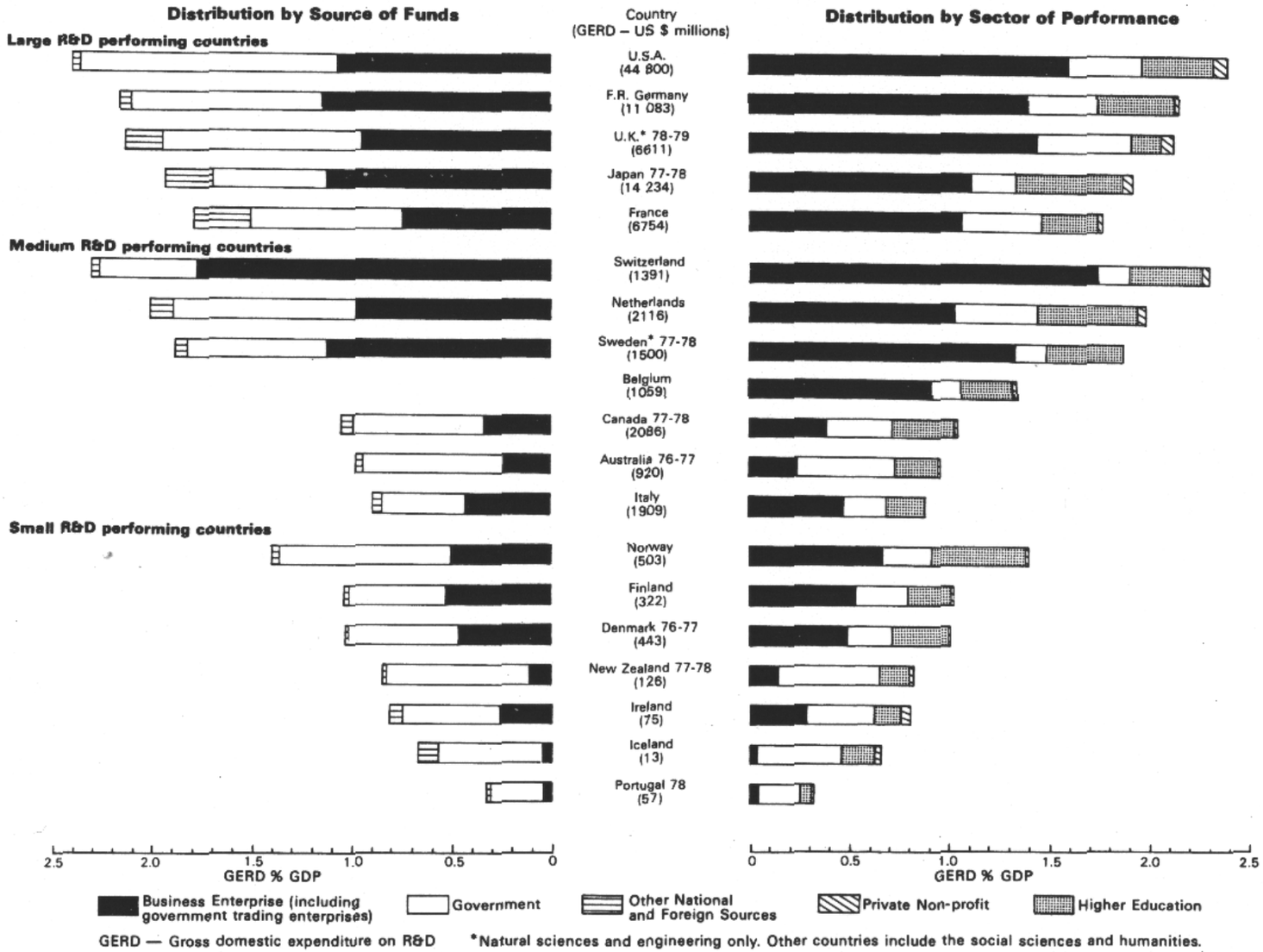
(1) International comparisons are subject to a number of caveats arising from differences in R&D survey practice in the various countries. The proposed standard OECD practice is set out in the "Frascati Manual": The Measurement of Scientific and Technical Activities, OECD Paris 1980, but most member 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:

- International Statistical Year 1977, International Survey of the Resources devoted to R&D by OECD member countries - New Zealand 1977 and Preliminary International Tables. Organisation for Economic Co-operation and Development, DSTI/SPR/79.28/24, Paris, March 1981.
- Science Resources Newsletter, No. 6, Summer 1981, OECD/DSTI Science and Technology Indicators Unit, Paris.

