The Parliament of the Commonwealth of Australia

RIDING THE INNOVATION WAVE

The Case for Increasing Business Investment in R&D

House of Representatives
Standing Committee on Science and Innovation

June 2003

ISBN 0 642 78439 6

Contents

Foreword

Nothing is more compelling than an idea whose time has come. (Anon)

The Australian character is underscored by a pioneering and innovative spirit. Our unique history and geography combine to make us so. It is therefore not surprising that as a nation, we have developed a strong and deserved reputation for hatching great ideas.

Whilst this is an absolutely vital skill in taking up and maintaining a globally competitive position on today's economic stage, it is not of itself sufficient.

Our great ideas need the commercial impetus to help ensure "their time has come." They need not only the research but also greater development, to better expand the R&D equation. Business in Australia must invest in R&D with greater commitment, greater confidence and greater capital, if our best ideas are to not only catch, but successfully ride the innovation wave all the way to market.

The House of Representatives Standing Committee on Science and Innovation has spent just under twelve months examining this issue. In the report that follows, the Committee makes forty-eight recommendations designed to help the process of taking ideas forward, to help Australia better ride the innovation wave.

The Committee has been very impressed with the quality of submissions received. We have been extremely gratified by the preparedness of individuals, companies and organisations, to come forward and assist in the deliberations of the Inquiry.

There is no doubt that Australia has a strong and robust mix of researchers and businesses contributing to a growing commitment to R&D.

It is my personal hope that the recommendations made by the Committee will have a positive impact on two fronts. Firstly, in strengthening collaborative efforts between research agencies and business. Secondly, in furthering investment in the commercialisation of Australia's great ideas.

My thanks go to my colleagues on the Committee who worked extremely well together throughout the Inquiry. I am also indebted to each of the staff of the Secretariat for their wonderful support and assistance.

Gary Nairn MP

Chair

Membership of the Committee

Chair	Mr Gary Nairn MP
Deputy Chair	Ms Ann Corcoran MP
Members	Mr Martyn Evans MP
	Mr John Forrest MP
	Ms Sharon Grierson MP
	Mr Michael Hatton MP
	Mr Peter Lindsay MP
	Mr Tony Smith MP
	Mr Ken Ticehurst MP
	Dr Mal Washer MP

Committee Secretariat

Secretary	Ms Catherine Cornish
	Mr Paul McMahon (to January 2003)
Inquiry Secretary	Mr Rod Power
	Ms Shelley McInnis (to December 2002)
Research Officer	Mr Jerome Brown
Administrative Officers	Ms Suzy Domitrovic
	Ms Lisa Kaida (to February 2003)

Terms of reference

Inquiry into Business Commitment to R&D in Australia

International comparisons indicate that while the public sector in Australia supports R&D at an impressive level, business investment is less impressive.

With particular consideration of:

(i) the R&D drivers in small and medium-sized business;

(ii) the needs of fast-growing companies; and

(iii) the considerations by which major international corporations site R&D investment;

the committee seeks to address three questions:

(i) what would be the economic benefit for Australia from a greater private sector investment in R&D?

(ii) what are the impediments to business investment in R&D?

(iii) what steps need to be taken to better demonstrate to business the benefits of higher private sector investment in R&D?

List of recommendations

Steps that might be taken by the Commonwealth government in order to better demonstrate to business the benefits of higher private sector investment in R&D

Recommendation 1

The committee recommends that, in order to increase awareness of the importance of innovation and commercialisation, the Commonwealth government:

- promote case studies which show the success of companies that have benefited from R&D;
- introduce a system of prestigious awards to recognise individuals and companies that successfully commercialise their inventions;
- encourage, and facilitate where appropriate, the formation of mentoring groups to provide advice to researchers and businesses about commercialisation; and
- conduct education programs about taking a new product to market.

Recommendation 2

The committee recommends that the Commonwealth government expand the mentoring services available to small and medium-sized enterprises beyond those currently offered by the COMET Program.

Recommendation 3

The committee recommends that the Commonwealth government ensure that the Australian Bureau of Statistics undertakes surveys of innovative activity in the Australian economy, such surveys to include details of the non-technological innovation that is taking place in Australia.

Recommendation 4

The committee recommends that relevant industry associations, in conjunction with the Australian Bureau of Statistics, identify the economic benefits of research 'crossovers' such as that between the minerals / mining sectors and the environment sector.

Recommendation 5

The committee recommends that the Commonwealth government, in consultation with the states:

- identify key R&D sectors for further development;
- encourage state governments and local councils to promote R&D within their jurisdictions; and
- assist the efforts of local governments to encourage small and medium sized enterprises to share information about research and commercialisation.

Recommendation 6

The committee recommends that the Commonwealth government, in conjunction with the states:

- assess the efficacy of current efforts to improve students' knowledge of, and interest in, technology-oriented careers, with a view to introducing specific schemes to encourage young people to undertake the study of engineering and technology; and
- promote the interest of school students in such careers by publicising the achievements of successful engineers and technologists.

Recommendation 7

The committee recommends that the Commonwealth government seek to attract major international corporations to site their R&D facilities in Australia and actively manage an on-going relationship with these companies by:

- considering the use of a refundable tax offset whereby major international firms choosing to site new R&D investment in Australia can claim the offset;

- regularly meeting with the major international corporations already resident in Australia so as to refine, where necessary, the government's support programs in order to retain those companies' R&D investments; and

- incorporating input from international corporations into the operations of InvestAustralia.

Recommendation 8

The committee recommends that the Commonwealth government, as part of a program to support the take-up by Australian businesses of R&D that is developed offshore, consider developing programs to familiarise businesses with overseas research.

Recommendation 9

The committee recommends that the Commonwealth government waive the current 10% limit on overseas R&D that can be deducted, for investments of demonstrable benefit to Australia and where no equivalent domestic R&D provider is available.

Recommendation 10

The committee recommends that the Commonwealth government, as part of its efforts to increase the incentives for Australian firms to export, consider the following actions:

- increase the cap on the Export Market Development Grants Scheme to, at the least, maintain its real value;

- introduce a program to inform Australian high-technology companies about government procurement programs in other countries. For example, the United States government procurement programs (in advance of the release of actual tenders by US agencies); and

- accelerate the negotiation of trade agreements that facilitate access by Australian companies to overseas markets.

Recommendation 11

The committee recommends that the Commonwealth government:

- encourage small and medium-sized enterprises in industries with common interests to set up research funding bodies via voluntary sector levies; and

- develop a program (perhaps along the lines of the highly successful rural Research and Development Corporations) to financially assist such research bodies.

Recommendation 12

The committee recommends that the Commonwealth government investigate ways to better demonstrate to Australian superannuation funds the opportunities arising from investing in Australian small and medium-sized enterprises that conduct R&D (recognising the primary fiduciary duty of the funds to maximise returns to their members).

Recommendation 13

The committee recommends that the Commonwealth government consider a scheme, along the lines of the current Pooled Development Funds Program, to enable Funds or trusts whose *sole* purpose is to invest in R&D activities, to receive concessional tax treatment.

Recommendation 14

The committee recommends that the Commonwealth government make further changes to employee share option arrangements to boost the financial incentives for researchers to commercialise their research outcomes (possibly by removing the requirement to pay tax upfront on the issue of shares in a start-up company).

Recommendation 15

The committee recommends that the financial incentive for researchers, and those commercialising research outcomes, be improved by considering the introduction of a *tapered* capital gains tax in relation to assets held in new high-technology companies (whereby the tax is reduced in proportion to the length of time an asset is held).

Recommendation 16

The committee recommends that the Commonwealth government facilitate the involvement of small and medium-sized enterprises in government tender and purchasing processes by:

- incorporating a weighting within those processes which recognises the need to promote innovative activity; and

- investigating the establishment of a competitive small business set aside program, modelled on the United States Small Business Innovation Research Program, in which government agencies would be required to contract a portion of their R&D funds to small and medium-sized enterprises.

Recommendation 17

The committee recommends that the Commonwealth government minimise regulatory hurdles for businesses to conduct and take-up R&D by:

- promoting greater regulatory consistency across all tiers of Australian government;
- encouraging international harmonisation of regulations, especially with respect to Australia's major trading partners, and when negotiating new trade agreements; and
- ensuring that Australian regulations facilitate research and the take-up of new technology.

Recommendation 18

The committee recommends that the Commonwealth government, through the forum of the Council of Australian Governments (COAG), improve the public's access to spatial information by encouraging the states to make their spatial data available to the public at the cost of transferring the information, rather than at the cost of acquisition.

Recommendation 19

The committee recommends that the Commonwealth government, financial bodies and businesses harmonise Australian accounting standards to ensure that:

- they are not at odds with our major competitors;
- they are able to show the value of intellectual property held by a business; and
- they are able to indicate the innovative activity of the firm.

Recommendation 20

The committee recommends that the Commonwealth government, in order to stimulate greater recognition within companies of the benefits of the tax concession, allow the R&D tax concession to be treated by the company receiving it as a benefit to be recorded as operating income for accounting purposes (and offset against the company's tax expenses).

Steps that might be taken by the Commonwealth government in relation to specific R&D programs, in order to better demonstrate to business the benefits of higher private sector investment in R&D

Recommendation 21

The committee recommends that businesses be provided with greater certainty about the continuity of the Commonwealth government's R&D support programs, by ensuring that the programs are maintained for rolling periods of not less than five years.

Recommendation 22

The committee recommends that the Commonwealth government simplify and minimise the data requirements of companies registering for the tax concession or applying for R&D grant assistance, and specifically:

- reduce the number of government agencies requiring information from companies seeking R&D assistance (when possible, to a single contact point), with the agencies utilising enhanced data-sharing;
- minimise the length and complexity of registration and application forms;
- synchronise reporting cycles across agencies; and
- ensure consistent use of terms and definitions of terms in forms relating to R&D across agencies, including the Australian Bureau of Statistics.

Recommendation 23

The committee recommends that the Commonwealth government continue to simplify the various R&D programs and consider the introduction of a version of the Canadian *Preclaim* Scheme whereby businesses can get preliminary advice about their eligibility for the government's R&D schemes.

Recommendation 24

The committee recommends that the Commonwealth government ensure that regular evaluations of the R&D support programs take place, including assessment of the effect of tax concessions on the R&D outcomes of businesses.

Recommendation 25

The committee recommends that the Commonwealth government encourage the development of measures that can serve as 'surrogates for productivity'. This would lessen dependence on Business Investment in R&D (BERD), which is a measure and not necessarily a good indicator of productivity, as well as contribute to the clearer identification of the results of government grants and subsidies, and provide fuller information of the success of converting research to innovation.

Recommendation 26

The committee recommends that, in order to better assess the effect of R&D support programs (including the tax concessions), the Australian Bureau of Statistics add a question to its business survey form asking companies to estimate the increased turnover generated by their use of the tax concession and / or other R&D support measures.

Recommendation 27

The committee recommends that the Industry Research and Development Board (IRDB) review the current guidelines for R&D Plans (required when registering for the tax concession) to provide that the Plans specify the technical risk factors and outline the risk mitigation strategies. To reduce the compliance burden on companies (especially small and medium-sized enterprises), the IRDB should provide a spreadsheet or similar template for carrying out net present value estimates and provide associated guidance.

Recommendation 28

The committee recommends that the Commonwealth government evaluate and consider extending the tax concession to cover the cost of intellectual property protection and patent applications for businesses that have already qualified for the tax concession.

Recommendation 29

The committee recommends that the Commonwealth government review the current eligibility criteria for the incremental tax concession to ensure that they maximise the conduct and take-up of business R&D, in particular, that the government consider the inclusion of essential non-labour R&D expenditure in relation to eligibility for the incremental tax concession.

