



**OVERVIEW OF THE AUSTRALIAN AND
NEW ZEALAND SCIENCE AND TECHNOLOGY SYSTEMS**

By

Innovation Dynamics Pty Ltd

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Authorship

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Glossary

Administrative Arrangement Orders	Direction from government as to the arrangement of government portfolios and relative responsibilities
Crown Entities	Government organisations established through an enactment of parliament which defines their roles, responsibilities and governance arrangements applying to the entity.
Department	Established, under the Constitution, by the Governor-General, on the advice of the Prime Minister.
Executive Agency	Non-statutory bodies established by the Governor-General on the advice of the Prime Minister. The agency head is appointed by, and directly accountable to, the Minister responsible for the agency. The purpose of the executive agency structure is to provide a degree of separation from departmental management where that is appropriate to the functions of the agency and something less than a statutory authority is warranted.
Federal	Collection of Australian States and Territories united under the Australian Constitution of 1901. The highest level of government in Australia is the Federal Government.
Government agency	Department responsible for the oversight and administration of a specific function
Government Business Enterprise	Commercial entities of the Australian government
Governor-General	Her Majesty's representative in the Commonwealth of Australia or New Zealand as the formal Head of State. The Governor-General has executive power of the Commonwealth of Australia or New Zealand.
Local	Relates to the lowest tier of government in Australia, at an intra-state/territory level. Usually refers to local council or shire governance.
Ministry	Ministerial responsibility as allocated by the Prime Minister
Output funding	Funding provided directly for desired outcome

Portfolio	See Ministry
Private	Non-government corporation and business sector
Public	Government, or public-owned sector
Purchaser-Provider	In a governmental sense, a government agency (as the purchaser) enters into a formal procurement relationship (eg. Contractual relationship) with an organisation (the provider) to deliver a specific outcome.
R&D	Research and Development
RS&T	Research, Science and Technology
S&T	Science and Technology
SME	Small to Medium Enterprise
State	Australia is divided into 6 states and 3 territories. The state and territory governments are the middle tier of Australian government.
Statutory Agency / Organisation	Bodies established by legislation that specifies the extent to which the agency staff are part of the public service. The enabling legislation also sets out the arrangements for the appointment and termination of the agency head and their specific powers, responsibilities and accountability requirements.

Australia

Overview of Australian Government

Australia is a constitutional Monarchy with three tiers of government: Federal (or Commonwealth), State and Local.

The Federal Government, along with the States, is based on the Westminster system of government: the powers of each of these governments is split between three areas: Executive (eg. Governor-General of Australia), Parliament (includes both houses of parliament), and the Judiciary. Local government, as such, is not recognised specifically in the Constitution and is established under legislation of the individual states. Local governments deliver a range of community services including waste management, pre-school education and community health care.

Subject to a few exceptions, the Constitution does not limit the subjects on which the States may make laws. However, States are precluded from imposing duties of customs and excise, and cannot raise defence forces without the consent of the Federal Parliament. Otherwise, State parliaments may pass laws on any subject of relevance to the particular state. Hence, State laws regulate important areas such as education, health, roads and criminal law. Apart from the Australian National University and the Australian Maritime College, states are responsible for the establishment and accreditation of higher education courses, as well as for most other education.¹

The powers of the Federal Government are more limited than those of the States. The federal Constitution does not include science or technology as areas of Federal responsibility; however, in relation to science and technology, the Federal Government operates under other powers:

- Trade and commerce with other countries, and amongst the States;
- Postal, telegraphic, telephonic and other like services (the Federal has used this power to gain legislative control over such areas as the Internet);
- Astronomical and meteorological observations;
- Quarantine;
- Fisheries in Australian waters beyond territorial limits;
- Weights and measures; and
- Copyrights, patents of inventions and designs, and trademarks.²

There are approximately 112,000 ongoing employees within the Federal Government, covering 82 different Australian public service agencies (17 departments, 58 statutory agencies and 7 executive agencies). More than half these employees work in the three largest agencies, Centrelink (administers social services benefits), the Australian Taxation Office and the Department of Defence.

Overview of Federal and State responsibilities in S&T

Federal Responsibilities

The Federal government is organised into several portfolios, each containing at least one government department and potentially several executive agencies, statutory authorities and/or

government business enterprises. The organisation of the Federal government is detailed in the Administrative Arrangement Orders (AAO) of the Federal Government. These can be changed by the Federal government with the approval of the Governor-General. The current AAO, which was introduced on 16 December 2004, details the following portfolio S&T-related responsibilities:

- *Agriculture, Fisheries and Forestry Portfolio* - Agricultural, pastoral, fishing, food and forest industries; water, soils, and other natural resources; rural industries inspection and quarantine; primary industries research including economic research; commodity-specific international organisations and activities; administration of export controls on agricultural, fisheries and forestry industries products; and food policy, processing and exports.
- *Communications, Information Technology and the Arts Portfolio* - Management of the electromagnetic spectrum; national policy issues relating to the information economy; application of information and communications technology, including broadband and electronic commerce; and information and communications industries development.
- *Defence Portfolio* - Defence scientific research and development.
- *Education, Science and Training Portfolio* - Education policy and programs including schools, vocational, higher education; science policy, science awareness programs and co-ordination; promotion of collaborative research in science and technology; co-ordination of research policy; commercialisation and utilisation of public sector research relating to portfolio programs and agencies; research grants and fellowships; and radioactive waste management.
- *Environment and Heritage Portfolio* - Environment protection and conservation of biodiversity; air quality; land contamination; meteorology; Greenhouse policy coordination; and environmental research.
- *Foreign Affairs and Trade Portfolio* - External Affairs, including relations and communications with overseas governments and United Nations agencies; treaties, including trade agreements; bilateral, regional and multilateral trade policy; and international trade and commodity negotiations.
- *Health and Aging Portfolio* - Public health and medical research; health promotion and disease prevention; pharmaceutical benefits; specific health services, including human quarantine; regulation of therapeutic goods; and notification and assessment of industrial chemicals; gene technology regulation.
- *Industry, Tourism and Resources Portfolio* - Industry innovation policy and technology diffusion; promotion of industrial research and development, and commercialisation; biotechnology, excluding gene technology regulation; energy and resources science and research; patents of inventions and designs, and trade marks; weights and measures standards; analytical laboratory services; geoscience research and information services including geodesy, mapping, remote sensing and land information co-ordination; and ionospheric prediction.

State Responsibilities

Under the federal Constitution, State governments are responsible for powers in education, transport, law enforcement, health services and agriculture.

A significant proportion of science and technology research in Australia occurs within State primary industries/agriculture departments, tertiary education institutions and medical institutes, the last two both set up under State legislation. In addition, some medical research institutes are set up as not-for-profit corporations. States may provide funding to their own organisations through appropriation and the Federal government may provide funding through competitive grants and block funding. The Federal Government places conditions on the provision of this revenue, predominantly as to the specified use of the funding, thereby indirectly controlling the type and level of investment by the State governments in science and technology. Many Federal government programs require matching funding and the States often have specific competitive grants programs that provide this money.

Each State government has slightly different structural arrangements in terms of government departments and their responsibilities. By way of example, the state of Victoria has structured its science and technology responsibilities as follows:

- *Education and Training Portfolio*- Principal responsibilities are to: provide and ensure access to high quality primary and secondary education for all Victorian children; ensure that all Victorians have access to high quality training and further education services necessary for the social and economic development of the State; link training and further education to employment; and ensure that Government policies and service delivery reflect and meet the needs of all young Victorians. It also has a number of statutory authorities and other bodies within the portfolio (see Appendix A).
- *Innovation, Industry & Regional Development Portfolio* - The Victorian Government's lead agency for economic and regional development, responsible for building an innovative State. It reflects the increasing emphasis that the government places on innovation as a key driver of future economic success. It also has a number of statutory authorities and other bodies within the portfolio (see Appendix A).
- *Primary Industries Portfolio* - Influences improvements in industry performance by providing information and advice on the use and management of resources, guided by our expertise in science and technology. Encourages the adoption of new technologies and development practices through a range of community education and extension programs. It also has a number of statutory authorities and other bodies within the portfolio (see Appendix A).
- *Sustainability and Environment Portfolio* - Focuses on sustainability as a key driver in its own activities. This is seen as a critical prerequisite if it is to successfully influence the actions of other government agencies, businesses, other levels of government, Victorian communities, households and individuals. It also has a number of statutory authorities and other bodies within the portfolio (see Appendix A).

Federal Government policy approach

Overall philosophy

Australia's policies and approaches in S&T have been influenced by:

- Relative strengths of R&D activities in government-owned laboratories, tertiary institutions etc (collectively termed "public sector R&D") and relative weakness of R&D efforts in Australian companies (collectively termed "private sector R&D" or "business enterprise R&D"). This has led to major programs to try to enhance co-operation amongst the public sector organisations (to reduce duplication of effort, encourage commercialisation of

research and enhance focus on major issues facing Australia), to encourage greater levels of company R&D, and to enhance communication and co-operation between the public and private sectors.

- Australia's strong heritage in rural industries and mining. Although agricultural industry has fallen from 20% of GDP to around 4% of GDP (and mining currently stands at 5% of GDP), there is disproportionate R&D effort in rural industries and mining technologies, in part because the government's National Party partner has most of its seats in rural areas and because the institutional frameworks set up to encourage this R&D are difficult to dismantle.
- Relatively unskilled industry and heavy reliance on manufactured imports and the operations of multinationals in Australia. Major trading partners include the UK, Japan, China and the USA. Policies here encourage technology exchange and access (e.g. through bilateral S&T agreements), and higher levels of R&D or local industry linkages by the multinationals located here.
- Australia's heavy involvement in the OECD, whose analytical approach, in turn, has been influenced by national innovation systems and innovation networks literature. Australia regularly contributes to the STI (Science, Technology and Industry) Directorate of the OECD, and plays an active role in the operation of this directorate.
- Increased desire for research to have concrete outcomes that can be measured in terms of national benefit (this may be commercial benefit, skills development or environmental benefit). The Government, its advisory boards and funding agencies have spent a lot of time developing methods of measuring research outcomes in the last 10-15 years.
- The current Liberal-National Party Government's philosophical support for market-based economics. Hence the focus of government policy is in removing barriers to innovation and interaction. In general, competitive grants programs are not sector-based (though there are exceptions).

The current Federal government's policy framework for science, research and innovation is contained in the broad policy statement Backing Australia's Ability (BAA).³ BAA is a science and innovation package aimed at pursuing research and development, promoting the commercial application of ideas and developing and retaining skills. It is administered through the Education, Science and Training Portfolio and the Industry, Tourism and Resources Portfolio.⁴ The initial 10-year funding framework was delivered in 2001 and added to in 2004, and is aimed at the generation of new ideas, the commercial application of ideas, and the development and retention of skills.⁵

The funding for BAA is channelled through research grants, venture capital funds managers, university places and teaching initiatives.⁶ BAA includes specified National Research Priorities, which highlight areas of particular social, economic and environmental importance to Australia, where a whole-of-government focus has the potential to improve research and broader policy outcomes. National Research Priorities are broadly based, thematic and multi-disciplinary in nature. There are four National Research Priorities: An Environmentally Sustainable Australia; Promoting and Maintaining Good Health; Frontier Technologies for Building and Transforming Australian Industries; and Safeguarding Australia.⁷

The Federal government has several S&T-related policy initiatives and strategies, besides BAA, which are outlined below. These are designed to establish and maintain the operational framework in each area and are intended to be implemented by the government, with involvement from industry and the general community.

Biosecurity Australia (administered through the Agriculture, Fisheries and Forestry Portfolio) - Biosecurity Australia provides science-based quarantine assessments and policy advice that protects Australia's favourable pest and disease status and enhances Australia's access to international animal and plant-related markets.