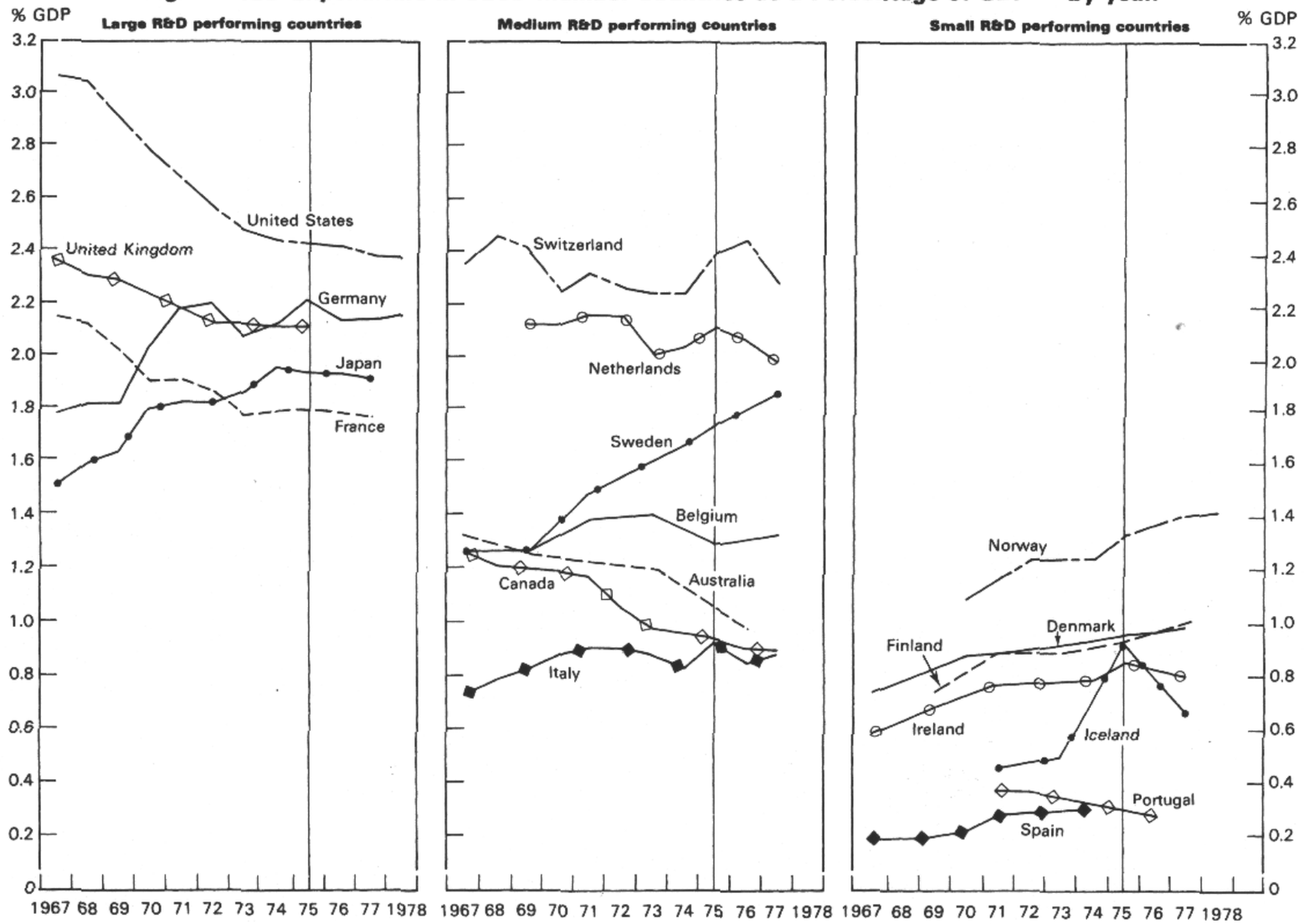
(2) Research and Experimental Development - Business Enterprises, Australia - 1978-79; Australian Bureau of Statistics Catalogue No. 8104.0, March 1980.

Fig. 3 R&D Expenditure by Country — 1977 or nearest year.



GERD — Gross domestic expenditure on R&D *Natural sciences and engineering only. Other countries include the social sciences and humanities.

Fig. 4 R&D Expenditure in OECD Member Countries as a Percentage of GDP — by year.



Source: OECD/DSTI Science and Technology Indicators Unit 'Science Resources Newsletter', No. 5 Summer 1980

Table 19: Sources of funds for total intramural R&D expenditure in the Business Enterprise sector (BERD) in OECD member countries - 1977 or nearest year

Country	(US $m) BERD	Sources of funds for BERD (%)			
		Business Enterprise	Government	Other National	Abroad
Large R&D performing countries					
United States	29 933	64.8	35.2	-	-
Japan	8 223	97.9	1.9	0.1	0.1
Germany	7 200	80.4	15.8	0.1	3.6
United Kingdom	4 473	62.8	29.2	-	8.0
France	4 070	66.5	25.3	0.3	7.9
Medium R&D performing countries					
Netherlands	1 092	n.a.	n.a.	n.a.	n.a.
Sweden	1 065	82.7	15.3	0.2	1.8
Switzerland	1 053	98.3	1.7	-	n.a.
Italy	1 022	86.9	11.0	n.a.	2.1
Canada	779	82.4	11.6	-	6.0
Belgium	719	n.a.	n.a.	n.a.	n.a.
Australia	224	93.0	4.9	-	2.1
Small R&D performing countries					
Norway	235	74.4	23.8	-	1.8
Denmark	217	89.8	8.2	0.3	1.7
Finland	162	94.7	4.8	-	0.5
Ireland	23	89.4	5.6	-	5.0
New Zealand	23	75.8	24.2	-	-
Portugal	8	95.3	4.1	-	0.6
Iceland	1	99.2	-	-	0.8

Source: OECD Science and Technology Indicators Unit, International Statistical Year 1977, op. cit.

The most recently published OECD Science Resources Newsletter(1) compared Government R&D funding by socio-economic objective of some OECD member countries. Table 20 compares Commonwealth R&D funding (other than defence R&D) with some larger R&D performing OECD members on the basis of socio-economic objective in the most recent year for which the figures have been reported.

Table 20: Government R&D funding (other than defence R&D) by OECD socio-economic objective.

Country and Year	Aust.* 1981-82	Belgium 1981	France 1980	Germany 1980	Italy 1980	Nether. 1981	Sweden 1981-82	U.K. 1981-82
% of total civil R&D								
Agriculture	16.8	4.6	6.2	2.1	4.2	7.5	2.4	8.6
Industrial growth	17.4	14.6	14.7	11.0	17.9	7.8	5.7	16.1
Energy production	5.5	7.9	12.4	15.5	23.5	4.7	12.6	13.8
Transport , Telecommunications	4.8	1.4	4.6		0.4	1.9	3.8	1.5
Urban & Rural Planning	..	2.0	2.2	4.2	0.8	3.7	2.3	1.9
Environment Protection	5.4	3.0	1.8		1.0		2.3	1.7
Health	5.6	13.1	7.2	6.9	4.6	5.0	9.6	2.9
Social Development Services	3.4	11.3	2.1	4.5	2.3	6.6	9.5	2.5
Earth & Atmosphere	5.9	4.0	4.8	3.1	2.2	1.2	0.7	1.7
Advancement of Knowledge	35.1	32.4	36.1	47.7	36.7	54.9	47.1	45.6**
Civil Space	-	5.5	7.2	4.9	6.4	3.5	4.0	3.8
Not Specified	—	-	0.6	-	-	3.3	-	-

Source: For countries other than Australia figures have been derived from the OECD Science Resources Newsletter, No. 6, Summer 1981.

