SCIENCE AND TECHNOLOGY STATEMENT 1980-81

by

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

APRIL 1981

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1980-81

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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 Government agencies

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TABLING STATEMENT

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MINISTER FOR SCIENCE AND TECHNOLOGY

THE HONOURABLE DAVID THOMSON M.C., M.P.

TUESDAY 12 MAY 1981

I have pleasure in tabling the Science and Technology Statement 1980-81.

The Government's aim is to advance the welfare of the Australian people. The great social and humanitarian reforms of the last century were largely possible because of increased industrial productivity, better health services and improved communications. Science and technology played a major role. It is equally true that science and technology will underwrite Australia's economic and social development in the future.

Questions of the Government's role, the ways of co-ordinating science policy and establishing priorities must fall within this aim. The first Science Statement was tabled last year and I believe the document was a major development in helping to answer science policy questions. It provided a new basis for analysis, observing changes and providing data.

The response to the Science Statement has been positive and this year it has been expanded to cover not only research and development but a range of scientific and technological activities. It is now the Science and Technology Statement, not just the Science Statement and some new figures have to be treated cautiously. It is a post-Budget analysis of Commonwealth expenditure listed by agency, ministry and by socio-economic objectives. I would like to thank fellow Ministers, their officers and the Australian Science and Technology Council for their help in compiling the statement.

Development of science and technology policy

In formulating Government policies towards science and technology, both long and short-term factors have to be examined and taken into account. Over the past decade there have been significant changes in community attitudes to science and technology which cannot be ignored. Presently there is concern about job-replacing technology, the environment, the availability of a highly skilled workforce and a continuing supply of energy. In addition I sense a growing fear of the impact of science and technology among the less well informed.

Looking towards the year 2000, there are several factors which will have an important impact on science and technology policies. Some examples are the emergence of new technologies, such as biotechnologies and micro-electronics, changes in the patterns of energy supply, and demographic changes. Coherent and far-sighted policies are needed to meet these challenges. The Organization for Economic Co-operation and Development has pointed out that these challenges and changes will require a different sort of policy response - one in which science and technology policy is taken together with economic and social policy.

Australian science itself must also recognise these changes and respond to them. This is as much the responsibility of individual scientists as it is of governments and other bodies responsible for formulating science policy.

Government role

The Government is determined that the science and technology sector should not be considered in isolation. It must be linked and co-ordinated with other sectors such as manufacturing, tertiary and

primary industries, and energy, to form a coherent research policy to meet national goals. Scientific, economic and social policies must be integrated.

At the same time the public must be kept continually informed. Society should not be put in a position of being swept along by new developments without influencing their direction. This is the basic reason why I have produced the Science and Technology Statement. To help meet these objectives a four-point plan was outlined last year in the Science Statement. The plan balances the demands for science and technology to meet community needs and problems with public concern over possible side effects from new technologies. The plan is to stimulate and support basic research, applied research, to transfer research results into the market place and to minimise any undesirable impacts of new technologies.

Government support for industrial research

Apart from establishing policy and priorities, governments are examining the extent to which they should promote innovation through funding of basic research and industrial research and development. This question was discussed at an Organization for Economic Co-operation and Development Conference of Science and Technology which I attended earlier this year. Organization for Economic Co-operation and Development reports are challenging the prevailing economic wisdom that the solution to current economic problems lies solely with conventional demand management mechanisms. Major recommendations focus on the critical importance of restoring declining innovation. Co-ordinated technological and economic policies must be used to create a growing economy. Governments throughout the world have accepted this premise.

For the information of Honourable Members I seek leave to incorporate in Hansard the Declaration adopted by Ministers at the OECD Meeting.

ANNEX

Declaration on future policies for science and technology

Ministers responsible for policies concerning science and technology in the OECD Member countries* and in Yugoslavia, meeting in the framework of the Committee for Scientific and Technological Policy of the Organization:

- recognising the essential contribution of science and technology to the economic and social development of both industrialised and developing countries;

- recognising that common challenges now face Member countries, such as the slow-down in economic growth, high levels of unemployment, low rates of productivity increase, persistent inflation, structural imbalances in their economies, increased energy prices and environmental problems;

- recognising that science, technology and innovation have a vital role to play in the resolution of these difficulties and in responding to the needs and aspirations of society;

- recognising that fundamental research plays an indispensible role in the generation of ideas and new knowledge, including those needed for future technological innovation;

- recognising that national policies have an important influence on the vigour of the scientific enterprise and innovation;

- recognising that progess in science and technology depends upon many forms of international co-operation and on the widest possible circulation of ideas and new knowledge between scientists, between institutions and between countries;

- recognising the value of continuing international consultation on the formulation, implementation and assessment of policies concerning science and technology;

DECLARE

That it is necessary to integrate policies for science and technology with other aspects of government policy, particularly economic, social, industrial, including energy, education and manpower policies;

that the following require attention in the formulation and implementation of policies for science and technology in Member countires and in Yugoslavia:

A. With regard to technological innovation, steps to:

(i) promote innovation as an objective within the framework of economic, social and regulatory policies;

(ii) assign priority to investment in research, development and innovation so as to ensure that short-term pressures do not jeopardise the sources of future economic growth, higher levels of employment and structural adjustment;

(iii) develop favourable conditions for innovation, including the openness of markets, and encourage risk-taking in innovation in the public and private sectors;

(iv) give particular attention to the innovative potential of small and medium-sized firms;

(v) stimulate research, development and innovation to increase the effectiveness and quality of output in the public and social services sectors;

(vi) stimulate research, development and innovation related to worldwide problems in such areas as energy, raw materials, environment, food, urban conditions, health and the work environment;

(vii) promote the diffusion of technological information.

* The mention of Member countries is deemed to apply also to the European Communities.

B. With regard to long-term research, steps to:

(i) maintain the strength and continuity of fundamental and long-term research to increase the stock of basic scientific and technological knowledge throughout the range of disciplines;

(ii) reinforce the research capacity of the universities and other relevant institutions, having appropriate regard to problems of their funding, administration, research facilities, staffing, and their links with industry and the public sector, and with other sectors of society.

C. With regard to the social, economic, cultural and political effects of technological change, steps to:

(i) take due account of the social and cultural implications of new technologies, in respect of the employment, mobility and training of the labour force;

(ii) monitor the introduction and spread of new technologies while attempting to assess their possible future implications for the economy, the environment and society;

(iii) facilitate public participation in the definition of major technological orientations, particularly through public access to information concerning their foreseeable long-term impacts, and through fostering public understanding of science and technology.

D. With regard to international co-operation in science and technology, steps to:

(i) stimulate the exchange of scientists, engineers and students between Member countries, facilitate the exchange of scientific and technical information, and encourage the flow of technologies;

(ii) explore new opportunities for co-operation in areas of common interest, with a view to making more effective use of human resources and major research facilities, to sharing of costs, to obtaining more rapid results, and to mounting large-scale efforts where these are necessary for an effective attack on problems;

(iii) encourage at the international level measures conducive to an improved scientific basis for regulations in areas such as health, safety and the environment;

(iv) pursue a broad range of activities in co-operation with developing countires to strengthen their scientific and technological capabilities, and contribute to the implementation and assessment of these efforts.

Ministers further DECLARE that OECD should:

(i) give increased emphasis to the integration of scientific and technological factors within the activities of the Organization and, in particular, within its work on the various aspects of economic policy;

(ii) improve the understanding of factors underlying the innovative performance of Member countries, and of the effects of international transfers of technology;

(iii) assist the less-industrialised Member countries as they tackle the problems of increasing the contribution of science and technology to their economic and social development;

(iv) continue the exchange of experiences and information among Member countries concerning policies for science and technology, and facilitate the definition of such policies;

(v) facilitate the assessment by Member countries of the consequences of technological change upon economic growth, rates of employment, productivity increase, structural changes in the economy, upon the environment and upon society at large;

(vi) facilitate the identification by Member countries of both research areas in which they would wish to co-operate and arrangements conducive to such co-operation;

(vii) facilitate the effects of Member countries to strengthen the scientific and technological potential and capabilities of developing countries.

The Australian Government has been involved in 'pump priming' industrial research and development through the Industrial Research and Development Incentives Scheme. It is the Government's plan to use the Scheme to increase employment, raise productivity and maintain the competitiveness of Australian industry. This year $53 million are being spent. We believe this investment will repay itself many times over in the future. My Department has conducted a survey of estimated benefits which companies expect to receive this decade from project grants under the Scheme. The companies estimate that new sales generated in this period will total $8 600m in domestic sales and a similar amount in exports. Jobs created will be an estimated 29 000.

Applied science

The Government is continuing to support Commonwealth Scientific and Industrial Research Organization research aimed at assisting Australian industry. In particular, CSIRO is stepping up its work in the manufacturing and energy sectors. A new Division of Manufacturing Technology has been created. Initially it will focus on the processing of metals and computer-aided manufacturing.

Also CSIRO is establishing a new Institute of Energy and Earth Resources formed from existing CSIRO energy research activities and the non-nuclear research sections of the Australian Atomic Energy Commission. Research will be expanded in such areas as fossil fuels, mining of energy resources, energy conservation, alternative fuels and renewable energy. Policy will be formulated in co-operation with my colleague, the Minister for National Development and Energy (Senator Carrick). In marine sciences CSIRO will be expanding activities also to assist the fishing industry and the exploitation of off-shore resources.

Basic Research

I have concentrated mainly on policy considerations particularly in meeting practical problems. Basic research must not be ignored. It is a paradox that, in order to apply science more directly and effectively to problems, we must extend our knowledge of basic science. Without this foundation successful technology transfer will not be possible. Basic research must be funded at a realistic level without necessarily being measured against short-term application. The need of man to extend constantly his knowledge of himself and the universe is an undeniable argument for the funding of basic research.

The Government mainly funds basic research through the Australian Research Grants Scheme, the Australian Marine Sciences and Technologies Advisory Committee and the National Energy Research Development and Demonstration Council. Over the past few years the Australian Science and Technology Council has examined the role of the Australian Research Grants Scheme, the role of university research, the objectives of funding basic research and the appropriate levels of funding. The Government has agreed to a recommendation from the Australian Science and Technology Council that the role of the Australian Research Grants Scheme must be used to support the most outstanding research projects. We have also agreed to an Australian Science and Technology Council recommendation that the universities themselves should allocate their internal research funds to give greater support for good quality research. Even greater emphasis will be placed on excellence as the basis of the Australian Research Grants Scheme support for research.

Role of private sector

I am concerned that the private sector is still not investing enough in research and development. The Industrial Research and Development Incentives Scheme has arrested an alarming slump in industry spending in this area during the mid-seventies. There has been a slow upturn and I am challenging private enterprise to increase its spending in this important area. Research and development are essential if we are to compete internationally, yet OECD figures indicate that spending by Australian industry is very low compared to other western countries. I would like to see research and development spending by industry more than doubled in this decade. Also the whole innovative process from invention to commercial marketing will have to be strengthened in line with this aim.

The Australian Government makes an unequal contribution to research and development spending in Australia, currently accounting for about 70 per cent of the estimated total of $1200m. The Government should not be

expected to further upgrade that figure unless industry also greatly increases its research and development funding. It is in the interest of the private sector to increase its own effort and, in so doing, create new jobs. Industries not willing to do this run the risk of being left behind, and as such should not expect government protection. Australia's financial institutions have also been tardy in providing risk capital to develop and commercialise new products and processes.

Along with resources development, the creation of specialised high technology industries is necessary for Australia's long-term economic well-being. My Department has conducted forums bringing together financiers and high technology entrepreneurs. Matters discussed included changes to the capital market, establishing a specialist venture capital financing body and taxation incentives. We are planning also a high-level symposium bringing together the Academy of Technological Sciences, financiers and the Government to look at these points.The House will be aware that the Campbell Commission of Inquiry into the Australian Financial System is examining these and other related points.

Conclusion

Australian science and technology policy must be integrated with economic and social goals. If not, the nation's scientific and technological resources will be wasted. All sections of the economy must play their part in supporting science and technology if Australia is to be counted among the technologically advanced countries of the world. High technology industries must be created. Present industrial processes and products must incorporate the latest technology, and must be basic research promoted. Australia must maintain and improve its data base of technological and scientific knowledge otherwise we will lose jobs and business opportunities to other countries.

We must not forget that science is a cultural activity essential to the spirit of mankind. This Government has adopted policies aimed at making the best use of science and technology for the economic and social advancement of all Australians. In pursuit of these goals, the Government is acting to minimise the undesirable social consequences of new technologies. A special sub-committee of the Australian Science and Technology Council has been established to advise the Government on this matter.

The Science and Technology Statement will be the factual basis on which scientists, policy makers and the public can work.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

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 this reason, and for greater clarity in presenting broad aggregates, tables 3 to 6, 9 and 10 are 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 informs 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 present report, which is the second in the annual series, has been 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. It documents, at the broad program expenditure level, the resources devoted by the Commonwealth Government to R&D in the financial years 1978-79 to 1980-81, and to a wider range of S&T activities in 1979-80 and 1980-81.
A number of improvements have been incorporated:

- a uniform methodology was developed in consultation with the Australian Bureau of Statistics to improve the quality of the data, and to promote consistency with the Project SCORE R&D survey;
- intramural and extramural(2) expenditures have been presented separately in the Ministry tables;
- intramural capital and current expenditures have been presented separately at the Ministry level; and
- coverage has been expanded to include a range of science and technology activities beyond R&D.

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

(2) See Appendix 1 for definitions.

An outline of the methodology is presented in Appendix I, together with definitions of terms and descriptions of the activities included as science and technology.

In interpreting the expenditure data, readers should be aware of the following points, which are expanded in Appendix 1.

- The 1980-81 figures throughout the statement are estimates.
- All S&T figures presented include the R&D components.
- In addition to departments, Commonwealth Government agencies, public enterprises, and other statutory authorities are included in the scope of this Statement.
- The R&D data are, as far as possible, consistent with the definitions and instructions used in the Project SCORE R&D survey(3). As indicated at the time, this was not always the case in Science Statement 1979-80, and movement of a number of activities from the R&D category to the S&T (other than R&D) category has caused the reported aggregate for R&D to fall by about $50m, or 10 per cent, for the years common to the two Statements i.e. 1978-79 and 1979-80. Percentage changes for some individual organisations have been considerably larger.
- In addition to identifiable Budget appropriations directed towards R&D, the Statement contains estimates of R&D performed in units whose principal objective is not research. In the majority of cases these estimates have been made by the agencies concerned.
- The R&D data and the S&T (other than R&D) data were collected according to different guidelines. An attempt was made to identify all R&D performed or funded by the Commonwealth. Because of the magnitude of the task, it was not possible to collect data on all S&T performed or funded by the Commonwealth. Therefore, the aim was limited to identifying and reporting the full expenditures of Commonwealth programs and organisational units whose activities are primarily directed towards one or more areas of S&T. Thus, if more than half the expenditure of a program or organisational unit could be attributed to S&T (bearing in mind that R&D is a component of S&T) the total expenditure was included as S&T. If not, only the R&D expenditure was included as S&T. While the data presented for S&T can therefore be used to identify programs and units primarily devoted to S&T, and give a broad approximation to the levels of expenditure involved, they cannot be used to compare levels of S&T activity between agencies or Ministries. The collection of S&T data (other than R&D) is still experimental.
- Treatment of Research Trust Funds differs between the two Statements. Whereas the earlier Science Statement adopted the Budget viewpoint and showed Commonwealth payments to the

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(3) Project SCORE, Research and Development in Australia 1976-77, Australian Government Publishing Service, Canberra, 1980.

Trust Funds, the present Statement seeks to show R&D expenditures from the Funds, and to apportion these expenditures among the various funding sources.

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 in developing the format and content of the Statement; and the assistance provided by the Australian Bureau of Statistics in planning the information collection.

RECENT TRENDS IN COMMONWEALTH FUNDED S&T

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 (!) 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 per cent in 1976-77. These features are illustrated in Table 1.

Table 1: 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	($m)	159	346	519	600*
GERD	($m)	347	613	816	970*
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	16*
GERD	77	33	19
GDP implicit price deflator	48	51	17
Government final consumption expenditure implicit price deflator	70	59	14

* These estimates are DST projections. Firm data will be issued by ABS later in 1981. Note that Table 1 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 29.

** 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 (preliminary), ABS Catalogue No. 8105.0
- Quarterly Estimates of National Income and Expenditure - September Quarter, 1980, ABS Catalogue No. 5206.0.

(1) Actual purchasing power of the Commonwealth R&D funding is difficult to establish. See Appendix 1 for discussion.

Preliminary results of the Australian Bureau of Statistics 1978-79 survey of R&D show some recovery in the private sector.

Commonwealth R&D Expenditure Compared to Commonwealth Outlays and GDP

Commonwealth Government funds expended on R&D for the years 1978-79 to 1980-81, as reported by funding agencies for the purposes of this Statement, are compared in Table 2 to total Commonwealth outlays and gross domestic product (GDP). Figures presented for the Budget sector(1) 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 to an appropriation(2). This treatment of Trust Funds differs from that followed in Science Statement 1979-80. Figures presented for the Commonwealth Non-Budget sector represent the R&D funded from Commonwealth bodies' own funds (other than direct appropriations) and consist mainly of government enterprise trading revenues, plant disposals, publication sales, and residuals of appropriations retained from previous years.

Note also that, in contrast to Table 1, the data shown in Table 2 for "Commonwealth Government funds expended on R&D" do not contain estimates for the research components of higher education sector teaching-and-research expenditures - see page 29. If these estimates, totalling about $140 million in 1978-79, were added in, Table 2 would show a figure of about $624 million for 1978-79 as compared with the $600 million shown for that year in Table 1, a difference of 4%. This difference is consistent with Table 2 having been compiled from data provided by R&D funders while Table 1 is based on data provided by R&D performers.