National Biotechnology Strategy (administered through the Industry, Tourism and Resources Portfolio) - The objective of the Strategy is to provide a framework for Government and key stakeholders to work together to ensure that developments in biotechnology are captured for the benefit of the Australian community, industry and the environment, while safeguarding human health and ensuring environmental protection.

National Greenhouse Strategy (administered through the Environment and Heritage Portfolio) - The National Greenhouse Strategy provides the strategic framework for advancing Australia's domestic greenhouse response. It maintains a comprehensive approach to tackling greenhouse issues, and details both existing and additional measures aimed at improving the awareness and understanding of greenhouse issues, limiting the growth of emissions and enhancing greenhouse sink capacity, and developing adaptation responses.

National Oceans Policy (administered through the Environment and Heritage Portfolio) - The National Oceans Policy recognises the need to maintain the oceans ecosystem health. It aims to promote strong, diverse and internationally competitive marine industries, as this is important to national and regional economies which depend on the long-term ecological sustainability of a wide range of ocean uses.

National Strategy for the Conservation of Australia's Biological Diversity (administered through the Environment and heritage Portfolio) - The Strategy's primary focus is Australia's indigenous biological diversity. Implementation of the Strategy will require actions affecting virtually all of Australia's land and sea, most of which will continue to be subject to a multiplicity of uses, either in parallel or in sequence.

Purchaser Provider Model

With the exception of Federal departments and executive agencies, a purchaser-provider model is used to procure or fund S&T research. That is, the government enters into, either through direct funding arrangements or through formal contracts/grants, arrangements for the funding of specific research. These arrangements involve a formal management process that includes output agreements, progress reports, budget recommendations and an annual progress and achievement reports.

The current government's philosophy regarding all government services is that unless there is a sound reason for the government to continue to provide a service (eg. the private sector is either incapable or unwilling to provide the service), the government will move through a staged process of corporatising, and then if appropriate, privatising services. This is in line with National Competition Policy. There are several organisational structures of government organizations, from a government department to a government business enterprise (the last stage before full privatisation). The governance arrangements for each type of government organisation along this continuum are outlined in Appendix B. In essence, policy advisory and development groups are to stay within government; however, service provision, where possible (and politically acceptable), is pushed first to statutory authorities and companies, then to government business enterprises, then finally into the private sector. Important S&T-performing organisations which have been privatised in the last decade include Telecom Australia (now Telstra Ltd) and the Commonwealth Serum Laboratories (now CSL Ltd).

Federal budget (S&T budget statement)

The Australian government's budget statements are delivered to provide information on the proposed allocation of resources by government agencies to achieve government-determined outcomes.⁸ Table 1 describes the Federal expenditure on science and innovation from 1996-97 to 2003-2004, along with the budgeted allocation for 2004-2005 and 2005-06.

Table 1: Federal Funding of Science and Innovation from 1996/97 to 2005/06 (\$million AUD)

Major Areas of Funding	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001/2002	2002-2003	2003-2004	2004-2005	2005-2006
Major Federal Research Agencies										
Defence Science and Technology Organisation	255	212	221	238	261	275	283	294	314	330
CSIRO	445	467	475	500	497	510	532	569	577	594
Other R&D	280	256	244	273	338	386	403	442	399	400
Business Enterprise Sector										
Industry R&D Tax Concession	525	420	370	460	510	370	416	406	456	491
Other Business R&D Support	58	20	60	177	177	238	159	231	63	87
Other Innovation Support	70	120	167	112	125	284	244	216	359	396
Higher Education Sector										
Australian Research Council ⁹	-	-	-	-	248	266	298	394	481	557
Performance Based Block Funding	-	-	-	-	943	1,013	1,087	1,172	1,179	1,251
Former Educational R&D Support	1,611	1,675	1,737	1,776	-	-	-	-	-	-
Other R&D Support	3	3	3	16	614	599	588	595	589	450
Multisector										
NH&MRC and Other Health	167	175	195	187	310	248	274	369	420	432
Cooperative Research Centres	142	144	142	138	140	145	149	201	194	208
Rural	126	141	150	138	141	198	204	211	194	207
Energy and the Environment	11	25	9	12	21	34	29	36	43	64
Other Science Support	25	29	12	7	7	13	38	49	55	71
TOTAL	3,717	3,687	3,785	4,032	4,330	4,577	4,704	5,185	5,323	5,538
% Total Federal Expenditure	2.55%	2.48%	2.58%	2.61%	2.76%	2.75%	2.78%	2.83%	2.77%	2.76%

Source: 2005/2006 Federal Government Budget Papers, 2005.¹⁰

As can be seen in Table 1, Federal expenditure on science and innovation has increased from AUD\$3.7 billion in 1996-97 to a budget of AUD\$5.5 billion in 2005-06. However, in terms of the expenditure on science and innovation as a proportion of total government expenditure, the figure has only increased from around 2.5% to 2.8% over the same period. The most notable change during this period was the cessation of former block funding for higher educational R&D expenditure in 1999-2000 and the commencement of performance-based higher educational

funding in 2000-01. This also corresponds to an increase in other educational R&D funding. During the period 1996-97 to 2005-06, the overall funding for higher education science and innovation funding has increased; however, it has also moved to more performance-based funding using a purchaser-provider model (see below).

Federal Government-owned S&T

In Australia, Federal Government-owned S&T has two distinct categories: 1) government departments and executive agencies; and 2) government statutory organisations. These have different reporting and governance arrangements. However, as a general rule, if the activity is to be charged for and may compete with private companies, the government will establish it as a statutory organisation rather than leaving the function within a government department. Other key differences are discussed in more detail in the next sections.

Federal government departments and executive agencies

Government departments have their policy directions set by the government. They report to their portfolio minister and to government through the normal government reporting mechanisms. Federal government departments are not providing, in general, services that compete with the private sector.

Government departments are funded by direct appropriations from the government and the agency head reports to the portfolio minister. The Federal government sets the policy directions for the agency and the agency head is responsible for the implementation of the government's policy. Departments and executive agencies may charge for specified goods or services provided; however, the charges cannot exceed what the goods or services cost to provide (cost recovery). Further detail on the governance of these agencies is at Appendix B.

The Federal government in Australia has several departments and executive agencies involved in S&T; however, these organisations' primary role is regulatory, government testing and/or the setting and maintenance of S&T standards. These agencies are listed below:

- *Australian Bureau of Agricultural and Resource Economics* – provides economic forecasting and policy analysis on agriculture and natural resources;
- *Bureau of Meteorology* – provides weather, climate and hydrological services;
- *Defence Science and Technology Organisation* – undertakes research to support Australia's defence and national security (mainly equipment testing prior to procurement);
- *Department of Environment (Australian Antarctic Division)* – provides advice on Antarctica and conducts Antarctic research;
- *Geoscience Australia* – provide geospatial information and undertakes geoscience research;
- *National Measurement Institute* - formed from the amalgamation of the Australian Government Analytical Laboratories, the National Measurement Laboratories and the National Standards Commission on 1 July 2004 (the first time the current government has taken back ownership of a previously separated function) – organisation responsible for Australia's units and standards of measurement; and
- *Therapeutic Goods Administration* – provides assessment and monitoring services to ensure acceptable standards are maintained in therapeutic goods.

A description of each and their function is at Appendix C. Most of the government's funding organisations (for example the Australian Research Council and the Co-operative Research Centres secretariat) operate from within Departments and Executive Agencies. More detail on these is provided in the discussion of government-funded S&T.

Federal government statutory organisations

Government statutory organisations are usually established under their own Act of Parliament and also report to government through the relevant portfolio minister. However, the organisation itself normally sets the policy directions and specifies the areas of research interest, usually with the agreement of the portfolio minister. The exception is the Commonwealth Scientific and Industrial Research Organisation (CSIRO). CSIRO, whilst government funded, does not require government approval to progress research in any particular areas. The government can direct CSIRO to undertake specific research; however, the government must provide specific additional funding for such research. All statutory agencies report to government against pre-defined measures, normally embodied in the enacting legislation.

Statutory organisations can charge for their services and may be in a position to compete with the private sector. Where this happens, they must ensure that they do not have an unfair advantage over private sector organisations due to their government status (for example, they may be exempt from certain taxes). To compensate, when setting prices for goods and services for sale in competition with private companies, they must make "competitive neutrality" adjustments to ensure fair competition, including a commercial rate of return. Further detail on the governance of these agencies is at Appendix B.

The Federal Government in Australia has several statutory authorities and statutory bodies directly involved in S&T research and/or its regulation, which are listed below. They report to a range of portfolio Ministers. The largest is the CSIRO, which employs about 5,000 scientists and has over 100 laboratories around Australia.

- *Australian Institute of Marine Science* (research) – directed towards generating knowledge on sustainable use and protection of marine environments through scientific and technological research;
- *Anglo Australian Observatory* (research) – provide world-class observing facilities for British and Australian optical astronomers as part of the agreement between the Australian and United Kingdom astronomical communities;
- *Australian Nuclear Science & Technology Organisation* (research) – the national nuclear research and development agency providing advice, services and products to government, academia, industry and other research institutes;
- *Australian Institute of Sport* (research) – provides national sports training for elite athletes and conducts sports-related research in biomechanics, medicine, physiology, psychology and physiotherapy;
- *Australian Pesticides and Veterinary Medicines Authority* (regulation) – responsible for the assessment and registration of pesticides and veterinary medicines, including regulation up to point of sale
- *Australian Radiation Protection and Nuclear Safety Agency* (regulation) – provides policy advice and has a regulatory role in minimizing the effect on humans and the environment from ionising and non-ionising radiation;
- *Commonwealth Science & Industrial Research Organisation (CSIRO)* (research) – Australia's national S&T agency is primarily focused on R&D in fields of national economic, social and environmental importance. CSIRO has six main research priorities

(called National Research Flagships) which are: 1) Energy Transformed; 2) Food Futures; 3) Light Metals; 4) Preventative Health; 5) Water for a Healthy Country; and 6) Wealth from Oceans;

- *Food Standards Australia New Zealand* (regulation) – independent bi-national statutory authority that develops food standards covering the entire supply chain for both producers and manufacturers;
- *National Acoustic Laboratories* (research) – undertakes research into hearing, hearing habilitation and rehabilitation;
- *Office of the Gene Technology Regulator* (regulation) – provides administrative support to the Gene Technology Regulator; and
- *R&D Corporations & Companies* (research funding) – rural funding agencies that invest in rural R&D to achieve increased productivity and high-quality products.

A description of each and their function is at Appendix D.

Government-funded

Government-funded S&T is defined as research into S&T where government directs funding to a particular area of interest. It must be stressed, however, that the Federal government does not structure programs around particular S&T topics. For example, the government does not specify that particular grant funding is to be used to research a particular disorder, but rather provides competitive grants to S&T research organisations based on the type and level of S&T activities they undertake. The organisations themselves primarily direct what specific S&T areas the funding goes towards.

Government-funded S&T is funded through a purchaser-provider model. This is accomplished through providing funding through programs and grants. Potential recipients apply for a certain funding program or grant, displaying how they meet the selection criteria (which nearly always include a criterion of excellence of science). These programs and grants at both a Federal and State level have moved progressively from block (non-competitive) baseline funding to competitive programs and grants over the past decade. It is through the setting of the selection criteria that government exerts some influence on the direction of S&T research.

Where there is a particular interest in research to solve a pressing problem, for example AIDS, the government may set up a new competitive grants fund, administered by one of its existing funding bodies. Research in the area is then encouraged through distributing the funds to research applicants. On occasion, the government has commissioned CSIRO to undertake specific research projects (such as current funding for research to reduce the threat of feral cane toads in northern Australia) but this is rare and is nearly always in response to a submission from the research agency (for example, in this case CSIRO would have been lobbying for funding for this purpose).