Recommendation 30

The committee recommends that the Commonwealth government, once the existing R&D programs have been fully evaluated, consider adjusting the present incremental or 'Premium' tax concession by:

- ensuring that companies already conducting a high R&D expenditure relative to their turnover are eligible for the concession (thus maintaining the incentive to do R&D); and

- considering linking the tax concession regime to the national research priorities and / or to the particular industries in which Australia wishes to promote itself as a centre of excellence and / or to the high-growth areas of the economy and / or to whether the business is a small or medium-sized enterprise and / or to whether the R&D is undertaken collaboratively by the private and public sectors.

Recommendation 31

The committee recommends that the Commonwealth government enhance its promotion of the cash rebate (tax offset) program, especially to small and medium-sized enterprises, and industry associations.

Recommendation 32

The committee recommends that the Commonwealth government evaluate and consider adjusting the eligibility thresholds for access to the tax offset program.

Recommendation 33

The committee recommends that the Commonwealth government review its ongoing level of funding for the START program, in light of significant demand and the program's great success in assisting the establishment of small and medium-sized enterprises. Increased funding of programs like START and COMET might be particularly appropriate at times when the general profitability of business is constrained by a downturn in economic activity.

Recommendation 34

The committee recommends that the Commonwealth government expand the grants-based START program by introducing a scheme that provides loans to early-stage companies, with the requirement that those loans be paid back if the venture is successful (but which enables the loans to be converted back to grants if the venture is unsuccessful).

Recommendation 35

The committee recommends that, in relation to BITS incubator seed funds, the Commonwealth government consider:

- increasing the current eligibility threshold of $450,000; and
- review the existing taxation treatment of the seed funds in order to maximise the encouragement of R&D by businesses.

Recommendation 36

The committee recommends that the Commonwealth government encourage universities to implement more flexible arrangements for university superannuation to remove an impediment to the movement of researchers between the public and private sectors.

Recommendation 37

The committee recommends that the Commonwealth government increase the incentives for researchers to work in businesses by:

- promoting the Graduate START program more widely;
- providing within the Graduate START scheme an option whereby up to an additional 100 post-doctoral students could be placed in businesses with the cost shared equally between government and business;
- encouraging research bodies such as the CSIRO to regularly meet representatives of the companies that currently conduct a high level of R&D in Australia; and
- consider the use of tax rebates to businesses employing new graduates in R&D activities.

Recommendation 38

The committee recommends that the Commonwealth and state governments take steps to increase the number of "research brokers" and technology diffusion coordinators in universities, industry associations and professional associations.

Recommendation 39

The committee recommends that the Commonwealth government, business associations and the universities improve the way that intellectual property is handled by industry and universities by taking the following measures:

- developing guidelines for public / private R&D collaborative projects;
- considering the introduction of appropriate revenue-sharing conditions into the award of some Australian Research Council (ARC) grants to enable researchers and universities to hold the licence to exploit their intellectual property; and
- the ARC considering making 'closed' R&D programs eligible for ARC grants (if only under certain specified circumstances).

Recommendation 40

The committee recommends that the Commonwealth government's 'Review of Closer Collaboration between Universities and Major Publicly Funded Research Organisations' examines how to encourage the research bodies to 'partner' with small and medium-sized enterprises, including the provision of equity.

Recommendation 41

The committee recommends that the Commonwealth government encourage universities to take the following measures to improve their governance arrangements so that they are less averse to commercialisation of their research:

- facilitate the flow of block grants to their associated business entities rather than through the university's financial system;
- allow for flexible funding arrangements where commercially sensitive technology is involved; and
- permit their staff to earn income above their usual salaries.

Recommendation 42

The committee recommends that the Australian Research Council make publicly available the information it holds on research which has been judged as being of high quality and which is likely to deliver national benefits.

Recommendation 43

The committee recommends that the Commonwealth government promote the involvement of small and medium-sized enterprises (SMEs) in Cooperative Research Centres, especially by way of non-cash contributions and through associations representing a number of SMEs within an industry.

Recommendation 44

The committee recommends that AusIndustry monitor the expenditure by CRCs on projects involving the universities to ensure that the smaller, often regionally-based universities are able to participate fully in the CRC program.

Recommendation 45

The committee recommends that the Commonwealth government encourage Research and Development Corporations to increase their commercial expertise by:

- employing managers with commercial skills;
- establishing commercial entities based on their research; and
- possibly registering a greater number of entities under the Corporations Law.

Recommendation 46

The committee recommends that the Commonwealth government:

- promote the opportunities for very early phase commercialisation by university researchers (such as developing a prototype) under the existing R&D programs; and
- encourage the study of commercialisation as part of the relevant undergraduate courses.

Recommendation 47

The committee recommends that, in order to reduce ambiguity about eligibility for the R&D tax concession and to facilitate R&D that involves *small* innovative steps, the Commonwealth government consider amending Section 73B(2B) (i) of the Income Tax Assessment Act broadly along the following lines: 'Whilst it may be possible to estimate the probability of obtaining the technical or scientific outcome on the basis of current knowledge and experience, this probability is sufficiently low that the investment is unlikely to go ahead without the benefit of a special tax treatment for the investment.'

Recommendation 48

The committee recommends that the Commonwealth government review the current definition of R&D to ensure that its technological orientation continues to be relevant to the type and extent of innovation occurring in Australia and, in particular, that it recognises the importance of R&D in the services sector.

List of abbreviations

AAS	Australian Academy of Science
ABF	Australian Business Foundation
ABS	Australian Bureau of Statistics
ACCI	Australian Chamber of Commerce and Industry
ACIS	Automotive Competitiveness and Investment Scheme
AEEMA	Australian Electrical and Electronic Manufacturers
AFFA	(Commonwealth Department of) Agriculture, Fisheries and Forestry Australia
ANAO	Australian National Audit Office
AIA	Australian Innovation Association
AIG	Australian Industry Group
AIRG	Australian Industrial Research Group
AIIA	Australian Information Industry Association
AMIRA	Australian Mineral Industries Research Association International Ltd
'Angels'	High net-worth individuals prepared to invest in the early stage of a business

ANSTO	Australian Nuclear Science and Technology Organisation
ANZAAS	Australian & New Zealand Association for the Advancement of Science
APIC	Australian Paper Industry Council
AQIS	Australian Quarantine Inspection Service
ARC	Australian Research Council
ATG	Australian Technology Group
ATO	Australian Taxation Group
ATS	Australian Technology Showcase
ATSE	Australian Academy of Technological Sciences and Engineering
AusIMM	Australasian Institute of Mining and Metallurgy
AVCA	Australian Venture Capital Association
AVCC	Australian Vice-Chancellors' Committee
BAA	Backing Australia's Ability
BCA	Business Council of Australia
BERD	Business Expenditure on Research and Development
BIF	Biotechnology Innovation Fund
BITS	Building on Information Technology Strengths
CCRC	Cotton Cooperative Research Centre
CGT	Capital gains tax
CITA	(Commonwealth Department of) Communications, Information Technology and the Arts
COMET	Commercialising Emerging Technologies Program
CRC	Cooperative Research Centre
CRDC	Cotton Research and Development Corporation

CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSSIP	Cooperative Research Centre for Sensor Signal and Information Processing
DEST	(Commonwealth) Department of Education, Science and Technology
DITR	(Commonwealth) Department of Industry, Tourism and Resources
DSTO	Defence Science and Technology Organisation
EFIC	Export Finance and Insurance Corporation
EFS	Export Facilitation Scheme
EMDG	Export Market Development Grants
EU	European Union
FASTS	Federation of Australian Scientific and Technological Societies
FDA	(United States) Food and Drug Administration
FRDC	Fisheries Research and Development Corporation
FWPRDC	Forest and Wood Products Research and Development Corporation
GERD	Gross Expenditure on Research and Development
GOVERD	Government Expenditure on Research and Development
GWRDC	Grape and Wine Research and Development Corporation
GRDC	Grains Research and Development Corporation
GSK	GlaxoSmithKline
HECS	Higher Education Contribution Scheme
HERD	Higher Education Expenditure on Research and Development
ICT	Information and Communications Technology
IEAust	Institution of Engineers, Australia

IIF	Innovation Investment Fund
IMD	International Institute for Management Development
IMS	Intelligent Manufacturing Systems
IP	Intellectual Property
IRDB	Industry, Research and Development Board
ISIG	Innovation Summit Implementation Group
MCA	Minerals Council of Australia
MSD	Merck, Sharp & Dohme (Australia)
MNC	Multinational corporation
NEIS	New Enterprise Incentive Scheme
NHMRC	National Health and Medical Research Council
OECD	Organisation for Economic Cooperation and Development
PBS	Pharmaceutical Benefits Scheme
PDF	Pooled-Development Fund
PIIP	Pharmaceutical Industry Investment Program
PMSEIC	Prime Minister's Science, Engineering and Innovation Council
PSF	Pre-Seed Fund
RACI	Royal Australian Chemical Institute
R&D	Research and Development
RDC	Research and Development Corporation
REEF	Renewable Energy Equity Fund
RIRDC	Rural Industries Research and Development Corporation
RMIT	Royal Melbourne Institute of Technology
ROI	Return on Investment

SBA	(United States) Small Business Administration
SBIF	Small Business Investment Fund
SBIR	(United States) Small Business Innovation Research Program
SME	Small to medium sized enterprise
SPIRT	Strategic Partnerships with Industry- Research and Training Scheme
TAS	Technology Advisory Service
TIA	Taxation Institute of Australia
US	United States
VCLP	Venture Capital Limited Partnerships

Executive summary

1. In July 2002 the Minister for Science, the Hon. Peter McGauran MP, asked the committee to inquire into the commitment of Australian business to research and development (R&D). The committee's terms of reference required it to address a number of factors bearing on business expenditure on R&D (BERD). The report is structured in line with the terms of reference.

2. The first element of the terms of reference involved assessing the relative level of BERD in Australia compared to countries in the Organisation for Economic Cooperation and Development (OECD). Chapter 2 contains this analysis and leads to the conclusion that Australia's BERD is relatively low but increasing, when compared to other OECD countries. Given the general productivity, innovative activity and national competitiveness of the Australian economy in recent years, there are grounds for optimism about developments affecting business R&D in Australia (Chapter 2). However, the committee considers that it is important to seize every opportunity to increase the level of BERD.

3. The committee examined in some detail the Commonwealth government's support for R&D. Chapter 3 considers the Commonwealth government's expenditure on science and innovation. It also describes the extensive range of Commonwealth R&D programs. Many of these are designed specifically for small and medium-sized enterprises (SMEs). Also, many of the programs are relatively new and need time to bed-down.

4. Chapter 4 assesses BERD in Australia and finds that it is on a rising trendline. While just under half of BERD is spent in the manufacturing sector, R&D expenditure in the services sector is rising rapidly. Foreign firms are responsible for over 40% of BERD. Funding of BERD is largely internally generated from businesses.

5. The second element of the committee's terms of reference required it to examine the R&D drivers in SMEs and the needs of fast-growing companies. These are set out in Chapter 5. The committee concludes that the drivers of SMEs and fast-growing companies include:

   - company profit;
   - successful commercialisation of R&D;
   - establishment of a distinctive presence in the market;
   - access to capital;
   - the general level of economic activity in Australia;
   - speedy access to markets, especially overseas markets;
   - government incentive programs and government tender / purchasing policies;
   - collaboration with public sector research bodies;
   - knowledge of the industry sector in which the firm operates;
   - the presence of major international corporations (and large companies generally); and
   - the national macroeconomic environment, including the education, taxation and legal systems.

6. The committee was also required to examine the considerations by which major international corporations site their R&D investment. Chapter 6 analyses the evidence from major international corporations and other bodies. The committee concludes that the large international firms make decisions about where to conduct their R&D on grounds which include:

   - cost and control concerns;
   - the extent to which a country is innovation-friendly;
   - the standard of pre-competitive research support and the quality of skilled personnel;
   - the legal, financial, taxation and regulatory environment;
   - the consistency of government policy and incentive programs;
   - the national 'brand' of a country; and
   - access to markets.