* Commonwealth Government only. It is estimated that including State government funding would change Agriculture to about 27%. Environment Protection, Health, Social Development Services and Transport Telecommunications would remain at about the same level, while Advancement of Knowledge would drop to approximately 28%. All other categories would be reduced by about one tenth of the levels shown.

** Does not include General University Funds in the Social Sciences and Humanities

Table 21 ranks Australia relative to other OECD member countries in terms of R&D expenditure in the social sciences and humanities expressed as a percentage of GDP.

Table 21 R&D expenditure in the social sciences and humanities (% GDP) 1977

Japan (77-78)	.22	F.R. Germany	.11	Italy	.07
Netherlands	.19	Finland	.10	Iceland	.06
Norway	.18	Australia (76-77)	.09	New Zealand (77-78)	.05
Canada (77-78)	.12	Ireland	.09	Switzerland	.05
Denmark (76-77)	.12	Belgium	.08	France	.04

COMMONWEALTH CONTRACTS AND GRANTS IN SUPPORT OF S&T

In 1979 the Australian Science and Technology Council (ASTEC) sought information on scientifically and technologically-oriented R&D contracted out by nineteen government departments and agencies to determine amounts, areas of placement, purposes, motivations and procedures used(1). A summary of the results was included in Appendix 3 of Science Statement 1979-80. For the period reported (mainly 1978-79) Commonwealth R&D to the value of $32.0m was reported as having been contracted out. Of this, $19.1m was placed with manufacturing and other industries, with the remainder going to academics, consulting firms, the State governments and non-profit research organisations.

In collecting information for Science Statement 1980-81 provision was made for reporting total contracting of R&D and S&T, and also the component contracted to industry. The results were reported in Tables 9 and 10 (Appendix 3) of the 1980-81 Statement.

It was clear from the results reported in the last Statement that a substantial proportion of contracts is placed outside industry. For this reason, the information collection for the 1981-82 Statement sought more detail than in 1980-81. The results are presented at Tables 22 and 23. Table 24 summarises this data and includes information for 1978-79 and 1979-80.

For other reasons it has been considered worthwhile to determine the proportion of grants going to universities and colleges of advanced education. These results are presented in Tables 25 and 26.

In this Appendix contracting refers to "contracts and commissions" and grants to "grants and donations" which form the remainder of extramural expenditure. These categories are defined in Appendix 6.

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(1) Industrial Research and Development: Proposals for Additional Incentives; A Report to the Prime Minister by the Australian Science and Technology Council.

Table 22: Commonwealth contracting in the natural sciences and engineering (NSE)

($ million)		R&D		S&T (including R&D)	
		80-81	Projected 81-82	80-81	Projected 81-82
Administrative Services	PE	0.05	-	0.05	-
	HE	0.10	0.17	0.10	0.17
	OR	0.05	0.02	0.05	0.02
Capital Territory	CW	-	-	0.13	0.15
	PE	-	-	0.24	0.17
	HE	0.02	-	0.05	-
Communications	CW	0.02	0.03	0.04	0.05
	PE	0.53	1.13	0.66	1.27
	HE	0.23	0.30	0.23	0.30
	OR	-	0.05	-	0.05
Defence	CW	0.40	0.41	0.40	0.41
	PE	-	-	6.46	12.65
Foreign Affairs	CW	2.8	2.3	8.0	7.0
	PE	0.9	2.9	7.9	8.1
	HE	1.3	2.1	6.8	8.3
	OR	0.4	0.1	2.8	2.4
Health	PE	0.01	-	0.01	-
	HE	0.08	0.18	0.08	0.18
Home Affairs and Environment	CW	0.03	0.10	0.27	0.31
	PE	0.01	0.01	0.09	0.08
	HE	0.42	0.35	0.53	0.47
	OR	0.09	0.05	3.05	0.21
Housing and Construction	PE	0.03	0.02	2.67	3.28
	HE	0.07	0.06	0.07	0.06
	OR	0.01	0.02	0.01	0.02
Industry and Commerce	PE	-	-	0.02	0.02
National Development and Energy	CW	0.14	0.05	0.14	0.05
	PE	0.39	0.16	0.84	0.78
	HE	0.38	0.48	0.42	0.53
	OR	0.15	0.19	0.15	0.19
Primary Industry	CW	..	-	0.18	0.18
	PE	-	-	..	0.01
	OR	-	-	0.89	0.81
Prime Minister and Cabinet	PE	-	-	-	0.02
	HE	-	-	0.01	0.02
Science and Technology	CW	0.25	0.25	0.30	0.41
	PE	0.16	0.42	8.11	6.98
	HE	0.03	0.02	0.97	2.87
	OR	-	-	0.41	0.02
Transport	CW	0.05	-	11.94	12.91
	PE	0.02	0.01	0.03	0.02
	HE	0.05	0.24	0.05	0.24
	OR	0.10	0.13	0.10	0.13
TOTAL (Direct Commonwealth funding, all NSE contracts)		9.2	12.2	65.2	71.8

CW Contracts to other Commonwealth agencies
HE Contracts to institutions of higher education
PE Contracts to private business enterprise
OR Contracts to other bodies

Table 23: Commonwealth contracting in the social sciences and humanities (SSH)