Table 2: Trends in Commonwealth Government funds expended on R&D: 1978-79 to 1980-81

		1978-79	1979-80	1980-81
Estimated Commonwealth Government Budget sector funds expended on R&D	($m)	451.	513.	603.
% Total Commonwealth outlays	(%)	1.55	1.62	1.67
Estimated Commonwealth Government funds expended on R&D (including Non-Budget sector)	($m)	484.	550.	647.
% GDP	(%)	0.48	0.48	0.50
Total Commonwealth outlays*	($m)	29045.	31694.	36037.
GDP**	($m)	101133.	113816.	n.a.

* 1980-81 Budget Paper No. 1, Budget Speech, Statement No. 6.

** Quarterly Estimates of National Income and Expenditure - September Quarter, 1980, ABS Catalogue No. 5206.0, Table 5.

(1) The Budget sector consists of all transactions relating to the Consolidated Revenue Fund, the Loan Funds, and the Trust Funds, as reported in the Budget Statements.

(2) See Appendix 1 for further discussion.

Commonwealth S&T Expenditure by Ministry, Function and Objective

Table 3: 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)	
Ministry	78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure					
Aboriginal Affairs	1.33	1.19	0.97	3.09	2.95
Administrative Services	0.03	0.12	0.15	0.16	0.22
Attorney-General ' s	1.33	1.52	2.28	2.33	3.24
Business & Consumer Affairs	0.18	0.16	0.21	0.16	0.21
Capital Territory	0.42	0.43	0.48	4.12	4.25
Communications	0.05	0.10	0.05	0.13	0.08
Defence	86.72	93.74	104.51	131.75	142.29
Education	76.3	82.5	89.3	83.5	90.6
Employment and Youth Affairs	0.06	0.31	0.60	0.31	1.04
Foreign Affairs	0.05	0.05	0.23	0.61	0.88
Health	21.92	24.18	29.66	31.72	37.50
Home Affairs and Environment	1.54	2.54	4.17	9.30	12.53
Housing and Construction	1.56	1.74	1.94	2.45	2.77
Immigration & Ethnic Affairs	0.30	0.45	0.42	0.90	2.15
Industry and Commerce	0.61	0.76	1.07	5.37	5.83
National Development & Energy	27.19	31.08	39.04	65.35	77.00
Primary Industry	14.86	16.13	19.51	84.70	95.20
Prime Minister and Cabinet	0.14	0.14	0.20	0.91	1.22
Science and Technology	209.24	248.32	300.22	338.28	395.88
Social Security	0.20	0.28	0.57	0.33	0.62
Transport	4.67	4.88	4.80	21.80	24.74
Treasury	1.59	1.86	2.33	64.13	88.50
Veterans' Affairs	0.36	0.40	0.44	0.40	0.44
Total (Budget sector)	450.6	512.9	603.1	851.8	990.1
B. Commonwealth Non-Budget sector					
Aboriginal Affairs	0.05	0.03	0.21	0.11	0.29
Attorney General's	0.02	0.02	-	0.02	-
Communications	27.36	28.15	33.17	51.73	60.79
Health	0.97	1.25	2.51	1.25	2.51
Housing and Construction	0.07	0.04	0.01	43.13	42.00
Science and Technology	3.47	5.72	7.16	5.77	7.25
Treasury *	1.24	1.37	1.58	1.37	1.58
Total (Non-Budget sector)	33.18	36.58	44.65	103.37	114.43
Total (Direct Commonwealth funding)	483.8	549.5	647.3	955.1	1104.5

* Financial Enterprises sector

Budget sector funds shown in Table 3 were disbursed by Budget function in Table 4, whereas Table 5 shows the socio-economic objectives to which the R&D activities would be allocated in Project SCORE. Although a number of category titles in the two tables are the same, the entries will in general differ because the R&D activities of some organisations contribute to national objectives other than the Budget function to which they are classified. Further explanation is given in Appendix 1.

Table 4: Estimated Commonwealth Government Budget sector funds expended on S&T by Budget function

($ million)	R&D			S&T (including R&D)	
	1978-79	1979-80	1980-81	1979-80	1980-81
Defence	86.72	93.76	104.55	136.38	147.07
Education	76.4	82.6	89.4	83.6	90.7
Health	22.28	24.58	30.10	32.12	37.94
Social Security and Welfare	1.03	1.00	1.04	1.09	1.15
Housing	0.10	0.10	0.13	0.10	0.13
Urban and Regional Development n.e.c. and the Environment	1.00	2.14	3.79	8.02	10.58
Culture and Recreation	0.81	0.73	0.75	5.80	7.72
Economic Services					
. Transport and Communications	4.72	4.98	4.85	21.93	24.83
. Water Supply and Electricity	-	-	-	-	-
. Industry Assistance and Development	49.98	60.52	90.24	152.68	191.69
. Labour and Employment	0.36	0.76	1.03	1.05	1.80
. Other Economic Services	0.71	0.66	0.80	41.32	43.63
Total Economic Services	55.77	66.92	96.92	216.98	261.95
General Public Services					
. Legislative Services	-	-	-	-	-
. Law, Order and Public Safety	1.36	1.64	2.43	2.61	3.59
. Foreign Affairs and Overseas Aid	0.05	0.05	0.23	0.61	0.88
General and Scientific Research n.e.c.	201.89	235.72	269.47	271.41	305.71
Administrative Services	3.19	3.64	4.34	93.48	123.05
Total General Public Services	206.49	241.05	276.46	368.11	433.23
Not allocated to function	-	-	-	-	-
Total (Budget sector)	450.6	512.9	603.1	851.8	990.1

Table 5: Estimated Commonwealth Government Budget sector funds expended on R&D by socio-economic objective#

Objective Category	1978-79	1979-80	1980-81
		(Sm)	
National security			
. Defence	86.72	93.76	104.55
Sub-total	86.72	93.76	104.55
Economic development			
. Agriculture	64.06	85.40	104.37
. Other primary industries	12.30	14.51	15.46
. Mining	12.14	12.15	13.67
. Manufacturing	59.94	68.67	90.12
. Construction	7.55	7.24	7.70
. Energy	26.74	31.15	39.83
. Transport	4.95	5.08	5.06
. Communications	0.15	0.21	0.15
. Economic services n.e.i.	9.94	11.44	12.25
Sub-total	197.75	235.84	288.60
Community welfare			
. Environment*	26.33	26.76	30.20
. Health	26.01	28.63	33.68
. Education**	4.04	4.01	4.33
. Welfare	0.72	1.18	1.63
. Community services n.e.i.	2.33	2.62	3.52
Sub-total	59.43	63.19	73.37
Advancement of knowledge			
. General advancement of knowledge	106.7	120.1	136.6
Sub-total	106.7	120.1	136.6
Total	450.6	512.9	603.1

See Appendix 1 for classification differences relative to Science Statement 1979-80.

* 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.

Table 6: Estimated Commonwealth Government Non-Budget sector* funds expended on R&D by socio-economic objective

Objective Category	1978-79	1979-80	1980-81
		(Sm)	
National security			
. Defence	-	-	-
Sub-total	-	-	-
Economic development			
. Agriculture	0.87	1.62	1.80
. Other primary industries	0.26	0.34	0.53
. Mining	0.04	0.14	0.14
. Manufacturing	0.18	0.63	0.64
. Construction	0.10	0.13	0.10
. Energy	0.04	0.17	0.18
. Transport	0.01	0.01	0.01
. Communications	27.36	28.15	33.17
. Economic services n.e.i.	2.98	3.50	4.77
Sub-total	31.84	34.67	41.35
Community welfare			
. Environment**	0.11	0.36	0.38
. Health	0.98	1.29	2.56
. Education	0.01	-	-
. Welfare	-	-	-
. Community services n.e.i.	0.08	0.09	0.09
Sub-total	1.19	1.75	3.02
Advancement of knowledge			
. General advancement of knowledge	0.16	0.16	0.28
Sub-total	0.16	0.16	0.28
Total	33.18	36.58	44.65

* The main contributions in the Non-Budget sector are from Telecom, Snowy Mountains Engineering Corporation, CSIRO, and Commonwealth Serum Laboratories. The Reserve Bank, which should strictly be included in the Financial Enterprises sector, has been included as Non-Budget for Tables 3 and 6.

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

RECENT INITIATIVES

In November 1980, the Government established a Department of Science and Technology. This included the science elements of the former Department of Science and the Environment together with the patents, industrial research and development, innovations, technology development and transfer, productivity improvement, productivity promotion and working environment elements of the former Department of Productivity.

Industry

The Industrial Research and Development Incentives Amendment Bill 1981 was introduced to the House in April 1981, to continue industrial R&D incentives grants for a further five years from 30 June 1981, and to improve the selectivity of these incentives in encouraging the development of efficient, internationally competitive manufacturing. Project grant limits will be increased from $500 000 to $750 000 per annum and the limit on commencement grants will be increased from $25 000 to $40 000 per annum. Eligibility for assistance under the Act will be extended and changes will be made to the administrative machinery.

Outlays for programs under the Act in 1980-81 will increase by about 55 per cent over 1979-80 to an estimated $53.7 million.

Within CSIRO, a new Division of Manufacturing Technology was created in April 1980 from existing resources. Its research work will be concentrated on metal processing, including casting, forging, machining, surface finishing and welding, and will be expanded, to cover production engineering, automation, and robotics.

Two initiatives have been taken in the area of microelectronics technology:

- a research group has been established within the CSIRO Division of Computing Research to develop methods of designing special purpose computers on single silicon chips using a technique known as very large scale integration (VLSI);

- the Government has invited the National Semiconductor Corporation to examine the feasibility of establishing a silicon wafer fabrication plant in the ACT. The Government has offered to provide land and buildings (valued at approximately 19 million) in return for most favoured customer access to the company's products, assistance to Australian manufacturers in the application of semi-conductors, and training of Australians. The capital cost of the project is estimated at $100 million.

Primary Industry

Included in the 1980-81 appropriation was an estimated $35 million expenditure on the Australian National Animal Health Laboratory which is being constructed at Geelong at a total estimated cost of $106 million.

Energy

Commonwealth appropriation to the National Energy Research Development and Demonstration (NERD&D) Program rose by almost 50 per cent to $13.5 million in 1980-81. Total commitment to the NERD&D program is expected to be about $18 million this financial year.

Within CSIRO, a new Division of Fossil Fuels was created in January 1981 from existing resources. Its research work will be concentrated on coal, oil shale, petroleum and gas.

Environment

The 1980-81 Budget increased funding of the Supervising Scientist and the Alligator Rivers Region Research Institute from $1.7 million (1979-80) to $3.5 million, including an initial outlay for housing and laboratory facilities at Jabiru. Increased support has also been given to the Australian National Parks and Wildlife Service for wildlife conservation, and the Great Barrier Reef Marine Park Authority for management of the reef.

Health

The 1980-81 Budget provided an increase of 29 per cent in funds appropriated to the Medical Research Endowment Fund for medical research to $18.0 million in 1980-81.

Marine sciences

The Government announced in April 1980 that it would establish new headquarters in Hobart for CSIRO marine research activities and would fund the acquisition of a purpose-built oceanographic research ship, at a total cost of $25 million. CSIRO has identified marine research, especially oceanography, as an area of high priority. It has recently restructured the previous Division of Fisheries and Oceanography into a Division of Oceanography and a Division of Fisheries Research. The two Divisions will jointly occupy the new Sandoro Marine Laboratories in Hobart.

The research program of the Australian Institute of Marine Science (AIMS) was expanded, with expenditure increasing by $1.9 million to $5.5 million in 1980-81.

The Budget included an increase in Marine Sciences and Technologies Grants from $400 000 to $2 million in 1980-81, for investigations in the Barrier Reef region, Bass Strait and other priority areas.

A build up in marine science has also occurred in research being conducted by the Antarctic Division of the Department of Science and Technology. In 1980-81 $1.2 million was provided for the first stage of the Division's marine science program which was primarily devoted to participation in an international survey of krill stocks. The results of this and similar programs in the future will assist in providing the scientific basis for the work of the new international Commission established to give effect to the conservation principles of the

Convention on the Conservation of Antarctic Marine Living Resources. Australia took a leading role in the development of this Convention and the headquarters of the Commission will be in Hobart.

Antarctic research

Approval has been given to a ten year $52 million program to rebuild Australia's three Antarctic stations. The program is being examined by the Parliamentary Standing Committee on Public Works. Studies and design work are proceeding on transport facilities to support Antarctic activities. The Initial Report of the Antarctic Research Policy Advisory Committee (ARPAC) was tabled in the House on 20 March 1980. The Antarctic marine science program is discussed under the heading of "Marine sciences".

Meteorology

In December 1980 the Government decided to upgrade the nation's weather services by provision of a new central computer system to support the research and operational functions of the Bureau of Meteorology. The system will be installed in 1982 at an estimated cost in the region of $5 million.

Social sciences

Several new research institutions have been recently established. The Institute of Family Studies began operations in February 1980. The inaugural meeting of the Council of the Australian Institute of Multicultural Affairs was held in March 1980. The Bureau of Labour Market Research commenced operation in July 1980.

A National Centre for Research and Development in Technical and Further Education is being established jointly by the Commonwealth and the States. It will be located in Adelaide. The Commonwealth has undertaken to meet half the cost of the Centre up to a maximum Commonwealth contribution of $300 000 per annum for a period of five years.

In the area of the working environment and labour-management cooperation the following initiatives are of note:

- the establishment of a research fund to support and encourage practical research into employee participation methods and practices ($500 000 in 1980-81; $100 000 in 1981-82);

- tripartite (employers, employees, government) research into the projected likely major technological changes in the 1980s and their impacts on employment, productivity and society generally.

Research coordination

CSIRO is introducing more formalised strategic planning procedures for the allocation of resources to major areas of research. These procedures will form the main basis for interaction with the CSIRO Advisory Council, a broadly representative body established under the Science and Industry Research Act 1949 to advise the Executive of CSIRO regarding research priorities.

The Defence Science and Technology Organisation has established Defence Research Groups to gather together industry, academic and government researchers for specialised discussions and conferences.

The AUSTREC Program of the Australian Development Assistance Bureau will draw together, within a coordinated framework, existing activities and new aid initiatives in the science and technology area.

International cooperation

The Japan-Australia Science and Technology Agreement was established in November 1980 at an initial funding level on the Australian side of $100 000 per annum.

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. The total S&T figures are not comparable between agencies or between ministries. (See Introduction for brief explanation, or Appendix 1 for detail).

ABORIGINAL AFFAIRS

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Aboriginal Affairs	(a)	-	-	-	0.042	0.057
	(b)	0.182	0.152	0.114	0.152	0.114
Australian Institute of Aboriginal Studies (AIAS)	(a)	-	-	-	1.401	1.445
	(b)	0.497	0.471	0.489	0.928	0.970
Applied Ecology Pty Ltd	(a)	0.648	0.565	0.362	0.565	0.362
Total (Budget sector)		1.327	1.188	0.965	3.088	2.948
B. Commonwealth Non-Budget sector						
AIAS	(a)	-	-	-	0.077	0.080
Applied Ecology Pty Ltd	(a)	0.050	0.034	0.210	0.034	0.210
Total (Non-Budget sector)		0.050	0.034	0.210	0.111	0.290
Total (Direct Commonwealth funding)		1.377	1.222	1.175	3.199	3.238
C. Expenditure from other sources						
AIAS	(a)	-	-	-	0.105	0.128

($million)	R&D			S&T (including R&D)	
	78-79	79-80	80-81	79-80	80-81
D. Type of expenditure					
Intramural capital	0.108	0.148	0.225	0.177	0.243
Intramural current	0.590	0.451	0.347	2.046	2.039
Extramural	0.679	0.623	0.603	1.080	1.084
Total (A+B+C)	1.377	1.222	1.175	3.303	3.366

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Aboriginal Affairs, Australian Institute of Aboriginal Studies, Applied Ecology Pty Ltd.

Department of Aboriginal Affairs

All of the research work supported by the Department of Aboriginal Affairs is undertaken by outside agencies, including some Aboriginal organisations. The first aim of all such research, is 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 planning and performance of research by other research bodies.

On a biennial basis the Department collects data which are used to provide a general measure of the well being of Aboriginal communities. Aboriginal communities form the basic unit of collection. The Department's policy is that these communities should form the focus of its programs.

Australian Institute of Aboriginal Studies

The Institute promotes Aboriginal studies and assists relevant co-operation 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, operating 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 are saltwater crocodiles, emus, and tropical black-lip oysters as viable resource bases for Australian Aborigines and Islanders. The green turtle project was phased out in June 1980.

ADMINISTRATIVE SERVICES

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Administrative Services	(b)	-	-	-	0.040	0.027*
Australian Federal Police scientific research	(a)	-	-	0.005	-	-
	(b)	0.026	0.124	0.144	0.124	0.189
Total (Direct Commonwealth funding)		0.026	0.124	0.149	0.164	0.220
B. Type of expenditure						
Intramural capital		-	-	-	-	-
Intramural current		-	-	0.005	-	0.005
Extramural		0.026	0.124	0.144	0.164	0.215
Total		0.026	0.124	0.149	0.164	0.220

(a) Intramural expenditure (b) Extramural expenditure

Source: Department of Administrative Services

* This figure includes grants to conferences of a scientific nature approved for 1980-81 as at 1 April 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 performance of its functions. A current example is the speech processing research at the Australian National University, which includes in its aims the development of techniques for improving tape recording intelligibility, tape recording validation and speaker identification.