In recent years the Government has also set up funds for the National Stem Cell Centre and National ICT Australia (NICTA). In both cases the government sought proposals from consortia for R&D centres, in biotechnology and IT. The type of biotechnology or IT was not specified and consortia had to submit proposals for the funding, demonstrating research excellence, co-operation between a number of research groups and forward plans for commercialisation. Both organisations must report on progress and are to be reviewed regularly as part of their contractual arrangements with the Federal Government.

Federal funding for public-sector R&D grants and programs

Federal government support for S&T research in public-sector organisations (statutory organisations, universities, medical research institutes, other non-private sector organisations, and may include not-for-profit organisations) is provided through a range of competitive grants programs. The Federal government does not specify the particular S&T issues to be addressed by this funding, however requires the applicant to provide detail on the proposed use of the funding and to demonstrate research excellence. Further, applicants for this form of funding normally have to explain the potential national benefits of the research they are proposing.

There are several public-sector R&D programs and grants administered by various Federal agencies. Details on the individual programs are at Appendix E. Several agencies, notably the National Health and Medical Research Council and the Australian Research Council have introduced additional criteria on intellectual property protection to try to encourage researchers to ensure the outcome of their research is protected, if relevant, for future commercialisation.

Federal funding for business enterprise R&D grants and programs

The Federal government provides grants and programs directed towards increasing the level of private sector (business) expenditure on R&D. The recipients of these grants are private companies (including those spun out from public sector research institutions), industry consortia (including those which have public sector partners) and industry associations. The Federal government does not specify the particular S&T issues to be addressed by this funding, however requires the applicant to provide detail on the proposed use of the funding and will often require the applicant to match the funds 1:1 (as noted earlier, State governments often have funds which an applicant can use to obtain the matching dollars). An additional requirement of this type of funding is the explanation of the anticipated commercial outcomes of projects funded through these schemes. In some cases funding may be delivered in tranches according to milestones.

The Federal government funds several programs and grants aimed at increasing and/or facilitating business enterprise R&D. Details on the individual programs are at Appendix F. An example of the approach above is the Commercial Ready program, where applicants must submit a business plan and a commercialisation plan and must match the funding 1:1. Successful applicants may receive funding of several million dollars over 3 years and payments will be made on meeting specified R&D milestones over that period.

Federal funding for R&D-business linkage grants and programs

The Federal government provides grants and programs directed towards increasing the level of direct business involvement with R&D institutions. The recipients of these grants are consortia of industry and public sector R&D institutions, industry associations and private companies. As with other government funded S&T, the Federal government does not specify the particular S&T issues to be addressed, however requires the applicant to provide detail on the proposed use of the funding. An additional requirement of this type of funding is the explanation of the anticipated commercial outcomes of projects funded and how the R&D organisation/s and business organisation/s will work together. A final requirement normally is an explanation of the national benefit of the project.

R&D-business linkage grants and programs, as with other government-funded S&T, are funded through a purchaser-provider model. There are several programs and grants administered by the Federal government. Details on the individual programs are at Appendix G. An example of a major program of this type is the Co-operative Research Centres (CRC) program. Initiated n

1991, this program now funds over 70 CRCs around Australia over 7 years (often providing tens of millions of dollars in funding). All CRCs have a group of industry and public sector R&D partners, specified research outcomes and major post-graduate training programs. Most aim to commercialise the outcomes of R&D through industry partners or spinoff companies.

Government-influenced

As with government-funded S&T, government-influenced S&T is funded through a purchaser-provider model. This is accomplished through providing funding through programs and grants. Potential recipients apply for a certain funding program or grant, displaying how they meet the selection criteria. It is through the setting of the selection criteria that government exerts some influence on the direction of S&T research.

At the federal level, the Federal government only delivers one such program, the *R&D Tax Concession*. R&D Tax Concession is a broad-based, market-driven tax concession which allows companies to deduct up to 125% of qualifying expenditure incurred on R&D activities when lodging their corporate tax return. A 175% Incremental (Premium) Tax Concession and R&D Tax Offset are also available in certain circumstances (related to large R&D programs and increasing effort in R&D over several years).

Government advisory mechanisms

Internal

Besides the policy advice provided by the various government-owned S&T and government-funded S&T organisations for both Federal and State governments, there are other internal advisory mechanisms. The most notable is, in the Federal government, the role of the Department of Finance and Administration in advising and setting direction with regard to financial management and accountability for government-owned S&T, along with government-funded S&T. Each State government has a similar advisory mechanism located normally in the Department of Finance or the Treasury of the State.

Office of the Chief Scientist

The Chief Scientist is employed by the Federal government as an advisor and provides independent advice on science, technology and innovation issues to the Prime Minister and Ministers. The role provides a link between government and science, engineering, innovation and industry groups, facilitating active communication and input into strategic thinking.

Coordination Committee on Science and Technology

The Coordination Committee on Science and Technology (CCST) brings together Deputy Secretaries and heads of Federal Government departments and agencies with an interest in science and technology. It facilitates networking, exchange of information, strategic thinking and coordination of activities in areas of S&T, and complements the work of the Prime Minister's Science, Engineering and Innovation Council (PMSEIC).

External

Parliamentary Committees, reviews

Parliamentary Committees are established by one or both houses of Federal parliament to scrutinise and assess government activities, legislation, policy and administration.¹¹ Information is gathered by the committee, made up of either members of parliament or senators, or a

combination of both. Issues surrounding science and technology are no exception, and recently an inquiry into the pathways to technological innovation has been established by the House of Representatives (referred by the Minister for Education, Science and Training) to examine Australian technological innovations and their pathway to commercialisation,¹² and provide advice to the government on policy and procedure.

Ministerial Councils and ministries

To facilitate cooperation between state and territory governments and the federal government in specific policy areas, Ministerial Councils are established that monitor, develop, initiate and help resolve inter-governmental issues in policy reform.¹³ The Councils consist of more than four federal and state/territory government ministers and are aimed at producing joint policy that enables efficient outcomes.¹⁴

Prime Minister's Science and Engineering Council

The Prime Minister's Science and Engineering Council is the Federal government's principal science, engineering and innovation advisory body. The Council consists of both government and non-government members, and investigates the capabilities of Australian science and innovation, as well as their organisation and utilisation.¹⁵ The Council's aims are to provide advice on government policy, examine science and innovation and its contribution to Australia's economic and social development, and to enhance the community's awareness of science and technology.¹⁶ In the mid 1990s, when it was part of the Prime Minister's Department, PMSEIC played an important role in bringing major issues of concern before the Government. However, its influence appears to have declined and it is now supported by the Education, Science and Training department.

The Chief Scientist is also Executive Officer of PMSEIC and chairs the Council's Standing Committee (the non-Ministerial members of the Council), which discusses strategies and directions for the Council, and current issues in science, engineering and innovation.

State Innovation Councils

Most State and Territory governments have also developed their own advisory councils in relation to science and innovation, to advise them on current situations and future policy direction. The councils, like the PMSEIC, are made up of both sector representatives and government personnel.¹⁷

New Zealand

Overview of New Zealand Government

New Zealand is a constitutional Monarchy with two tiers of government: national and Local. The New Zealand Government is based on the Westminster system of government: the powers of each of these governments is split between three areas: Executive (eg. Governor-General), Parliament (includes both houses of parliament), and the Judiciary.

There are no provincial/State governments, but there is a system of Regional councils which manage environmental issues, resource management and public transport. City (urban) and district (rural) councils provide a wide variety of community services. In four parts of New Zealand - Gisborne, Marlborough, Tasman and Nelson City and in the Chatham Islands, - there are unitary authorities which combine regional and local councils into one organisation.

Responsibility for S&T falls under the power of the New Zealand government. However, the general philosophical approach is that S&T research is conducted at arms-length from the government and that the R&D performers and their partners drive the direction of the research.

Overview of national S&T system

The New Zealand government has stated that research and innovation will play a key role in the transformation of New Zealand from a primary-industry based economy to a knowledge-based economy.¹⁸ The Government has stressed that development of the already existing innovation base requires focus on skills, talent and global connectedness, in particular in biotechnology, information and communications technology and creative industries.¹⁹ The New Zealand government is the source of funding for approximately two-thirds of New Zealand's R&D expenditure.²⁰

The New Zealand government, in 1992, made a conscious decision to move science and technology research and programs from government ministries and created a series of Crown Research Institutes to perform S&T research (see later section). In order to achieve this, separate crown entities were established to administer RS&T (research, science and technology) funding through purchaser-provider arrangements (a contractual relationship between the government represented by a funding ministry, and the various crown entities, known as funding agents). The Royal Society of New Zealand (a non-government body) was also nominated as a funding agent through this purchaser-provider model. These funding agents administer the funding provided through various programs to various bodies, the majority of which are non-government. The selection process for these programs is objective-driven, that is, programs funds are awarded to organisations that clearly define a tangible outcome of the proposed projects. An overview of the RS&T funding system can be seen in

Figure 1.

A detailed overview of the funding system, the RS&T programs administered by each funding agent, and a list of potential recipients can be found at Appendix I.

Figure 1: Overview of New Zealand's RS&T funding system



Source: Ministry of Research, Science and Technology

Ministry of Research, Science and Technology (MoRST)

The Ministry of Research, Science and Technology (MoRST) is the New Zealand government department responsible for developing research and innovation policies.²¹ The Ministry focuses primarily on policy and advice, and managing contracts with funding agencies, such as the Foundation for Research, Science and Technology (FoRST). On behalf of the Minister for Research, Science and Technology, MoRST manages government contracts, international linkages, domestic R&D linkages, and provides analytical and practical support to the Growth and Innovation Advisory Board.

Government Research, Science and Technology Strategies

A number of Government strategies outline the Government's approach to managing a particular area, and the future direction for work conducted in that area.

Growth and Innovation Framework

The Growth and Innovation Framework (GIF) is the broad framework set out by the New Zealand Ministry of Economic Development for the projection of New Zealand's long-term sustainable economic growth.²² The government focuses on innovation as the key driver of growth and, along with labour and capital, knowledge has been identified as a key factor of economic development.²³ The Growth and Innovation Advisory Board is independent of government and provides an independent perspective on the implementation of the various aspects of the GIF.²⁴

Biotechnology Strategy

The New Zealand Biotechnology Strategy was released in May 2003 and sets out the vision and direction for the development of biotechnology in New Zealand. It was developed following a Royal Commission on Genetic Modification, which examined the pros and cons of genetically modified crops. The Royal Commission's report supported GM technologies with environmental safeguards; hence the Strategy's theme is "a foundation for development with care". Work is concentrated in three main areas: community engagement (building understanding about biotechnology in the community and encouraging dialogue); growing the sector to enhance economic and community benefits; and regulation that provides robust safeguards while allowing innovation.²⁵

Biosecurity Strategy

The Biosecurity Strategy sets an overall direction for biosecurity and identifies areas of priority for biosecurity programs. The strategy applies to primary production (agriculture, horticulture, forestry), public health, and indigenous terrestrial, marine, and freshwater environments. The strategy applies to all New Zealand environments (land, freshwater and marine), and to both indigenous and valued introduced flora and fauna. It also has regard to international obligations.²⁶

Biodiversity Strategy

The New Zealand Biodiversity Strategy fulfils, in part, commitments New Zealand made under the Convention of Biological Diversity. It takes up the challenge to halt the decline of its indigenous biodiversity — the unique plants and animals and the places they live.²⁷

Digital Strategy

The New Zealand government has released a draft Digital Strategy for public comment. It outlines the government's vision for New Zealand to become a world-leader at using information and technology to realise economic, social and cultural goals. The final strategy will be released later in 2005.²⁸

Tertiary Education Strategy

The New Zealand government's Tertiary Education Strategy is a 5-year blueprint (2002-2007) for a more collaborative and cooperative tertiary system. The Strategy supports the six national goals of economic transformation; social development; Maori development; environmental sustainability; infrastructure development; and innovation. The Strategy identifies the key changes required to increase the relevance, connectedness and quality of the tertiary education system.²⁹

Government funding framework

NZ Budget Statement - Vote RS&T

The New Zealand government appropriates funding annually for the various Crown agencies and Ministries. Funds are allocated through a series of 69 packages called "Votes". Funding for science and technology is provided through the 'Vote Research, Science & Technology' (Vote RS&T). In the budget that was released on 19 May 2005, the funding provided through Vote RS&T was NZD\$632.99 million.³⁰ This is the latest in a series of increasing Vote RS&T allocations by the New Zealand Government. The trend of increasing government expenditure on RS&T between 2000-01 and 2005-06 can be seen in Table 2.