($ million)		R&D		S&T (including R&D)	
		80-81	Projected 81-82	80-81	Projected 81-82
Attorney-General ' s	PE	0.15	-	0.15	-
	HE	0.09	0.30	0.09	0.30
	OR	0.04	0.03	0.04	0.03
Capital Territory	CW	-	-	0.06	0.07
	PE	-	-	0.17	0.02
Communications	PE	-	0.04	-	0.04
Employment and Youth Affairs	PE	..	0.06	0.01	0.11
	HE	-	0.01	-	0.01
Education	HE	0.24	0.23	0.24	0.23
	OR	0.19	0.18	0.20	0.19
Foreign Affairs	CW	-	-	1.1	0.6
	PE	-	..	0.2	0.4
	HE	-	_-	1.9	2.3
Health	HE	_-	_-	0.03	-
Home Affairs and Environment	PE	0.01	0.01	0.02	0.02
	HE	_-	-	0.05	0.07
	OR	_-	_-	0.01	0.01
Immigration and Ethnic Affairs	CW	_-	0.01	0.02	0.06
	PE	0.06	0.09	0.37	0.50
	HE	0.25	0.19	0.27	0.24
	OR	0.05	0.03	0.05	0.03
Industry and Commerce	CW	-	-	0.01	0.03
	PE	0.01	0.08	0.01	0.09
	HE	0.01	0.02	0.01	0.02
National Development and Energy	HE	0.03	0.03	0.03	0.03
Prime Minister and Cabinet	PE	_-	-	0.01	..
Science and Technology	PE	0.02	0.02	0.02	0.02
	HE	_-	0.01	-	..
	OR	0.01	0.02	0.01	0.02
Social Security	OR	-	-	0.08	0.09
Transport	CW	0.04	0.01	0.04	0.02
	PE	0.11	0.18	0.17	0.26
	HE	0.10	0.05	0.11	0.06
	OR	0.05	0.09	0.05	0.09
TOTAL (Direct Commonwealth funding, all SSH contracts)		1.58	1.71	5.8	6.1

CW Contracts to other Commonwealth agencies
HE Contracts to institutions of higher education
PE Contracts to private business enterprise
OR Contracts to other bodies

Table 24: Summary of Commonwealth S&T contracting 1978-79 to 1981-82

($ million)		R&D				S&T (including R&D)		
		78-79	79-80	80-81	Projected 81-82	79-80	80-81	Projected 81-82
Commonwealth agencies	N	n.a.	n.a.	3.7	3.1	n.a.	21.4	21.5
	S	n.a.	n.a.	0.04	0.02	n.a.	1.21	0.80
	N+S	n.a.	n.a.	3.7	3.1	n.a.	22.6	22.3
Higher Education	N	n.a.	n.a.	2.6	3.9	n.a.	9.3	13.1
	S	n.a.	n.a.	0.85	0.86	n.a.	3.0	3.3
	N+S	n.a.	n.a.	3.5	4.7	n.a.	12.3	16.5
Other Bodies	N	n.a.	n.a.	0.7	0.6	n.a.	7.5	3.8
	S	n.a.	n.a.	0.34	0.34	n.a.	0.45	0.45
	N+S	n.a.	n.a.	1.1	0.9	n.a.	7.9	4.3
Sub-total (non-private enterprise)	N	n.a.	n.a.	7.0	7.6	n.a.	38.1	38.4
	S	n.a.	n.a.	1.22	1.22	n.a.	4.6	4.6
	N+S	2.00*	6.7	8.3	8.8	34.7	42.8	43.0
Private Enterprise	N	n.a.	n.a.	2.1	4.7	n.a.	27.1	33.3
	S	n.a.	n.a.	0.36	0.48	n.a.	1.2	1.5
	N+S	1.17*	1.3	2.5	5.1	21.4	28.2	34.8
Total (Direct Commonwealth funding all contracts)		3.17*	8.1	10.8	13.9	56.1	71.0	77.8

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

* No estimate of the R&D component of Australia's development assistance program (see pages 36 to 38) is at present available for 1978-79, so that totals for that year are understated to that extent.

Table 25: Commonwealth grants in the natural sciences and engineering (NSE)

($ million)		R&D		S&T (including R&D)	
		80-81	Projected 81-82	80-81	Projected 81-82
Aboriginal Affairs	HE	-	-	-	-
	OR	-	-	0.10	0.10
Administrative Services	HE	-	-	-	-
	OR	-	-	0.02	0.06
Communications	HE	0.03	0.05	0.03	0.05
	OR	0.13	0.18	0.13	0.18
Education	HE	54.0	59.8	54.0	59.8
	OR	4.77	5.34	5.41	6.01
Foreign Affairs	HE	-	-	1.5	1.4
	OR	5.8	7.0	14.3	16.5
Health	HE	15.58	19.82	15.58	19.82
	OR	2.94	5.53	2.94	5.53
Home Affairs and Environment	HE	0.11	0.12	0.21	0.26
	OR	0.13	0.14	0.54	0.69
Housing and Construction	HE	0.01	0.03	0.01	0.03
	OR	0.28	0.28	0.28	0.28
National Development and Energy	HE	2.00	2.25	2.06	2.32
	OR	5.12	5.96	15.25	16.17
Primary Industry	HE	3.60	4.01	3.70	4.10
	OR	13.50	13.89	17.68	14.97
Prime Minister and Cabinet	HE	0.03	0.03	0.03	0.03
	OR	0.02	0.02	0.02	0.02
Science and Technology	HE	13.00	14.92	13.00	14.92
	OR	48.69	46.36	53.69	51.06
Transport	HE	-	-	-	-
	OR	0.50	0.33	4.25	0.81
Treasury	HE	0.67	1.10	0.67	1.10
	OR	0.48	0.73	0.48	0.73
Total grants to higher educ.		89.0	102.1	90.8	103.8
Total grants to other bodies		82.381	85.72	115.11	113.08
TOTAL (Direct Commonwealth funding, all NSE grants)		171.4	187.8	205.9	216.9