ATTORNEY-GENERAL'S

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Australian Institute of Criminology	(a)	0.354	0.402	0.456	1.103	1.223
Criminology Research Council*	(b)	0.030	0.030	0.050	0.030	0.050
Commonwealth Legal Aid Commission	(a)	0.110	0.148	0.175	0.148	0.175
	(b)	0.013	0.021	0.045	0.021	0.045
Institute of Family Studies	(a)	-	0.018	0.251	0.022	0.321
	(b)	-	-	0.250	-	0.250
Law Reform Commission	(a)	0.822	0.900	1.054	0.900	1.054
Legislative Drafting Institute	(a)	-	-	-	0.102	0.118
Total (Budget sector)		1.329	1.519	2.281	2.326	3.236
B. Commonwealth Non-Budget sector						
Criminology Research Council*						
. Attributable to past Commonwealth contributions	(b)	0.020	0.020	-	0.020	-
Total (Direct Commonwealth funding)		1.349	1.539	2.281	2.346	3.236
C. Expenditure from other sources						
Criminology Research Council*						
. Attributable to State contributions	(b)	0.050	0.050	0.050	0.050	0.050

($million)	R&D			S&T (including R&D)	
	78-79	79-80	80-81	79-80	80-81
D. Type of expenditure					
Intramural capital	0.006	0.002	0.003	0.020	0.009
Intramural current	1.280	1.466	1.933	2.254	2.882
Extramural	0.112	0.121	0.395	0.121	0.395
Total (A+B+C)	1.399	1.589	2.331	2.396	3.286

(a) Intramural expenditure (b) Extramural expenditure

Sources: Attorney-General's Department, Australian Institute of Criminology, Criminology Research Council, Commonwealth Legal Aid Commission, Institute of Family Studies, Law Reform Commission, Legislative Drafting Institute.

* 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 1.

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 Government authorities on such subjects as crime trends, drug offences, prison labour, suicide, 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 2000 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 regional conference of correctional administrators held in Hong Kong in 1980. A second such meeting of regional correctional administrators is scheduled for July 1981.

Criminology Research Council

The Criminology Research Council was established to control and administer a Criminology Research Fund and determine the manner in which the expenditure of moneys from the Fund were to be allocated. In pursuance of its functions the Council invites applications for research grants from individuals or organisations wishing to undertake research in connection with the causes, correction and prevention of criminal behaviour and any related matter. Since 1972 the Council has provided funds for sixty seven separate research projects to a value of $717 000. These projects cover a wide range of subjects, many being relatively long term whilst others have been completed in less than one year.

The Council consists of seven members, one representing the Commonwealth Government and one representing each State Government. By virtue of its composition and the range of projects for which it provides funds the Council is a practical example of cooperative federalism.

Commonwealth Legal Aid Commission

The Commonwealth Legal Aid Commission was established in 1977 to ascertain and keep under review, the extent of the need for legal assistance in Australia, to advise and make recommendations to the Attorney-General, and to the State Legal Aid Commissions, to undertake research into all aspects of legal assistance, to collect and publish statistics and other allied functions. Research is conducted by staff members and by externally contracted consultants.

Institute of Family Studies

The Institute of Family Studies which began operations in February 1980, was established to conduct and co-ordinate 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.

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.

BUSINESS AND CONSUMER AFFAIRS

($million)	R&D			S&T (including R&D)	
	78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget Sector					
Industries Assistance Commission					
. IMPACT Project (a)	0.180	0.156	0.206	0.156	0.206
Total (Direct Commonwealth funding)	0.180	0.156	0.206	0.156	0.206
B. Type of expenditure					
Intramural capital	-	-	0.001	-	0.001
Intramural current	0.180	0.156	0.205	0.156	0.205
Extramural	-	-	-	-	-
Total	0.180	0.156	0.206	0.156	0.206

(a) Intramural Expenditure Source:

Source: Industries Assistance Commission

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	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Capital Territory	(a)	0.392	0.419	0.457	3.609	3.792
	(b)	-	-	-	0.120	0.125
National Capital	(a)	0.002	0.001	0.001	0.077	0.057
Development Commission	(b)	0.027	0.013	0.016	0.312	0.281
Total (Direct Commonwealth funding)		0.421	0.434	0.475	4.118	4.254
B. Expenditure from other sources						
Department of Capital Territory	(a)	-	0.012	0.010	0.012	0.010
C. Type of expenditure						
Intramural Capital		0.003	0.004	0.005	0.595	0.346
Intramural Current		0.391	0.428	0.464	3.104	3.513
Extramural		0.027	0.013	0.016	0.432	0.406
Total (A+B)		0.421	0.446	0.485	4.130	4.264

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Capital Territory, National Capital Development Commission.

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. This responsibility requires the Department to carry out functions performed elsewhere in Australia by State and Local governments.

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. This involves a range of activities extending from basic land use planning to construction of public facilities.

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.

Some of the studies are undertaken internally, mainly by the Commission's Engineering Division; some are undertaken by other government agencies, such as the Department of Housing and Construction, or by academic institutions such as the Canberra College of Advanced Education; others are undertaken by commercial consultants.

COMMUNICATIONS

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Communications	(a)	0.037	0.087	0.038	0.121	0.070
	(b)	0.013	0.013	0.013	0.013	0.013
Total (Budget sector)		0.050	0.100	0.051	0.134	0.083
B. Commonwealth Non-Budget sector						
Australia Post	(a)	0.584	0.635	0.739	1.259	1.428
	(b)	0.040	0.060	0.160	0.087	0.210
Overseas Telecommunications Commission, Australia (OTC)	(a)	-	-	-	0.034	0.061
	(b)	0.180	0.181	0.298	0.181	0.519
Telecom Australia	(a)	26.300	27.000	31.300	49.900	57.900
	(b)	0.254	0.269	0.674	0.269	0.674
Total (Non-Budget sector)		27.358	28.145	33.170	51.730	60.792
Total (Direct Commonwealth funding)		27.408	28.245	33.221	51.869	60.875

($million)	R&D			S&T (including R&D)	
	78-79	79-80	80-81	79-80	80-81
C. Type of expenditure					
Intramural capital	1.945	2.185	2.761	4.084	5.092
Intramural current	24.976	25.537	29.315	47.230	54.367
Extramural	0.487	0.523	1.145	0.550	1.416
Total (A+B)	27.408	28.245	33.221	51.864	60.875

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Communications, Australia Post, OTC, Telecom Australia.

Department of Communications

The Department of Communications is responsible for the provision of broad policy advice on postal and telecommunications services; for policy and technical aspects involved in developing and maintaining broadcasting services; and for the management and use of the radio frequency spectrum. Its research activities in recent years have been principally concerned with the development of a domestic communications satellite system for Australia.

Telecom Australia

The efficient provision of telecommunications services depends to a large degree on the timely adoption of new technology in the telecommunications network. Advances in technology offer telecommunications administrations opportunities to reduce operating costs, improve standards of service and diversify the services they provide to the community. The efficient operation and development of a telecommunications network is thus vitally concerned with the management of technology.

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.

Telecom Australia purchases its major equipment items by calling for tenders world-wide, and it evaluates these tenders on the basis of technical suitability, price and availability. This practice provides the major motivation for the R&D endeavour in Telecom Australia, in that, through conducting its own in-house R&D, Telecom seeks to equip itself with the necessary independent technical awareness and competence.

Telecom evaluates new telecommunications technology and systems in the Australian context, plans and programs developments of the Australian network, prepares technical procurement specifications for the systems needed to implement these plans, and ensures that the systems chosen for purchase meet these specifications.

Although the R&D effort is not primarily directed towards the development of major equipment items, Telecom Australia sometimes requests suppliers to make special modifications to their standard types of equipment to suit particular Australian conditions, or makes such modifications itself. But, in principle, Telecom Australia buys from world industry and, in accordance with this philosophy has no significant manufacturing capability of its own.

There is an element of R&D in many of the nationwide engineering activities of Telecom Australia, but most of the R&D effort is centred in the Research and Engineering Departments of Telecom's Headquarters Administration.

The R&D activities cover the whole spectrum of telecommunications engineering. 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, such as planned or programed network developments. 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 construction and maintenance operations.

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, is also required to operate its services as efficiently and economically as practicable and must have special regard to the needs of Australians residing and carrying on business outside the cities.

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.

DEFENCE

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Defence	(a)	86.324	93.367	104.039	125.697	134.171
	(b)	0.397	0.370	0.475	6.053	8.121
Total (Direct Commonwealth funding)		86.721	93.737	104.514	131.750	142.292
B. Type of expenditure						
Intramural capital		6.871	9.394	7.999	23.365	15.686
Intramural current		79.453	83.973	96.040	102.332	118.485
Extramural		0.397	0.370	0.475	6.053	8.121
Total		86.721	93.737	104.514	131.750	142.292

(a) Intramural (b) Extramural

Source: Department of Defence

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)

The bulk of the research and development performed for the Department of Defence is carried out by the Defence Science and Technology Organisation. DSTO's functions are to:

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

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 4 900 including about 1 100 professional scientists and engineers, deployed in twelve establishments located in the A.C.T., the Eastern States and South Australia.

Current projects of significance include the JINDALEE over the horizon radar, the MULLOKA sonar system and the WRELADS laser depth sounding system for marine charting.

DSTO participates in international co-operative programs in science and technology, notably the Technical Co-operation 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 co-operating in staff exchanges with industry and academic institutions, in addition to arrangements for study leave at DSTO laboratories and staff secondments.

During 1979-80 some Defence Research Groups were set up under DSTO sponsorship. These groups gather together R&D workers in some specialised areas from industry, tertiary educational institutions, defence and other government laboratories, for discussions, conferences etc. It is an objective that these will lead to some co-ordination and sharing of research tasks.

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 proposed 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. Such expenditure accords with the Government's policy to increase Australia's independence by improving industry's ability to support the requirements of the Defence Force.

EDUCATION

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Education						
. Education Review and Evaluation Studies	(b)	0.110	0.139	0.140	0.139	0.140
. Australian Council for Educational Research	(b)	0.275	0.295	0.319	0.295	0.319
. Education Planning Group	(a)	0.052	0.068	0.067	0.087	0.089
. Education Research and Development Committee	(a)	-	-	-	0.024	0.118
	(b)	1.002	0.963	0.957	0.963	0.957
. Postgraduate Awards	(b)	8.002	7.583	7.984	8.480	8.962
. TAFE National R&D Centre	(b)	-	-	-	-	0.200

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
Tertiary Education Commission						
. Research and Investigation	(a)	0.179	0.094	0.080	0.094	0.080*
Schools Commission	(b)	0.100	0.114	0.142	0.114	0.142
A.C.T. Schools Authority	(a)	0.087	0.101	0.119	0.101	0.119
Curriculum Development Centre	(a)	1.428	1.614	1.750	1.614	1.750
	(b)	0.748	0.568	0.700	0.568	0.700
Grants to universities**	(b)	64.3	71.0*	77.0*	71.0*	77.0*
Total (Direct Commonwealth funding)		76.3	82.5	89.3	83.5	90.6
B. Expenditure from other sources						
Curriculum Development Centre	(a)	0.121	-	0.020	-	0.020
C. Type of expenditure						
Intramural Capital		0.001	-	-	-	-
Intramural Current		1.867	1.877	2.036	1.920	2.176
Extramural		74.5	80.7	87.2	81.6	88.4
Total (A+B)		76.4	82.5	89.3	83.5	90.6

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Education, Tertiary Education Commission, Department of Education "Receipts and Expenditure Estimates 1980-81", Budget Speech 1980-81.

* 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 1979-80 and 1980-81 are based on the assumption that the proportion of general recurrent grants and equipment grants expended on research in 1979 is maintained for 1980 and 1981, and take into account the level of the special research grant approved for these years.

Note 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 21 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 $120m in 1977, $130m in 1978 and $140m in 1979 and 1980.

   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.

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
Identifiable research expenditure by universities from Category 1		
. from general funds	50.1	52.2
. from special research grants	4.5	5.6
. from equipment grants	8.4	7.7
Total	63.0	65.5

Research expenditure from general funds and equipment grants is not yet available for 1980 and 1981. However, for these years special research grants of $5.9m in December 1979 cost levels have been approved, an increase of $0.3m relative to the 1979 level.

Department of Education

. 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.

. 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 co-ordination at Ministerial level. The figures in the table above show only the Commonwealth grants. 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 co-operation 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 a Division of the Commonwealth Department of Education. It is concerned broadly with education at the national level, and with co-ordination 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 co-ordinated projects involving other parts of the portfolio and other Departments.

. 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.

Research Awards were introduced in 1959 with the following aims:

- to develop postgraduate research schools in Australian universities;

- to maintain a flow of highly trained personnel to the workforce;

- to promote the full intellectual development of the most talented students.

The Scheme was extended to Course Awards in 1971 in order to provide opportunities for further study for people who have gained a first degree and had been employed for several years, and who wish to improve their professional competence in their respective fields.

Advanced Education Institution Awards were introduced in 1974 with aims similar to the Course Awards Scheme and with the intention of linking the research with industry.

For 1981 800 new Awards will be available comprising 635 Research Awards, 140 Course Awards and 25 Advanced Education Institution Awards. This is an increase of 100 over the number provided for 1980. The Awards are highly competitive and are not subject to a means text. At 30 June 1980 approximately 1 850 students were receiving benefits under Postgraduate Awards.

. Education Research and Development Committee (ERDC)

Under its terms of reference the Committee advises the Minister on educational research priorities and on the improvement, development, co-ordination and application of results of educational research in Australia.

ERDC, to fulfill these roles, accepts annually applications from individuals and groups for education research grants as well as commissioning people to undertake research on topics identified by it as being of high priority in education. Additionally, it makes awards, through an annual application process, for three types of educational research training fellowships and arranges for the dissemination of reports and materials produced through its research grants program.

. TAFE National Research and Development Centre

The TAFE National Research and Development Centre is being established by the Australian Education Council. The function of the Centre is to stimulate and co-ordinate research and curriculum development in technical and further education. The Government has authorised a Commonwealth half share of up to $300 000 per annum for five years for the establishment and operation of the Centre.

Schools Commission

The Schools Commission Act 1973 requires the Commission to enquire into and furnish advice to the Minister for Education on the needs of schools in Australia. The Commission is currently conducting,

with the co-operation of the States, a study of resource levels in government schools in an attempt to determine the factors influencing school running costs. In addition to its general funding programs the Commission has specific purpose programs that are designed to assist special target groups such as those in disadvantaged schools or areas, Aborigines, 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. All of these provisions are based on continuing investigation to determine needs and to tailor appropriate programs to meet those needs. In short the Commission, in carrying out its functions, must constantly enquire into the needs of schools and school students in relation both to current provisions and community expectations and to the future demands of a changing Australian society.

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 works on school curricula in co-operation with educational authorities and agencies throughout Australia and overseas. Its activities include research into curricula and the publishing and marketing of curriculum and teaching materials.

EMPLOYMENT AND YOUTH AFFAIRS

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Employment and Youth Affairs						
. Bureau of Labour Market Research	(a)	-	-	0.089	-	0.445
	(b)	-	-	0.014	-	0.070
. Development of Australian Standard Classification of Occupations	(a)	0.057	0.307	0.501	0.307	0.501
. Office of Youth Affairs	(b)	-	-	-	-	0.020
Total (Direct Commonwealth funding)		0.057	0.307	0.604	0.307	1.036

($million)	R&D			S&T (including R&D)	
	78-79	79-80	80-81	79-80	80-81
B. Type of expenditure					
Intramural capital	-	-	-	-	-
Intramural current	0.057	0.307	0.590	0.307	0.946
Extramural	-	-	0.014	-	0.090
Total	0.057	0.307	0.604	0.307	1.036

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Employment and Youth Affairs.

Department of Employment and Youth Affairs

. Bureau of Labour Market Research

The Bureau of Labour Market Research conducts research into the functioning of the Australian labour market as an arm of the Department of Employment and Youth Affairs. The Bureau commenced operation in July 1980 and is expected to achieve its full staff level of fifty by 1982.

The functions of the Bureau are to undertake research and analysis on the functioning of the labour market, sponsor research into aspects of the labour market, and coordinate the work of other agencies involved in labour market research.

During 1980-81 the Bureau's work will be principally involved with the collection, collation and interpretation of labour market information and research of other agencies both within and outside Australia.

. Australian Standard Classification of Occupations (ASCO)

In conjunction with the Australian Bureau of Statistics the Department of Employment and Youth Affairs is developing a new, comprehensive Australian Standard Classification of Occupations (ASCO). The classification will be used by the Commonwealth Employment Service for matching job seekers with job vacancies and by the ABS for statistical compilations. 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 co-ordination 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.

The Minister for Employment and Youth Affairs announced on 13 June 1980 an upgrading of the Office designed to strengthen, inter alia, the Office's research capacity.

Three research proposals are currently underway in the Research and Policy Section of the Office. These are an enquiry into the needs of isolated youth, a study of attitudes of school-leavers to employment, and a study of Youth and the Law. Some $20 000 is expected to be spent on the initial stages of these studies in 1980-81.

FOREIGN AFFAIRS

($million)	R&D			S&T (including R&D)	
	78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure					
Department of Foreign Affairs					
. Bilateral Agreements (b)	-	-	-	0.104	0.117
. Multilateral Grants (b)	0.053	0.049	0.053	0.501	0.588
. Economic Studies (b)	-	-	0.172	-	0.172
Total (Direct Commonwealth funding)	0.053	0.049	0.225	0.605	0.876
B. Type of expenditure					
Intramural capital	-	-	-	-	-
Intramural current	-	-	-	-	-
Extramural	0.053	0.049	0.225	0.605	0.876
Total (A+B)	0.053	0.049	0.225	0.605	0.876

(b) Extramural expenditure

Source: Department of Foreign Affairs.

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. 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 the Commonwealth Science Council (CSC). The objective of the CSC is to provide a forum for collaboration between Commonwealth countries and to increase the capabilities of individual nations to use science and technology for their economic, social and environmental development. The main thrust of the Research and Development Program is in areas of alternative energy, rural technology, standards, technological training, science education, and mineral resources and geology.

Scientific and technological expenditure was also identified in Australia's voluntary participation in OECD programs such as the International Energy Agency, the Nuclear Energy Agency, and the Centre for Educational Research and Innovation (CERI).

. Economic Studies

The Australia/Japan and Western Pacific Economics Relations Project was set up in 1972 as a joint enterprise, funded from both Australia and Japan to co-ordinate research by Australian and Japanese economists on economic relations between the two countries. It is planned to enlarge the activities of the Project by extending economic research, through a centre at the Australian National University to include the Republic of Korea and China.