7. The committee's terms of reference also required it to examine the economic benefit to Australia of greater BERD. Chapter 7 concludes that Australia would gain from a higher level of BERD, though it needs to be borne in mind that there are limits to the amount of BERD that businesses will outlay. The principal constraint is set by what businesses perceive to be their returns in the marketplace from R&D expenditure.

8. The penultimate element of the committee's terms of reference required it to consider the impediments to BERD in Australia. Submitters and witnesses pointed to a diverse range of impediments which, in their view, affected the government's efforts to increase the level of BERD. Chapter 8 provides a broad 'map' - or overview - of views about R&D in Australia. The impediments to BERD were said to relate, in varying degrees, to:

   - the location of Australia and the relative size of our economy in the global context;
   - aspects of the Australian culture and the way that Australia 'projects' itself to the world;
   - Australia's industry structure;
   - the management 'culture' in Australia;
   - the actions of foreign companies;
   - the commercialisation of research;
   - the challenge of marketing globally;
   - the higher education and financial sectors;
   - regulatory activity both in Australia and overseas;
   - government policies and programs designed to facilitate R&D;
   - financial incentives for both scientists and entrepreneurs; and
   - a shortage of skills.

9. The final element of the terms of reference required the committee to set out the steps that should be taken to better demonstrate to business the benefits of a higher level of BERD. Chapters 9 and 10 set out the committee's recommendations in this regard. A list of the committee's detailed recommendations is at pages *xiii-xxiii*.

10. In Chapter 9 the committee recommends that the Commonwealth government take steps designed to:

    - raise public awareness of the importance of innovation and commercialisation (Recommendations 1-4);
    - identify national research priorities and encourage the efforts of states and local governments to promote R&D (Recommendations 5 and 6);
    - encourage major international corporations to conduct R&D in Australia (Recommendation 7);
    - improve the take-up of overseas R&D by Australian companies (Recommendation 8) and recognise special circumstances when R&D conducted overseas by Australian companies should be eligible for the R&D tax concessions (Recommendation 9);
    - encourage exporting (Recommendation 10);
    - encourage industry associations of SMEs (Recommendation 11);
    - increase the capacity of SMEs to access capital (Recommendations 12 and 13);
    - improve financial incentives for individuals to conduct R&D and to commercialise the outcomes of research (Recommendations 14 and 15);
    - improve government tender and purchasing policies so as to facilitate the involvement of SMEs (Recommendation 16);
    - reduce regulatory barriers to business R&D (Recommendations 17 and 18); and
    - improve accounting standards and practices so as to better recognise the importance of R&D (Recommendations 19 and 20).

11. In Chapter 10 the committee recommends that the Commonwealth government take steps designed to:

    - improve the consistency of R&D programs (Recommendation 21);
    - improve the administration of the R&D programs (Recommendations 22 and 23)
    - evaluate the R&D programs (Recommendations 24 to 26);
    - improve the general (or flat) tax concession (Recommendations 27 and 28);
    - adjust the incremental or ‘Premium’ tax concession (Recommendations 29 and 30)

- raise awareness of the cash rebate (tax offset) program (Recommendations 31 and 32);
- improve the START program (Recommendations 33 and 34);
- improve the BITS program (Recommendation 35);
- improving collaboration between the public and private sectors (Recommendations 36 to 44);
- adjust the Australian Research Council's *Linkage* Program (Recommendation 45);
- provide additional support for early phase commercialisation (Recommendation 46); and
- reconsider the definition of R&D (Recommendations 47 and 48).

1

Introduction

Conduct of the inquiry

1.1 On 9 July 2002 the Minister for Science (the Hon Peter McGauran MP) referred to this committee an inquiry into the commitment of Australian business to research and development (R&D). The inquiry's terms of reference are outlined earlier in this report.

1.2 The inquiry was advertised in major national newspapers and members of the public were invited to lodge submissions. Also, the committee wrote to key stakeholders inviting them to submit written material. In all, 82 submissions were received; they are listed in Appendix A. Additional material relevant to the inquiry, which was received as exhibits, is described in Appendix B.

1.3 Public hearings were held in Sydney, Melbourne and Canberra. Roundtable meetings with representatives of small and medium sized enterprises (SMEs) were held in Canberra, Adelaide, Brisbane and, by teleconference, in Melbourne. A further roundtable meeting, this time with representatives of large international companies, was held in Canberra. The dates and locations of the hearings and roundtable meetings, together with the names of witnesses, are listed in Appendix C.[1]

---

1 Both the submissions and the transcript are available electronically through links on the committee's web page at: www.aph.gov.au/house/committee/scin/randd/hearings.htm

Structure of the report

1.4 The report has three Parts. Part I deals with the first term of reference, namely, international comparisons of public and private expenditure on R&D. It has three Chapters. The first (Chapter 2) examines Australia's standing relative to other countries in the Organisation for Economic Cooperation and Development (OECD); the second (Chapter 3) sets out details of public sector expenditure on R&D in Australia, focusing in particular upon that by the Commonwealth government; and the third (Chapter 4) provides information about the level and nature of private sector investment in R&D.

1.5 Part II of the report examines the matters listed in the second part of the committee's terms of reference, namely, the needs of fast-growing companies and the R&D drivers in small and medium-sized businesses (Chapter 5), the considerations by which major international corporations site their R&D investment (Chapter 6), and the economic benefit for Australia of a greater private sector investment in R&D (Chapter 7).

1.6 Part III of the report addresses the final terms of reference, namely, the nature of the impediments to higher business investment in Australia (Chapter 8) and the steps that might be taken by the Commonwealth government in an effort to reduce some of these impediments. The latter are covered in two Chapters. Chapter 9 examines the *general* steps that might be taken by the Commonwealth government, and Chapter 10 examines the steps that could be taken in relation to *specific* R&D programs. All of the committee's recommendations are contained in these two Chapters.

Principal findings

1.7 The principal findings reached by the committee in relation to each element of the terms of reference are set out in the Executive Summary on pages xix-xxiii and appear in the Conclusion at the end of Chapters 1-8.

Appreciation

1.8 The committee wishes to thank all those who contributed to the inquiry, including the representatives of SMEs and large companies who participated in the roundtable meetings in Adelaide, Brisbane, Canberra and (by tele-conference) in Melbourne.

2

International comparisons of public and private sector expenditure on R&D

2.1 When comparing R&D activity between countries:

> … the most commonly used indicator for comparison purposes is the ratio of expenditure on R&D to Gross Domestic Product (GDP).[1]

2.2 The Organisation for Economic Cooperation and Development (OECD) compiles figures for the R&D / GDP ratio by sector: the business sector, the government sector, the higher eduction sector, and the private non-profit sector. The latter is small in absolute terms. Table 1 lists OECD countries in order of total expenditure on R&D as a percentage of GDP (the far-right column) as well as showing the R&D expenditure / GDP ratio of the business sector, the government sector and the higher education sector. Table 1 shows that Australia has:

- a relatively low business sector expenditure on R&D (BERD)—15th out of the 21 countries listed in the Table;
- a relatively high ratio of government sector R&D expenditure to GDP—equal third out of the 21 countries in the Table; and
- a relatively high ratio of higher education sector expenditure to GDP—equal tenth out of the 21 countries.

---

1 Australian Bureau of Statistics (ABS), *Year Book Australia 2002, Science and Innovation, Expenditure on R&D – how does Australia compare internationally?* Cat. No. 1301.0, January 2002, p. 1.

2.3 On the basis of the information in the Table, it appears reasonable to conclude that the public sector in Australia (which includes both the government and most of the higher education sectors) is supporting R&D at an internationally competitive level but that the level of business R&D investment is less competitive. However, there are important qualifications to drawing so blunt a conclusion. These qualifications involve the following factors: problems of collecting international and national R&D data; differences in the structure of national economies; and limitations on what BERD measures. Each of these factors is examined in this chapter.

Problems of collecting international and national R&D data

2.4 Australian data on R&D is collected by the Australian Bureau of Statistics (ABS) which utilises the standard OECD definition of R&D. The ABS defines R&D as comprising creative work undertaken on a systematic basis in order to increase the stock of knowledge (of people, culture and society) and the use of this stock of knowledge to devise new applications. It is important that the work be original and have:

> … investigation as a primary objective, the outcome of which is new knowledge, with or without a specific practical application, or new or improved materials, products, devices, processes or services. R&D ends when work is no longer primarily investigative.[2]

2.5 Key aspects of this definition are the emphasis on 'creative' and 'original' work, the 'systematic' and 'investigative' nature of the activity, its use in 'new applications', and the very wide nature of the activity (it can be about people, culture or society).

2.6 When the R&D definition is used for international comparisons, it has the problem that:

> … the data is compiled from firms [which] are categorising expenditures as meeting the definition and there will be substantial errors and differences between countries. How big they are is really unknown.[3]

2 Australian Bureau of Statistics (ABS), *Australian Standard Research Classification (ASRC) 1998*, Cat. No. 1297.0, pp. 3-4.

3 Dr Ralph Lattimore (Productivity Commission), Transcript, p. 483.

Table 2.1: Expenditure on R&D as a percentage of GDP, OECD countries – 2000-2001

Country	**Business (%)**	**Government (%)**	**Higher education (%)**	**Total** [a] **(%)**
Sweden(b)	2.84	0.13	0.81	3.78
Finland	2.39	0.36	0.60	3.37
Japan	2.11	0.29	0.43	2.98
USA	2.04	0.18	0.38	2.72
Korea	1.96	0.35	0.30	2.65
Switzerland	1.95	0.03	0.60	2.64
Germany	1.75	0.34	0.40	2.49
France	1.37	0.38	0.41	2.18
Denmark(b)	1.32	0.32	0.44	2.09
Netherlands	1.13	0.25	0.57	1.97
Belgium(b)	1.40	0.06	0.47	1.96
United Kingdom	1.21	0.22	0.38	1.85
Canada	1.04	0.21	0.56	1.82
Norway(b)	0.92	0.25	0.47	1.65
Australia	**0.72**	**0.35**	**0.41**	**1.53**
Czech Republic	0.80	0.34	0.19	1.33
Italy	0.54	0.20	0.33	1.07
Spain	0.50	0.15	0.28	0.94
Hungary	0.36	0.21	0.19	0.80
Poland	0.25	0.23	0.22	0.70
Slovak Republic	0.44	0.17	0.06	0.67

(a) Includes private non-profit (b) Data for 1999-2000 only *Source:* ABS *Year Book Australia 2003*, Table 25.*3*

2.7 The cause of the difficulties was outlined by the Australian Bureau of Statistics in the following way:

> - There are difficulties in delineating the point which clearly separates the culmination of R&D investigative work and the beginning of the implementation phase of the innovations or recommendations resulting from R&D. Errors at this point are particularly significant because, although R&D programmes require large outlays of resources, the costs of implementing innovations or recommendations resulting from R&D may also be as high or higher in many instances;
> - Formulating a definition of what constitutes a unit of R&D [is difficult]. From a statistical point of view it is desirable that R&D expenditure be reported in the smallest cluster which can be classified to a single field of research and a single socio-economic objective. The extent to which it is not practicable to provide this detail will reduce the validity and usefulness of the classification, and the resulting R&D statistics; [and]
> - There is also a wide range of scientific and related activities which are not R&D, but which are closely linked with R&D in terms of organisation, resource allocation, institutional affiliation and the use or flow of information. However, activities conducted solely or primarily for the purposes of R&D support are included in R&D.[4]

2.8 These difficulties in compiling international data also apply to the collection of *national* data, as indicated in the Queensland government's submission to the inquiry:

> - There is no agreed conceptual framework governing the collection of data on innovation. As a result, data is often selectively and/or inappropriately used;
> - There is a lack of readily available comparative data on innovation measures available in Australia;
> - When figures are available, their validity and inaccuracy hinders the degree to which they can be used in evidence-based policy development;
> - Historical measures of innovation tend to focus on the manufacturing sector. As such, they provide a less accurate measure of innovative capacity in an economy like Queensland's, where resource and services industries are more dominant. Queensland's high productivity growth and stronger performance in some 'new economy'

4 ABS, *Australian Standard Research Classification (ASRC) 1998, op.cit.*, p. 4.

> indicators suggest that innovation is occurring more broadly across all sectors of the economy.[5]

2.9 Some witnesses told the committee that a further problem of collecting national data on business R&D is that the official statistics may understate business R&D. This could be caused by many SMEs being too busy to fill in survey forms or mistakenly thinking that the questions do not apply to their circumstances.[6] It may also be caused by a narrow definition of R&D that, in the case of the mining sector, has the effect of excluding ore processing, metal production and mining technology services.[7] The committee comes back to this definitional issue in the final chapter of this report.