HE Grants to institutions of higher education OR Grants to other bodies

Table 26: Commonwealth grants in the social sciences and humanities (SSH)

($ million)		R&D		S&T (including R&D)	
		80-81	Projected 81-82	80-81	Projected 81-82
Aboriginal Affairs	HE	0.06	0.07	0.06	0.07
	OR	0.51	0.54	0.89	0.93
Administrative Services	HE	-	-	-	-
	OR	-	-	0.02	0.04
Attorney-General's	HE	0.03	0.03	0.03	0.03
	OR	0.02	0.02	0.02	0.02
Education	HE	22.9	25.1	23.0	25.1
	OR	3.90	4.41	4.57	5.36
Employment and Youth Affairs	HE	0.01	0.04	0.03	0.08
	OR	-	-	-	-
Foreign Affairs	HE	0.17	0.17	0.5	0.7
	OR	1.6	3.2	9.6	12.1
Health	HE	0.49	0.61	1.18	1.31
	OR	0.29	0.24	1.48	1.42
Home Affairs and Environment	HE	0.01	0.01	0.01	0.01
	OR	..	..	0.01	0.01
National Development and Energy	HE	0.02	0.02	0.02	0.02
	OR	0.05	0.06	0.10	0.09
Primary Industry	HE	0.10	0.07	0.10	0.07
	OR	0.51	0.28	0.51	0.29
Prime Minister and Cabinet	HE	0.01	0.01	0.14	0.14
	OR	..	..	0.02	0.02
Science and Technology	HE	2.90	3.76	2.90	3.76
	OR	0.04	0.10	0.19	0.27
Social Security	HE	0.41	0.50	0.41	0.50
	OR	0.02	0.02	0.23	0.18
Transport	HE	-	-	-	-
	OR	2.00	1.30	2.00	1.30
Treasury	HE	0.19	0.20	0.19	0.20
	OR	0.05	0.07	0.04	0.07
Total grants to higher educ.		27.3	30.6	28.6	32.0
Total grants to other bodies		8.96	10.20	19.70	21.14
TOTAL (Direct Commonwealth funding, all SSH grants)		36.3	40.8	48.3	53.1

HE Grants to institutions of higher education OR Grants to other bodies

APPENDIX 4

SCIENCE AND TECHNOLOGY STATEMENT 1980-81 WORKSHOP

University of Wollongong, 18th June 1981

Chairman: Professor Ron Johnston

PROGRAMME

Vice-Chancellor's Welcome : Prof. L.M. Birt, Vice-Chancellor, University of Wollongong

Paper 1 - 'Production of the Science and Technology Statement Past and Future' : Mr D.J. Baines, Department of Science and Technology.

Paper 2 - Critique of the Science and Technology Statement I - 'How Good are the Numbers' : Or Ian Lowe, Science Policy Research Centre, Griffith University.

Paper 3 - Critique of the Science and Technology Statement II - 'Value of Science and Technology Statement for Policy: An Academic View' : Professor Jarlath Ronayne, School of History and Philosophy of Science, The University of New South Wales.

Paper 4 - Value for Policy Makers -

(i) 'The Value of the Science Statement for Policy Makers - an ASTEC View' : Mr Ian Shortt, Australian Science and Technology Council.

(ii) 'The value of the Science and Technology Statement for Commonwealth Policy Advisors' : Mr W.N. Hurst, Department of Science and Technology.

Concluding Comments : Professor Ron Johnston, Department of History and Philosophy of Science, The University of Wollongong.

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Media

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Mr Richard Eckersley
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Ms Jane Ford
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REVIEW OF BILATERAL SCIENCE AND TECHNOLOGY COOPERATION AGREEMENTS

Australia has science and technology agreements with USA (1968), the Soviet Union (1975), India (1975), the Federal Republic of Germany (1976), China (1980), Japan (1980) and Mexico (1981). Exchanges under the Agreement with the Soviet Union were suspended in 1980 following the Soviet intervention in Afghanistan. Exchanges under the Agreement with Mexico have not yet begun. An Australian science and technology delegation visited Mexico in September/October 1981 in order to identify priority areas and to establish a program of cooperation.

Activities under the agreements have included short term research visits (usually up to six months), seminars/workshops and information exchange.

The agreements with USA, FRG and India are operated along similar lines to the ARGS in that the Department advertises for proposals from the research community and assesses the proposals through a peer review process on the basis of academic merit. The agreements are not intended as a primary source of research funds but as support for airfares, living allowances and the running of seminars and workshops.

The Agreement with Japan is being used to develop a new approach. It is believed that the limited funds allocated for exchanges under the agreements will yield more benefit if concentrated in carefully selected priority areas than if diffused over a range of projects. An Australian science and technology delegation visited Japan in December 1980 to identify areas where cooperation could be most advantageously pursued. The delegation operates from an ad hoc Committee which advises on the operation of the Agreement. Proposals are elicitied through the Committee rather than by appeals to the research community at large, and are reviewed by the Committee in the first instance. If deemed necessary, proposals are referred to appropriate experts for appraisal.

Similar arrangements will be followed in disbursing funds under the Mexico/Australia Agreement.

The Science and Technology Agreement with China is a special case reflecting the historical circumstances of the re-establishment of political relations with that country. The Agreement serves as an umbrella formalising a variety of prior links between Australian and Chinese institutions. There is no specific allocation of funds for the Agreement, but scientific and technological exchanges are funded by Government through grants to four Australian learned Academies and the Australia China Council.

Table 1 shows funds outlayed under the Agreements for the 1978/79 to 1981/82 fiscal years disaggregated by subject area.