Support is also given to the Indonesia Project at the Australian National University to carry out research on Indonesian economic affairs.

Australian Development Assistance Bureau

Australia's development assistance program is a major focus of our relations with many Third World countries. This program has, over the past few years, given increasing priorities to science and technology. For example, the Australian Development Assistance Bureau (ADAB) has estimated that the science and technology related components of its training programs have increased from $9.018 million in 1979-80 to $11.077 million in 1980-81.

ADAB has now developed a new program - the Australian Science, Technology and Research Cooperation (AUSTREC) Program - which will strengthen and draw together within a co-ordinated framework existing activities and new aid initiatives in the science and technology area. The AUSTREC program is designed to make Australia's science and technology aid efforts more effective without requiring the establishment of costly new institutional arrangements in Australia.

In 1977 the Minister for Foreign Affairs established the Consultative Committee on Research for Development (CCRD) as an advisory body on science and technology to ADAB. One of its functions is to advise the Bureau on Australian research capabilities. In this way, the CCRD has been central to the development of AUSTREC.

The AUSTREC program is to be developed largely within the existing structure of bilateral, multilateral and regional aid activities which involve a variety of forms of assistance:

- financial support for core budgets and special projects of international, regional and national research and training institutions;
- provision of experts and equipment for work in developing-country research institutions on particular projects; and
- support for Australian research institutions to enable them to co-operate with developing country institutions and to conduct training courses and seminars and organise research networks.

HEALTH

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Health						
. Health Services R&D Grants Program	(a)	-	-	-	0.124	0.130
	(b)	-	-	-	1.810	1.880
. National Biological Standards Laboratory	(a)	1.682	1.866	2.077	3.915	4.291
	(b)	-	-	-	0.008	0.005
. Australian Radiation Laboratory	(a)	2.300	1.875	2.015	2.565	2.750
. Commonwealth Institute of Health	(a)	0.467	1.661	2.243	2.406	3.124
. Ultrasonics Institute	(a)	0.580	0.719	0.724	0.719	0.724
	(b)	0.034	0.022	0.007	0.022	0.007
. National Acoustics Laboratories	(a)	0.794	0.804	0.752	2.239	2.008
. National Health and Medical Research Council	(a)	-	-	-	0.610	0.670
	(b)	13.175	14.000	18.700	14.000	18.700
. Other*	(a)	0.633	0.472	0.979	0.535	1.045
	(b)	0.370	0.516	0.785	0.516	0.785
Commonwealth Serum Laboratories	(a)	1.881	2.249	1.381	2.249	1.381
Total (Budget sector)		21.917	24.184	29.663	31.717	37.500

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
B. Commonwealth Non-Budget sector						
Commonwealth Serum Laboratories	(a)	0.969	1.248	2.511	1.248	2.511
Total (Direct Commonwealth funding)		22.886	25.432	32.174	32.965	40.011
C. Expenditure from other sources						
Department of Health						
. Commonwealth Institute of Health	(a)	0.021	-	-	-	-
. Other*	(a)	0.048	0.038	0.059	0.038	0.059
Total (Other sources)		0.069	0.038	0.059	0.038	0.059
D. Type of expenditure						
Intramural Capital		1.926	1.334	2.126	1.937	2.803
Intramural Current		7.450	9.597	10.615	14.741	15.890
Extramural		13.579	14.538	19.492	16.356	21.378
Total (A+B+C)		22.955	25.470	32.233	33.003	40.070

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Health, Commonwealth Serum Laboratories.

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

Department of Health

. Health Services Research and Development Grants

Health Services 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 and planning of health care in Australia and to provide information which will assist the 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, whether too much or too little, and of contaminations of products with micro-organisms capable of producing disease in individuals or epidemics in populations, can be catastrophic. They can also be extremely expensive.

The controls exercised over product quality by manufacturers are imperfect, despite their attempts to minimise potential hazards, as evidenced by many recalls of products each year (over 350 in the last ten years). 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.

. 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, including 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, whilst its various training, consultative and professional service roles are maintained by the Commonwealth Department of Health, which funds the Institute's activities.

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. The NH&MRC supports medical research mainly through its project and program grants, specialised units, institution grants, scholarships and fellowships. NH&MRC grants form the major proportion of the total Commonwealth funds spent on medical research in Australia.

. Community Health Program

There are fourteen projects approved for funding under the Community Health Program (CHP) which are specifically directed towards activities of a research/planning/evaluation nature.

. 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.

. 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 research into child health with the view to lessening illness in children and hastening recovery through:-

(a) basic biochemical research;

(b) prevention of rheumatic fever recurrences and management of rheumatoid arthritis; and

(c) child psychiatric problems.

. Hospital Facilities Services Branch

The Hospital Facilities Services Branch is developing a Facility Planning System (FPS) to provide a framework for the organisation and

control of the planning process to enable fuller utilisation of health facility planning resources in Australia. 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 (HIP) which is a national computer-based reference and referral system designed to provide highly specific recall on any aspect of health facility planning. This file is the indexing medium for health facility related information generated by both the F.P.S. and other sources.

. 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 Government-owned Commonwealth Serum Laboratories, established in 1916, 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 unique to Australia.

CSL produces or purchases for distribution stocks of suitable products to meet clinical demands in Australia, and stockpiles certain products for use in emergency situations. It provides to State health authorities a range of vaccines for use in State and local Government immunization campaigns. Since 1949 CSL has processed blood plasma into various fractions free of charge for provision by the Australian Red Cross Society.

CSL's research and development activities in the biological area have enabled the production and marketing in Australia of products that have apparently not been feasible or commercially attractive for private pharmaceutical manufacturing industry to undertake.

HOME AFFAIRS AND ENVIRONMENT

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Home Affairs and Environment						
. Bureau of Flora and Fauna	(a)	0.004	0.003	0.016	0.054	0.117
	(b)	0.032	0.023	0.210	0.192	0.652
. Environmental Activities	(a)	-	-	-	1.365	1.946
	(b)	-	-	-	3.551	3.714

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
Australian Film and Television School	(a)	0.123	0.065	0.084	0.094	0.118
	(b)	0.024	0.036	0.024	0.036	0.024
Australian National Parks and Wildlife Service (ANPWS)	(b)	0.336	0.193	0.200	0.292	0.340
Great Barrier Reef Marine Park Authority	(a)	0.034	0.056	0.008	0.065	0.020
	(b)	0.052	0.057	0.085	0.103	0.264
National Library of Australia	(a)	-	-	-	1.450	1.792
Office of the Supervising Scientist for the Alligator Rivers Region	(a)	0.810	1.682	3.105	1.682	3.105
	(b)	0.125	0.420	0.440	0.420	0.440
Total (Direct Commonwealth funding)		1.540	2.535	4.171	9.304	12.532
B. Expenditure from other sources						
Australian Film and Television School	(a)	0.011	-	-	-	-
C. Type of expenditure						
Intramural Capital		0.282	0.405	1.018	1.266	2.197
Intramural Current		0.700	1.402	2.195	3.444	4.901
Extramural		0.569	0.728	0.958	4.594	5.434
Total (A+B)		1.551	2.535	4.171	9.304	12.532

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Home Affairs and Environment, Australian Film and Television School, Australian National Parks and Wildlife Service, Great Barrier Reef Marine Park Authority, National Library of Australia, Office of the Supervising Scientist for the Alligator Rivers Region.

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, co-ordinates and directs the national effort to describe and document Australia's vast and unique biota.

The ABRS Participatory Program through which grants are given to support individual projects within the spectrum of the Study is conducted in parallel with the scientific work of Bureau staff.

. Environmental Activities

The Environment Division of the Department of Home Affairs and Environment 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 for the protection of whales, and activities directed towards the development of a National Conservation Strategy which would seek to apply to Australia the world theme of wise management of resources and harmonious balance between economic development and the conservation of living resources and ecosystems.

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. In addition to assessment of specific proposals, there is an ongoing program of environmental assessment relating to air quality, marine quality, the development of the nuclear industry, and to environmentally hazardous chemicals. Other studies undertaken by the Division include measurement of the costs and benefits of environment protection measures, utilisation of environment statistics, and the evaluation of potential risks to the environment associated with present and proposed public policies in environmentally important areas.

The programmatic activities of the Division include the administration of marine dumping, grants of financial assistance to voluntary conservation bodies, and support for enviornmental regulatory services in the Alligator Rivers Region of the Northern Territory. Secretariat and support services are provided to the Australian Environment Council, the Australian Council of Nature Conservation Ministers, the Australian Ionising Radiation Advisory Council and the Great Barrier Reef Ministerial Council.

The Australian Film and Television School

The Australian Film and Television School has a charter to serve the needs of industry and education in film, television, radio and

audio-visual communications training. The Schools Research and Survey Unit conducts an on-going program of research into film, television, radio and audio-visual communication as to aid the formulation of School training policies, to locate and index historical data which will provide background material for students of media courses in all tertiary institutions, and to assess training courses. The Unit also encourages, advises and co-ordinates research activities and courses for students of the School's fulltime program.

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. It works in close co-operation with other Commonwealth authorities and with relevant State and Territory agencies.

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 research function of the Authority is clearly established in the Great Barrier Reef Marine Park Act 1975:

> "to carry out, by itself or in co-operation with other institutions and persons, and to arrange for any other institutions or persons to carry out, research and investigations relevant to the Marine Parks."

The Authority's research role is principally to secure information needed for marine park planning and management. However, it has been also given the responsibility to supervise and report to the Ministerial Council on the program of short and longer term research into the Great Barrier Reef ecosystem announced in the Prime Minister's Parliamentary statement of 4 June 1979. Research is undertaken either 'inhouse' or by contract.

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 a prerequisite 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.

In order to minimise duplication and maximise the use of facilities, the Authority has developed close relationships with the

Australian Marine Sciences and Technologies Advisory Committee (AMSTAC), the Australian Institute of Marine Science (AIMS) and other marine research bodies.

The need to accelerate research in the Great Barrier Reef Region was highlighted in a report to Federal Parliament in July 1979 by the Australian Science and Technology Council (ASTEC). It said that research projects and programs concerned with the understanding and preservation of the Great Barrier Reef should be given a high priority because of the Reef's scientific importance; its fragility in respect of human impact; and because of community concern.

The special reef research funding program through AMSTAC-FAP, as well as the research activities of the Australian Institute of Marine Science (AIMS), provided the opportunity for the Authority to reappraise its own research priorities which previously had included projects of longer-term importance to marine park development, aimed at increasing overall understanding of the functioning of the Great Barrier Reef ecosystem. The Authority decided that because a considerable proportion of this research could now be seen to fall within the terms of reference of AMSTAC-FAP much of its own research effort could be directed towards the immediate priorities of Marine Park declaration and zoning.

National Library of Australia

The Science and Technology Branch of the National Library of Australia has the 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, as appropriate; 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

In recognition of the unique and priceless environment of the Alligator Rivers Region and the legitimate interests of the aboriginal people of the area, the Ranger Environmental Inquiry recommended the establishment of a complex regime of environmental protection to guard against damage to the environment by uranium mining operations. Among the measures agreed to when the Government announced in August 1977 that uranium mining could proceed were the appointment by the Commonwealth of a Supervising Scientist to oversee environmental protection measures, the establishment of a Research Institute to be managed by the Supervising Scientist, and the setting up of a Co-ordinating Committee comprising nominees of all interested parties. The Environment Protection (Alligator Rivers Region) Act 1978 gave legislative effect to these decisions. Under this legislation the Supervising Scientist for the Alligator Rivers Region is required, in relation to the effects of the uranium mining operations on the environment of the Region, to:

- co-ordinate and supervise the implementation of relevant laws and instruments issued under those laws;

- develop, co-ordinate and undertake programmes of research; and

- develop standards, practices and procedures and measures for protection and restoration.

The Supervising Scientist is advised by the Co-ordinating Committee for the Alligator Rivers Region, which he chairs. Members of the Committee are appointed by the Minister for Home Affairs and the Environment from nominees of the mining companies, the Northern Territory Supervising Authorities, relevant Commonwealth departments and agencies, and the Northern Land Council.

The Supervising Scientist manages the Alligator Rivers Region Research Institute, which has initiated a multi-disciplinary research programe concentrating largely at this stage on hydrology and aquatic biology. Some twenty projects aimed at establishing the base line data necessary for the setting of standards and for defining practical monitoring programs have been set in train.

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 co-ordinating 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	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Housing and Construction						
. Experimental Building Station	(a)	0.958	1.031	1.109	1.345	1.441
. Central Investigation and Research Laboratories	(a)	0.500	0.610	0.700	1.000	1.200
Australian Housing Research Council	(b)	0.100	0.100	0.100	0.100	0.100
Australian Uniform Building Regulations Consultative Committee	(b)	-	-	0.033	-	0.033
Total (Budget sector)		1.558	1.741	1.942	2.445	2.774
B. Commonwealth Non-Budget sector						
Snowy Mountains Engineering Corporation	(a)	0.073	0.042	0.013	42.160	41.000
	(b)	-	-	-	0.969	1.000
Total (Non-Budget sector)		0.073	0.042	0.013	43.129	42.000
Total (Direct Commonwealth funding)		1.631	1.783	1.955	45.574	44.774
C. Expenditure from other sources						
Department of Housing and Construction						
. Experimental Building Station	(a)	0.141	0.157	0.140	0.157	0.140
Australian Housing Research Council	(b)	0.100	0.100	0.100	0.100	0.100
Australian Uniform Building Regulations Consultative Committee	(b)	-	-	0.033	-	0.033
Total (Other sources)		0.241	0.257	0.273	0.257	0.273

($million)	R&D			S&T (including R&D)	
	78-79	79-80	80-81	79-80	80-81
D. Type of expenditure					
Intramural capital	0.183	0.200	0.231	17.151	16.292
Intramural current	1.489	1.640	1.731	27.510	27.489
Extramural	0.200	0.200	0.266	1.169	1.266
Total (A+B+C)	1.872	2.040	2.228	45.830	45.047

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Housing and Construction, Snowy Mountains Engineering Corporation.

Department of Housing and Construction

. Experimental Building Station (BBS)

BBS 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.

. 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.

Australian Housing Research Council (AHRC)

AHRC comprises Ministers of the Commonwealth Government and State and Territory Governments responsible for administering the Commonwealth/State housing agreement. The main objectives of AHRC are to provide for research into housing, dissemination of research results, promotion of collaborative research and the co-ordination of research, and where necessary to complement research conducted elsewhere.

Australian Uniform Building Regulations Consultative Committee (AUBRCC)

AUBRCC was established in 1980 to replace the Interstate Standing Committee on Uniform building Regulations. The Commonwealth matches State and Territory contributions in sponsoring research into areas of concern to the Committee, such as the development of a

computerised Australian Model Uniform Building Code, technical approaches to development of regulations for the provision of access to buildings by the disabled, and study of the technical aspects of the impact of regulations on energy conservation objectives in building.

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. It was established by the Parliament in 1970 to retain in one organisation the extensive experience and expertise invested in the Snowy Mountains Hydro-electric Authority during the twenty years of investigation, design and construction of the Snowy Mountains Scheme. The Corporation is constituted by the Director and exercises its functions with the approval of the Minister, who may seek advice from the Snowy Mountains Engineering Corporation Consultative Committee on whether and how a function of the Corporation should be exercised.

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 undertaking significant work in Australia the Corporation has become increasingly more committed to assisting with engineering development programs in developing countries and by far the larger part of the work is now performed overseas. The Corporation has worked in over thirty countries throughout the world and an increasing number of assignments are being carried out in the more undeveloped and needy countries.

As a business establishment the Corporation is required to maintain its technical and financial viability in competiton with other national and international consulting organisations. As indicated above the Corporation's activities have incorporated an increasing component of overseas work which has resulted in increased export earnings.

IMMIGRATION AND ETHNIC AFFAIRS

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Immigration and Ethnic Affairs						
Studies and Research	(a)	0.103	0.121	0.154	0.409	0.494
	(b)	0.200	0.333	0.269	0.333	0.269

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
Australian Institute of Multicultural Affairs	(a)	-	-	-	0.154	1.051
	(b)	-	-	-	0.006	0.335
Total (Direct Commonwealth funding)		0.303	0.453	0.422	0.902	2.148
B. Type of expenditure						
Intramural capital		-	-	-	-	-
Intramural current		0.103	0.121	0.154	0.563	1.545
Extramural		0.200	0.333	0.269	0.339	0.604
Total		0.303	0.453	0.422	0.902	2.148

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Immigration and Ethnic Affairs.

Department of Immigration and Ethnic Affairs

The principal advisory body on population and immigration policy, the Australian Population and Immigration Council (APIC), advises the Minister for Immigration and Ethnic Affairs 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 Planning and Research Branch of the Department provides executive assistance to APIC and conducts policy-oriented research in the above areas and investigatory research on issues of migrant settlement.

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. For example, expenditure in 1979-80 on R&D into English language needs was $191 000, while expenditure on the survey of migrant information needs was $74 000. Although the development of these research activities has been undertaken mainly within the Department using general administrative funds, a substantial portion of the research has been contracted to outside organisations.

Australian Institute of Multicultural Affairs

The Australian Institute of Multicultural Affairs was recently established as 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.

INDUSTRY AND COMMERCE

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Industry and Commerce						
. Bureau of Industry Economics	(a)	0.561	0.722	1.041	0.722	1.041
. Munitions Supply	(a)	-	0.027	0.032	4.599	4.747
	(b)	-	-	-	0.030	0.028
. Ship design	(a)	0.046	0.016	-	0.022	0.016
Total (Direct Commonwealth funding)		0.607	0.764	1.072	5.373	5.831
B. Expenditure from other sources						
Department of Industry and Commerce						
. Aircraft Guided Weapons and Electronics Supply	(a)	1.953	1.849	2.200	1.849	2.200
. Munitions Supply	(a)	-	-	-	3.884	3.261
Total (Other)		1.953	1.849	2.200	5.733	5.461
C. Type of expenditure						
Intramural Capital		0.002	0.001	-	1.966	0.552
Intramural Current		2.558	2.613	3.272	9.109	10.712
Extramural		-	-	-	0.030	0.028
Total (A+B)		2.560	2.614	3.272	11.104	11.292

(a) Intramural (b) Extramural

Source: Department of Industry and Commerce

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

The Ship Design Group undertakes a self-initiated program of scientific and technological activity to meet current and changing requirements of the marine industry, primarily with regard to ship design. It also has an increasing role in undertaking investigative activities with respect to specialised areas of marine technology related to ship and machinery performance, vibration, noise and environmental issues.