Table 2: Vote RS&T Allocations for the period 2000-01 to 2005-06 (NZ4million)

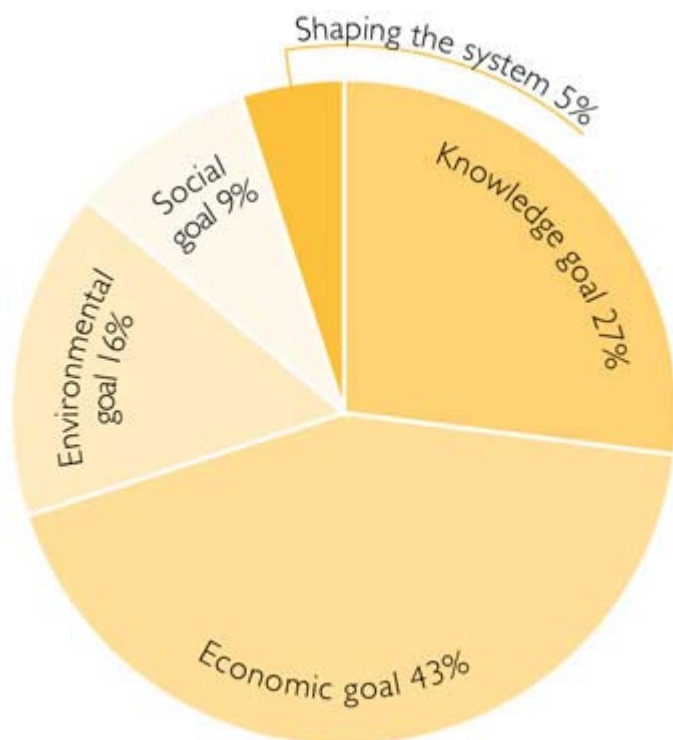
Four Major Areas of Funding	2000-2001	2001/ 2002	2002-2003	2003-2004	2004-2005	2005-2006
Economic Goal	263	210	214	238	256	252
Environmental Goal	84	85	86	88	94	86
Knowledge Goal	85	123	131	150	166	169
Social Goal	42	47	44	48	54	60
Shaping the System	-	20	26	29	34	32
Other RS&T Funding	-	-	-	-	17	34
TOTAL	474	485	500	553	621	633

% Total Expenditure	2.89%	2.67%	2.60%	2.66%	2.73%	2.82%
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Source: New Zealand Budget Statements (Vote RS&T) between 1999 and 2005.

The New Zealand government aims to ensure the investment of Vote RS&T is appropriately targeted. MoRST, with input from other government agencies and advisory bodies, develops policy and allocates resources around four goals – Knowledge, Economic, Environmental and Social. There is a fifth area of minor investment, called Shaping the System, which is to ensure the effective development and running of the RS&T system. The breakdown of the Vote RS&T funding for these five areas can be seen in Figure 2.

Figure 2: Funding Breakdown of Vote RS&T by Output Class



Source: Ministry of Research, Science and Technology

Under each goal are a number of output classes. An output class is a group of outputs that deliver a common set of goods or services. The funding for each output class is specified in the budget each year. The goals show the intended outcomes of the work done in each output class. They aim to maintain focus on the desired results being achieved by investing in these output classes.

MoRST does not directly fund research and innovation projects, but purchases management of S&T funding through other agencies, following reforms implemented in 1989. A key element of the reforms was the organisational separation of the Government's involvement in:

- science and technology policy (MoRST's role);
- science funding (FoRST's role, along with other funding agents); and
- carrying out research and development (Crown Research Institutes, etc).

One of MoRST's roles is to manage the Government's investment in RS&T, ensuring that the system runs efficiently and smoothly. It negotiates, manages and monitors contracts, on behalf of the Minister of Research, Science and Technology, with RS&T purchase agents and service providers. This involves a formal contract management process that includes output agreements, progress reports, budget recommendations and an annual progress and achievement report.

There are three main funding agents who have contractual relationships with MoRST to direct the investment of RS&T funding in New Zealand. These are FoRST, the Health Research Council (HRC) and the Royal Society of New Zealand (RSNZ). These funding agents receive money from the New Zealand government, through MoRST, that they invest on behalf of the Minister of Research, Science and Technology, in several hundred projects every year. They are responsible for managing projects under the different output classes identified in the Vote RS&T.

The projects funded through the funding agents under the various output classes include many different programs, grants, and ongoing funding for various New Zealand government entities, specifically the Crown Research Institutes. The funding agents develop guidelines for the various programs and grants in line with the output classes and overall goals as described in the Vote RS&T. The New Zealand government, through the funding agents, requires RS&T expenditure to be output-driven in an effort to leverage the maximum benefit to New Zealand of RS&T.

Foundation for Research, Science and Technology

The Foundation for Research, Science and Technology (FoRST) is the largest single government investment body for research and innovation funding. FoRST is primarily aimed at research directly applicable to industry. FoRST invests in innovation via a range of schemes, including the Crown Research Institutes, New Economy Research Fund (NERF), TechNZ, Grants for Private Sector Research and Development (GPS R&D), Public Good Science and Technology (PGS&T), and the Pre-Seed Accelerator Fund (PSAF). FoRST purchases innovative technology, unlikely to be funded by non-governmental sources, on behalf of the New Zealand government, to encourage innovative research and create public-good wealth for the prosperity of New Zealand. FoRST also provides policy advice to government on the development of science priorities and new programs.

The main mechanism through which the New Zealand government controls or directs the way in which FoRST invests funds from Vote RS&T is through the formal contractual relationship between FoRST and MoRST. However, as FoRST is a government body, it still has reporting responsibility to the New Zealand government.

Health Research Council

The Health Research Council (HRC) of New Zealand is the government agency responsible for managing government investment in public health research. The HRC is operated under the Minister of Health, with funding coming from VOTE Health and VOTE RS&T (via the Minister for Research, Science and Technology). The HRC's statutory functions include advising government and administering funds related to government health research policy, facilitating current and potential personnel engaged in health research, initiating and supporting health research, promoting the results of health research to encourage their contribution to health policy, and undertaking consultation to establish research priorities.

As with FoRST, the main mechanism through which the New Zealand government controls or directs the way in which HRC invests funds from Vote RS&T is through the formal contractual relationship between HRC and MoRST. However, as HRC is a government body, it still has reporting responsibility to the New Zealand government.

Royal Society of New Zealand

The Royal Society of New Zealand (RSNZ) is an independent national academy of sciences funded by both government and private sector sponsors. RSNZ promotes awareness of science, administers several funds for science and technology, offers science and policy advice to government, and encourages international scientific cooperation and networking. RSNZ also manages the Marsden Fund.

Unlike FoRST and HRC, the only way the New Zealand government can control or direct the way in which RSNZ invests funds from Vote RS&T is through the formal contractual relationship RSNZ has with MoRST.

Tertiary Education funding

New Zealand's tertiary education providers include both state-owned and privately-owned institutions. The state-owned providers, known as tertiary education institutions (TEIs), comprise:

- 20 polytechnics and institutes of technology (emphasis on vocational training rather than research);
- 8 universities;
- 4 colleges of education; and
- 3 wananga (education delivered within a Maori context).

There are also 11 government agencies recognised as government training establishments (GTEs) because they provide education and training for significant numbers of their employees, and 13 providers that are recognised by the Minister of Education for funding purposes because they provide services (e.g. Schools of Dance & Drama). There are about 800 registered PTEs. Over 200 of these receive funds from the government that subsidizes the cost of tertiary education.

The current operating model is de-centralised and highly competitive. The current government has signalled an intention to make considerable changes, reducing competition and encouraging co-operation.³¹

In the education portfolio, the Tertiary Education Commission (TEC) is the crown entity that administers funding for science and technology through funding programs in tertiary institutions. TEC is responsible for funding all post-compulsory education and training offered by universities, polytechnics, colleges of education, wananga, private training establishments, foundation education agencies, industry training organisations and adult and community education providers.³²

Government-owned S&T

Government-owned S&T is defined as research into S&T where government has full ownership of the organisation undertaking the S&T activities. In New Zealand, government departments do not carry out any S&T research; however, government-owned entities do. These organisations are called Crown Research Institutes.

Crown Research Institutes

Crown Research Institutes (CRIs) were created in 1992 out of former government departments, to provide wider access to capital, enhanced management accountability, a clearer framework for management and the removal of operational decision-making from the government.³³ The CRIs are major R&D performers in New Zealand.³⁴ CRIs derive their funding through grants delivered through FoRST, and through revenue generation by the sale of products and services. Where revenue is generated through the sale of goods and services, CRIs must ensure that they do not have an unfair advantage over private sector organisations due to their government status (for example, they may be exempt from certain taxes). To compensate, when setting prices for goods and services for sale in competition with private companies, they must make “competitive neutrality” adjustments to ensure fair competition.

Crown Research Institutes’ funding from government, as previously mentioned, is through funding programs administered by FoRST. This means that the New Zealand government provides RS&T funding to FoRST through a purchaser-provider model, and then FoRST provides the funding to the CRIs through objective-driven programs. The implication is that the only control the government has over the research activities of CRIs is through setting the contractual relationship with FoRST, directing FoRST to fund the CRIs for certain activities. There is no direct funding relationship between the New Zealand government and the CRIs.

The CRIs report to or advise FoRST on the outcome of the research for which they have been funded. FoRST then advises the government on the outcome of its funding programs. There is no direct linkage between the New Zealand government and the CRIs in terms of reporting and/or advice.

In 2005, the CRIs include: AgResearch Ltd, Industrial Research Ltd, the Institute of Environmental Science & Research Ltd, the Institute of Geological & Nuclear Sciences Ltd, Landcare Research New Zealand Ltd, the National Institute of Water & Atmospheric Research Ltd, the New Zealand Forest Research Institute Ltd, the New Zealand Institute for Crop & Food Research Ltd, and the Horticulture & Food Research Institute of New Zealand Ltd. For a description of each, see Appendix J.

Government-funded S&T

Government-funded S&T is defined as research into S&T where government directs funding to a particular area of interest. It must be stressed, however, that the New Zealand government rarely structures programs around particular S&T topics. For example, the government does not specify that particular grant funding is to be used to research a particular disorder, but rather provides competitive grants to S&T research organisations based on the type and level of S&T activities they undertake. The organisations themselves primarily direct what specific S&T areas the funding goes towards.

Government-funded S&T is funded through an objective-driven model, that is, programs funds are awarded to organisations that clearly define a tangible outcome of the proposed projects. It is through the setting of the selection criteria that government exerts some influence on the direction of S&T research.

Below are the S&T and S&T-related programs and grants types. These programs are funded through an objective-driven model.

Government funding for public-sector R&D grants and programs

Through this form of government-funded S&T, the New Zealand government provides grants and programs to S&T activities in public sector organisations. These organisations include CRIs, universities, medical research institutes, other non-private sector organisations, and may include not-for-profit organisations. The New Zealand government does not normally specify the particular S&T issues to be addressed by this funding, however requires the applicant to provide detail on the proposed use of the funding.