2.10 The above difficulties in compiling national and international data on R&D activity, even when using a common definition, need to be kept in mind when drawing conclusions from the data.

Differences in the structure of national economies

2.11 The Productivity Commission told the committee that:

> … the lower ratios of BERD that we observe in Australia have more to do with Australia's industry structure being rather less-R&D intensive than the industry structures in some other countries. The services sector in this relatively small economy looks particularly large and, while the service sector does much innovation, not a lot of that is technological R&D, although services are big users of technology.[8]

2.12 The Commonwealth Department of Industry, Tourism and Resources supported the Productivity Commission's view, noting that:

---

5 Queensland Government, Submission No. 71, p. 2.

6 Mr Michael Turner, Submission No. 30, p. 1: 'Because SMEs do not register for AusIndustry tax concessions (due to the perceived plethora of paperwork or apply for grants and assistance (again due to the volume of paperwork), Federal agencies are therefore unable to easily ascertain the actual level of SME R&D'; Mr Matt Crellin, Submission No. 1, p. 1: Services-based organisations 'are keen to undertake R&D but do not have the incentive offered to organisations in other sectors to register and obtain government assistance;' Mr Robert Campbell (Precision Metals Pty Ltd), Transcript, p. 582: 'A lot of R&D is being done, but I do not think the government is recording it properly.'

7 Mr Richard Davies (Australian Mineral Industries Research Association International Ltd), Transcript, p. 254: 'The ABS statistics undervalue the total contribution of the [mining and minerals] industry because they adopt a narrow definition which excludes much of manufacturing services'.

8 Mr Gary Banks (Productivity Commission), Transcript, p. 481.

> Australian industry is characterised by a large number of small firms, the dominance of foreign-owned firms in some industries and few large firms that operate as home-based multinationals. This leads to gaps in the availability of global distribution channels and limited availability of domestic innovators and producers. Australia has a small population and home market especially for specialised products.[9]

2.13 Other witnesses also commented on Australia's industry structure. It was noted that agriculture is 'diminishing in terms of percentage of the economy'[10] and that Australia 'lack[s] the concentration of R&D-intensive industries such as pharmaceutical, chemicals and information technology'.[11]

2.14 The United States was said to have '33% more manufacturing contributing to GDP than we do'[12] and, just in terms of defence activity, the US expenditure on 'defence R&D, as a percentage of GDP, is about eight times higher than in Australia, and around 40 times higher than in Italy'.[13]

2.15 In relation to large and small companies, the committee was told that 'we do not have enough larger companies' which are the ones with the financial capacity to undertake R&D.[14] ABS figures confirm that the larger businesses conduct most of the R&D done in Australia: firms employing more than 1,000 people accounted for 39% of total R&D expenditure in 2000-01; firms employing less than 20 people accounted for just 11% of the R&D expenditure.[15]

2.16 In relation to small companies, witnesses stated that there is a 'predominance of SMEs in the Australian industry structure' and most of these SMEs are not in a position to do R&D.[16] 'They do not have the financial capacity and they cannot take those long-term risks'.[17]

---

9 Commonwealth Department of Industry, Tourism and Resources, Submission No. 38, p. 12.

10 Mr John Grace (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 76.

11 Australian Paper Industry Council, Submission No. 44, p. 7.

12 Mr John Grace, *op cit*., p. 73.

13 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, pp. 7-8.

14 Ms Catherine Livingstone (Australian Business Foundation Ltd), Transcript, p. 295.

15 Australian Bureau of Statistics (ABS), *Research and Experimental Development, Businesses Australia*, Cat. No. 8104.0, July 2002, p. 6.

16 Mr Gary Banks (Productivity Commission), Transcript, p. 482.

17 Ms Catherine Livingstone, *op cit*., p. 283.

2.17 ABS figures confirm the predominance of SMEs. In 1998-99 small private sector businesses (defined by the ABS as those employing less than 20 full-time equivalent people) accounted for 95% of all private sector businesses. These small businesses employed almost 3.4 million people, which is 48% of all private sector employment.[18]

2.18 The overall result of these factors is to render Australia's industry structure less R&D-intensive than some other countries. The structural differences between countries mean that international comparisons of R&D activity should be treated cautiously, even though such comparisons 'will nevertheless continue to form a part of the wider information base on which judgements about the appropriateness of national investment in R&D will be made'.[19] The structural differences:

> … make international comparisons of relative expenditure on R&D by business and/or by governments difficult to interpret and of limited value on their own.[20] [Further,] Australia is far from being a typical OECD country and so comparisons with economies of OECD countries may be quite inappropriate.[21]

Limitations on what BERD measures

2.19 The limitations on what BERD measures are of two broad kinds. Both relate to what BERD is *not*. It is *not* a measure of productivity, and it is not necessarily a good measure of innovative capacity or achievement.

BERD is *not* a measure of productivity

2.20 BERD is a measure of what businesses spend on R&D; hence, it is an output measure and 'a poor indicator of the value that accrues to

---

18 Australian Bureau of Statistics (ABS), *Small Business in Australia 1999*, Cat. No. 1321.0. The ABS defines a 'large business' (excluding those in the agriculture sector) as one employing 200 or more people. The ABS defines a 'medium business' as one employing 20 to 199 people. The ABS does not utilise an employment-size definition of an agricultural business because of difficulties in defining small business on this criterion. For this sector, the ABS utilises a measure called the 'estimated value of agricultural operations' (EVAO). A small agricultural business is defined as one having an EVAO of between $22,500 and $400,000.

19 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*

20 *ibid.*, pp. 7-8.

21 Australian Academy of Technological Sciences and Engineering, Submission No. 48, p. 1.

productivity and export performance in the commercialisation of R&D'.[22]

2.21 While international comparisons focus on the BERD / GDP ratio, it is the *inverse* ratio which gives some indication of productivity, that is, the ratio of GDP to BERD. The Productivity Commission stated that, on this ratio, Australia scores well, meaning that our R&D productivity is high compared to many other countries that are hailed as a model: 'Australia has a high R&D productivity [which means that] we get a lot of output for less R&D'.[23]

BERD is not necessarily a good measure of innovative capacity or achievement

2.22 Australia does not yet have statistical studies on innovative activity (with the exception of two surveys of the manufacturing sector conducted by the Australian Bureau of Statistics in 1993-94 and 1996-97).[24] This gap in the data on innovation is of concern to the ABS, which is developing a broader innovation survey for use in late-2003. The concern of the ABS is reflected in the following comment:

> Conspicuously absent from the data presently available for Australia are recent measures of innovation outputs (that is, new products and processes that are being implemented). Such "output" data provide an informative and direct way to measure the degree to which Australia is innovating and can be obtained through industry-wide business surveys… [Such surveys would] ascertain what proportion and types of businesses are innovating (that is, introducing new products and processes), what types of innovations are occurring and what impact they are having on the output and productivity of the businesses concerned.[25]

2.23 The new survey being developed by the ABS will be compatible with OECD guidelines 'although it would probably also include non-technological (organisational and managerial) innovation'.[26] The

---

22 Mr Richard Davies (Australian Mineral Industries Research Association International Ltd), Transcript, p. 254.

23 Mr Gary Banks (Productivity Commission), Transcript, p. 488 and discussion on p. 492.

24 Australian Bureau of Statistics (ABS), *Innovation in Manufacturing (1996-97), Cat.* No. 8116.0, June 1998. Also see ABS, *Year Book Australia 2003 - Science and Innovation, Innovation Statistics*, Cat No. 1301.0, January 2003.

25 Australian Bureau of Statistics (ABS), *Newsletters: Science and Technology Statistics Update*, Bulletin No. 7, December 2002, p. 10.

26 *ibid.*

importance of including information about non-technological innovation was stressed by the Productivity Commission and the Australian Business Foundation:

> Technological R&D is often less valuable as perceived by SMEs than other forms of innovation: organisational innovation, innovation in terms of the relationships with their customers and so on.[27]
>
> There is a lot of innovative activity going on where R&D investment is not central to it… for example [there are] new competitive strategies going on in Australia where both manufacturing and service firms are linking and selling products and services together in innovative ways… They are doing things like prototyping, help desks, maintenance services, training, technical upgrades and even putting together packages of sutures and surgical instruments for any given surgical procedure and for a number of surgical supply companies. This has been found to be widespread.
>
> A new competitive dynamism… [is] going on in that respect. New skills, new alliances and new capabilities are being fostered as a result of that, in response to tough, crowded and saturated markets, low-cost competition and so on. *Mostly this does not involve business R&D investment*… There is a new dynamic going on and a new competitiveness is happening because companies see the need to do so—to retain customers, to share risks, to add new value to customers…
>
> [But the important point is that] while it [business R&D] is quite crucial to Australia's innovation, it is not necessarily the full story.[28]

2.24 In the absence of Australian-derived statistical data on innovative activity, it is useful to examine material in the *World Competitiveness Yearbook* of the Institute for Management Development. The *Yearbook* compares 75 countries against 174 indicators. On global competitiveness in relation to innovative activity, the Institute found that 'Australia has dropped to 14th position in the overall rankings for 2002, from 11th position in 2001'.[29] This assessment took account

27 Mr Gary Banks (Productivity Commission), Transcript, p. 482.

28 Ms Narelle Kennedy (Australian Business Foundation Ltd), Transcript, p. 293 (emphasis added).

29 Institute for Management Development, *World Competitiveness Yearbook*, June 2002, quoted in Submission No. 29 (Council for Knowledge, Innovation, Science & Engineering, Victoria).

of economic performance, government efficiency, business efficiency, infrastructure, the nature of research and innovation (whether oriented to basic research or not),[30] the number of patents issued, the number of personnel engaged in research, and international prizes won. Some of the relevant R&D indicators used in making the global assessment, and Australia's ranking on these indicators, are shown in Table 2.2.

2.25 The detailed information in the global assessment of innovative activity led the non-Ministerial members of the Victorian Council for Knowledge, Innovation, Science and Engineering to conclude that:

> The total number of Australian patents in force is relatively high (12th rank) but other countries are catching up (32nd rank for change in patents granted to residents).
>
> Business expenditure on R&D (17th rank) lags total spending on R&D (14th rank). Likewise, the total number of R&D personnel in business enterprises (19th) lags the total number of R&D personnel nationwide (13th). This indicates that government is currently investing more significantly in R&D than business.[31]

2.26 Further insights into Australia's innovative capacity and achievement are available from the measures of 'current competitiveness' prepared by the World Economic Forum. This shows Australia as ranked ninth in 2001-02, up from 15th in 1998-99.[32] The 'current competitiveness indicator' has two elements: 'company operations and strategy', and

30 'Basic research' is defined by the ABS as being 'experimental and theoretical work undertaken primarily to acquire new knowledge without a specific application in view'. It contrasts to 'applied research' which is defined as 'original work undertaken in order to acquire new knowledge with a specific application in view'. A further category mentioned in this report is 'experimental development' which is defined as 'systematic work, using existing knowledge gained from research or practical experience for the purposes of creating new or improved products / processes' (ABS, *Research and Experimental Development: Higher Education Organisations Australia, 2002*, Cat. No. 8111.0, Glossary, p. 20).