US/Australia Agreement for Scientific and Technical Cooperation'	1978-79 $	1979-80 $	1980-81 $	1981-82 $
Physical and Chemical Sciences	14 294	15 254	16 194	12 700
Engineering and Applied Sciences	21 207	9 794	11 269	7 459
Biological and Agricultural Sciences	30 014	41 276	43 200	28 819
Earth Sciences	2 249	14 506	-	9 454
Social Sciences	1 176	9 428	4 331	13 300
Total	68 940	90 258	74 994	71 732

India/Australia Science and Technology Agreement	1978-79 $	1979-80 $	1980-81 $	1981-82 $
Physical and Chemical	-	-	-	5 650
Engineering and Applied	1 990	1 584	2 105	1 200
Biological and Agricultural	8 953	25 239	12 775	5 534
Earth Sciences	13 471	3 395	18 082	27 616
Social Sciences	-	-	-	-
Total	24 414	7 518	32 962	40 000

FRG/Australia Science and Technology Agreement	1978-79 $	1979-80 $	1980-81 $	1981-82 $
Physical and Chemical	-	9 526	4 324	-
Engineering and Applied	20 442	-	-	1 300
Biological and Agricultural	1 900	4 278	4 775	10 675
Earth Sciences	10 266	11 478	15 900	9 000
Social Sciences	-	-	-	-
Total	32 608	25 282	24 999	20 975

Japan/Australia Science and Technology Agreement	1978-79 $	1979-80 $	1980-81 $	1981-82 $
Physical and Chemical Sciences	-	-	-	-
Engineering and Applied Sciences	-	-	28 140	72 000
Biological and Agricultural Sciences	-	-	27 400	40 000
Earth Sciences	-	-	-	10 000
Social Sciences	-	-	-	-
Total	-	-	55 540	122 000

TECHNICAL NOTES

Background

The form of the first Science Statement (1979-80) was based on recommendations made by Ron Johnston (now Professor of History and Philosophy of Science, University of Wollongong) while on secondment in 1978 to the then Department of Science and the Environment. The recommendations took account of Departmental policy requirements, ASTEC requirements, and Departmental experience in collecting and disseminating data on the funding and performance of R&D. The desire for detailed information on the nature of expenditures, and on the specific fields and objectives being supported, had to be balanced against the need to present a readily comprehended overview and to avoid excessively burdening the agencies who were to supply the information. Furthermore, the Department wished to relate the R&D expenditures as far as possible to those presented in the Budget papers. The methodology was developed by the Department in consultation with ASTEC, with helpful advice from the Department of Finance.

As noted in Science Statement 1979-80 (p.13) expenditures were derived from the Appropriation Bills (Nos 1 and 2) and Special Appropriations, showing actual expenditures for the years 1976-77, 1977-78 and 1979, and estimates for 1979-80. In addition to these Budget line items, most (but not all) departments and agencies submitted estimates for R&D not specifically identified in their accounting systems. Data collection was not formally structured. Although contact officers in departments and agencies were encouraged to report on a basis consistent with their reporting to the 1978-79 Project SCORE R&D survey(1), which was then in progress, some preferred to report on other bases. This led to a variety of S&T activities other than R&D being included as R&D, and also in a few cases to estimates not being provided for R&D actually performed, the former effect being dominant.

Although the first Science Statement was well received, planning for the second Statement (1980-81) sought to remove these deficiencies, and to implement several suggestions for improvements. Further improvements have been incorporated in the present Statement. The remainder of this Appendix describes the 1981-82 concepts and methodology.

Definitions and concepts

Research and development (R&D)

The definition adopted by the Organisation for Economic Co-operation and Development (OECD)(2) 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.

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(1) See for example "Project SCORE, Research and Development in Australia 1976-77", Australian Government Publishing Service, Canberra 1980.

(2) The Measurement of Scientific and Technical Activities: Proposed Standard Practice for Surveys of Research and Experimental Development, "Frascati Manual" 1980 OECD Paris June 1980.

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.

. 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: Design engineering and 'tooling-up', often following either an experimental development or a demonstration phase, and aimed at placing innovatory products or processes on a routine production basis. Includes products or processes 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.
- 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 (anthropological, archaeological, geological, etc.).

- 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 and Technology are examples falling in this category.

This list was compiled as an amalgamation of the following classes of activities:

. Promotion of science and technology.
  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; 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(3). 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).

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(3) 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.

. 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 (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(4) 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 specialized non-university higher education and training, higher education and training leading to a university degree, post-graduate and further training, and organized lifelong training for scientists and engineers. These activities correspond broadly to ISCED(5) 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 our 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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(4) Op cit.
(5) 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(6) 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) discussed this question. While agreeing that further work is required, the Workshop itself did not produce clearer guidelines.

The nature of S&T data included in Science and Technology Statement 1980-81

Given the lack of a statistically satisfactory definition of S&T, and the additional reporting burden that would be placed on most respondents if asked to identify and quantify expenditures for S&T (other than R&D) the following guidelines (paraphrased) were devised:

- Complete the R&D questions first.
- Determine whether S&T activities (other than R&D), together with R&D, account for the majority of the costs of the complete organisational sub-unit or program. If so, include the total costs of the complete organisational sub-unit or program, less the cost of R&D, in the S&T (other than R&D) questions. Otherwise exclude these costs.

The rationale for this approach is that organisational sub-units and programs primarily involved in the given spectrum of S&T activities will be identified, and their total expenditure will be presented. While there will usually be some over-statement of S&T expenditure in these agencies arising from inclusion of their total expenditures, there will be a counter effect arising from omission of the S&T expenditures of those programs and units for which the S&T activity is not dominant. The relative magnitudes of these opposing tendencies across all ministries is unknown, but the data are useful in the following ways:

- for identification of programs and organisational sub-units primarily involved in S&T activities;
- for giving a broad approximation to the level of expenditure on S&T in these programs and sub-units, by providing upper and lower bounds (total expenditure and 50 per cent of total expenditure);
- by providing indicative totals at the Commonwealth Government sector level, and in at least some cases at the ministry level, suitable for time trend analysis. (Consistency for this purpose is imposed by the programs and sub-units identified, as they persist over time.)