. 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	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of National Development and Energy						
. Energy Research, Development and Demonstration Program	(a)	-	-	-	1.013	1.443
	(b)	3.998	5.190	11.910	5.190	11.910

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
. Australia/FRG Coal Liquefaction Study	(b)	-	0.109	0.341	0.109	0.341
. Water Division	(b)	0.390	0.415	0.475	9.544	10.879
. Bureau of Mineral Resources, Geology and Geophysics	(a)	7.420	7.788	8.749	13.066	14.696
	(b)	0.200	0.200	0.220	0.247	0.263
. Grant-in-aid to Australian Institute of Urban Studies	(b)	-	-	-	0.050	0.050
. Division of National Mapping	(a)	-	-	-	7.433	7.959
	(b)	-	-	-	0.378	0.393
Australian Atomic Energy Commission	(a)	14.605	16.733	16.683	27.539	28.299
	(b)	0.581	0.649	0.665	0.778	0.765
Total (Direct Commonwealth funding)		27.194	31.084	39.043	65.347	76.998
B. Expenditure from other sources						
Department of National Development and Energy						
. Energy Research, Development and Demonstration Program	(b)	2.869	5.471	5.700	5.471	5.700
. Australia/FRG Coal Liquefaction Study	(b)	0.007	0.726	0.617	0.726	0.617
. Bureau of Mineral Resources, Geology and Geophysics*	(a)	-	0.096	0.250	0.096	0.250
Australian Atomic Energy Commission	(a)	0.003	0.291	1.618	0.291	1.618
Total (Other sources)		2.879	6.583	8.185	6.583	8.185
C. Type of expenditure						
Intramural capital		1.220	1.347	1.533	2.296	2.665
Intramural current		20.807	23.561	25.767	47.141	51.600
Extramural		7.430	12.759	19.929	22.493	30.918
Total (A+B)		30.073	37.668	47.228	71.931	85.183

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of National Development and Energy

* This item shows funding of the BMR under the National Energy Research, Development and Demonstration Program.

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.

Since the inception of the Program, the Minister, on the advice on NERDDC, has approved grants totalling $60.4m for energy R, D&D projects. In developing its recommendations, 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.

The major areas of support provided under the Program since its commencement in 1978 are:

$16.3m - coal mine site technology
$14.3m - technology of synthetic fuels
$ 8.0m - coal utilisation technology
$ 5.6m - solar energy.

. 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 New South Wales, Victoria and Queensland. The State Governments are contributing 2/3 of Australia's share of the cost of the study.

. Water Division

The National Water Resources Assessment Program was initiated in 1964 as a first priority of the newly established 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. From 1964 to 1979 the States have spent approximately $148 million on water resources assessment, of which $51 million has been provided by the Commonwealth.

Funds are also provided by the Commonwealth through the Department to support a Water Research Program recommended by the Australian Water Resources Council. For the 1980-83 triennium the following priority areas were identified: floodplain management; water storage management; non-point sources of pollution; salinity; wastewater disposal and reuse; drinking water quality; aquatic biology; groundwater; evapotranspiration; instruments and techniques. 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.

. 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.

To fulfil its primary role, BMR undertakes research into:

. the geochemistry, petrology and mineralogy of metalliferous deposits and their environments;

. the geochemistry and sedimentology of the formation and accumulation of fossil fuels;

. sedimentary, metamorphic and igneous provinces including the continental shelf and margins;

. structure of crust and upper mantle; and

. exploration geophysical methods and interpretation.

Currently, emphasis is being placed on research in support of petroleum exploration.

. 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 co-ordinate 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 co-operative enterprise shared between the Commonwealth and the States. The Department of Defence contributes to this activity.

Following recommendations by the Antarctic Research Policy Advisory Committee, new arrangements for Natmap's involvement in Antarctic survey and mapping have been adopted.

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.

In accordance with the Atomic Energy Act 1953, the AAEC collects and distributes information relating to uranium and atomic energy, and provides advice to State organisations and to industry on nuclear matters. The AAEC provides an advisory and consulting service to Commonwealth and State organisations and to industry on applications of nuclear science and technology.

The AAEC's current research and development program emphasises safety and the environment, uranium and nuclear fuel, and radioisotopes and radiation. International relations with the International Atomic Energy Agency, the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development, and with government and private enterprise in a number of other countries, form an important component of the Commission's work.

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.

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
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	(a)	-	-	-	0.141	0.158
- Library Services	(a)	-	-	-	0.252	0.277
- Ministerial Councils	(a)	-	-	-	0.214	0.240
- Statutory Research Funds, Commonwea1th Extension Services and Special Research Grants	(a)	-	-	-	0.499	0.559
. Australian Agricultural Council Sponsored Projects	(b)	-	0.053	0.064	0.127	0.200
. Australian Wine Research Institute Grant	(b)	0.100	0.099	0.148	0.099	0.148
. Barley Improvement Schemes (S.A., Vic., W.A.)	(b)	0.142	0.145	0.148	0.145	0.148
. Bureau of Agricultural Economics	(a)	0.879	0.843	0.831	4.692	5.222
. Bureau of Animal Health	(a)	0.156	0.184	0.269	37.401	43.227
	(b)	-	0.010	0.022	20.412	19.992
. Commonwealth Extension Services Grant	(a)	-	-	-	0.003	0.003
	(b)	3.763	1.884	1.689	4.997	4.997
. Commonwealth Special Research Grant	(a)	-	-	-	0.003	0.003
	(b)	0.217	0.237	0.248	0.240	0.250
. Fisheries Division	(a)	-	-	-	0.703	1.157
	(b)	-	-	-	0.455	0.875
. Fishery Management (Torres Strait)	(b)	-	-	-	0.100	0.175
. Forestry Research Grants	(b)	0.041	0.031	0.034	0.031	0.034
. Lucerne Aphid Assistance	(b)	-	-	-	0.143	-
. Plague Locust Commission	(a)	0.045	0.053	0.055	0.273	0.309
. Statutory Rural Industry Research Schemes *						
- Chicken Meat	(b)	0.151	0.162	0.218	0.175	0.242
- Dairying	(b)	0.428	0.363	0.502	0.431	0.591
- Dried Fruit	(b)	0.033	0.054	0.056	0.054	0.057
- Fishing Industry Research **	(a)	-	-	-	0.017	0.001
	(b)	0.472	0.552	0.699	0.716	0.746

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
- Fishing Industry Development #	(a)	0.124	0.254	0.415	0.254	0.415
	(b)	0.086	0.175	0.120	0.175	0.120
- Meat	(b)	2.676	2.916	3.165	3.565	3.820
- Oilseeds	(b)	0.062	0.217	0.315	0.233	0.330
- Pig Industry	(b)	0.252	0.262	0.252	0.302	0.320
- Poultry	(b)	0.121	0.084	0.119	0.096	0.137
- Tobacco	(b)	0.467	0.323	0.422	0.404	0.567
- Wheat	(b)	1.490	2.143	2.534	2.263	2.800
- Wine	(b)	0.054	0.082	0.082	0.082	0.082
- Wool	(b)	3.100	5.000	7.100	5.000	7.000
Total (Direct Commonwealth funding)		14.859	16.126	19.507	84.695	95.201
B. Expenditure from other sources						
Department of Primary Industry						
. Bureau of Agricultural Economics ##	(a)	0.111	0.094	0.096	0.521	0.570
. Plague Locust Commission (State-contributed funds)	(a)	0.045	0.053	0.055	0.273	0.309
Sub-total		0.156	0.147	0.151	0.794	0.879
. Statutory Rural Industry Research Schemes *						
- Chicken Meat	(b)	0.160	0.175	0.242	0.190	0.269
- Dairying	(b)	0.427	0.489	0.398	0.581	0.469
- Dried Fruit	(b)	0.045	0.053	0.093	0.053	0.095
- Meat	(b)	2.446	2.815	2.550	3.441	3.078
- Oilseeds	(b)	0.071	0.208	0.341	0.224	0.357
- Pig Industry	(b)	0.243	0.231	0.227	0.265	0.288
- Poultry	(b)	0.096	0.116	0.119	0.133	0.137
- Tobacco	(b)	0.467	0.368	0.422	0.460	0.567
- Wheat	(b)	1.647	2.343	2.570	2.474	2.840
- Wool	(a)	-	-	-	0.931	0.776
	(b)	8.568	7.383	5.524	7.383	5.524
Sub- total (Industry-derived expenditure)		14.169	14.183	12.486	16.135	14.398
Total (Other sources) ##		14.325	14.330	12.637	16.929	15.277

($million)	R&D			S&T (including R&D)	
	78-79	79-80	80-81	79-80	80-81
C. Type of expenditure					
Intramural capital	0.009	0.021	0.017	0.090	0.157
Intramural current	1.351	1.459	1.705	46.085	53.069
Extramural	27.824	28.976	30.421	55.449	57.253
Total (A+B) ##	29.184	30.456	32.144	101.624	110.478
Less intra-Ministry transfers	(0.111)	(0.094)	(0.096)	(0.521)	(0.570)
Total	29.073	30.362	32.048	100.103	109.908

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Primary Industry, and, for the years 1978-79 and 1979-80, Reports of the Auditor-General upon Financial Statements prepared by the Minister for Finance.

* The convention adopted for the reporting of expenditure to and from Research Trust Funds is outlined in Appendix 1. 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 for the three years 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

While the Department of Primary Industry is not primarily a research organisation it does have a broad interest in science and technology as they relate to agriculture, forestry and fisheries, and it does undertake some direct research activity. The administration of research and extension funds are important functions of the Department.

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 Minister also receives advice directly from the Commonwealth Council for Rural Research and Extension, which was established in 1978 to:

- advise the Minister for Primary Industry across the whole spectrum of rural research and extension;
- review from time to time, or as directed by the Minister, the entire range of rural research and extension being undertaken in Australia, and relate this to the role of agriculture in the Australian economy;
- advise the Minister on priority areas for research and new areas for research, taking into account the research programs of Commonwealth and State instrumentalities, universities and other institutions;
- develop a working relationship with other Commonwealth authorities, including ASTEC and CSIRO, on broad research objectives and the co-ordination of research;
- consider and report on the broad principles under which Commonwealth/industry joint research schemes might operate; and
- review the overall relationship between research and advisory services to ensure the practical application of research findings in rural industry.

The Department comprises six industry-oriented divisions, a Forestry Branch, two non-industry specific divisions and the normal Management Services support. Two bureaux, 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.

In response to the changing role of agriculture in the economy and to the increasing pressures placed on the Bureau by government and industry for policy analysis there has been a significant reorientation of the Bureau's program which has involved a relative shift in emphasis towards in-depth economic research and policy analysis based on the rigorous application of quantitative techniques. Large-scale modelling and short-term forecasting are two areas receiving intensified attention. The Bureau's program now 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 co-ordination 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

Fisheries Division encourages and facilitates the development of the Australian fishing industry, consistent with Australia's international obligations, and within existing constitutional arrangements, in such a manner as to sustain maximum yield in conjunction with the efficient, profitable and orderly conduct of the industry.

The functions of the Division include:

- management of Australian fisheries in co-operation 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 was established in 1974 and 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 which pose an inter-State threat to rural industries.

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.

Current research is concerned with plague generation and detection, migration, locust behaviour and the development of improved control techniques.

. 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-priming1 or 'catalytic' effect.

Industry Contributions to Primary Industry Trust Accounts

$ million)	78-79	79-80	80-81
Chicken Meat	0.189	0.226	0.269
Dairying	0.435	0.459	0.424
Dried Fruit	0.089	0.090	0.105
Honey	-	-	0.020
Meat	3.198	3.178	3.100
Oilseeds	0.349	0.412	0.357
Pig Industry	0.290	0.288	0.288
Poultry*	0.138	0.096	0.137
Tobacco	0.393	0.389	0.378
Wheat	3.466	3.086	2.840
Wool	1.932	10.239	7.100
Totals	10.479	18.463	15.018

Sources: Department of Primary Industry, and, for the years 1978-79 and 1979-80, Reports of the Auditor-General upon Financial Statements prepared by the Minister for Finance.

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

. Commonwealth Extension Services Grant

The objectives of the Grant are to encourage and facilitate the continuing increase in the efficiency of Australian agriculture and the adjustment of agriculture to change. The Grant has been renewed on an annual basis since 1977-78.

The bulk of the funds go to State departments of agriculture but the Commonwealth Department of Primary Industry retained $250 000 in 1980-81 for projects of a national character.

. 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 or by the relevant States. 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.

CSIRO is undertaking a three-year research program on tropical rock lobsters in the area. The Department of Primary Industry provides funds for this research project.

. 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.

. Co-ordination of Rural Science and Technology

Recognising that rural research and extension are areas in which the States are major contributors to the national effort, the need for effective liaison and coordination on agricultural research policy and related technical activities in Australia between Commonwealth and State Government agencies is of considerable importance. The Australian Agricultural Council, and its Standing Committee on Agriculture together with its technical sub-committees, are important vehicles for such liaison and coordination, not only on a Commonwealth/State basis but also between States. The Secretariat of the Australian Agricultural Council and its Standing Committee is part of the Department of Primary Industry.

Similarly, the Australian Forestry Council, and the Australian Fisheries Council, and their respective Standing Committees and various technical sub-committees are important research policy and co-ordination bodies in respect to the foresty and fisheries industries. The secretariats of these Councils are also part of the Department.

PRIME MINISTER AND CABINET

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Auditor-General's Office	(a)	-	-	-	0.116	0.129

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
Australian Science and Technology Council (ASTEC)	(a)	-	-	-	0.404	0.592
	(b)	-	-	-	0.009	0.037
Office of Public Service Board						
. Manpower planning	(a)	-	-	0.009	0.227	0.251
. Postgraduate Awards	(b)	0.140	0.142	0.189	0.150	0.212
Total (Direct Commonwealth funding)		0.140	0.142	0.198	0.905	1.220
B. Type of expenditure						
Intramural capital		-	-	-	-	-
Intramural current		-	-	0.009	0.746	0.972
Extramural		0.140	0.142	0.189	0.159	0.248
Total		0.140	0.142	0.198	0.905	1.220

(a) Intramural expenditure (b) Extramural expenditure

Sources: Auditor-General's Office, ASTEC, Office of the Public Service Board.

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 establshed 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

The continued pressures within the Public Service for more efficient use of resources have placed a greater importance on improved planning. A major component of the Service's resources is its manpower element, which is continually changing in composition and demand, and yet is restrained by tight controls in its size. Manpower planning can assist departments to manage more effectively under such conditions.

The Planning Research and Information (PRI) Branch of the Public Service Board, as part of its statutory responsibilities, maintains records of Public Service staff. Information from these records is made available to the Board and Departments to assist management with planning. In addition, PRI Branch under the auspices of an inter-departmental committee 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.

The Branch's role includes the development of quantitative techniques and data sources for long term forecasting and analysis of trends.

. 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 1979-80 thirty-eight scholarships and financial assistance awards were granted in the general category (twenty-two being taken up at overseas institutions and sixteen in Australia) and seven under the management studies scheme (three overseas and four in Australia).