31 Council for Knowledge, Innovation, Science and Engineering, Victoria, Submission No. 29 (Non-Ministerial members of the Victorian Council for Knowledge, Innovation, Science and Engineering), Attachment A, quoting from the Institute for Management Development, *World Competitiveness Yearbook*, June 2002.

32 'The Current Competitiveness Index [CCI] examines the microeconomic bases of a nation's GDP per capita and provides insights into the level of GDP per capita that is sustainable into the medium term. Unless firms are fundamentally improving their operations and strategies and competition is moving to a higher level, growth will be snuffed out. The CCI is a bottom-up type of indicator that is attuned to the corporate base rather than macro measures of performance and is based on survey data rather than hard data.' World Economic Forum, quoted in Submission No. 29 (Council for Knowledge, Innovation, Science and Engineering, Victoria), Attachment A, p. 2.

'quality of the national business environment'. The Forum found that in 2001/2002, Australia's business environment was ranked in seventh position ahead of company practice in 24th position. The specifically R&D factors used by the Forum are listed in Table 2.3.

Table 2.2: R&D indicators in relation to global assessment of innovative activity in 75 countries

R&D indicators	Australia's rank
Patent and copyright protection	10
Basic research	11
Scientific articles	11
Total R&D personnel nationwide per capita	12
Number of patents in force	12
Nobel prizes	13
Nobel prizes per capita	13
Total R&D personnel nationwide	13
Total expenditure on R&D	14
Securing patents abroad	16
Business expenditure on R&D	17
Patents granted to residents	17
Patent productivity	18
Total expenditure on R&D per capita	19
Total R&D personnel in business enterprises	19
Total expenditure on R&D%GDP	21
Business expenditure on R&D per capita	21
Total R&D personnel in business per capita	21

Source: Institute for Management Development, *World Competitiveness Yearbook*, June 2002, quoted in Submission No. 29 (Non-Ministerial members of the Victorian Council for Knowledge, Innovation, Science and Engineering), Attachment A, p. 1.

2.27 On the basis of these figures, the Victorian non-Ministerial Council for Knowledge, Innovation, Science and Engineering concluded that:

- Much of the supporting infrastructure for R&D in Australia is in place with world-class tax credits (sixth rank) and subsidies (eighth rank) for firm-level research

and development as well as high-quality scientific research institutions (ninth rank);

- Business enterprises, however, are not taking full advantage of the supporting infrastructure. Firm-level innovation is very low (35th rank) as is company spending on R&D (23rd rank);
- There is room to improve the linkages between universities and industry (14th rank) and the technology transfer resulting from foreign direct investment (21st rank) in order to facilitate R&D and improve Australia's technological sophistication (16th rank).[33]

Table 2.3: R&D indicators used by the World Economic Forum to rank the current competitiveness of 75 countries

R&D indicators	Australia's rank
Tax credits for firm-level R&D	6
Subsidies for firm-level R&D	8
Quality of scientific research institutions	9
Firm-level technology absorption	13
University/industry research collaboration	14
Technological sophistication	16
Foreign direct investment and technology transfer	21
Company spending on R&D	23
Availability of scientists and engineers	24
Firm-level innovation	35

Source: Institute for Management, *Development World Competitiveness Yearbook,* June 2002, quoted in Submission No. 29 (Non-ministerial Council for Knowledge, Innovation, Science and Engineering), Attachment A, p. 2.

2.28 The information in the *World Competitiveness Yearbook* indicates that Australia's overall innovation performance compares well to other countries, particularly when it is realised that the most recent data on business expenditure on R&D 'precedes the commencement of *Backing Australia's Ability* which includes a number of initiatives aimed at increasing BERD'.[34] These initiatives are described in the following chapter.

2.29 The Commonwealth Department of Industry, Tourism and Resources concluded that:

33 Council for Knowledge, Innovation, Science and Engineering, Victoria, Submission No. 29, Attachment A, p. 2.

34 Commonwealth Department of Education, Science and Training, Submission No. 64, p. 11.

> Australia's innovation performance based on internationally comparable data is consistently high—in the top ten of the 30 OECD member countries... [This is due to] the relative strength of our skills base, the competitive cost of labour, and the capacity of Australian businesses to transfer technology throughout the economy.[35]

2.30 The Department of Industry, Tourism and Resources added:

> Australia has the highest number of domestic and international strategic alliances for the size of its economy. Further, Australian businesses have one of the strongest relative capacities to integrate technology into their operations - the number of young science technology graduates in the labour force is 42% higher than the OECD average.
>
> Research by the United States-based Economist Intelligence Unit has rated Australia second only to the US in its provision of an environment conducive to the development of e-business opportunities. This is critical to Australia maximising its position in the emerging information economy.[36]

2.31 The Chief Scientist added his support for Australia's improved, and impressive, innovation performance when he stated that the 'most recent data' shows:

> 16 start-up companies per one billion dollars of research expenditure in the year 2000—this is a survey undertaken, with a fair amount of rigour, of the medical research institutes, the government-funded research agencies and the universities, so it is fairly comprehensive—versus 13.8 in the US and 37.5 in Canada. You can look at this and say we are on track for the sort of target that I had proposed to the Prime Minister's Science, Engineering and Innovation Council a year or so ago of creating 250 start-up companies from our public investment in R&D within five years, with an expectation that this will add $20 billion per annum… to our exports… [This] is telling us that we are now getting the settings more right than we have in the past.[37]

---

35 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 12.

36 *ibid.*

37 Dr Robin Batterham (Chief Scientist), Transcript, p. 467.

Conclusion

2.32 On the basis of the information outlined in this chapter, the committee concludes that Australia's level of BERD is relatively low, but increasing, when compared to OECD countries. However, our general productivity, innovative activity and the national competitiveness of the Australian economy in recent years gives the Committee cause for confidence. Nonetheless, every effort should be made to increase the level of BERD for reasons that are explained in the following chapters

3

Commonwealth government support for R&D

3.1 This chapter provides information about the Commonwealth government's expenditure on science and innovation, its expenditure on R&D by portfolio areas (and the major research agencies within those portfolios), the general nature of government sector expenditure (both Commonwealth and the states) and the key Commonwealth programs designed to influence R&D.

Commonwealth government expenditure on science and innovation

3.2 The Commonwealth government's Budget for 2003-04 indicates that expenditure on science and innovation is expected to amount to $5,426 million, made up of the following components:[1]

- $1,372 million to be expended by the major Commonwealth research agencies;
- $890 million to be expended on science and technology support (including expenditure by the National Health and Medical Research Council and the Cooperative Research Centres);

---

1 The Hon Dr Brendan Nelson MP (Minister for Education, Science and Training), media release, 13 May 2003, *Science and Innovation*, Table 1 *Summary of Major Commonwealth Support for Science and Innovation through the Budget and Other Appropriations*; and Table 2 *Major Commonwealth Research Agencies, Budget Expenditures.*

- $1,006 million on innovation support, which includes expenditure on the R&D tax concessions and the R&D START program; and
- $2,158 million on higher education research (see Table 3.1 below).

Table 3.1: Summary of major Commonwealth support for science and innovation ($m), 2003-04

MAJOR COMMONWEALTH RESEARCH AGENCIES	**$M**
Defence Science and Technology Organisation (DSTO)	355
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	568
Other R&D agencies	449
Sub-total	**1372**
SCIENCE AND TECHNOLOGY SUPPORT	
NH&MRC and other health	378
Cooperative Research Centres	202
Rural	202
Energy and environment	63
Other science support	43
Sub-total	**890**
INNOVATION SUPPORT	
IR&D tax concession	484
R&D START	162
Other innovation support	354
Sub-total	**1006**
HIGHER EDUCATION RESEARCH	
Australian Research Council (ARC)	414
Other R&D support	1744
Sub-total	**2158**
TOTAL COMMONWEALTH SUPPORT	**5426**
%GDP	0.68

Source: Commonwealth Government Budget 2003-04, *Science and Innovation,* Table 1

3.3 It was noted in chapter 2 that Australia has a relatively high ratio of public sector R&D expenditure to GDP (see Table 2.1). The Commonwealth Department of Education, Science and Training told the committee that:

> Commonwealth government financing of R&D [in 2000-01] reached an all-time high of $3.9 billion—an increase of 13% over 1998-99.[2]

2 Commonwealth Department of Education, Science and Training, Submission No. 64, p. 2.

3.4 The information in Table 3.1 shows that Commonwealth expenditure in 2003-04 will increase even further, to $5.4 billion.

3.5 Both the Industry Commission and its successor body (the Productivity Commission) found that the level of Commonwealth government support for R&D is high in international terms:

> Whilst the level of direct support by Government through grants or loans is low by international standards it provides one of the highest overall levels of support when both direct and indirect support, through tax credits and concessions, is considered. Next to Canada, Australia provides one of the highest levels of support for non-defence business R&D.[3]
>
> When all forms of assistance were accounted for, business R&D appeared to be more highly supported in Australia than in most other countries.[4]
>
> Subsidy rates for R&D in Australia are generally comparable or more generous than those overseas, particularly when you look more closely at what looks like a beaut program overseas and you discover that it is quite selective in its application and so on.[5]

Expenditure on R&D by Commonwealth government research agencies

3.6 The 2003-04 Budget shows anticipated expenditure of $1,372 million on R&D by Commonwealth government research agencies, broadly distributed as follows:

- $813 million (59% of the total) to be expended by research agencies within the Education, Science and Training portfolio;
- $355 million (26% of the total) to be expended in the Defence portfolio;
- $102 million (7%) to be expended within the Environment and Heritage portfolio; and
- $96 million (7%) to be expended in the Industry, Tourism and Resources portfolio.

---

3 Industry Commission, *Report of Research and Development*, Canberra, 1995, quoted in Submission No. 50 (Australian Research Council), p. 8.

4 Productivity Commission, *Trade & Assistance Review 1999-2000*, p. 73.

5 Mr Gary Banks (Productivity Commission), Transcript, p. 481.

3.7 Table 3.2 shows this information in greater detail (by research agency within each portfolio area). Three agencies are collectively responsible for over 80% of the R&D expenditure of Commonwealth research agencies—they are the Commonwealth Scientific, Industrial and Research Organisation (CSIRO), the Defence Science and Technology Organisation (DSTO) and the Australian Nuclear Science and Technology Organisation (ANSTO).

Table 3.2: Commonwealth Budget outlays on R&D, by major research agencies, 2003-04

AGRICULTURE, FISHERIES AND FORESTRY	**$M**
Australian Animal Health Laboratory	6
DEFENCE	
Defence Science and Technology Organisation	355
EDUCATION, SCIENCE AND TRAINING	
CSIRO	568
Australian Nuclear Science and Technology Organisation	219
Australian Institute of Marine Science	22
Anglo-Australian Telescope	4
ENVIRONMENT AND HERITAGE	
Antarctic Division	85
Bureau of Meteorology Research Centre	10
Environmental Research Institute of the Supervising Scientist	7
INDUSTRY, TOURISM AND RESOURCES	
Geoscience Australia	96
TOTAL	**1372**

Source: Commonwealth Government Budget 2003-04, *Science and Innovation,* Table 2.

The general nature of government sector expenditure (both Commonwealth and the states), by sectors of the economy

3.8 The ABS figures on government sector R&D expenditure omit government expenditure on the business and higher education sectors—it therefore excludes Commonwealth government expenditure on higher education and on business R&D which, as shown in Table 3.1, is significant.[6]

6 Australian Bureau of Statistics (ABS), *Research and Experimental Development: Government and Private Non-profit Organisations 2000-01,* Cat. No. 8109.0, July 2002, Explanatory Notes p. 38: 'Public sector organisations mainly engaged in higher education (for example universities) are included in the Higher Education sector whilst those mainly engaged in trading or financial activities are included in the Business Enterprise sector'. The ABS adds that the figure for the Government sector excludes local government organisations 'as it is considered their contribution to total R&D activity would be minimal' (*ibid*., p. 37).