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(6) See for example The Concise Oxford Dictionary.

The S&T data cannot be used to:

. compare the level of S&T between agencies or programs;

. compare the level of S&T between ministries.

By contrast, the R&D data can, with some caution, be compared between agencies and ministries.

The nature of S&T data in Science and Technology Statement 1981-82.

The treatment of S&T activities (other than R&D) is essentially the same in the 1981-82 Statement as in its predecessor, except that in four Ministries an attempt was made to collect direct estimates of the expenditures on S&T activities other than R&D. The organisations participating in this approach were, by ministry:

. Communications

  - Telecom Australia

. Foreign Affairs

  - Australian Development Assistance Bureau (ADAS)

. Housing and Construction

  - Department of Housing and Construction

. Transport

  - Department of Transport

For these organisations the limitations discussed above in regard to interpretation of the S&T expenditure data are not applicable, but as a degree of subjective judgement is involved in arriving at the estimates the data should be treated as indicative rather than precise.

Broad field of science

Some users of the first two Statements, including ASTEC, 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, 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, (tote 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 NSE 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 R&D or other S&T activities undertaken by the respondent organisation. Intramural expenditure is separated into the two categories, capital and current:

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(7) Project SCORE, op cit.

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");

- 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).

. 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 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^). 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).

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(8) See for example 1981-82 Budget Paper No. 1, Appendix, page 303.

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 fund which are attributable to Commonwealth contributions. A 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 fund matches other contributions $ for *$*, 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 $ for $, 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(9) 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.

The data presented in Table 4 were classified by the Department of Science and Technology using information provided in the 1981-82 Budget Papers(9).

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 R&D 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)
Manufacturing(10)	Food Beverages and malt Tobacco

(9) See 1981-82 Budget Paper No. 1, Appendix, pp 306-312 for detailed description of the classification, and Statement No. 3, pp 64-216 for treatment of individual items.

(10) Promotion of industry aspects only e.g. funding of development of transport equipment for Australia's transport system is included under "Transport".

	Textiles and textile products
	Clothing and footwear
	Wood, wood products and furniture
	Paper and paper products
	Printing and allied industries
	Chemical fertilisers
	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	Prospecting & resource assessment techniques - uranium
	Prospecting & resource assessment technqiues - coal
	Prospecting & resource assessment techniques - oil and gas
	Extraction techniques – uranium
	Extraction techniques - coal

	Extraction techniques - oil and gas
	Production and utilisation of energy from - Oil and gas - Coal - Solar - Nuclear - Other primary sources
	Production and utilisation of synthetic fuels from - Coal - 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 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
General advancement of knowledge	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

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 programmes 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 1976 were Advancement of knowledge, 64%; Community welfare, 18%; and Economic development 18%.

- 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 Commonwealth Government sector intramural *R&D* expenditure data from the 1976-77 SCORE survey illustrates the difference:

($ million)	Type of activity			
Objective category	Basic research	Applied research	Experimental development	Total
National security	10.5	46.2	30.8	87.6
Economic development	50.2	82.0	22.6	154.7
Community welfare	4.2	11.2	1.9	17.3
Advancement of knowledge	31.2	10.9	2.9	45.0
Total	96.1	150.3	58.1	304.5

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" can be taken as 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".

The Statement does not attempt to distinguish between basic research, applied research, and experimental development.

Estimation of trends in real terms

Expenditures throughout this Statement are presented 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(11). 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(ll). Nevertheless, because of the difficulty of constructing accurate R&D deflators, the GDP implicit price deflator is 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. Several price indices and deflators of some relevance are given below, for interest, but no attempt has been made to deflate the expenditures presented in the Statement. 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.

(11) Australian National Accounts, National Income and Expenditure 1976-77, Australian Bureau of Statistics, Catalogue No. 5204.0, pp 109-112.

Price index or deflator	Base year where index = 100	Index values for year					
		1973-74	1976-77	1977-78	1978-79	1979-80	1980-81
GDP implicit price deflator	1974-75	84.5	127.4	137.8	148.6	164.1	181.2
Gross non-farm product implicit price deflator	1974-75	82.2	128.8	139.7	150.0	164.1	181.7
Government final consumption expenditure implicit price deflator	1974-75	80.5	127.8	137.8	146.5	160.6	181.2
Consumer price index (CPI)	1966-67	146.6	220.0	241.0	260.7	287.2	314.2
CPI (base year 1966-67) normalized to 100 at 1974-75	1974-75	85.7	128.6	140.9	152.4	167.9	183.7
Private enterprise intramural R&D expenditure implicit price deflator*	1974-75	81.	129.	n.a.	156.	n.a.	n.a.
Research scientists and engineers salaries index**	1974-75	84.3	119.9	128.1	134.1	138.3	156.8
Private other non-dwelling construction implicit price deflator	1974-75	79.0	130.8	142.0	151.7	169.6	190.7
Private equipment implicit price deflator	1974-75	81.4	130.1	147.4	162.6	181.0	197.6
Industrial machinery and equipment including photographic professional and scientific equipment - price index	1968-69	n.a.	228.3	252.5	273.0	308.2	346.1

Sources: Australian Bureau of Statistics:

. Catalogue No. 5206.0, Quarterly Estimates of National Income and Expenditure, Australia, June Quarter 1981, pp40-41;

. Catalogue No. 6412.0, Price indexes of Articles Produced by Manufacturing Industry, Australia, May 1980 (p5) and August 1981 (p5);

. Catalogue No. 6401.0, Consumer Price Index - December Quarter 1977 (p4), and September Quarter 1981 (p3).

. Catalogue No. 8104.0, Research and Experimental Development - Business Enterprises, Australia - 1978-79;

Salary data from Public Service Board and CSIRO.