There are several programs and grants administered by the three funding agents and one crown entity (the Tertiary Education Commission). Details on the individual programs are at Appendix K

Government funding for business enterprise R&D grants and programs

Private business R&D in New Zealand is relatively low (as a percentage of turnover) and the New Zealand government provides grants and programs directed towards increasing the level of business expenditure on R&D. The recipients of these grants are normally private companies, with some industry consortia, industry associations and universities also getting funding through these programs. The New Zealand government does not specify the particular S&T issues to be addressed by this funding, however requires the applicant to provide detail on the proposed use of the funding. Selection criteria for this type of funding normally include a requirement for an explanation of the anticipated commercial outcomes of the project.

The New Zealand government funds several programs and grants aimed at increasing and/or facilitating business enterprise R&D through two funding agents (FoRST and RSNZ). Details on the individual programs are at Appendix L.

Government funding for R&D-business linkage grants and programs

The New Zealand government provides grants and programs directed towards increasing the level of direct business involvement with R&D institutions, and vice-versa. The recipients of these grants include consortia of industry and R&D institutions, industry associations, the commercial arms of universities, private companies and individuals. As with other government-funded S&T, selection for receipt of one of these grants or programs is assessed against objective-driven criteria. The New Zealand government does not normally specify the particular S&T issues to be addressed. Normally, an additional requirement of this type of funding is the explanation of the anticipated commercial outcomes of projects funded and how the R&D organisation/s and business organisation/s will work together.

There are several programs and grants administered by the three funding agents, one crown entity (the Tertiary Education Commission), and one program administered through a collection of three government bodies. Details on the individual programs are at Appendix M.

Government advisory mechanisms

Internal

There are several internal policy advisory mechanisms within the New Zealand government on science and technology related issues. All of these advisory bodies are New Zealand government ministries, and as such, are wholly administered and governed by the New Zealand government. They are as follows:

- Ministry of Research, Science and Technology – primarily advisor on research and innovation;
- Ministry of Agriculture and Forestry – provide policy advice on agriculture, horticulture and forestry;
- Ministry of Economic Development - leads the production and co-ordination of policy advice related to economic, regional and industry development. It is also responsible for the Intellectual Property Office and the Plant Variety Rights Office;
- Ministry of Education – provides policy advice on all issues surrounding education;
- Ministry for the Environment - principal adviser on the New Zealand environment and international matters that affect the environment;
- Ministry of Fisheries – provides policy advice to ensure that fisheries are sustainably used within a healthy aquatic ecosystem;
- New Zealand Trade and Enterprise - supports the Government's objective of raising the average income of New Zealanders in line with countries in the top half of the OECD; and
- Crown Company Monitoring Advisory Unit (part of the New Zealand Treasury) - protects and enhances shareholder value by providing high quality, commercial advice on State Owned Enterprises, Crown Research Institutes and other Crown owned companies and entities.

There are also two Select Committees:

- Select Committee on Education & Science; and
- Select Committee on Health.

Select Committees are small groups of about eight Members of Parliament (MPs). These committees consider bills, estimates, reviews and petitions that are referred to them, and report back to the House. Select Committees can also launch their own formal inquiries.

External

Each of the above listed ministries that make up the internal advisory mechanisms has various forms of community and/or industry consultative mechanisms. These are used to help form the policy advice they provide to the New Zealand government. However, there is one independently established, external advisory mechanism that provides policy advice and direction to the New Zealand government through MoRST: the Growth and Innovation Advisory Board (GIAB).

The GIAB was established in 2002 and provides the NZ government with independent advice on the development of its growth and innovation policies, in particular areas such as policy implementation and prioritisation.³⁵ The Board is made up of people from a range of sectors, including business, labour, investment and higher education. The GIAB also acts as a facilitator between government and business, and commissions government research on relevant issues.³⁶

Appendix A: Structure of S&T-related Portfolios in Victoria (example of State Government)

Portfolio/Agency	Government Owned S&T	Government Funded S&T	Government Influenced S&T	S&T regulatory body	Involved in S&T Research?
<i>Education and Training Portfolio</i>					
Department of Education and Training	X			N	N
<i>Innovation, Industry and Regional Development Portfolio</i>					
Department of Innovation, Industry and Regional Development	X			N	N
Baker Medical Research Institute	X	X		N	Y
Howard Florey Institute of Experimental Physiology & Medicine	X	X		N	Y
Prince Henry's Institute of Medical Research	X	X		N	Y
<i>Primary Industries Portfolio</i>					
Department of Primary Industries	X			Y	Y
Dairy Food Safety Victoria	X			N	Y

Portfolio/Agency	Government Owned S&T	Government Funded S&T	Government Influenced S&T	S&T regulatory body	Involved in S&T Research?
Fisheries Co-management Council and Fisheries Committees	X			Y	Y – indirectly
Murray Valley Wine Grape Industry Development Committee	X			N	N
Northern Victorian Fresh Tomato Industry Development Committee	X			N	N
Office of the Mining Warden	X			Y	N
PrimeSafe	X			Y	
Veterinary Practitioners Registration Board of Victoria	X			Y	
Victorian Strawberry Industry Development Committee	X			N	
Agriculture Victoria Services Pty Ltd		X		N	Y – indirectly
Animal Welfare Advisory Committee		X		N	N
Apicultural Industry Advisory Committee		X		N	N
Cattle Compensation Advisory Committee		X		N	N

Portfolio/Agency	Government Owned S&T	Government Funded S&T	Government Influenced S&T	S&T regulatory body	Involved in S&T Research?
Swine Industry Projects Advisory Committee		X		N	N
Victorian Agricultural Chemicals Advisory Committee		X		N	N
<i>Sustainability and Environment Portfolio</i>					
Department of Sustainability and Environment	X			N	N
Committees of Management for Crown Land Reserves	X			Y	N
EcoRecycle Victoria	X			N	N
Environment Protection Authority	X			Y	N
Environment Protection Board	X			Y	N
Office of the Commissioner for Environmental Sustainability	X			Y	N
Scientific Advisory Committee	X			N	N
Sustainable Energy Authority Victoria	X			Y	N
Victorian Catchment Management Council	X			N	N

Portfolio/Agency	Government Owned S&T	Government Funded S&T	Government Influenced S&T	S&T regulatory body	Involved in S&T Research?
Victorian Environmental Assessment Council	X			Y	N
Victorian Mineral Water Committee		X			
Melbourne Water Corporation			X	Y	N

Appendix B: Governance and operational arrangements of different Federal government organisations

Requirement	Department of State	Executive Agency	Statutory Authority	Statutory Company	Government Business Enterprise
Head of organisation	Secretary	Agency Head	Agency Head	Agency Head	CEO
Report to a board	No	No	No	Yes	Yes
Report to government	Yes, through Portfolio Minister	Yes, through Portfolio Minister	Yes, through Portfolio Minister	Yes, through two Shareholding Ministers	No
Source of funding	Appropriation (revenue possible)	Appropriation (revenue possible)	Appropriation (revenue possible)	Revenue plus direct gov't funding of specified activities.	Revenue plus direct gov't funding of specified activities.
Source of revenue	Services charged on partial or full cost recovery basis	Services charged on partial or full cost recovery basis	Services charged on partial or full cost recovery basis, and possibly commercial rates	Services charged on partial or full cost recovery basis, and possibly commercial rates	Services charged at commercial rates
Required to take account of competitive neutrality in pricing	No	No	Yes, for services charged at commercial rates	Yes, for services charged at commercial rates	Yes
Annual report to stakeholder	Yes	Yes	Yes	Yes	Yes
Audit committee	Yes	Yes	Yes	Yes	No
Audit of financial statements	Yes	Yes	Yes	Yes	Yes
Submit budget estimates to stakeholder	No	No	Yes	Yes	No
Notify stakeholder of significant events	No	No	Yes	Yes	Yes
Disclose Director's interests	Yes	Yes	Yes	Yes	Yes

Requirement	Department of State	Executive Agency	Statutory Authority	Statutory Company	Government Business Enterprise
Prepare corporate plan for stakeholder	No	No	No	Yes	No
Comply with general government policies or directions	Yes	Yes	Yes	Yes	No
Implement fraud control plan	Yes	Yes	Yes	No	No
Ability to delegate CEO powers and functions to give instructions	Yes	Yes	Yes	Yes	Yes
Have regard to sound commercial practice	No	No	Yes	Yes	No
Organisation Head not to engage in other paid employment without prior approval	No	No	Yes	Yes	No
Prepare Statement of Corporate Intent for stakeholder	No	No	No	No	Yes
Promote efficient, effective and ethical use of resources	Yes	Yes	Yes	Yes	No
Exercise of powers and discharge duties in good faith and for a proper purpose	Yes	Yes	Yes	Yes	Yes
Prevent insolvent trading	No	No	No	Yes	Yes

Appendix C: List of Federal Government owned S&T

Australian Bureau of Agricultural and Resource Economics

The Australian Bureau of Agricultural and Resource Economics (ABARE) is an Australian government economic research agency focusing on agriculture and natural resources. ABARE provides the government with economic forecasting and policy analysis to enhance the competitiveness of Australia's primary industries. Aside from government funding, ABARE also conducts commercial consulting work, of which it derives almost half of its external revenue.³⁷

Bureau of Meteorology

The Bureau of Meteorology is an Executive Agency that operates within the Department of Environment and Heritage portfolio, and its appropriations are separately identified in the budget process. The Bureau of Meteorology is aimed at providing national strategic planning, management and coordination of integrated information and weather, climate and hydrological services.³⁸

DSTO – Defence Science and Technology Organisation

The Defence Science and Technology Organisation (DSTO) is part of the Australian Government's Department of Defence. DSTO is led by an appointed Chief Defence Scientist and its conducted research is aimed at supporting Australia's defence and national security.³⁹

Department of Environment - Australian Antarctic Division

The Australian Antarctic Division (AAD) is an agency of the Department of Environment and Heritage, and leads Australia's Antarctic Program.⁴⁰ In science and innovation, the AAD administers the Australian government's role in Antarctica and provides policy advice, conducts Antarctic science research, and promotes Antarctic research in universities through grants and logistical support.

Geoscience Australia

Geoscience Australia is the national agency for geoscience research and geospatial information. Geoscience Australia is federally-funded and run under the Industry, Tourism and Resources portfolio. Geoscience Australia provides information and advice on resource use, environmental management and public safety⁴¹ through earthquake and landslide monitoring, magnetic field information for navigation, mineral exploration, geological mapping and maritime boundary identification.⁴²

National Measurement Institute

The National Measurement Institute is a unit within the Department of Industry, Tourism and Resources responsible for Australia's units and standards of measurement. Alongside regulatory and standardising functions, the NMI is also research driven, requiring continuing development of measurement in science and technology to keep up with industry and innovative growth.⁴³

Therapeutic Goods Administration

The Therapeutic Goods Administration (TGA) is a unit of the Australian Government Department of Health and Ageing. The TGA carries out a range of assessment and monitoring activities to ensure therapeutic goods available in Australia are of an acceptable standard with the aim of ensuring that the Australian community has access, within a reasonable time, to therapeutic advances.⁴⁴

Appendix D: List of Federal Government funded S&T

AIMS

Alongside CSIRO as a federally-funded scientific research organisation and independent statutory authority, is the Australian Institute of Marine Science (AIMS). Through scientific and technological research, AIMS is directed at generating knowledge about the sustainable use and protection of the marine environment, and encouraging the application of its research results.⁴⁵ AIMS research is primarily selected to match government priorities, but also is aimed to meet the needs of industry clients, resource managers, other research agencies and the Australian community.⁴⁶ The Minister for Science and the Department of Education, Science and Training are responsible for AIMS, whilst its objectives and research strategies are administered through the Governor-General appointed Council of the Australian Institute of Marine Science.⁴⁷

Anglo Australian Observatory

The Anglo-Australian Observatory operates the Anglo-Australian and UK-Schmidt telescopes on behalf of the UK and Australian astronomical communities. The AAO is an independent bi-national authority, with each nation having its own minister responsible for its operation.⁴⁸ Funding is provided equally by the British and Australian governments.⁴⁹

ANSTO

Australian Nuclear Science and Technology Organisation (ANSTO) is Australia's national nuclear research and development agency and is responsible for providing specialised advice, services and products to government, academia, industry and other research organisations.⁵⁰ ANSTO is a federally-funded body corporate⁵¹ whose priorities are driven by national nuclear, science and industry policies.⁵² As with AIMS, the Minister for Science and the Department of Education, Science and Training, are responsible for ANSTO.