SCIENCE AND TECHNOLOGY

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Science and Technology (DST)						
. Administrative and other costs not elsewhere included	(a)	-	-	-	17.866	20.685
	(b)	-	-	0.007	-	0.007
Antarctic Activities						
- Antarctic Division	(a)	7.189	11.775	14.326	20.226	22.250
	(b)	0.026	0.024	0.026	0.024	0.026
- Antarctic Ship Design Study	(b)	-	0.038	0.068	0.038	0.068
- Scott Polar Research Institute Grant	(b)	0.002	0.002	0.010	0.002	0.010
. Australian Government Analytical Laboratories	(a)	-	-	-	8.605	10.593
. Baseline Air Pollution Monitoring Station	(a)	-	-	-	0.313	0.221
. Bureau of Meteorology	(a)	0.280	0.256	0.288	29.698	30.478
. Commercial Development of Technology						
- InterScan support	(b)	-	-	-	3.702	2.450
- Public Interest Grants	(b)	-	-	-	3.999	5.000
. Grants-in-Aid						
- Academies and ANZAAS	(b)	-	-	-	0.470	0.515
- Industrial Design Council	(b)	-	-	-	0.420	0.450

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
- National Association of Testing Authorities	(b)	-	-	-	0.708	0.767
- National Safety Council	(b)	-	-	-	0.160	0.160
- Standards Association of Australia	(b)	-	-	-	2.354	2.460
. Industrial R&D Grants						
- Commencement Grants	(b)	6.000	7.000	10.600	7.000	10.600
- Project Grants	(b)	16.501	22.950	37.400	22.950	37.400
. International Cooperation						
- Academies' Scientific Exchanges with China	(b)	0.068	0.075	0.120	0.075	0.120
- Association for Science Cooperation in Asia	(b)	-	-	-	0.018	0.025
- Bilateral Agreements (India, Japan, U.S.A., West Germany)	(b)	0.137	0.138	0.225	0.138	0.225
. Inventions and Innovation						
- Assistance to inventors	(b)	-	-	-	0.076	0.076
- Pilot Programs in innovation	(b)	-	-	-	0.449	0.350
. Ionospheric Prediction Service	(a)	0.098	0.105	0.096	1.020	1.162
. National NMR Centre	(a)	0.099	0.094	0.061	0.094	0.061
. Patent Activities						
- Patent Office*	(a)	-	-	-	8.434	9.476
- Contributions to international patent bodies	(b)	-	-	-	0.233	0.252
. Productivity Improvement						
- Human Relations and	(a)	-	-	-	0.850	0.866
related programs	(b)	-	-	0.025	0.013	0.067
- Industry productivity improvement program	(b)	-	-	-	1.123	1.500
- Physical distribution and MATPAK	(b)	-	-	-	0.187	0.380
- Physical environment	(a)	0.090	0.110	0.137	0.340	0.423
standards	(b)	-	-	-	-	0.007
- Productivity Promotion Council (admin.	(a)	0.023	0.028	0.035	0.125	0.141
support)	(b)	0.008	0.008	0.008	0.008	0.008
- Research activities	(a)	0.035	-	-	-	-

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
. Research Grants and Fellowships						
- ARGC Grants	(b)	12.300	12.800	15.303	12.800	15.303
- Fellowships	(b)	0.376	0.503	0.560	0.503	0.560
- Marine Science Grants	(b)	-	0.394	2.000	0.394	2.000
- Marine Science Fellowships	(b)	0.162	0.245	0.253	0.245	0.253
. Space and Upper Atmosphere Activities						
- Balloon Launching Station	(a)	-	-	-	0.293	0.331
- LANDSAT Station	(a)	-	-	-	2.257	1.626
Anglo-Australian Telescope Board (AATB)	(a)	1.040	1.034	1.530	1.034	1.530
Australian Institute of Marine Science (AIMS)	(a)	2.802	3.576	5.275	3.576	5.275
Commonwealth Scientific and Industrial Research	(a)	160.082	185.330	210.035	193.291	218.958
Organization (CSIRO) **	(b)	1.921	1.834	1.837	1.834	1.837
Metric Conversion Board	(a)	-	-	-	0.235	0.179
National Standards Commission	(a)	-	-	-	0.522	0.579
Total		209.237	248.318	300.224	348.702	407.710
Less recoveries from patent-related charges*		-	-	-	(9.221)	(9.874)
Less other DST recoveries#		-	-	-	(1.197)	(1.956)
Total (Budget sector net expenditure)		209.237	248.318	300.224	338.284	395.880
B. Commonwealth Non-budget sector						
Anglo-Australian Telescope Board (AATB)	(a)	-	-	0.100	-	0.100
Commonwealth Scientific and Industrial Research Organization (CSIRO)	(a)	3.474	5.723	7.060	5.723	7.060

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
National Standards Commission	(a)	-	-	-	0.047	0.090
Total (Non-budget sector)		3.474	5.723	7.160	5.770	7.250
Total (Direct Commonwealth funding)		212.711	254.041	307.384	344.054	403.130
C. Expenditure from other sources						
Department of Science and Technology						
. Bureau of Meteorology	(a)	0.010	-	-	11.013	13.385
. National NMR Centre	(a)	0.016	0.007	0.007	0.007	0.007
. Productivity Promotion						
- Productivity Promotion Council (admin.	(a)	0.008	0.009	0.012	0.029	0.034
support – industry contribution)	(b)	0.012	0.012	0.011	0.012	0.011
. Space and Upper Atmosphere Activities						
- Balloon Launching Station	(a)	-	-	-	0.111	-
- Space Projects (U.S. contribution)	(a)	-	-	-	11.485	12.805
Anglo-Australian Telescope Board (U.K. contribution)	(a)	1.040	1.034	1.630	1.034	1.630
Commonwealth Scientific and Industrial Research Organization**	(a)	15.739	19.856	28.192	19.960	28.499
Total (Other sources)		16.824	20.918	29.852	43.652	56.370
D. Type of expenditure						
Intramural Capital		38.783	59.889	75.368	74.324	87.225
Intramural Current		153.238	169.048	193.416	253.447	289.390
Extramural		37.512	46.022	68.452	59.934	82.886
Total (A+B+C)		229.535	274.959	337.236	387.706	459.501

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Science and Technology, Anglo-Australian Telescope Board, Australian Institute of Marine Science, CSIRO, National Standards Commission.

* The activities of the Patent Office result in revenue to the Commonwealth. In 1979-80 this amounted to $9.221m. Revenue of $9.874m is anticipated for 1980-81.

** 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.

\# For 1980-81 major items of revenue are expected to include $730 000 from productivity improvement activities (about two-thirds in relation to MATPAK) and $520 000 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, productivity and the development of innovation. It has administrative and operational responsibilities across a wide span of scientific and technological 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 global atmospheric and oceanic circulations, in particular those affecting Australia's weather, and in its marine life and potential mineral resources. It has been estimated that the Antarctic region may contain over half the world's fresh water and up to half the mass of its living organisms. Short and medium-term guidelines for Australian Antarctic research were recommended by the Antarctic Research Policy Advisory Committee (ARPAC) in November 1979. The guidelines recommended by ARPAC endorse an Antarctic policy directed towards the maintenance of sovereignty over the Australian Antarctic Territory, strengthening of the Antarctic Treaty and the maintenance of a balanced scientific program as a contribution to world science and in support of Australian sovereignty and the Antarctic Treaty system. Government recognises that excellence achieved in Antarctic scientific programs is important as a demonstration of Australian presence in Antarctica. Research programs are directed at understanding the Antarctic and its influence on the earth, surveying and mapping of the Antarctic Territory, and research which contributes to the understanding of the possible environmental effects of resource exploitation and the development of ways of ensuring that future Antarctic activities are conducted according to environmental standards.

Australia's Antarctic program is coordinated by the Antarctic Division of the Department of Science and Technology. The Antarctic Division, in co-operation with other agencies, conducts research in nine broad disciplines. These are meteorology, terrestrial biology, marine biology, glaciology, cosmic ray physics, upper atmosphere physics, geology, geophysics, surveying, mapping and medical research. The Division also provides logistic support for the research.

Antarctic marine biological research has been given particular impetus during 1980-81 through Australian involvement in the international program of 'Biological Investigation of Marine Antarctic Systems and Stocks' (BIOMASS). The aim of the BIOMASS Program is to gain an understanding of the structure and dynamic functioning of the Antarctic marine ecosystem as a basis for future conservation and management of living resources. It will also provide baseline data on the marine ecosystem. An amount of $1.2m was made available in the 1980-81 budget to modify the Antarctic resupply vessel "M.V. Nella Dan" and for the purchase of specialised scientific equipment required for measurements associated with BIOMASS.

To implement policy aims, the Government has approved funds for the rebuilding of Australian Antarctic stations and for preliminary design studies for an Australian Antarctic ship.

. 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. These services are provided by laboratories in Sydney, Melbourne, Hobart, Adelaide and Perth and are also provided at Bureau of Customs offices in the capital cities where AGAL staff examine import documents and, where necessary, forward work for laboratory examination.

. 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. The station is administered by AGAL which has been conducting a monitoring program in temporary facilities at Cape Grim for the past three years. The results have confirmed that the site is suitable for such a program in that it is free from man-made pollution and reflects the basic, slowly changing composition of the atmosphere. The construction of permanent facilities was recently completed.

Two officers of the Department maintain facilities and conduct the routine monitoring program, while scientists from several organisations visit the site to conduct research. The program is in a development phase, as is the worldwide network, with monitoring techniques still being developed and refined.

. 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. The Bureau participates in international meteorology, particularly in activities of the World Meteorological Organization. It also provides general services to the public and special services to the Defence Forces, navigation and shipping authorities and civil aviation, primary producers and industrial and commercial organisations.

Meteorology is a highly scientific and technologically based field. Application of meteorology is very often in other high technology areas such as aviation, engineering, agriculture, etc. As the principal Commonwealth agency in this field, it is necessary for Bureau R&D to be maintained at a viable level. This is achieved through a separate Research Branch and by maintaining appropriate expertise in other areas of the Bureau.

. 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: Where the Minister for Science and Technology has determined that projects are in the public interest within the terms of Section 39 of the Industrial Research and Development Incentives Act 1976, the Government may contract out such projects. These are intended to help the competitive position of Australian industry by supporting the development of new products, manufacturing processes and techniques. Usually they are projects which would not proceed without significant government support, because of long development periods, lack of industrial resources, and technical risk. Public interest projects are managed by the Department of Science and Technology.

- InterScan (Australian Microwave Landing System (MLS)): The Government is contributing $8.2m over three years to the development of a range of InterScan MLS equipment suited to the operational requirements and market demands of potential customers, world-wide. 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 co-operation 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 50th Congress in Adelaide in May 1980. 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 and the National Association of Testing Authorities. 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.

. Industrial R&D Grants

- 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 was originally set up to operate until 30 June 1981. Following the recent review of the Act, it is now the Government's intention that the scheme should continue, in modified form, for a further five-year period. Grants are set at 50% of the company's eligible expenditure, with an upper limit of $25 000 (taxable) per company or group of related companies*. A company's eligibility for commencement grant consideration, depends on whether it or any related companies have received grant payments aggregating $125 000 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 may be paid by the Board in support of specific projects submitted by companies. Under the current legislation, agreements between the Board and applicant companies may be concluded up to 30 June 1984 for projects which will commence no later than 1 July 1981*. Successful applicants for project grants are required to undertake to exploit the results of the 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 four 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 and the Japan-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.

The Department is responsible for managing Australia's involvement in the Association for Science Cooperation in Asia (ASCA). Australia is presently involved in five 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 the Academia Sinica of the Peoples Republic of China.

. Invention and innovation

Australia is well endowed with inventors and innovators, but a problem has been to get their inventions developed and produced in Australia. 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 to assist private inventors (assessed as meritorious) in the development of pre-production prototypes;

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

- sponsorship of adventure workshops in innovation and entrepreneurship, for new 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

In a continent as vast and as isolated as Australia, high frequency (HF) radiowave communication provides an important cohesive link internally and an inexpensive means of long distance communications outside. Australian high frequency radio communication links are used primarily for emergency situations, defence communications, civil aviation, and for communications with isolated communities where mobile and good quality communication can be vital for safety. Australia has the policy of assisting in the maintenance of its HF radio communications circuits and of making the most efficient and effective use of the radio spectrum. Australia adheres to the International Telecommunication Union Radio Regulations in allocating operating frequencies from the radio spectrum and prepares advice for the Australian community on the optimum usage of their HF facilities.

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

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* Amending legislation at present before Parliament is intended to increase the upper limit of commencement grants to $40 000 p.a., while it is intended that project grant limits will rise from $500 000 to $750 000 p.a.

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 and 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 importance to Australia of a prosperous and internationally competitive manufacturing sector has long been recognised by the Government and has been re-affirmed by successive committees of inquiry in recent years. The Government has made a commitment to an industrial development policy that will encourage manufacturing industry to become more capital and skill intensive, more export oriented, more productive and innovative. In the long term, this will enable the industry to rely less on government support and on high levels of protection.

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. The programs are based on the principle that, by working together, industry and government can identify and initiate the cooperative action required to overcome productivity barriers and secure major growth opportunities. These programs have already contributed to the emergence of a more competitive manufacturing sector. 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 encouraging:

  . more use of in-country expertise through a Technical Referral Network;

  . adoption of more effective information handling systems;

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

  . improvement in quality control;

  . greater Australian participation in development of Australia's natural resources; 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.

- The Division also provides support to the Productivity Promotion Council of Australia, a multipartite, independent body concerned with increasing community action for and understanding of ways and means of improving productivity. Through its wide range of programs, the Council conducts research and delivers productivity extension and information services to the secondary and tertiary sectors of the economy.

. Research Grants and fellowships

- Australian Research Grants Scheme (scientific research)

A total of $16 million was allocated to individual research scientists for the 1981 calendar year 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, pure 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'. Since the inception of the scheme in 1979-80, funds totalling $2.4 million have supported over one hundred projects involving marine research on the Great Barrier Reef, Bass Strait, South Australia and the North-West Shelf.

. 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, consisting of the Data Acquisition Facility (DAF) located at Alice Springs and the Data Processing Facility (DPF) at Canberra, has been completed. DAF receives and records data from NASA's Landsat series of earth resources satellites. This data is sent to the DPF where it is processed into images and computer compatible tapes for clients. DAF began continuous operations in December 1979 while DPF became operational in November 1980. Information and sales outlets in capital cities have been established by State Governments.

- 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.

  The Tidbinbilla and Honeysuckle Creek tracking stations, known as the Canberra Deep Space Communication Complex, has given support to Pioneer 10 and and 11, Voyager 1 and 2, Helios 1 and 2, Viking 1 and the Venus Orbiter. Of special note was the support of the Voyager 1 encounter with Jupiter and the Voyager 2 encounter with Saturn.

  The Department operates a Visible Satellite Prediction Service providing trajectory information on satellites visible from Australia. The information is distributed monthly to various departments, universities and museums. Information on NASA satellite programs is provided to groups and individuals.

Anglo-Australian Telescope Board (AATB)

Australia provides a particularly good locality for observations of many important astronomical features, including the central regions of our galaxy and the Magellanic Clouds. Australia has the technological infrastructure needed for maintaining a modern astronomical telescope, and advanced optical observations complement Australia's substantial involvement in radioastronomy.

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)

Marine science covers a vast field ranging from biological studies in the littoral zone through to the deep waters beyond the continental shelf and from physical studies of the bays and estuarine waters to the deep ocean and of the sea floor. Because of its location near Townsville, AIMS concentrates 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.

The Australian Institute of Marine Science occupies a self-contained laboratory complex at Cape Ferguson from where a team of more than twenty scientists undertake research on the biological, chemical and physical processes in the marine environment and living communities of the Great Barrier Reef. For this purpose it operates a small fleet of vessels and with recent expansion of researchers in 1980 an amount of $5.2m is provided in 1980-81 which includes a substantial provision for charter of additional ships to undertake research needs both internal and in collaboration with other organisations.

Commonwealth Scientific and Industrial Research Organization (CSIRO)

CSIRO is a statutory body created to carry out, on behalf of the Commonwealth, a wide range of research and related activities. It was established under the Science and Industry Research Act 1949, succeeding the Council for Scientific and Industrial Research established 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, co-operate with and make grants to industrial research associations;

. to establish, develop, maintain, and promote the use of, standards of measurements 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.

. Ancillary Functions

Certain of CSIRO's statutory functions are undertaken as integral parts of the Organization's main role in research. In particular, the transfer to potential users in Australia of results is seen as an essential component of each CSIRO research program. The conduct of these programs often also involves liaison with overseas research workers and the training of Australian research workers including, in suitable cases, the award of a studentship or fellowship.

In addition, CSIRO undertakes the following:

- it maintains science liaison offices in London, Washington and Tokyo;

- it administers Commonwealth funding support for industrial research associations, and promotes their formation and development;

- it maintains and develops the Australian standards of physical measurement and, in collaboration with the National Standards Commission, promotes their use;

- it provides scientific and technical information services to Australian industry, research workers and the general public, particularly in fields of science and technology in which the Organization is itself carrying out research; and

- it publishes the Australian Journals of Scientific Research (AJSR) and a range of monographs and other serials. Editorial standards for the AJSR are set jointly with the Australian Academy of Science.

. General Policies

The Australian Constitution makes very few matters the exclusive preserve of the Commonwealth. In most areas the picture is one of shared responsibility, and this is true also of scientific research. The division of responsibility between the Commonwealth and State Governments is therefore primarily a matter of political agreement and convention and, as such, tends to be variable and blurred. In general, however, the Commonwealth assumes major responsibility for matters of national significance. From the standpoint of scientific research these include matters affecting a number of States or involving relationships with other countries, or potentially having a significant effect on the national economy, or involving national and international obligations.

In the case of scientific research in support of economic growth, the Commonwealth does not take upon itself the task of performing research and development 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.

The Commonwealth's role in scientific research therefore tends to be concentrated towards work of broad application, and hence towards work at the more fundamental end of the research and development spectrum.

. Consultative Mechanisms

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

- the Organization's objectives and priorities;

- industrial and economic matters relevant to CSIRO; and

- Australian community goals.

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

CSIRO is a statutory corporation and is governed by an Executive comprising three full-time Members and five part-time Members. The Chairman is the Chief Executive of the Organization and he is assisted in this role by the other two full-time Members of the Executive. The Executive is primarily concerned with the development of policies relating to the scientific and technical direction of the Organization and its internal management; relationships with Government, advisory bodies and other institutions; the definition of broad areas of research; the securing and distribution of resources to each area; and monitoring the effective performance of the 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. Directors are responsible, in consultation with their constituent Chiefs and Officers-in-Charge, for regularly reviewing the research objectives, programs and priorities within their Institutes. Chiefs and Officers-in-Charge provide scientific leadership and managerial direction in the pursuit of broad goals established by the Executive.

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

  The Institute's activities include research on:
  - control of animal diseases;
  - nutrition, reproduction, genetics and management of livestock;
  - 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 Food Research
  Division of Human Nutrition

Centre 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 agricultural, forestry and fisheries 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 biological control;

- biology of native and introduced birds and mammals in the context of pest control and conservation; and

- biology of the major fisheries and its application to the development of improved methods of management.

The Institute comprises the following Divisions:

Division of Entomology
Division of Fisheries Research
Division of Forest Research
Division of Horticultural Research
Division of Plant Industry
Division of Tropical Crops and Pastures
Division of Wildlife Research.

- The Institute of Earth Resources

The Institute conducts scientific and technological research relating to the more effective definition, utilization and management of Australia's resources - atmospheric, land, water, mineral and energy.

The Institute's activities include research on:

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

. planning the recovery, development and effective use of Australia's earth resources, consistent with appropriate conservation of the environment; and

. the balanced management of Australia's earth resources for such uses as mining, agriculture, urban development and recreation.

The Institute comprises the following Divisions and Units:

Division of Applied Geomechanics
Division of Fossil Fuels
Division of Land Resources Management
Division of Land Use Research
Division of Mineral Chemistry
Division of Mineral Engineering
Division of Mineral Physics
Division of Mineralogy
Division of Soils
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:

. water utilisation and reclamation;

. conservation of oil;

. renewable sources of energy;

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

. utilisation of forest 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.