3.9 Table 3.3 shows this sectoral expenditure for selected years: 1994-95, 1996-97, 1998-99, and 2000-01 (the most recent year for which ABS figures are available). The Table shows that all sectors of the economy are increasing their R&D expenditure. In volume terms, government expenditure on R&D in 2000-01 was 7% up on 1998-99, with the ABS finding that:

> R&D expenditure by *Commonwealth* government organisations rose by $218 million or 18%, while *state/territory* government organisations increased their R&D expenditure by $81 million or 9%.[7]

Table 3.3: Gross expenditure on R&D [GERD] in Australia in recent years ($m), by sectors

Sector	1994-95	1996-97	1998-99	2000-01
Business	3508.3	4234.7	4091.2	4825.3
Government				
-Commonwealth	1193.3	1266.6	1207.1	1428.8
-State/territory	782.8	797.7	862.8	943.6
- Govt. total	**1976.1**	**2064.3**	**2069.9**	**2372.4**
Higher education	1829.6	2307.6	2555.1	2774.6
Private non-profit	152.7	185.8	220.1	283.2
Total	**7466.7**	**8792.4**	**8936.4**	**10,251.4**

Source: ABS, *Research and Experimental Development, All Sector Summary, Australia 2000-01,* Cat. No. 8112.0, July 2002, p. 1.

3.10 The ABS found that the fields of research in which most government R&D expenditure took place were:

> Agricultural sciences ($664 million, or 32%), Biological sciences ($255 million, or 12%), Earth sciences ($207 million, or 10%), Medical and health sciences ($189 million, or 9%), Applied sciences and technologies ($188 million, or 9%) and General engineering ($181 million, or 9%)...
>
> [In terms of socioeconomic objectives] most government sector R&D expenditure ($1,139 million or 55%) was directed toward Economic development. Of this, $353 million (31%) was directed towards Plant production and primary products, $237 million (21%) towards Animal production and primary products and $237 million (21%) towards manufacturing. About 21% was directed towards

7 *Newsletters: Science and Technology Statistics Update*, ABS Bulletin No. 7, December 2002, p. 7 (emphasis added).

> Environment, 11% towards Society, 10% towards Defence, and 3% to Advancement of knowledge.[8]

The key Commonwealth programs influencing business R&D

3.11 A major expansion of the Commonwealth government's R&D programs was announced in January 2001 with the release of the program called *Backing Australia's Ability*, which was the outcome of the National Innovation Summit, held in February 2000, and the Chief Scientist's report, *The Chance to Change*, issued in November 2000.[9]

3.12 *Backing Australia's Ability* reflected the Commonwealth government's view that:

> … investment in science and innovation is an investment in Australia's economic and social prosperity. New knowledge and new ways of doing science enables us to push the boundary of what is possible with our resources and help build solutions to issues in areas such as health, the environment and industrial development.[10]

3.13 The most significant R&D support programs are described in the following section, with specific programs identified by bold text where they first appear.

Programs to promote awareness of R&D support measures

3.14 Under the government's Online Strategy, a **Business Entry Point** (BEP) has been established to facilitate industry access to information about government support. It provides:

> … a consolidated point of online access for business at all levels and areas of government through its website; facilitates the take-up of e-commerce by Australian businesses and the Government's agencies; enables transactions online; and reduces the compliance burden for businesses.[11]

---

8 Australian Bureau of Statistics (ABS), *Year Book Australia 2002 -Science and Innovation, R&D expenditure, General government sector,* Cat. No. 1301.0, pp. 1-2.

9 *Backing Australia's Ability*, Commonwealth Government 2001, p. 2.

10 Prime Minister The Hon John Howard MP, Address to the Committee for Economic Development of Australia, 20 November 2002.

11 Commonwealth Department of Industry, Tourism and Resources, Submission No. 38, p. 20.

3.15 As a complement to BEP, Industry Online includes the Department of Industry, Tourism and Resources (DITR) and AusIndustry Internet sites and the AusIndustry hotline. This provides businesses with access to accurate up-to-date information on policy and programs administered by DITR, and information about the Government and its work.[12] In addition, AusIndustry has taken specific steps to improve knowledge of the government programs in regional and rural Australia:

> A year ago we set up 14 one-person offices in regional centres around Australia, with the explicit aim of increasing awareness and accessibility. That initiative seems to be going very well.[13]

Programs to promote awareness of innovation

3.16 *Backing Australia's Ability* established a **National Innovation Awareness Program** (with $35 million funding) 'to raise understanding of the importance and commercial potential of science and technology.' The program is administered by DITR and the Commonwealth Department of Education, Science and Training (DEST).[14]

3.17 The **Innovation Access Program - Industry** commenced in June 2001 and assists industry to innovate more readily by increasing access by Australian researchers and firms to global research and technologies. DITR gave as an example:

> … the recently announced InnovationXchange, established by the Australian Industry Group, with the support of the Program, [which] will assist Australian industry to access information from around Australia and overseas on the latest research and innovations in both hard and soft technologies, education and training resources, commercialisation resources and Government programs.[15]

12 *ibid.*

13 Mr Drew Clarke (Industry, Research and Development Board), Transcript, p. 495.

14 Commonwealth Department of Education, Science and Training, *op.cit.*, pp. 8-9.

15 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 20.

3.18 Another aspect of the Innovation Access Program is the **Technology Advisory Service** (TAS), which:

> … will provide practical access to technology for day-to-day and short-term problem solving to all small and medium enterprises.[16]

3.19 Also, the Commonwealth government has joined the governments of New South Wales, Victoria, Queensland, South Australia, and the Australian Capital Territory in the **National Australian Technology Showcase** (ATS) which is:

> … a national and international campaign designed to promote leading-edge Australian technology and the skills of the companies that produce them.[17]

Programs to encourage innovation in particular industry sectors

3.20 The Commonwealth Department of Industry, Tourism and Resources (DITR) stated that:

> Finding competitive advantage may rely increasingly on collaborative processes, through market-led networks, clusters and other linkages which industry can foster. **Action Agendas** are industry-driven, and aim to position specific industry sectors to realize the opportunities of international markets and new technologies, overcome impediments and barriers, and encourage sustainable economic development and national growth.[18]

3.21 The **Automotive Competitiveness and Investment Scheme (ACIS)** encourages firms to conduct R&D in Australia through a 45% allowance on expenditure and 'there are also generous allowances for plant and equipment acquired for R&D'.[19] The ACIS program commenced in January 2001 and provides 'import duty credits to registered automotive industry participants on a quarterly basis'—it is estimated to cost $586 million in 2002-03.[20]

16 *ibid.*

17 AusIndustry, *Summary of AusIndustry Products*, 5 February 2003.

18 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 20.

19 *ibid.*, p. 17.

20 AusIndustry, *Summary of AusIndustry Products*, 5 February 2003.

3.22 The **Pharmaceuticals Industry Investment Program (PIIP):**

> **…** partially compensates participating manufacturers for the reduced prices they receive under the Pharmaceutical Benefits Scheme, in return for their commitment to undertake activities, such as R&D, in Australia.[21]

3.23 The **Textile, Clothing and Footwear Strategic Investment Program** 'encourages the industry to invest and innovate to enhance its competitiveness'.[22]

3.24 The **Shipbuilding Innovation Scheme**:

> **…** is aimed at encouraging the development of an internationally competitive shipbuilding industry in Australia [and] pays a benefit of 50% of eligible R&D capped at 2% of eligible construction costs.[23]

3.25 The **Biotechnology Innovation Fund (BIF)** program commenced in May 2001 and its funding was doubled in *Backing Australia's Ability* to $16 million for 2002-2003.[24] The program is administered by the Industry, Research and Development Board (IRDB) which stated that the program:

> … builds on Australia's competitive strengths in biotechnology by providing support at the critical "proof of concept" stage of development. Attracting capital to fund this stage of an innovation in this sector, because of the long commercialisation lead times, can be difficult and is often a substantial impediment to realising the commercial potential of an innovation… 94 projects are being supported to the tune of $21.2 million.[25]

3.26 The IRDB stated that the BIF program:

> … fits in very nicely where the market failure was perceived to be: how does a start-up biotech actually get itself to the level where it might attract investment?... [The BIF program] is an example of a very targeted merit program that plugs a current hole in the marketplace.[26]

---

21 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*

22 *ibid.*

23 *ibid.*

24 Commonwealth Department of Education, Science and Training, *op.cit.*, pp. 8-9. Also AusIndustry, S*ummary of AusIndustry Products*, 5 February 2003.

25 Industry, Research and Development Board, Submission No. 66, p. 3.

26 Mr Drew Clarke (Industry, Research and Development Board), Transcript, p. 502.

Programs to promote R&D through tax concessions

3.27 *Backing Australia's Ability* established a **175% Tax Concession Premium** for additional R&D and **R&D Tax Rebate** for small companies. These supplement the ongoing **125% R&D Tax Concession** (administered jointly by the IRDB within DITR, and by the Australian Tax Office).[27]

3.28 The R&D Tax Concession (which was first introduced in 1985) 'is the government's principal initiative to increase the amount' of BERD.[28] It is 'a broad-based, market driven incentive that supports much of the industrial R&D in Australia'[29] and:

> … allows companies incorporated in Australia, public trading trusts and partnerships of eligible companies, to deduct up to 125% of eligible expenditure on R&D activities when lodging their corporate tax returns… To attract the tax concession deduction, annual eligible R&D expenditure must exceed $20,000. Where R&D is contracted to either an approved Registered Research Agency or a Cooperative Research Centre (CRC) this expenditure threshold is waived.[30]

3.29 The IRDB stated that 'at 30 June 2002, 3,565 companies were registered for the tax concession for the 2000-01 financial year with reported R&D expenditure totalling $5.2 billion'.[31] The new measures introduced in 2001-02 included the following:

- a 175% Premium (Incremental) Tax Concession for additional investment in R&D. By December 2002, 67 companies had registered for the premium, involving $49 million of R&D.[32] A company is eligible 'to receive the 175% Premium Tax Concession, for labour costs associated with R&D, if its ratio of R&D spending to turnover exceeds the average of the previous three years';[33]

27 Commonwealth Department of Education, Science and Training, *op.cit*., pp. 8-9.

28 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 15.

29 Industry, Research and Development Board, *op.cit*., p. 4.

30 ABS, *Year Book Australia 2002 – Science and Innovation, Department of Industry, Science and Resources*, Cat No. 1301.0, p. 1.

31 Industry, Research and Development Board, *op.cit*.

32 Dr Laurie Hammond (Industry, Research and Development Board), Transcript, p. 500.

33 Council for Knowledge, Innovation, Science and Engineering, Victoria, Submission No. 29, Attachment B, p. 5.

- the R&D Tax Offset is available 'for small innovative companies, particularly those in tax-loss, to enable them to 'cash out' their R&D tax deductions'.[34] It is available:

  > … to all companies with an annual turnover of less than $5 million who spend up to $1 million per annum on R&D. These small companies… [are] eligible to receive a rebate equivalent to the value of the R&D Tax Concession. The government expects up to 1,300 companies [to] take advantage of the rebate, claiming around $13 million associated with R&D expenditure of around $30 million;[35]

- 'A new R&D plant/asset depreciation regime that allows a 125% deduction for effective life depreciation of assets used in R&D activities on a pro-rata basis'; and

- 'new requirements for R&D Plans… [marking] an important step in reinforcing the need for companies to think strategically about their R&D activities'.[36]

Grant programs to specifically encourage R&D

3.30 Grant programs to specifically encourage R&D include START, the Cooperative Research Centres (CRC) program, and the Australian Research Council's Strategic Partnerships with Industry Research and Training (SPIRT) Grants.[37] The latter two programs are separately described in this chapter.