* Computed by DST from current and constant price preliminary figures published in ABS Catalogue No. 8104.0. The ABS sees these constant price estimates as less reliable than most published ABS constant price data. The implicit price deflator should accordingly be treated with caution.

** Computed by DST using salaries at 31 December each year for the Research Scientist Group and Engineer Grade 3. Arbitrary weights were used as follows: Senior Principal Research Scientist, 1; Principal Research Scientist, 2; Senior Research Scientist, 6; Research Scientist, 12; Scientific Officer, 12; Engineer Grade 3, 12.

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. The following paragraphs present in outline the views of the Commissioner of Taxation, as well as an alternative. Because of the difficulty of estimating appropriate amounts, no allowances for taxation concessions have been included in the tables presented in this Statement.

The Commissioner of Taxation advises that revenue forgone in respect of concessions for expenditure on scientific research allowed under section 73A of the Income Tax Assessment Act has been estimated as amounting to about $lm in 1980-81. In addition there is a short-run forgoing of revenue attributable to provisions for accelerated depreciation of plant used for scientific research, estimated at about $lm for 1980-81, and the forgoing of sales tax through exemptions on certain items of scientific equipment. The cost of the latter has not been estimated.

The Commissioner argues that the total cost borne by the revenue in respect of expenditure on R&D is considerably greater than implied by the above deductions, depreciation allowances and sales tax exemptions, since much R&D expenditure is not readily distinguishable in accounts from other business expenditures which are allowed as losses or outgoings necessarily incurred in carrying on a business. As virtually all outlays by private business on R&D would be allowable outgoings for income tax purposes, the revenue could be inferred to bear 46 per cent of the R&D costs, other than items to which investment allowance applies, in which case the figure would rise to 55 per cent.

There is an alternative view based on a number of grounds. As the Commissioner points out, R&D expenditures are in many respects indistinguishable from other outgoings necessary in carrying on a business. They are necessary for the maintenance of a competitive situation and contribute, along with other factors, to business income. In these circumstances it would be invidious to list R&D taxation concessions as a form of revenue forgone unless it were intended to treat all business expenditure in the same way. This of course would be a substantial and meaningless departure from present practice.

Additionally there are long term revenue aspects to consider. While any given R&D project may carry high risks, historical experience is that the innovation process, of which R&D is a key element, has aggregate profitability. In the long term, therefore, this view argues that taxation forgone in the short term in relation to R&D expenditure may be more than recouped by taxation on the extra income of future years. Clearly the net cost or benefit to the Commonwealth's revenues is virtually unquantifiable, but equally clearly it would be misleading to highlight only short term costs of a revenue forgone nature.

AAEC	Australian Atomic Energy Commission
AATB	Anglo-Australian Telescope Board
ABRS	Australian Biological Resources Study
ABS	Australian Bureau of Statistics
ACC	Australia-China Council
ACER	Australian Council for Educational Research
ACIAR	Australian Centre for International Agricultural Research
ADAB	Australian Development Assistance Bureau
ADACS	Australian Development Assistance Courses
ADP	Automatic Data Processing
AGAL	Australian Government Analytical Laboratories
AHRC	Australian Housing Research Council
AIAS	Australian Institute of Aboriginal Studies
AIMS	Australian Institute of Marine Science
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
ANZAAS	Australian New Zealand Association for the Advancement of Science
ARGC	Australian Research Grants Committee
ARGS	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
ASTEC	Australian Science and Technology Council

ATAC	Australian Transport Advisory Council
AUBRCC	Australian Uniform Building Regulations Consultative Committee
AUSTRE	Australian Scientific and Technological Reports (data base)
AUSTREC	Australian Science, Technology and Research Co-operation (ADAB)
BAE	Bureau of Agricultural Economics
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
BTE	Bureau of Transport Economics
CCRD	Consultative Committee on R&D (ADAB)
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
CPI	Consumer Price Index
CSIRO	Commonwealth Scientific and Industrial Research Organization
CSL	Commonwealth Serum Laboratories
DAF	Data Acquisition Facility
DPF	Data Processing Facility
DST	Department of Science and Technology
DSTO	Defence Science and Technology Organisation
EBS	Experimental Building Station
EPG	Education Planning Group
ERDC	Education Research and Development Committee
FPS	Facility Planning System

FRG	Federal Republic of Germany
GBRMPA	Great Barrier Reef Marine Park Authority
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
HIF	Health Facilities Information File
ICAD	International Civil Aviation Organisation
ID	Defence Industry Development Branch
IPS	Ionospheric Prediction Service
IR&D	Industrial Research and Development
ISCED	International Standard Classification of Education
MATPAK	Materials Handling Program
MCB	Metric Conversion Board
MLS	Microwave Landing System (INTERSCAN)
n.a.	not available
NAL	National Acoustic Laboratory
NASA	United States National Aeronautics and Space Administration
National Centre	NMR National Nuclear Magnetic Resonance Centre
NATmap	National Mapping
NBSL	National Biological Standards Laboratory
n.e.c.	not elsewhere classified
n.e.i.	not elsewhere included
NERDDC	National Energy Research, Development and Demonstration Council
NH&MRC	National Health and Medical Research Council
NSC	National Standards Commission
NSE	Natural Sciences and Engineering
OECD	Organisation for Economic Co-operation and Development
OTC	Overseas Telecommunications Commission (Australia)
PPCA	Productivity Promotion Council of Australia

PR&I	Planning Research and Information Branch (Public Service Board)
RCF	Review of Commonwealth Functions
R&D	Research and Development
R,D&D	Research, Development and Demonstration
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
STS	Scientific and Technological Services
TAFE	Technical and Further Education
TTC	Technology Transfer Council
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VLSI	Very Large Scale Integrated Circuits
..	Figure non-zero, but insignificant for purposes of presentation.
.	Figure non-zero but not separately available is included elsewhere.

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