A new Division of Manufacturing Technology has been formed, built initially on existing resources. It has laboratories in Melbourne and Adelaide and will be extended to Sydney as resources become available. The Division's research programs will relate to the processing of metals and modern techniques such as computer-aided manufacturing. The Institute now comprises the following Divisions:

Division of Applied Organic Chemistry
Division of Building Research
Division of Chemical Technology
Division of Manufacturing Technology
Division of Mechanical Engineering

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:

. 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 pollution;

. physics of interactions between soil, water, plants and atmosphere;

. radiophysics and its application to astronomy, navigation and communications;

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

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

. the behaviour, productivity and sensitivity, to pollutants of coastal and oceanic waters.

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, co-ordinating 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

The table which follows sets out actual or anticipated expenditure by, or on behalf of, CSIRO, according to the primary purposes for which research was carried out. The figures given reflect operating and capital expenditure from all sources of funds and comprise:

- direct research expenditure;

- Organizational overheads; and

- capital expenditure on behalf of CSIRO by the Department of Housing and Construction and the Department of Administrative Services (identified as indirect intramural capital expenditure at the end of the table).

CSIRO's direct Research Program expenditure figures, excluding capital, are available in the Annual Reports of the Organization.

CSIRO Expenditure

(S million)	EXPENDITURE 1978-79	EXPENDITURE 1979-80	ESTIMATES 1980-81
A. RURAL INDUSTRIES			
Agriculture			
. Plant Improvement	3.605	4.089	4.556
. Plant Physiology & Biochemistry	4.195	4.547	4.946
. Soil Fertility & Plant Nutrition	4.169	4.939	5.399
. Agricultural Systems	7.670	8.210	9.632
. Management of Crop & Pasture Pests & Diseases	5.645	6.222	6.481
. Livestock Production	11.661	16.586	15.909
. Livestock Health	19.842	31.055	46.194
. Agricultural Engineering	.586	.741	.741
TOTAL (Agriculture)	57.373	76.389	93.858
Forestry			
. Production	3.547	3.756	4.055
. Management	2.930	3.271	3.552
. Harvesting	.483	.667	.657
TOTAL (Forestry)	6.960	7.694	8.264
Fishing			
. Resource Assessment	4.410	6.411	7.298
TOTAL - RURAL INDUSTRIES	68.743	90.494	109.420
B. MINERAL, ENERGY AND WATER RESOURCES			
Mineral resources			
. Exploration	4.095	4.290	5.369
. Mining and Beneficiation	5.611	5.986	6.735
. Environment	.753	.737	.886
TOTAL (Mineral resources)	10.459	11.013	12.990

(S million)	EXPENDITURE 1978-79	EXPENDITURE 1979-80	ESTIMATES 1980-81
Energy resources			
. Coal	3.813	4.018	4.812
. Petroleum and Oil Shale	.434	.651	.823
. Substitute Liquid Fuels	4.330	6.379	8.091
. Renewable Energy	1.424	1.911	1.985
. Energy Storage and Conservation	.797	1.057	1.167
TOTAL (Energy resources)	10.798	14.016	16.878
Water resources			
. Water Management	2.689	3.293	3.718
. Water Technology	1.027	.997	1.634
TOTAL (Water resources)	3.716	4.290	5.352
TOTAL - MINERAL, ENERGY AND WATER RESOURCES	24.973	29.319	35.220
C. MANUFACTURING INDUSTRIES			
Resource-based manufacturing industries			
. Food Processing	10.322	11.078	11.875
. Textiles	10.232	10.189	10.696
. Hides and Leather	.447	.520	.594
. Forest Products	2.391	2.667	3.546
. Basic Metal Products	2.175	2.360	2.662
TOTAL (Resource-based manufacturing industries)	25.567	26.814	29.373
Small technology-intensive industries			
. Electrical & Electronic Equipment and Instruments	2.870	3.157	3.499
. Advanced Materials	1.920	2.391	3.039
. Specialty Polymers	1.173	.910	1.091
. Chemical, Pharmaceutical and Veterinary Products	3.454	4.394	4.734

(S million)	EXPENDITURE 1978-79	EXPENDITURE 1979-80	ESTIMATES 1980-81
TOTAL (small technology-intensive industries)	9.417	10.852	12.363
Industrial machinery and equipment			
. Materials Processing Technology	2.266	2.207	3.314
Standards			
. Physical & Mechanical Quantities	2.130	2.349	2.624
. Electrical Quantities	2.998	3.189	3.779
. Thermal and Optical Quantities	2.376	2.462	2.816
. Properties of Solids, Liquids and Gases	1.842	1.945	2.226
TOTAL (Standards)	9.346	9.945	11.445
TOTAL - MANUFACTURING INDUSTRIES	46.596	49.818	56.495
D. COMMUNITY INTERESTS			
Knowledge and management of the natural environment			
. Fauna	5.673	6.170	6.580
. Flora	1.471	1.621	1.776
. Land	8.676	9.239	10.279
. Oceans	3.089	2.406	2.806
. Atmosphere	4.298	4.488	5.017
. Environmental Protection	2.692	2.575	2.961
. Astronomy	4.973	5.480	5.874
TOTAL (Knowledge and management of the natural environment)	30.872	31.979	35.293
Tertiary industry			
. Building and Construction	6.323	5.941	6.323
. Mathematics and Statistics	3.317	3.473	3.857

(S million)	EXPENDITURE 1978-79	EXPENDITURE 1979-80	ESTIMATES 1980-81
. Computing	3.947	5.547	5.839
. Information Services	.309	.341	.385
TOTAL (Tertiary industry)	13.896	15.302	16.404
Public health			
. Human Nutrition	2.897	3.202	2.838
. Industrial Hygiene	.542	.694	.684
TOTAL (Public health)	3.439	3.896	3.522
TOTAL - COMMUNITY INTERESTS	48.207	51.177	55.219
CSIRO TOTAL	188.519	220.808	256.354
TYPE OF EXPENDITURE			
Intramural Capital			
- indirect	23.169	38.025	48.767
- direct	12.906	16.994	21.570
Intramural Current	150.523	163.955	184.180
Extramural	1.921	1.834	1.837

Source: CSIRO.

The following areas of research have been designated by CSIRO's Executive as having high priority for expansion:

- marine science, particularly oceanography
- energy
- manufacturing technology
- land and water
- biotechnology
- biological control.

Metric Conversion Board (MCB)

The Metric Conversion Board's charter is 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. The Board has consequently been scaling down its activities. The Board is assisted by the Department of Science and Technology in matters such as public enquiries on the metric system and metric usage in legislation and government administration.

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	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Social Security						
Welfare research	(b)	0.108	0.188	0.472	0.188	0.472
Studies on rehabilitation and services for the handicapped	(b)	0.096	0.096	0.096	0.142	0.144
Total (Direct Commonwealth funding)		0.204	0.284	0.568	0.330	0.616
B. Type of expenditure						
Intramural		-	-	-	-	-
Extramural		0.204	0.284	0.568	0.330	0.616
Total		0.204	0.284	0.568	0.330	0.616

(b)Extramural expenditure

Source: Department of Social Security

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 and services for the handicapped.

The major items funded in 1979-80 included the Social Welfare Research Centre in the University of New South Wales which began operations during the year; continuing research projects at Monash and Macquarie Universities into mild mental retardation; and a project to demonstrate methods of activity therapy for handicapped people which was contracted out to two Brisbane Colleges of Advanced Education early in 1980.

TRANSPORT

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Transport						
. Airways facilities research	(a)	0.800	0.920	1.040	0.920	1.040
	(b)	0.125	0.110	0.100	0.110	0.100
. Air safety investigation	(a)	-	-	-	1.273	1.435
. Regulation of air transport						
- Environment and security	(a)	0.123	0.129	0.135	0.431	0.446
- Aviation medicine	(b)	0.029	0.035	0.043	0.035	0.043
- Airworthiness	(a)	0.020	0.020	0.020	0.020	0.020
	(b)	0.045	0.060	0.080	0.060	0.080
. Marine navigational aids	(a)	0.118	0.160	0.170	0.160	0.170
. Office of Road Safety: Road safety and emissions research	(a)	0.173	0.150	0.108	0.150	0.108
	(b)	0.350	0.300	0.300	0.300	0.300
. Provision of meteoro-logical services	(b)	-	-	-	9.010	11.640
. Transport planning and financial assistance	(b)	2.600	2.700	2.500	6.900	6.250
Bureau of Transport Economics	(a)	0.030	0.038	0.045	2.065	2.753
	(b)	0.002	0.002	0.002	0.105	0.100

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
Australian Road Research Board (Department of Housing and Construction contribution)*	(b)	0.259	0.259	0.259	0.259	0.259
Total (Direct Commonwealth funding)		4.674	4.882	4.802	21.798	24.744
B. Type of expenditure						
Intramural capital		0.624	0.751	0.840	0.789	0.852
Intramural current		0.640	0.666	0.678	4.230	5.120
Extramural		3.410	3.466	3.284	16.779	18.772
Total		4.674	4.882	4.802	21.798	24.744

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of Transport, Bureau of Transport Economics, Department of Housing and Construction "Explanations for Estimates of Expenditure 1980-81".

* The bulk of Commonwealth funding for the Australian Road Research Board is provided under the Transport planning and research financial assistance item.

Note: The Table does not include a significant component of S&T expenditure because the survey guidelines includes S&T only if it accounted for the majority of costs of a complete organisational sub-unit. See Appendix 1.

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.

. Air safety investigation

The Department has an obligation to carry out this function under the Air Navigation Act and Regulations. The fundamental objective of the investigations is the prevention of future accidents and incidents.

Air safety investigation involves formulation and development of Air Safety Investigation Procedures, conduct of aircraft accident and incidence investigation, and the determination and release of findings. It includes the discharge of Australian international obligations, provision of assistance to Boards of Accident Inquiry, the development of flight and ground recorder policies and the provision of associated analytical services.

. 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. These activities arise from obligations and commitments as follows:

. International Civil Aviation Organisation Convention

. Air Navigation Act and Regulations

. House of Representatives Select Committee on aircraft noise

. Government directions on Security matters.

- 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.

. Marine navigational aids

The Department has an obligation to provide Marine Navaids 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.

In keeping with that responsibility, research and development functions are undertaken to ensure the provision, review and upkeep of the most effective visual, audio and electronic aids.

. Office of Road Safety

The Government has a commitment to reducing the road toll, as re-affirmed by the Minister's Statement to Parliament on 24 November 1978. 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.

. Transport planning and research financial assistance

In a Second Reading Speech introducing the Transport Planning and Research (Financial Assistance) Act 1977, the Minister for Transport made a commitment to a continuing program of grants to the States for approved land transport planning and research programs. The Commonwealth contributes on a dollar for dollar basis with the States to a program maintained at a constant level in real terms.

The program is aimed at encouraging land transport planning and research of an innovative nature and involves the coordination of current research activities to avoid duplication.

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 Government's transport policy goal has been summarised by the Minister for Transport as:

- promoting fast, safe, energy-efficient and effective internal transport services to meet the needs of individuals and businesses;

- encouraging maximum utilisation and flexibility in the provision of road, rail, air and sea transport services;

- ensuring fuel-efficient, effective and economic transport is available for the purpose of Australia's overseas trade and travel; and

- ensuring that urban, regional and environmental considerations are fully assessed prior to the initiation of new transport systems or the further development of existing systems.

To assist the Government, 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.

TREASURY

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of the Treasury						
. Quantitative Studies	(a)	-	-	-	0.023	0.017
. Econometric forecasting	(a)	0.045	0.050	0.055	0.070	0.080
Australian Bureau of Statistics	(a)	1.549	1.805	2.271	64.041	88.403
Total (Budget Sector)		1.594	1.855	2.326	64.134	88.500
B. Financial Enterprises sector						
Reserve Bank of Australia						
. Grant Schemes (Rural Credits and Economic and Financial Research)	(b)	1.065	1.199	1.384	1.199	1.384

($million)		R&D			S&T (including R&D)	
		78-79	79-80	80-81	79-80	80-81
. Studies of Australian financial system	(a)	0.170	0.169	0.198	0.169	0.198
Total (Finance Enterprises sector		1.235	1.368	1.582	1.368	1.582
Total (Direct Commonwealth funding)		2.829	3.223	3.908	65.502	90.082
C. Type of expenditure						
Intramural capital		0.004	0.010	0.207	0.527	11.252
Intramural current		1.720	2.015	2.317	63.776	77.446
Extramural		1.065	1.199	1.384	1.199	1.384
Total (A+B)		2.829	3.223	3.908	65.502	90.082

(a) Intramural expenditure (b) Extramural expenditure

Sources: Department of the Treasury, Australian Bureau of Statistics, Reserve Bank of Australia.

Department of the Treasury

The Quantitative Studies Section collects data for and applies advanced economic techniques to the examination of the following topics:

- the direct and indirect effect of petroleum product prices and indirect tax measures upon the consumer price index;
- skilled labour shortages and resource development;
- aggregate investment and rates of return;
- the impact of budgetary changes on output growth; and
- economic growth and related issues.

This information is typically presented in a form suitable for internal departmental discussion and the development of government policies.

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.

Generally speaking the forecasting horizon is limited to four to six quarters although there is a developing requirement to extend the horizon to three years for forward estimates purposes. 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. Another important element in its function, however, is its responsibility for preparing Budget estimates which depend on a broad range of parameters that need to be consistent with the wider view of the economic outlook.

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 co-ordinates the statistical operations of official bodies to ensure the attainment of statistical compatability 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.

In regard to science and technology (S&T) activity, the ABS undertakes biennial surveys for the Department of Science and Technology's Project SCORE to measure the expenditure and manpower resources devoted to research and experimental development (R&D) in Australia. Separate biennial surveys into Energy R&D are also conducted as an extension of Project SCORE in the intervening years for the Department of National Development and Energy. Statistics produced from these series of surveys cover R&D and energy R&D activity by private businesses, tertiary education institutions, Commonwealth and State Government organisations, and private non-profit bodies. In 1979-80, the ABS also conducted a survey for the Committee of Inquiry into Technological Change to obtain information from non-farm enterprises for the three years ending 30 June 1979 on the nature and extent of technological change and its effects on personnel practices in Australia.

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, 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	79-80	80-81
A. Commonwealth Budget sector net expenditure						
Department of Veterans' Affairs						
. Central Medical Research Advisory Committee	(a)	0.243	0.273	0.297	0.273	0.297
. Central Development Unit	(a)	0.115	0.127	0.144	0.127	0.144
Total (Direct Commonwealth funding)		0.358	0.400	0.441	0.400	0.441
B. Type of expenditure						
Intramural capital		0.038	0.029	0.033	0.029	0.033
Intramural current		0.320	0.371	0.408	0.371	0.408
Extramural		-	-	-	-	-
Total		0.358	0.400	0.441	0.400	0.441

(a) Intramural expenditure

Sources: Department of Veterans' Affairs.

Department of Veterans' Affairs

. Medical Research Grants

To encourage, facilitate, assess and co-ordinate medical research, 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.

APPENDIX 1

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 o£ 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. The remainder of this Appendix describes the 1980-81 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:

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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.

> Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications.

To clarify this definition the information collection guidelines included the following:

> Any activity classified as R&D should contain an appreciable amount of novelty, it should have investigation as a primary objective, and should have a potential to produce results that are sufficiently general for mankind's stock of knowledge (theoretical and/or practical) to be recognisably increased. The concept of novelty is not associated with the actual creation of something which, although new, is made by artistry or by application of techniques that have already been established for that class of object. For example, devising and validating a new econometric model is R&D, whereas the econometric modelling of economic systems for policy purposes, using established techniques, is not R&D.
>
> R&D ceases when work is no longer experimental. Once its primary objective is no longer investigation, an activity can no longer be considered as R&D even though it could be regarded as an important part of the total innovative process.
>
> Note that R&D extends to substantial modifications to existing processes, systems, services and products.

The above definition and guidelines are also used in the Project SCORE R&D survey.

. 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.
>
> - Engineering 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.

- Active diffusion of scientific and technological skills and 'know-how', technology transfer, extension services: 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.

- Technologically 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.

- 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.

- Policy-related studies using advanced techniques: Policy-related studies using operations research and/or econometric techniques.

- 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. 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 work and other studies of S&T, n.e.i.: Administrative, policy ,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; engineering for innovative production; active diffusion of scientific and technological skills and 'know-how', technology transfer, and extension services. 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).

. 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 "technologically advanced scientific or engineering services" to "services associated with

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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 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 ("technologically advanced scientific or engineering services" and "policy-related studies using advanced techniques") taken 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. Pending clarification of this point, it was agreed between the Tertiary Education Commission and the Department of Science and Technology that the present 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 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 work and other studies of S&T n.e.i..
This class is not contained in the UNESCO Recommendation. It is, however, clear 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, as they should, in a Statement concerned with Commonwealth S&T activities.

Some respondents to the information collection 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:

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(4) Op cit.
(5) International Standard Classification of Education, UNESCO, Paris, 1976 (COM. 75/WS/27)

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).

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 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:

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(6) See for example The Concise Oxford Dictionary.

- 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.)

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.

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:

  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

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(7) Project SCORE, op cit.

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 private enterprise 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).

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(8). A11 transactions of departments are recorded in the Public Account and are accordingly part of the Budget sector); and

- via the Non-Budget sector (consisting of all transactions of authorities which do not pass through the Public Account).

Other sources relate to funds other than "Own funds" which are only available for the specified activity, and include, for example, any levy component from Research Trust funds, and funding provided by other Commonwealth departments and authorities, State government departments and authorities, and private enterprises.

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(8) See for example 1980-81 Budget Paper No. 1, Appendix, page 303.

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 similar accurate representation with respect to industry (or other non-Conmonwealth) 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 1980-81 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

(9) See 1980-81 Budget Paper No. 1, Appendix, pp 306-312 for detailed description of the classification, and Statement No. 3, pp 68-218 for treatment of individual items.