3.31 The **START** program commenced in 1996 and is administered by the IRDB. It 'provides grants and loans to complement business expenditure for R&D'.[38] It encourages early stage companies. It is 'a merit-based program designed to assist Australian industry to undertake R&D and its commercialisation through a range of grants and loans'.[39] *Backing Australia's Ability* provided $535 million additional funding for START.[40]

---

34 Industry, Research and Development Board, Submission No. 66, p. 4.

35 Council for Knowledge, Innovation, Science and Engineering, Victoria, *op.cit.*, p. 5.

36 Industry, Research and Development Board, *op.cit.*

37 Council for Knowledge, Innovation, Science and Engineering, Victoria, Submission No. 29, Attachment B, p. 3: 'Both Programs encourage collaborative research, the former effectively subsidising research performed on behalf of industry participants or firms contracting the Centres to undertake specific projects, the latter assisting in funding university research in collaboration with industry partners.'

38 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 16.

39 Information obtained from the web site of AusIndustry: www.ausindustry.gov.au/content/azindex.cfm, accessed on 20 February 2003.

40 Commonwealth Department of Education, Science and Training, *op.cit.*, pp. 8-9.

3.32 The key features of START are:

- it is an appropriate complement to the R&D Tax Concession program;[41]
- all of the START programs are taxable;[42]
- the program is generic and competitive and is capped at $180 million per annum;[43] and
- grants of up to $15 million are available, although they typically range between $50,000 and $5 million.[44]

3.33 START is intended to run to 2006. Over the last five years, it has provided assistance to about 1,000 companies. The IRDB stated that:

> … interest in the program has accelerated significantly with the Board approving 374 grants to the value of $357.5 million in financial years 2000/01 and 2001/02… [Further,] 65% of projects have been successfully completed and only 5% of projects have failed to be completed.[45]

3.34 The START program comprises:

- **Core START**, for companies with turnover under $50 million per annum. Funding is provided 'on a matching basis and assessed against the strategic value and level of risk to the firm, together with the likely spill-over benefits of the R&D';[46]
- **START Plus**, for companies with turnover over $50 million per annum [assessed similarly to Core START];
- **START Premium**, providing further assistance for high quality projects.[47] These are 'strategic, high-risk projects involving large companies/consortia, and repayable as a royalty if the project proceeds'. Also, there are:

  > … concessional loans for companies employing under 100 to commercialise innovation—the scheme provides 50% of the project costs with interest waived

41 Industry, Research and Development Board, *op.cit.*, p. 2.

42 Council for Knowledge, Innovation, Science and Engineering, Victoria, *op.cit*.

43 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 16.

44 ABS, *Year Book Australia 2002 – Science and Innovation, Department of Industry, Science and Resources, op. cit.*, p. 2.

45 Industry, Research and Development Board, *op.cit.*

46 Council for Knowledge, Innovation, Science and Engineering, Victoria, *op.cit*., p. 3.

47 *ibid.*

in the first three years and then charged at 40% of the Commonwealth Bank Index Rate;[48]

- **START Graduate**, to help companies with turnover under $50 million employ a graduate on a R&D project [in collaboration with research institutions]; and
- **Concessional Loans**, for small companies with less than 100 employees.[49]

Pre-seed programs

3.35 *Backing Australia's Ability* provided a **PreSeed Fund** (administered by DITR) to assist in commercialising research from universities and public sector research agencies.[50] The Fund commenced in 2001 and 'is a ten year, equity-based program'.[51] It 'establishes venture capital funds to invest in projects or companies spinning out from universities or Commonwealth public sector research agencies. The funds will be managed by private sector venture capital fund managers'.[52] The Commonwealth government is contributing $72.7 million over ten years 'to a total pool of over $100 million… [to be] managed by four fund managers'.[53] The funds 'will invest up to $1 million in each selected project or company'.[54]

Programs to help firms get their products to the market place

3.36 Programs that help firms get their products to the market place include **Commercialising Emerging Technologies** (COMET) and **Building on IT Strengths** (BITS).

Commercialising Emerging Technologies (COMET)

3.37 *Backing Australia's Ability* included a provision to double the funding for the COMET Program (which is administered by DITR) to help firms get their products to the market place.[55] The program is 'largely centred around mentoring as it is delivered by private sector Business Advisers located around Australia'.[56] The program commenced in

48 *ibid.*
49 ABS, *Year Book Australia 2002.*
50 Commonwealth Department of Education, Science and Training, *op.cit.*, pp. 8-9.
51 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 16.
52 Industry, Research and Development Board, *op.cit.*, p. 5.
53 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*
54 *ibid.*
55 Commonwealth Department of Education, Science and Training, *op.cit.*, pp. 8-9.
56 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*

1999 and runs until June 2005. It began as a $30 million three-year initiative and was extended in 2001 by a further $40 million.

3.38 COMET is 'targeted at small, start up companies trying to commercialise innovative technologies'[57] and:

> … offers a tailored package of support for such things as business planning, market research and intellectual property strategies, to improve the potential for successful commercialisation.[58]

3.39 To date, the program has achieved:

> … capital raisings of nearly $100 million; 104 COMET customers have either commenced manufacture or launched their product onto the market; 23 have entered into licence agreements; 81 have formed strategic or joint venture alliances; and 82 have entered commercial agreements for the distribution, manufacturing or market release of their product.[59]

3.40 The IRDB stated that COMET:

> … is sometimes perceived in the market as a granting program that comes with a bit of advice. I think it is better characterised as an advice and support program that comes with a bit of granting. An applicant for COMET has certain criteria in terms of being a start-up company. If they are successful in getting into the program—[and] it is highly competitive—they get a business adviser assigned to them… [to encourage efforts] to make them an attractive prospect for further investment.[60]

Building on Information Technology Strengths (BITS)

3.41 The $158 million **BITS** program, administered by the Commonwealth Department of Communications, Information Technology and the Arts (DCITA), provides support to ICT start-up companies including through business incubation centres.[61] The BITS Incubator Program aims:

---

57 Industry, Research and Development Board, *op.cit.*, p. 2.

58 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 16.

59 Industry, Research and Development Board, *op.cit.*, pp. 2-3.

60 Mr Drew Clarke (Industry, Research and Development Board), Transcript, p. 497.

61 Commonwealth Department of Education, Science and Training, *op.cit.*, pp. 8-9.

> … to improve the rate of commercialisation of ICT ideas and R&D by establishing incubators to increase the success rate of new business formation in the Australian ICT industries sector. The funding allows incubator managers to assist incubates at a critical stage of their development when they may not be well served by venture capital markets.[62]

3.42 Incubators can provide up to $450,000 in assistance to start-up companies through services, seed funding or a combination of both. Up to mid-2002, 158 companies were accepted for incubation and 31 companies have 'graduated' from the program.[63]

Programs to encourage venture capital

3.43 *Backing Australia's Ability* provided support for venture capital through the **Pooled Development Funds** and **Innovation Investment Funds**.[64]

Pooled Development Funds (PDF) Program

3.44 The PDF program was established in 1992 and its object was amended in 1999 'to develop, and demonstrate the potential of, the market for providing patient equity capital (including venture capital) to SMEs'.[65] PDFs are private companies:

> … that raise capital from investors and use it to take equity in Australian SMEs. In return, PDFs and their shareholders are taxed at a lower rate on income generated through PDF activities.[66]

3.45 The program is administered by the PDF Registration Board. The estimated total customer base in 2002- 2003 is 130 companies, and the Commonwealth's contribution is estimated to be $5 million:

> Since its inception, registered PDFs have invested over $550 million in Australian companies. During 2001-02, PDFs provided over $81 million to assist Australian companies to grow.[67]

62 Commonwealth Department of Education, Science and Training, *BITS Incubator Program, Annual Report 2001-02*, p. 3.

63 *ibid.*, p. 2.

64 Commonwealth Department of Education, Science and Training, Submission No. 64, pp. 8-9.

65 *Pooled Development Funds Registration Board Annual Report 2001-2002*, Canberra, 2002, p. 6.

66 *ibid.*, p. 3.

67 *AusIndustry Products Summary*, available online at: www.ausindustry.gov.au, accessed on 26 May 2003.

Innovation Investment Fund (IIF) Program

3.46 The IIF program commenced in 1998 and is administered by the IRDB. It was established:

> … to promote the development of an Australian venture capital market for early stage, technology-based companies. The Commonwealth, in partnership with the private sector, establishes venture capital funds to invest in small technology-based companies.[68]
>
> [The IIF program] has two prongs. The companies that get the investment clearly are immediate beneficiaries but the broader objective is about demonstrating to the venture capital market that early-stage assets are a class worth entering. One of the performance indicators for IIF is other venture capitalists emerging in the same space without the need for the Commonwealth funds to go through.[69]

3.47 The Department of Industry, Tourism and Resources (DITR) noted that:

> … the government has licensed nine private sector capital funds as IIF funds to support the provision of early stage capital to new technology based firms. In total, the program is providing $358.4 million of early stage capital, of which the Commonwealth is contributing $220.7 million and the private sector $137.7 million.[70]
>
> [To date] $138.9 million has been invested in 55 companies. Of this total, $34.5 million was invested in 31 companies during financial year 2001-02. The Commonwealth Government contributed $22 million towards these investments.[71]

3.48 In the 2001-02 financial year IIF program investments were made in the following sectors:

> $5.1 million in five companies in the internet sector;
> $10.0 million in eight companies in the information technology (IT)/software, telecommunications sector;
> $15.4 million in 14 companies in biosciences; and $4.0 million

68 Industry, Research and Development Board, *op.cit.*, p. 4.

69 Mr Drew Clarke (Industry, Research and Development Board), Transcript, p. 502.

70 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 16.

71 Industry, Research and Development Board, *op.cit.*, p. 4.

> in four companies in other industries including environment, engineering and building materials.[72]

3.49 The **Renewable Energy Equity Fund** (REEF) program provides venture capital and managerial advice for small, innovative renewable energy companies. In return for the provision of capital, the fund manager acquires a part-ownership of the company and usually a seat on the Board of Directors.[73]

3.50 The program is administered by the IRDB (on behalf of the Australian Greenhouse Office) and is:

> … a specialist renewable energy venture capital fund modelled on the Innovation Investment Fund program. There are five investee companies in the REEF program representing investments totalling $6 million.[74]

Programs to foster collaboration between publicly funded research institutions and private industry

3.51 Programs to foster collaboration between publicly funded research institutions and private industry include the **Cooperative Research Centres Program**, the **Major National Research Facilities Program**, and the **Centres of Excellence Program**.

Cooperative Research Centres (CRC) program

3.52 The CRC program was launched in May 1990 to:

> … bring together researchers and research users from universities, the public sector and business. They undertake long-term, collaborative R&D ventures of substantial quality and size that contribute to national objectives.[75]

3.53 *Backing Australia's Ability* provided $227 million in additional funding for the CRC program (administered by DEST) over three years from 2003-04 to 2005-06.[76] In July 2001, there were 64 established CRCs;[77] however, this number increased to 75 in the recent selection round.[78] Each CRC is funded for seven years and the CRCs cover the

---

72 *ibid.*

73 Information obtained from the web site of AusIndustry: www.ausindustry.gov.au/content/azindex.cfm, accessed on 20 February 2003.