AIS

The Australian Institute of Sport (AIS) is a federal government-funded national sports training institution responsible for developing elite sport, and conducts sports-related research in areas such as biomechanics, medicine, nutrition, physiology, psychology and physiotherapy to aid Australian athletes and enhance their performance.⁵³ The AIS is run under the Industry, Tourism and Resources portfolio. The AIS is a full participant in the CRC for Micro-Technologies program which is aimed at the development of unobtrusive monitoring systems for people exercising.

Australian Pesticides and Veterinary Medicines Authority

The Australian Pesticides and Veterinary Medicines Authority (APVMA) is responsible for the assessment and registration of pesticides and veterinary medicines and for their regulation up to and including the point of retail sale. The APVMA administers the National Registration Scheme for Agricultural and Veterinary Chemicals (NRS) in partnership with the States and Territories and with the active involvement of other Australian government agencies. Their role is to independently evaluate the safety and performance of chemical products intended for sale, making sure that the health and safety of people, animals and the environment are protected. Only products that meet these high standards are allowed to be supplied. We also do not register products if their use is likely to jeopardise trade or they don't work.

Australian Radiation Protection and Nuclear Safety Agency

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), as part of the Health and Ageing Portfolio, is a Federal Government agency charged with responsibility for

protecting the health and safety of people, and the environment, from the harmful effects of ionizing and non-ionizing radiation.⁵⁴

CSIRO

The Federal Scientific and Industrial Research Organisation (CSIRO) is Australia's national science agency and is primarily focused on research and development in fields of national economic, social and environmental importance. CSIRO is one of the three science agencies within the Department of Education, Science and Training Portfolio alongside the Australian Institute of Marine Science and the Australian Nuclear Science and Technology Organisation. CSIRO was established as a statutory authority in 1949 aimed at research assisting Australian industry, furthering the interests of the Australian community, contributing to national objectives and encouraging the use of the resultant research.⁵⁵ Specific areas of research include agriculture, communications and information technology, health, manufacturing and construction, minerals and energy, services, the environment, transport and infrastructure.⁵⁶ CSIRO is the largest single participant in the Australian Government's Cooperative Research Centre (CRC) program, and also the largest patenting enterprise in Australia. CSIRO is officially headed by the Minister for Education, Science and Training, and is primarily funded through federal government appropriation and self-generated earnings from services, specialized consultancy and research.⁵⁷ CSIRO works internationally with developing countries (especially in Asia), and also with scientific organisations in the United States, Japan and Europe. CSIRO staff co-supervise some post-graduate research students alongside university staff and CRC staff. Research objectives are directed by Sector Advisory Committees within CSIRO through a goal of prioritising research and improving the interface between industry and society.⁵⁸

Food Standards Australia New Zealand

Food Standards Australia New Zealand protects the health and safety of the people in Australia and New Zealand by maintaining a safe food supply. It is a bi-national independent statutory authority that develops food standards for composition, labelling and contaminants, including microbiological limits, that apply to all foods produced or imported for sale in Australia and New Zealand. In Australia, Food Standards Australia New Zealand develops food standards to cover the whole of the food supply chain for both the food manufacturing industry and primary producers.⁵⁹

National Acoustic Laboratories

The National Acoustic Laboratories (NAL) is a statutory authority which reports to the Minister for Aged, Family and Health Services. NAL undertakes scientific investigation into hearing, hearing habilitation and rehabilitation, and is funded by the Australian government. NAL also performs some additional research in collaboration with commercial organisations, and carries out research as part of its commitment to the CRC for Cochlear Implant and Hearing Aid Innovation.⁶⁰

Office of the Gene Technology Regulator

The Office of the Gene Technology Regulator was established to provide administrative support to the Gene Technology Regulator in the performance of their functions under the Gene Technology Act 2000. The Gene Technology Act 2000, which came into force on 21 June 2001, introduces a national scheme for the regulation of genetically modified organisms in Australia, in order to protect the health and safety of Australians and the Australian environment by identifying risks posed by or as a result of gene technology, and to manage those risks by regulating certain dealings with genetically modified organisms.⁶¹

R&D Corporations

Research and development corporations (RDCs) and companies are rural research funding agencies that invest in rural R&D in the aim of achieving better productivity and the delivery

of high quality products which underpins the competitiveness and profitability of Australia's agricultural, fish and forestry industries. R&D and innovation also support sustainability of primary production and the natural resource base.⁶² A list of RDCs is contained at Appendix H.

Appendix E: Federal funding for public sector R&D grants and programs

Programs/grants delivered through the Department of Education, Science & Training (DEST)

ARC – linkage, program grants,

The Australian Research Council (ARC) is an independent body which provides research policy advice to the government and administers funding programs to foster research and development. The ARC reports directly to the Minister for Education, Science and Training, and program funding is provided to successful applicants by the Minister at the recommendation of the ARC.⁶³ Funding is provided to applicants through the broad framework of the National Competitive Grants Program, which is aimed at ensuring the benefit of research reaches across the Australian community:⁶⁴ the Discovery program which is aimed at individual researchers and projects, and the Linkage program which focuses on partnerships and networks between researchers and industry.⁶⁵ The ARC also administers a competitive ARC Centres of Excellence program in which successful applicants receive government funding based on their ability to undertake innovative and internationally competitive research that addresses significant problems and produces beneficial economic, social and cultural outcomes for Australia.⁶⁶ There are five International Centres of Excellence and the National Information and Communications Technology Australia centre (NICTA).

Major National Research Facilities (MNRFs)

The Major National Research Facilities (MNRFs) are a collection of expensive, large equipment items, infrastructure or highly specialised laboratories that are used for leading-edge scientific research. The collection of 15 MNRF's are funded by the federal government on the basis of national benefit, and projects that use the facilities are funded up to 50% by the government with the remaining funding coming from the users and participant organisations.⁶⁷

University and other research institute funding

The Federal government provides universities and other research institutions with competitive grants for research separate to teaching funding, through the Research Training Scheme (RTS). The RTS is a performance-based government funding scheme that provides universities and other institutions with block research training grants to eligible higher education and research institutions to be used for supporting students undertaking masters and doctorates in research.⁶⁸

Programs/grants delivered through the Department of Health and Aging

NHMRC – project and program grants (old block funding approach)

The National Health and Medical Research Council (NHMRC) is a national organisation that comprises of sector-wide input from nominees including government health authorities, professional and scientific associations, universities, business and community groups, and welfare groups.⁶⁹ The NHMRC provides the government with policy advice, community advice, and recommendations for medical and health research funding.⁷⁰ The NHMRC's statutory obligations are to raise the standard of public health throughout Australia, to foster the development of health standards, to foster medical research and training, and to consider ethical issues that relate to health.⁷¹ The Minister for Health may give written general directions to the NHMRC as to its performance, functions or powers, however does not have the means to direct recommendations for funding or the council's treatment of ethical issues.⁷²

Appendix F: Federal funding for business enterprise R&D grants and programs

Funding through the Department of Agriculture, Fisheries and Forestry

Environmental Management Systems Incentive Program

The Environmental Management Systems (EMS) Incentive Program provides primary producers with a taxable cash reimbursement for developing and implementing an EMS. An EMS can help producers to manage natural resources better and meet consumer demands for sustainable agricultural production.

New Industries Development Program

New Industries Development Program (NIDP) helps people in the agricultural, processed food, fisheries and forestry industries turn innovative business ideas into competitive, profitable and sustainable commercial ventures. NIDP encourages and supports Australian agribusinesses as they commercialise new market-driven products, services and technologies.

Funding through the Department of Communications, Information Technology and the Arts

Information Technology Online (ITOL) Grant program

The Information Technology Online Program is designed to accelerate the national adoption of business to business electronic commerce solutions, especially by small and medium enterprises. Information Technology Online provides catalytic grant support to consortia of firms, business/industry associations and universities for the development of collaborative projects.

Programs delivered through the Department of Industry, Tourism & Resources

Biofuels Capital Grants Program

The Biofuels Capital Grants program offered competitive grants to fund one-off capital projects that provide new or expanded Biofuels production capacity. Grants subsidise the construction of new or additional plants at a rate of 16 cents per litre to projects.

Biotechnology Innovation Fund (BIF)

BIF is a merit-based competitive grants program which aims to increase the rate of commercialisation of promising biotechnology developed in Australia. It provides financial assistance to companies to demonstrate proof-of-concept between the initial research stage of a biotechnology project and the early stage of its commercialisation.

Commercial Ready

Commercial Ready is a competitive merit-based grant program supporting innovation and its commercialisation. It aims to stimulate greater innovation and productivity growth in the private sector by providing competitive grants to small and medium-sized businesses (SMEs). It offers industry a single entry point to competitive grants for early-stage commercialisation activities, research and development (R&D) with a high commercial potential, and proof-of-concept activities.

Commercialising Emerging Technologies (COMET)

COMET is a competitive, merit based program that supports early-growth stage and spin off companies to successfully commercialise their innovations.

Ethanol Production Grants

The Ethanol Production Grants (EPG) program aims to provide a targeted means of maintaining the use of biofuels in transport in Australia. Ethanol Production Grants are paid

to ethanol producers at a rate of 38.143 cents per litre. To claim the grant, ethanol must be produced entirely in Australia by the grant recipient from biomass feedstock and must be blended into or used as a transport fuel in Australia. To enable payment of the production grant, the ethanol producer must first enter into a contract with the Australian Government.

Innovation Investment Fund (IIF)

Innovation Investment Fund is a Venture capital program that invests in nine private sector venture capital funds to assist small companies in the early stages of development to commercialise the outcomes of Australia's strong research and development capability.

National Australian Technology Showcase (ATS)

Australian Technology Showcase is a national and international campaign designed to promote leading-edge Australian technology and the skills of the companies that produce them.

Renewable Energy Equity Fund (REEF)

The REEF program is a specialist renewable energy equity fund based on the Innovation Investment Fund (IIF) model. It provides venture capital (equity) to assist small companies to commercialise R&D in renewable energy technologies.

Appendix G: Federal funding for R&D-business linkage grants and programs

Funding through the Department of Agriculture, Fisheries and Forestry

Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry

The Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry are aimed at enhancing the use and recognition of innovation, science and technology in rural industries. Applicants must be aged 18-35 and submit a written proposal for funding to undertake a project related to an emerging scientific issue or innovative activity specifically related to an agricultural, fisheries or forestry related industry (including sustainable natural resource management).

Funding through the Department of Education, Science and Training

Collaboration and Structural Reform Fund

The Collaboration and Structural Reform Fund is designed to achieve better higher education outcomes in teaching, learning, research and innovation by promoting structural reform and collaboration. The Fund will support collaboration between universities and other education and training providers, business, industry and regional/local communities.