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 mineals (other than uranium)
	Extraction techniques - non-metallic minerals (other than coal, oil, gas)
Manufacturing(10)	Food
	Beverages and malt
	Tobacco
	Textiles and textile products
	Clothing and footwear
	Wood, wood products and furniture
	Paper and paper products
	Printing and allied industries
	Chemical fertilisers
	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.

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

	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 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 the present Statement, 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 the present Statement, 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.

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

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(11). 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 phasing of individual price changes.

Price index or deflator	Base year where index = 100	Index values for year				
		1973-74	1976-77	1977-78	1978-79	1979-80
GDP implicit price deflator	1974-75	84.5	127.4	137.8	148.5	163.5
Gross non-farm product implicit price deflator	1974-75	82.2	128.8	139.7	150.0	163.8
Government final consumption expenditure implicit price deflator	1974-75	80.5	127.8	137.8	146.2	159.2
Consumer price index (CPI)	1966-67	146.6	220.0	241.0	260.7	287.2
CPI (base year 1966-67) normalised to 100 at 1974-75	1974-75	85.7	128.6	140.9	152.4	167.9

Price index or deflator	Base year where index = 100	Index values for year				
		1973-74	1976-77	1977-78	1978-79	1979-80
Private enterprise intramural R&D expenditure implicit price deflator*	1974-75	81.	129.	n.a.	155.	n.a.
Research scientists and engineers salaries index**	1974-75	84.3	119.9	128.1	134.1	138.3
Private other non-dwelling construction implicit price deflator	1974-75	79.0	130.8	142.0	151.9	169.2
Private equipment implicit price deflator	1974-75	81.4	130.1	147.4	162.6	181.5
Industrial machinery and equipment including photographic professional and scientific equipment - price index	1968-69	n.a.	228.3	252.5	273.0	308.2

Sources: Australian Bureau of Statistics:

- Catalogue No. 5206.0, Quarterly Estimates of National Income and Expenditure, Australia, September Quarter 1980, pp40-41;
- Catalogue No. 6412.0, Price indexes of Articles Produced by Manufacturing Industry, Australia, May 1980 (p5) and March 1981 (p5);
- Catalogue No. 6401.0, Consumer Price Index - December Quarter 1977 (p4), and December Quarter 1980 (p3).
- Catalogue No. 8105.0, Research and Experimental Development - Business Enterprises, Australia - 1978-79 (Preliminary);

Salary data from Public Service Board.

* Computed by DST from current and constant price preliminary figures published in ABS Catalogue No. 8105.0. 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 1979-80. 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 1979-80, 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.

INTERNATIONAL COMPARISONS AND TRENDS(1)

Figure 1 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.

Figure 2 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. There is evidence (2) that the decline in Australian business enterprise R&D had been arrested by 1978-79.

A recently published OECD Science Resources Newsletter (1) compared trends in resources devoted to R&D by member countries in the period 1973-75 to those in 1975-77. Between 1975 and 1977 there was a slight rise in the amount of resources devoted to R&D in the OECD area. For most countries however, this growth was lower than in 1973-75. GDP picked up in most countries in 1975-77 after stagnating in 1973-75 and as GERD did not increase as rapidly, the GERD/GDP ratio fell in consequence. The estimates for Australia (1976-77 and 1978-79) of GERD ($m 816 and 970) and GDP ($m 83213 and 101133) give GERD/GDP of 0.98 per cent and 0.96 per cent respectively. While these figures suggest that Australia may have participated in this trend, the decrease is within the error band of the estimates.

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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 1976, 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. 5, Summer 1980, OECD/DSTI Science and Technology Indicators Unit, Paris.

(2) Research and Experimental Development - Business Enterprises, Australia - 1978-79 (Preliminary); Australian Bureau of Statistics Catalogue No. 8105.0, March 1980.

Fig. 1 R&D Expenditure by Country — 1977 or nearest year.

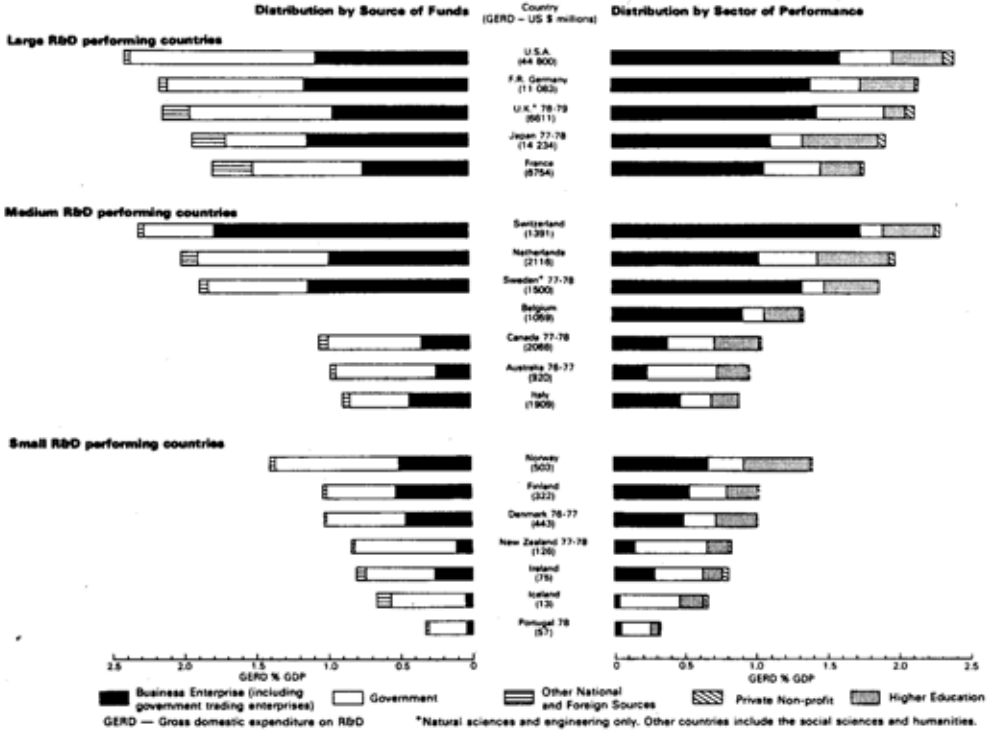
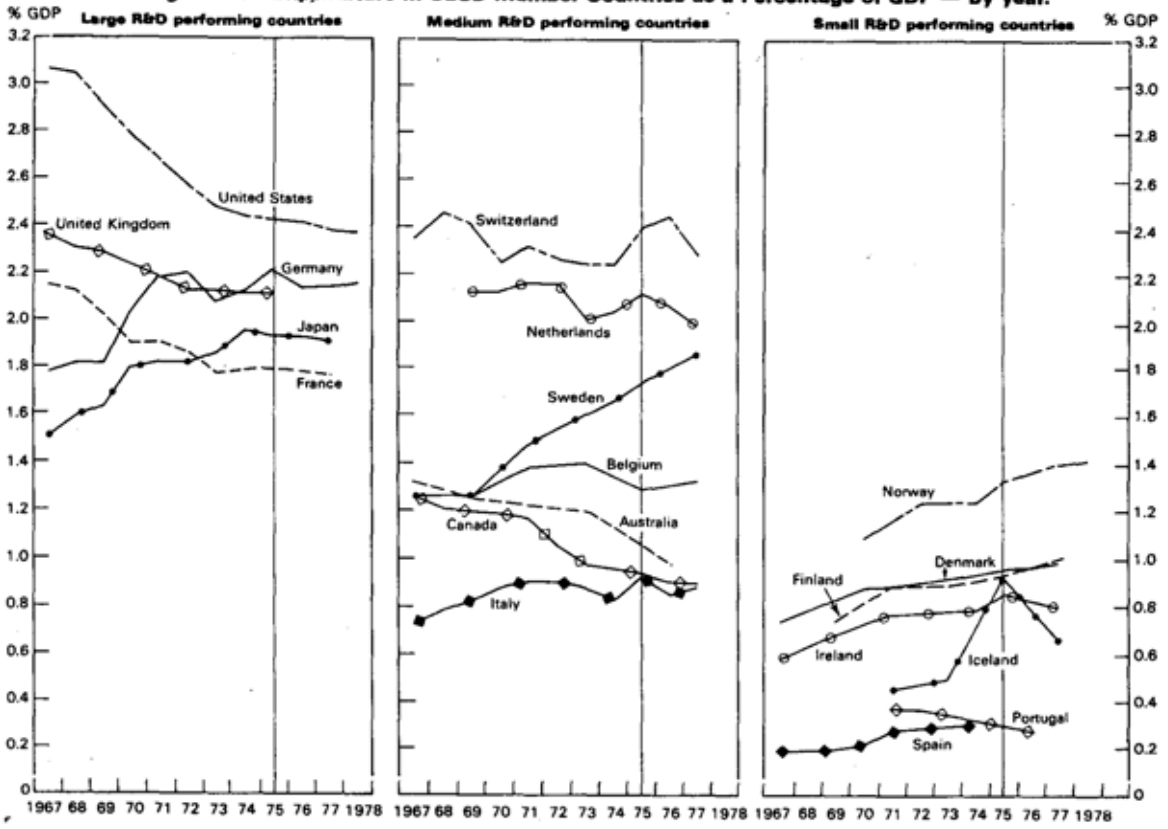


Fig. 2 R&D Expenditure in OECD Member Countries as a Percentage of GDP — by year.



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

The OECD reported a modest increase in real government R&D funding by members between 1977 and 1979. Objectives particularly favoured included "Energy", "Environment" and "Health". On the assumption that State government R&D funding has continued at expected levels, Australia participated in this trend, but also gave priority to "development of industry" objectives.

An area of strong interest for S&T policy is the extent to which governments fund R&D performed by business enterprises. Table 7 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.

Table 7: Sources of funds for total intramural R&D expenditure in the Business Enterprise sector (HERD) 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.

Table 8 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 8 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 S&T CONTRACTING

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(l). 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.Om 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. While the statistical control in this information collection was tighter than that employed in the 1979 ASTEC survey, the reliability of reporting the contracting items has not been independently checked. Because of the diverse areas of responsibility for such contracting within large departments it is possible that complete coverage was not achieved. The data obtained are presented in Tables 9 and 10. In this section contracting refers to "contracts and commissions" as distinct from "grants and donations" which form the remainder of extramural expenditure. These categories are defined in Appendix 1.

In table 10 the Primary Industry entry includes $20.41m (1979-80) and $19.99m (1980-81) paid to the State and Northern Territory governments towards eradication of bovine brucellosis and tuberculosis. This money is raised by Commonwealth imposed levies and export charges. The Transport entry includes $9.Olm (1979-80) and $11.64m (1980-81) paid by the Department of Transport for provision of meteorological services by the Bureau of Meteorology.

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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 9: R&D contracting by ministry - showing major agencies contracting to private business enterprises.

($ million)	78-79		79-80		80-81	
Ministry	A	B	A	B	A	B
Administrative Services	0.03	-	0.12	-	0.14	-
Attorney-General's	0.01	0.01	0.02	0.01	0.05	0.02
Institute of Family Studies	-	-	-	-	0.25	0.15
Capital Territory	0.03	-	0.01	-	0.02	-
Defence	0.40	0.40	0.37	0.37	0.48	0.48
Education	0.14	-	0.26	-	0.28	-
Employment and Youth Affairs	-	-	-	-	0.01	-
Health	0.05	0.02	0.04	0.02	0.04	-
Home Affairs and Environment	0.02	0.02	0.04	0.003	0.02	0.003
GBRMPA	0.05	0.01	0.06	0.02	0.09	0.03
Supervising Scientist	0.13	-	0.42	0.03	0.44	0.01
Immigration and Ethnic Affairs	0.20	0.11	0.33	0.08	0.27	0.04
National Development and Energy	0.59	-	0.70	0.11*	1.01	0.34*
AAEC	0.16	0.06	0.21	0.08	0.22	0.09
Primary Industry	-	-	0.01	-	0.02	-
Science and Technology	0.01	0.01	0.01	0.01	0.08	0.01
CSIRO	0.46	0.21	0.42	0.17	0.42	0.17
Transport	0.55	0.002	- 0.51	0.01	0.53	0.002
Total (Budget sector)	2.81	0.85	3.53	0.91	4.36	1.33
Communications						
Australia Post	0.04	0.03	0.06	0.04	0.16	0.12
OTC	0.16	0.16	0.16	0.16	0.25	0.25
Telecom Australia	0.16	0.13	0.17	0.11	0.56	0.46
Total (Direct Commonwealth funding)	3.17	1.17	3.91	1.21	5.32	2.16

* This represents the Commonwealth contribution to the R&D contract going to an overseas private business as part of the Australia/FRG Coal Liquefaction Study.

A. Total R&D contracts and commissions- funds disbursed under contract or commission arrangements to perform specified tasks.

B. R&D contracts and commissions going to private business enterprises.

Table 10: S&T contracting by ministry - showing major agencies contracting to private business enterprises.

Includes R&D contracts and commissions.

($ million)	79-80		80-81	
Ministry	A	B	A	B
Administrative Services	0.12	-	0.19	0.05
Attorney-General's	0.02	0.01	0.05	0.02
Institute of Family Studies	-	-	0.25	0.15
Capital Territory	0.43	0.26	0.41	0.23
Defence	6.05	3.95	8.12	6.92
Education	0.17	-	0.17	-
Employment and Youth Affairs	-	-	0.06	-
Health	0.05	0.02	0.05	-
Home Affairs and Environment	3.59	0.003	3.78	0.003
ANPWS	0.29	0.29	0.34	0.34
GBRMPA	0.10	0.04	0.26	0.05
Supervising Scientist	0.42	0.03	0.44	0.01
Immigration and Ethnic Affairs	0.33	0.08	0.27	0.04
Aust. Institute of Multicultural Affairs	0.01	0.01	0.34	0.03
Industry and Commerce	0.03	0.03	0.03	0.03
National Development and Energy	1.12	0.49*	1.44	0.99*
AAEC	0.34	0.21	0.32	0.19
Primary Industry	20.98	-	20.84	-
Prime Minister and Cabinet	0.01	-	0.04	0.01
Science and Technology	9.48	9.05	10.58	9.63
CSIRO	0.42	0.17	0.42	0.17
Social Security	0.05	-	0.05	-
Transport	9.52	0.01	12.16	-
Bureau of Transport Economics	0.11	0.11	0.10	0.10
Total (Budget sector)	53.63	14.75	60.70	18.95
Communications				
Australia Post	0.09	0.05	0.21	0.16
OTC	0.16	0.16	0.47	0.25
Telecom Australia	0.17	0.11	0.56	0.46
Housing and Construction				
SMEC	0.97	0.97	1.00	1.00
Total (Direct Commonwealth funding)	55.01	16.04	62.93	20.82

* $109 000 (1979-80) and $341 000 (1980-81) represent the Commonwealth contribution to an R&D contract going overseas. (See footnote to Table 9).

A. Total S&T contracts and commissions- funds disbursed under contract or commission arrangements to perform specified tasks.

B. S&T contracts and commissions going to private business enterprises.

ACRONYMS AND ABBREVIATIONS

AAEC	Australian Atomic Energy Commission
AATB	Anglo-Australian Telescope Board
ABRS	Australian Biological Resources Study
ABS	Australian Bureau of Statistics
ACC	Australian-China Council
ACER	Australian Council for Educational Research
ADAB	Australian Development Assistance Bureau
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
AMSTAC-FAP	Australian Marine Sciences and Technologies Advisory Committee - Funding Advisory Panel
ANMRC	Australian Numerical Meteorology Research Centre
ANPWS	Australian National Parks and Wildlife Service
ANZAAS	Australian New Zealand Association for the Advancement of Science
APIC	Australian Population and Immigration Council
ARGC	Australian Research Grants Committee
ARL	Australian Radiation Laboratory
ARPAC	Antarctic Research Policy Advisory Committee
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
AUSTREC	Australian Science, Technology and Research Co-operation (ADAB)
BAE	Bureau of Agricultural Economics
BAH	Bureau of Animal Health
BERD	Total Intramural R&D Expenditure in the Business Enterprise Sector
BIE	Bureau of Industry Economics
BIOMASS	Biological investigation of Marine Antarctic Systems and Stocks
BMR	Bureau of Mineral Resources, Geology and Geophysics
BTE	Bureau of Transport Economics
CCRD	Consultative Committee on R&D (ADAB)
CERI	Centre for Educational Research and Innovation
CHP	Community Health Program
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
CMRAC	Department of Veterans' Affairs Central Medical Research Advisory Committee
CSC	Commonwealth Science Council
CSIRO	Commonwealth Scientific and Industrial Research Organization
CSL	Commonwealth Serum Laboratories
DAF	Data Acquisition Facility
DCT	Department of Capital Territory
DPF	Data Processing Facility
DPI	Department of Primary Industry
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
PPS	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
HF	High Frequency
HIF	Health Facilities Information File
IAC	Industries Assistance Commission
ICAO	International Civil Aviation Organisation
ID	Defence Industry Development Branch
IPS	Ionospheric Prediction Service
IR&D	Industrial Research and Development
MATPAK	Materials Handling Program
MCB	Metric Conversion Board
n.a.	not available
NAL	National Acoustic Laboratory
NASA	United States National Aeronautics and Space Administration
National NMR Centre	National Nuclear Magnetic Resonance Centre
NATmap	National Mapping
NBSL	National Biological Standards Laboratory
NEAC	National Energy Advisory Committee
n.e.c.	not elsewhere classified
n.e.i.	not elsewhere included

NERD&D	National Energy Research, Development and Demonstration
NERDDC	National Energy Research, Development and Demonstration Council
NH&MRC	National Health and Medical Research Council
NIF	National Income Forecasting Econometric Model
NSC	National Standards Commission
OECD	Organisation for Economic Co-operation and Development
OTC	Overseas Telecommunications Commission (Australia)
PRI	Planning and Research Information Branch (Public Service Board)
PSB	Public Service Board
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
TAPE	Technical and Further Education
TEC	Tertiary Education Commission