Cooperative Research Centres (CRCs)

The Cooperative Research Centres (CRCs) were established to build connections between researchers and research users, through linking research with industry and focussing research and development efforts on product utilisation and commercialisation.⁷³ CRCs bring together university researchers, private and public sector agencies and government researchers in directed agreements to support research and development and education in particular areas. There are approximately 72 CRCs operating in 6 sectors reaching from the environment to technology and manufacturing. The Minister for Education, Science and Training has overall responsibility for the CRC programme, and appoints an advisory committee for the selection, evaluation and funding of the CRCs.⁷⁴

International Science Linkages

The International Science Linkages (ISL) was established to assist Australian researchers and firms to build networks to access international science and technology. Funding is available for Australian researchers and firms to: participate in strategically focused, leading-edge, international science and technology collaborations; hold international conferences in Australia; and gain access to world leading international research facilities, networks and programmes through international exchanges, fellowships, missions and workshops.

Programs delivered through the Department of Industry, Tourism & Resources

Innovation Access Program (IAccP) – Industry

The Innovation Access Program (IAccP) - Industry is a competitive program designed to foster innovation and competitiveness by increasing the take up of leading edge technologies and best practice processes by Australian firms, particularly SMEs.

Low Emissions Technology Demonstration Fund (LETDF)

The Low Emissions Technology Demonstration Fund is a flagship initiative of the Australian Government's Energy White Paper: Securing Australia's Energy Future. By leveraging \$1 billion in additional private sector investment, the Fund will support the commercial demonstration of technologies that have a potential in the longer term to deliver large-scale greenhouse gas emission reductions in the energy sector.

National Innovation Awareness Strategy (NIAS)

The National Innovation Awareness Strategy aims to increase the understanding of the importance and commercial potential of innovation and science, especially among small to medium enterprises and young Australians.

Pharmaceuticals Partnerships Program

The Pharmaceuticals Partnerships Program (P3) is aimed at increasing the amount of high quality pharmaceutical R&D activity in Australia throughout the entire value chain including biotechnology, originator and generic medicines companies. Participating companies will receive thirty cents for each additional dollar they spend on eligible R&D in Australia up to a maximum grant amount of \$10 million.

Pre-Seed Fund

The competitive pre-seed fund for universities and public sector research agencies addresses the gap between promising scientific discoveries and commercialisation. It assists the commercialisation of public sector R&D activities by further developing the management and entrepreneurial skills of public sector researchers and build links with the finance and business community.

Renewable Energy Development Initiative

REDI aims to support the development of new renewable energy technology products, processes or services that have strong early stage commercialisation and greenhouse gas emissions reduction potential.

Appendix H: List of Research and Development Corporations/Councils (RDC)

Australian Egg Corporation Limited

Australian Pork Limited

Cotton R&D Corporation

Dairy Australia

Fisheries R&D Corporation

Forest and Wood Products R&D Corporation

Grains R&D Corporation

Grape and Wine R&D Corporation

Horticulture Australia Limited (HAL)

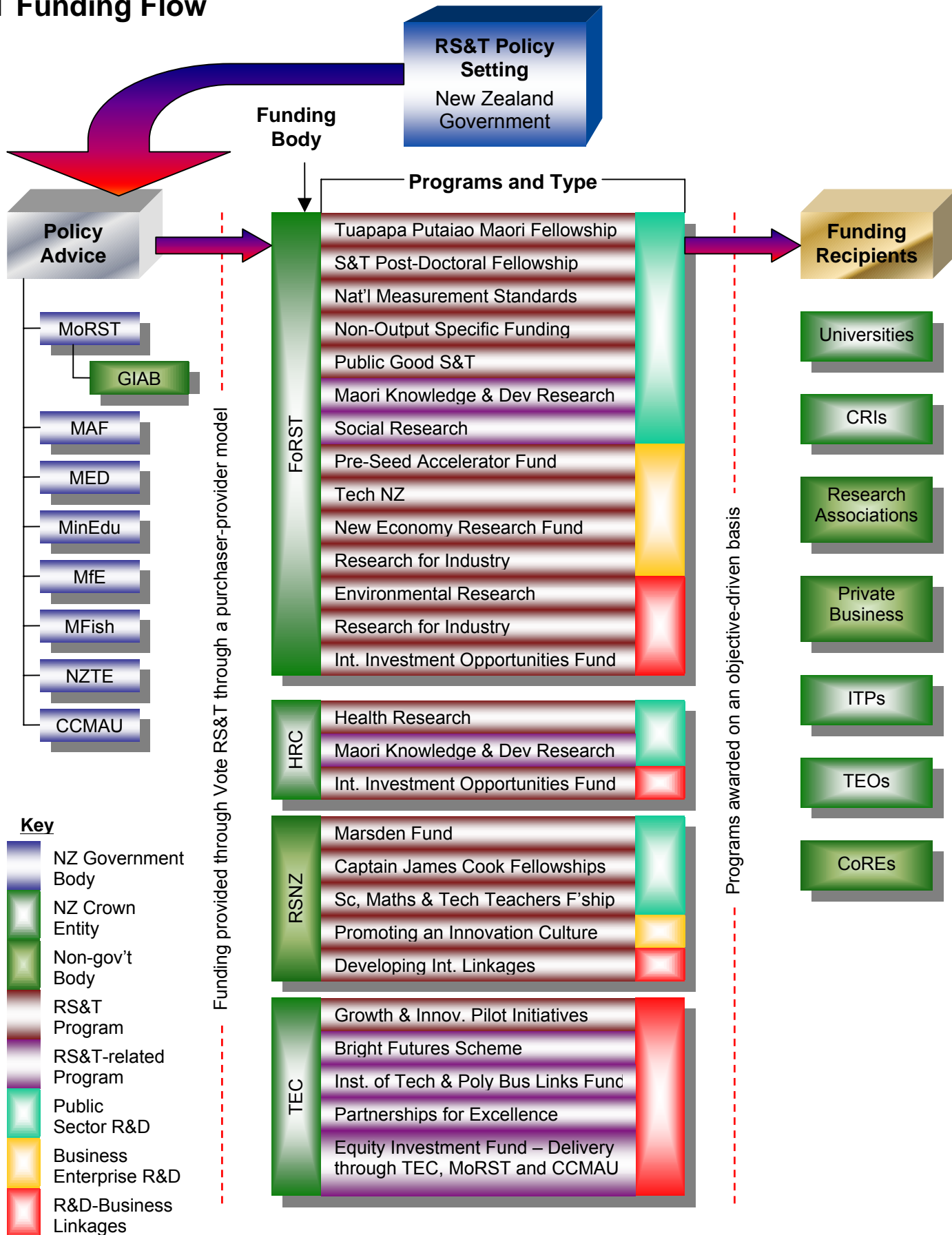
Land & Water Australia

Meat and Livestock Australia

Rural Industries R&D Corporation (includes tobacco as of 1 January 2004)

Sugar R&D Corporation

Appendix I: Overview of New Zealand RS&T Funding Flow



Appendix J: Description of New Zealand's Crown Research Institutes:

AgResearch Ltd

AgResearch has internationally recognised capabilities in animal and plant genomics, food science and food systems and technology, biocontrol and biosecurity, animal health, agricultural systems, land and environmental management, animal nutrition and behaviour, reproductive technologies, information technology, and statistics and bioinformatics. AgResearch also has a commercial arm, Celentis, which facilitates development and commercialisation of technology products.⁷⁵

Horticulture & Food Research Institute of New Zealand Ltd

The Horticulture and Food Research Institute of New Zealand Limited is New Zealand's largest horticulture and food research organisation. Research programmes focus on the development of new, high-quality cultivars which can be grown in environmentally-sustainable production systems. Post-harvest research programmes focus on improving the quality of fresh and processed horticultural and other food products. It also works to ensure continued market access for New Zealand exports by developing improved disinfestation and storage techniques along with sensory quality and food safety using sustainable systems.⁷⁶

Industrial Research Ltd

Industrial Research provides scientific research and technology development to a range of industry sectors, with an emphasis on the manufacturing, energy, and natural products processing industries. Technologies are also developed which benefit the horticultural, agricultural and forestry sectors. Industrial Research also operates the Measurement Standards Laboratory of New Zealand.⁷⁷

Institute of Environmental Science & Research Ltd

The Institute of Environmental Science and Research Limited (ESR), provides scientific research, consulting and analytical services to public and private sectors in New Zealand and the Asia-Pacific region. ESR covers a range of disciplines in water quality, food safety, environmental health effects, communicable disease, forensic examination and specialist analytical services, science information management services.⁷⁸

Institute of Geological & Nuclear Sciences Ltd

The Institute of Geological and Nuclear Sciences Limited provides independent scientific and technical advice. It is the leading supplier of earth and nuclear scientific research and consultancy services in New Zealand.⁷⁹

Landcare Research New Zealand Ltd

Landcare Research is New Zealand's foremost environmental research organisation. It specialises in sustainable management of land resources optimising primary production, enhancing biodiversity, increasing the resource efficiency of businesses, and conserving and restoring the natural assets of our communities.⁸⁰

National Institute of Water & Atmospheric Research Ltd

The National Institute of Water & Atmospheric Research Limited provides a scientific basis for the sustainable management and development of New Zealand's atmospheric, marine and freshwater systems and associated resources. It conducts research and provides consultancy in the areas of atmosphere and climate; freshwater, marine and coastal ecology and physical processes; fisheries; and aquaculture and fisheries enhancement.⁸¹

New Zealand Forest Research Institute Ltd

Forest Research offers skills and experience from genetics and nursery technologies, through forest management and harvesting, and the development of new products and processes, to the trade and marketing of wood-based products. It provides customised solutions to forest- and wood-related problems, to both domestic and international clients.⁸²

New Zealand Institute for Crop & Food Research Ltd

Crop & Food Research provides research, technology and services to support the development of high quality, commercially successful products from cereal, vegetable and flower crops and from seafood. It has expertise in plant breeding and biotechnology, food technology, nutrition, biochemistry, post-harvest technology, agronomy, plant physiology, and pest and disease control. It conducts research for clients under a range of flexible agreements, including exclusive contracted research, collaborative R&D arrangements, and licensing and purchasing agreements.⁸³

Appendix K: Government funding for public sector R&D grants and programs by funding agent

Funding through FoRST

Maori Knowledge and Development Research

This is one of the few jointly funded programs, with both FoRST and HRC providing funding and support for this program.

Tuapapa Putaiao Maori Fellowships

The Tūāpapa Pūtaiao Māori Fellowships aim to assist Māori to gain scientific qualifications in order to pursue a research career in science, technology, or engineering. Further, the fellowship aims to develop or assist in the development of skills relating to research, science and technology among Māori, especially young Māori, by providing opportunities for talented graduates to study for higher degrees, and develop positive role models in order to promote the participation and achievement of Māori in New Zealand science, technology and engineering, at school and under-graduate level.

NZ Science and Technology Post-Doctoral Fellowships

Science & Technology Post-Doctoral Fellowships provide early career support for New Zealand scientists, engineers and social scientists of outstanding talent, for post-doctoral research either in New Zealand or overseas. The scheme encourages New Zealanders who have recently completed doctoral degrees overseas to return to New Zealand, and also supports those who have completed doctoral degrees in New Zealand to work overseas, including in countries where few science contacts exist at present.

National Measurement Standards

The Measurement Standards Laboratory of New Zealand (MSL) is New Zealand's national metrology institute and is entrusted to ensure New Zealand's units of measurement are consistent with the SI, the international metric system of units. The laboratory maintains the New Zealand national standards for the basic and derived SI units under the authority of government legislation. These standards are disseminated through user-funded calibration services to calibration laboratories and clients who require the highest available levels of accuracy.

Social Research

The Social Research output class supports public good research science and technology that improves societal wellbeing. The Social goal seeks to increase understanding of the social, biological, environmental, cultural, economic, and physical determinants of wellbeing in order to build a society in which all New Zealanders enjoy health and independence and have a sense of belonging, identity and partnership.

Non-Specific Output Funding

This fundings is directed by FoRST to the Crown Research Institutes to undertake research that the CRIs themselves have identified as important. This is the only part allocation of funding administered from any of the three funding agents which is not output-driven.

Public Good Science & Technology

Public Good Science and Technology (PGST) is administered by FoRST, and includes six of the fourteen investment classes that are part of the Vote RS&T framework.⁸⁴ Within PGST, the classes of: Nonspecific Output Funding, Research for Industry, Maori Knowledge and Development Research, Health Research, Social Research and Environmental Research are contained.

Funding through HRC

Health Research

Health research has a two-pronged investment strategy, implemented through the annual funding round and the Partnership Programme. The annual funding round is the first 'prong' of the investment strategy. The HRC's nine Research Portfolios form the investment framework for the annual funding round. There is a research strategy for each portfolio, which defines the areas of research covered, key national issues and the research priorities. Relevance to the priorities identified in the portfolio strategies is a criterion for assessment of all research proposals submitted to the annual funding round. The portfolio strategies also prioritise research of relevance to the HRC's five priority populations.

The second prong of the investment strategy is the Partnership Programme through which the HRC partners with other agencies to develop highly targeted research strategies, designed to address specific needs for applied research. Fostering a cross-sectoral approach to health issues is a key objective of the Programme, which brings a diverse range of stakeholders together to pool resources and focus on common goals. Research is commissioned through a contestable 'Request for Proposals' process.

Funding through RSNZ

Marsden Fund

The Marsden Fund was established to encourage and support researchers involved in self-initiated research at the frontiers of new knowledge that could potentially lead to discoveries of international significance. The research undertaken with Marsden Fund support is not subject to governmental socio-economic priorities.

Captain James Cook Fellowships

The James Cook Research Fellowships are awarded to "forward thinking" researchers who will make a significant contribution to New Zealand's knowledge base. The Fellowships allow them to concentrate on their chosen research for two years. The Fellows are selected by the James Cook Research Fellowship Selection Committee, chaired by the Governor-General.

Science Mathematics and Technology Teacher Fellowships

The Science Mathematics and Technology Teacher Fellowships scheme seeks to raise the profile of science, mathematics, social sciences and technology within the wider community. The scheme aims to achieve this by providing teachers with new experiences and understanding outside the classroom that will enable them to become more effective educators.

Funding through TEC

Centres of Research Excellence Fund

The role of the Centres of Research Excellence (CoRE) is to support leading edge, international standard innovative research that fosters excellence and contributes both to New Zealand's national goals and to knowledge transfer. The research may be in any area including the social sciences and humanities. The CoRE are primarily, but not exclusively, inter-institutional research networks, with the researchers working together on a commonly agreed work program. Each CoRE is hosted by a tertiary education institution. A host's responsibilities include the overall management and co-ordination of the research plan, support for knowledge transfer, and network activities. A list of the CoRE is at Appendix N.

Building Research Capability in the Social Sciences

Building Research Capability in the Social Sciences (BRCSS) is an initiative to build the capability of the tertiary education social science sector, and promote greater quality and relevance in social service research.

Performance Based Research Fund

The Performance Based Research Fund (PBRF) is designed to focus national research efforts and resources around the areas existing areas of expertise and to encourage high performance. Between 2004 and 2007 the PBRF will progressively replace the current EFTS (equivalent full-time student) 'top-up' funding for research. The PBRF model has three elements: to reward and encourage the quality of researchers (60 percent of the fund); reflect research degree completions (25 percent of the fund); and reflect external research income (15 percent of fund).

Appendix L: Government funding for business enterprise R&D grants and programs by funding agent

Funding through FoRST

Pre-Seed Accelerator Fund

The Pre-Seed Accelerator Fund (PSAF) was set up to accelerate the commercialisation of knowledge and products produced by CRI's and other publicly-funded research organisations, including tertiary education institutes.⁸⁵ The Fund provides one-third of the pre-seed development costs for public institutions that are ineligible for the Technology for Business Growth (TBG) program, which is aimed at the private market.⁸⁶ This funding is provided to help in the movement of public R&D towards an investor-ready product, limiting the funding stage to the development of the 'first prototype'. The fund allows for the remaining two-thirds of the development costs to come from the input of other research funds.

Technology New Zealand

Technology New Zealand (TechNZ) is a business unit of FoRST aimed at increasing the ability of NZ firms to adopt new technology and apply technological innovation to suit their business.⁸⁷ TechNZ provides grants aimed at technical risk as opposed to commercial risk.⁸⁸ Within TechNZ, three schemes are provided to encourage technology transfer: TechLink is designed to provide promotion and technology guidance services to business enterprises, Technology for Business Growth provides part-funding for projects that encourage businesses to undertake technological projects, and Technology in Industry Fellowships supports the movement of researchers into business enterprises to increase industry linkages.⁸⁹ TechNZ funding is primarily aimed at New Zealand-owned businesses, but foreign owned companies are also eligible provided the outcome of investment can be shown to benefit the people of New Zealand.⁹⁰

New Economy Research Fund

The New Economy Research Fund (NERF) was established to support investigator-initiated research innovation that has the potential to create or develop advanced scientific or technology platforms in New Zealand. NERF is directed at high-risk, high-return investments,⁹¹ and focuses on new areas where industries have not yet emerged or are in their early stages,⁹² and supports the growth of basic research to a stage where it can be eligible for other public funding programs or private investment.

Research for Industry

The Research for Industry program aims to develop of innovative infrastructure, food and fibre industries, manufacturing and services. It includes funding for research consortia to promote and encourage private sector research and investment.

Funding through RSNZ

Promoting an Innovation Culture

The Promoting an Innovation Culture program is aimed at supporting and encouraging an innovation culture in research organisations but more specifically in industry. This includes promoting positive attitudes to innovation and fostering international linkages in science and technology. This is one of the few jointly funded programs, with both RSNZ and the Carter Observatory providing funding and support for this program.

Appendix M: Government funding for R&D-business linkage grants and programs by funding agent

Funding through FoRST

Environmental Research

The Environmental Research output class supports public good research, science and technology that enhance the understanding and management of our environment. Under this output class, FoRST invests in portfolios of research, science and technology that contribute to the understanding of ecosystems, species, habitats and the systems that contribute to them, and the human, pest and other influences to which they are exposed.

Research outputs provide the knowledge that underpins the management, protection and enhancement of natural ecosystems. Research on sustainable use of ecosystems and the productive sector's environment is also included as is the attention to the social impact of new technologies. These outputs contribute to an understanding of the global biophysical environment and the impact of atmospheric, climatic and other changes to natural, agricultural and other human ecosystems.

Research for Industry

Research for Industry aims to increase the competitiveness of sectors such as New Zealand's food and fibre industries, manufacturing and service industries, and in infrastructure such as communications, energy, water and waste. Funding for research consortia to encourage private sector investment is included.

Research consortia are partnerships between users and providers and are aimed at assisting businesses and organisations to successfully undertake and apply research to improve the economic, environmental and social wellbeing of New Zealanders. The partnerships can be private-public partnerships, between business and government enterprises or public-public partnerships between government agencies.

International Investment Opportunities Fund

The International Investment Opportunities Fund aims to increase the ability of New Zealand researchers to participate in research collaborations that attract international co-funding, to recruit highly experienced researchers from overseas and to support participation in international research programmes with a high relevance to New Zealand's economic, social and/or environmental development. Benefits to NZ will be recognised through access to equipment or technologies not available in New Zealand and ensuring advanced skills are matched to areas of strong growth.

The fund is jointly administered by FoRST and the HRC.

Funding through HRC

International Investment Opportunities Fund

See above.

Funding through RSNZ

Developing International Linkages

The International Science and Technology (ISAT) Linkages Fund was established in 1994. ISAT is designed to support international science and technology links between New Zealand and the world. The ISAT objectives are to:

- develop international opportunities and utilise overseas advances in RS&T for economic, social and environmental progress;
- positively influence regional and international RS&T linked activities that advance New Zealand's national interest;
- increase the level of funding, scientific skills and technological capabilities that New Zealand is able to source from other countries; and
- promote international recognition of New Zealand as a centre for innovation.

Funding managed through MoRST, the Crown Company Monitoring Advisory Unit (CCMAU) and the Tertiary Advisory Monitoring Unit (TAMU)

Equity Investment Fund

Like the Pre-Seed Accelerator Fund, the Equity Investment Fund (EIF) is also aimed at publicly-funded institutions, but is aimed more at the development of platform technologies until private investment buys out the technology.⁹³ The EIF is available to Crown Research Institutes and Tertiary Education Institutes who demonstrate to the Government that their investment will be recouped with interest when the technology is sold off to the private sector.⁹⁴ The EIF is co-managed by MoRST and the CCMAU.

Funding through TEC

Growth and Innovation Pilot Initiatives

The Growth and Innovation Pilot Initiatives (Growth Pilots) have been introduced to help build the capability of Tertiary Education Organisations (TEOs) to underpin the development of the government's Growth and Innovation Framework's (GIF) focus sectors. These focus sectors include biotechnology, design, and information and communication technology (ICT). The intention of the Growth Pilots is for TEOs to work with businesses to design an approach that will best suit their specific circumstances and capability requirements.

Institutes of Technology and Polytechnics (ITP) Business Links Fund

The ITP Business Links Fund is designed to better support capability development in ITPs, promote better and more productive joint working by business and the ITP sub-sector, and promote improvement in performance and better strategic alignment within the ITP sub-sector.

Partnerships for Excellence

The Partnerships for Excellence framework is aimed at increasing private sector investment in tertiary education to foster better linkages between tertiary education institutions, industry and business, maximising the positive outcomes from those linkages, and ensuring that the capability of the public tertiary education sector is developed in partnership with the private sector and industry.

Bright Future Scholarships Scheme

The Bright Future scholarships scheme supports people to conduct research. Bright Future includes two scholarships: Top Achiever Doctoral Scholarships and Enterprise Scholarships. Enterprise Scholarships support New Zealand students, in partnership with private companies, to undertake a course of study involving a significant research component at a New Zealand tertiary education institution. Top Achiever Doctoral Scholarships recognise, support and reward excellent post-graduate New Zealand students. This scheme supports research at PhD level in all disciplines, at New Zealand tertiary education institutions or appropriate overseas institutions.

Appendix N: New Zealand's Centres of Research Excellence:

Allan Wilson Centre for Molecular Ecology and Evolution

Host Institution: Massey University

Partners: University of Canterbury, University of Auckland, University of Otago, and Victoria University of Wellington.

Centre for Molecular Biodiscovery

Host Institution: University of Auckland.

The MacDiarmid Institute for Advanced Materials and Nanotechnology

Host Institution: Victoria University of Wellington

Partners: University of Canterbury, Industrial Research Limited, and Institute of Geological and Nuclear Sciences.

National Centre for Advanced Bio-Protection Technologies

Host Institution: Lincoln University

Partners: Massey University, New Zealand Crop and Food Research Ltd and AgResearch Ltd.

New Zealand Institute of Mathematics and its Applications

Host Institution: University of Auckland

Partner: New Zealand Mathematics Research Institute.

National Centre for Growth and Development

Host Institution: University of Auckland

Partners: Massey University, University of Otago, with contributions from AgResearch Ltd.

Nga Pae o te Maramatanga (Horizons of Insight) - The National Institute of Research Excellence for Maori Development and Advancement

Host Institution: University of Auckland

Partners: Te Whare Wananga O Awanuiarangi, Te Wananga O Aotearoa, Victoria University of Wellington, University of Otago, University of Waikato, and Landcare Research.

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