74 Industry, Research and Development Board, *op.cit.*, p. 5.

75 Cooperative Research Centres Committee, Exhibit No. 8, *2002 CRC Compendium*, p. vii.

76 Commonwealth Department of Education, Science and Training, *op.cit.*, pp. 8-9.

77 Department of Agriculture, Fisheries and Forestry, Australia, Submission No. 76, p. 9.

78 *Australian R&D Review*, December 2002, p. 5.

environment (winning $145 million or 30% of the total $478 million allocated), agricultural and rural based manufacturing (winning $122 million or 26% of the total), medical science and technology (winning $81 million or 17% of the total), mining and energy (winning $68 million or 14% of the total), information and communication technology (winning $46 million or 10% of the total), and manufacturing technology (winning $15 million or 3% of the total).[79]

Major National Research Facilities program

3.54 The Department of Education, Science and Training outlined the purpose and nature of this program in the following way:

> Some forms of R&D can only be conducted using large facilities and in some cases government-sponsored arrangements are required to provide infrastructure that can be shared between firms, and between basic research and commercial uses. The **Major National Research Facilities** (MNRF) program is an example of a mechanism to address this type of impediment. The MNRF program is funded through *Backing Australia's Ability* and is providing $155 million to support 15 leading-edge facilities. Other major facilities are supported through the CSIRO and the Australian Nuclear Science and Technology Organisation.[80]

Centres of Excellence

3.55 The Department of Education, Science and Training stated that *Backing Australia's Ability* also provides $176 million to establish World Class Centres of Excellence in Biotechnology [administered by DITR and the ARC] and Information and Communications Technology [administered by DCITA and the ARC], with strong industry participation.[81] The eight Centres of Excellence will receive ARC funds of $90 million over five years.[82]

Research and Development Corporations (RDCs)

3.56 While not specifically designed as a program to foster collaboration between public research institutions and private industry, the RDC framework is:

---

79 *ibid.*

80 Commonwealth Department of Education, Science and Training, *op.cit.*, pp. 8-9. (emphasis added).

81 *ibid.*

82 *Australian R&D Review*, *op.cit.*, p. 6.

> … one of the longest-standing and most successful government commitments to innovation in any industry and has also been recognised as world's best practice.[83]

3.57 There are currently 14 RDCs, which invested a total of $360 million on R&D in 2001-02, 56% ($200 million) of which was spent in public research institutions and 26% ($94.5 million) in private sector organisations.[84]

Skills programs

3.58 To improve the quantity and quality of graduate scientists, especially the likely skill requirements in key innovation areas, *Backing Australia's Ability:*

> … provided $151 million to create an additional 2000 university places each year – with priority given to ICT, mathematics and science. This will rise to 5470 places by 2005. This initiative strengthens our national skills base while meeting employers' needs for high calibre graduates in these fields.
>
> The government is also providing universities $25 million over three years from 2000-01 for the Science Lectureship initiative, a competitive grants scheme to assist universities or consortia of institutions, in partnership with industry to develop innovative approaches to science-related education, including the establishment of university lectureships and innovative course development…
>
> [And] policies have been initiated aimed at improving life-long learning at Postgraduate level. Over the five years to 2005-06 the government will lend an estimated $995 million to postgraduate students through the Postgraduate Education Loans scheme (PELS). PELS operates in a similar way to the

---

83 Commonwealth Department of Agriculture, Fisheries & Forestry – Australia (AFFA), *Innovating Rural Australia 2002: research and development corporation outcomes*, p. 11.

84 AFFA, Supplementary information provided to the committee, March 2003, *RDC R&D expenditure 2001-02 by research providers*. The RDCs include ten statutory corporations: cotton, dairy, fisheries, forest and wood products, grains, grape and wine, land and water, rural industries, sugar and tobacco. There are also industry owned RDCs in meat and livestock, horticulture, wool and pork. The RDC R&D expenditure in public research institutions in 2001-02 was allocated as follows: CSIRO 13% ($47 million); State Governments 27% ($95.5 million); Universities 16% ($57.6 million); CRCs 4% ($14.7 million).

existing Higher Education Contribution Scheme for undergraduate students.[85]

Australian Research Council (ARC) Grants program

3.59 The ARC is 'the key provider of agency support for university research' and provides 'about half of all national competitive grant support'.[86] It administers the Commonwealth Government's direct investment in higher education research through the **National Competitive Grants Program.** The ARC *Discovery* programs 'fund individual researchers and projects' and the ARC *Linkage* programs 'help to broker partnerships between researchers and industry, government and community organisations as well as the international community'.[87] The ARC stated that:

> At any one time the ARC is supporting 4,000-5,000 high quality research projects, across its two main funding programs – *Discovery* and *Linkage*. On average, each *Discovery* project involves six researchers and by the end of the project delivers 14 journal articles or books. Three per cent deliver a patent by the end of the project. On average each *Linkage* project involves six researchers and by the end of the project delivers five journal articles or books. 30% deliver a patent or have a patent pending by the end of the project.[88]

3.60 The Department of Education, Science and Training stated that the ARC *Linkage* program:

> … encourages and develops long-term strategic research alliances between higher education institutions and industry, and fosters opportunities for postdoctoral researchers to pursue internationally competitive research in collaboration with industry. Major publicly-funded research organisations such as CSIRO, are also being further encouraged to engage and expand links with industry.[89]

85 Commonwealth Department of Education, Science and Training, *op.cit*., pp. 8-9.

86 Australian Research Council, Submission No. 50, pp. 1-2.

87 Information obtained from the Australian Research Council web site: www.arc.gov.au/about_arc/default.htm, accessed on 13 May 2003.

88 Australian Research Council, Submission No. 50, p. 12.

89 Commonwealth Department of Education, Science and Training, *op.cit*., p. 9.

Programs to encourage R&D by Australian-based overseas companies

3.61 **Invest Australia** (within DITR) encourages overseas companies to base R&D activities in Australia. It utilises:

> … investment specialists, in key locations around the world, [who] work with Australian staff and State and Territory Governments to market the competitive advantages of investing in Australia and identifying potential investors. Invest Australia also provides continued support to assist companies considering expansion within Australia.[90]

Conclusion

3.62 The Commonwealth government's R&D programs that are described in this chapter are broad and extensive, meriting the description of a very 'diverse suite of measures'.[91] The programs that are specifically geared to SMEs include COMET, BIF, IIF, Pre-seed funding, and START.[92] The introduction of such programs shows that 'R&D policy, over time, and certainly since the Industry Commission's 1995 report, has evolved in ways that much better meets the needs of SMEs'.[93] As many of the programs are relatively new and are still bedding-down, the full effects of the R&D programs are yet to be realised.

90 Commonwealth Department of Industry, Tourism and Resources, *op.cit.*, p. 20.

91 Mr Gary Banks (Productivity Commission), Transcript, p. 482.

92 Prof. Don Nicklin (Industry, Research & Development Board), Transcript, p. 493.

93 Mr Gary Banks (Productivity Commission), *op.cit.*

4

Business investment in R&D

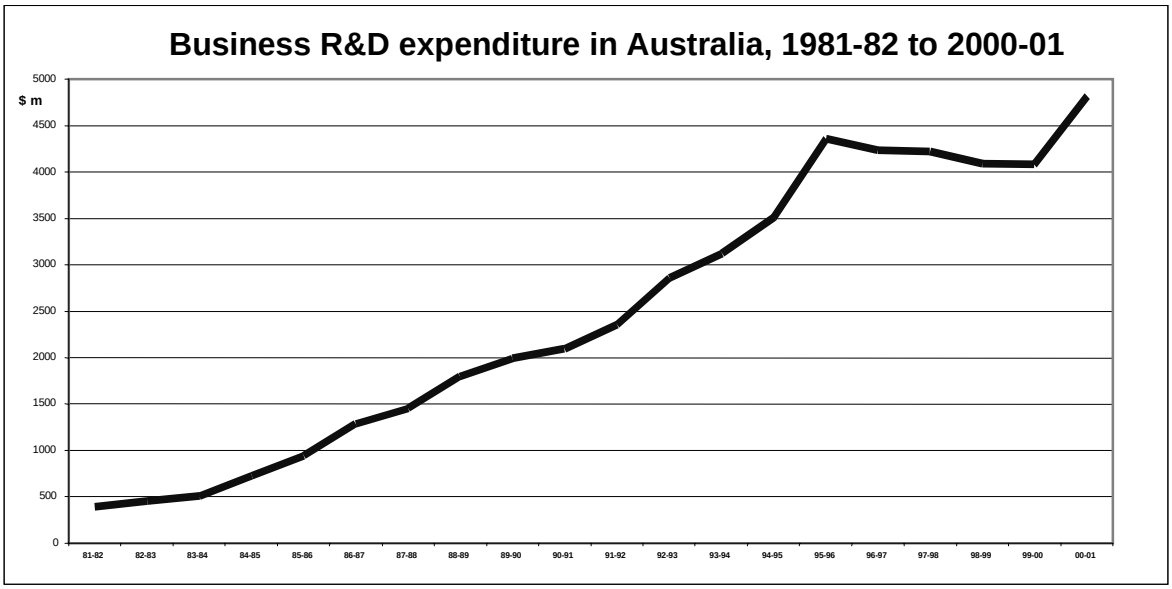
4.1 In 2000-01 the business sector spent $4,825 million (at current prices) on R&D which amounted to 47% of Australia's gross expenditure on R&D (see Table 3.3, on page 23 of the preceding chapter). By comparison, the federal and state governments spent $2,372 million, or 23%, of gross expenditure on R&D. The higher education sector spent $2,775 million or 27% of the gross expenditure on R&D, and the private non-profit sector spent $283 million, or 3% of the total expenditure (all figures are derived from Table 3.3).

4.2 The twenty-year long-term trend line of BERD is strongly upward, as shown in the following chart covering the period 1981-82 to 2000-01 in current dollars. In this time, BERD has grown 'from around 0.25% to 0.72% of GDP, representing an almost ten-fold increase in current dollar BERD and an almost three-fold increase as a per cent of GDP'.[1] The 2000-01 figure for BERD was 12% higher than the level recorded in 1999-2000, once the effect of changes in prices and wages and salaries is removed.[2]

---

1 Commonwealth Department of Industry, Tourism and Resources, Submission No. 38, p. 6. Source: Australian Bureau of Statistics (ABS), Bulletins, Cat. Nos. 8104.0, 8109.0, 8111.0, 8112.0, 8114.0 (various years) and 5206.0 (March 2002).

2 Australian Bureau of Statistics (ABS), *Research and Experimental Development, Businesses Australia,* Cat. No. 8104.0, July 2002, p. 3.



Source: ABS Cat. No. 8104 for 1992-93 and 1994-95 onwards; ABS Cat. No. 8114 for 1991-92 and 1993-94.

4.3 The Productivity Commission considered that 'the rate of growth in BERD is internationally comparable to, if not ahead of, the pack'.[3]

4.4 There were two reasons given by DITR for the dip in the trend line between 1995 and 1999. They were the ending of the mining boom after 1997-98 and the 'significant one-off increase in the utilisation of R&D incentives' in 1996 related to changes to the tax concession arrangements, removal of R&D syndication, amendments to the types of deductions that could be claimed and limits on the time within which companies could submit claims.[4]

4.5 The Department of Industry, Tourism and Resources stated that 'a striking trend' has been the increase in business expenditure on services:

> Over the period since 1992-93 [there] has been a relatively strong growth in R&D expenditure in services, particularly in computer and communications-related services (ICT services). The 2000-01 BERD data indicate that, for the first time, R&D expenditure in services and construction industries exceeds that in manufacturing. 37% of Australia's

3 Mr Gary Banks (Productivity Commission), Transcript, p. 487.

4 Commonwealth Department of Industry, Tourism and Resources, Submission No. 38, pp. 5-6.

> business effort in R&D now relies on an ICT-related skills base.[5]

4.6 In broad terms, 55% of BERD was spent on engineering and technology, and 26% was spent on information, computing and communication sciences. In greater detail, business expenditure on R&D went into the following industry sectors:

- $2,170 million into manufacturing (45% of total business expenditure on R&D);
- $831 million into property and business services (17% of BERD);
- $456 million into mining (9% of BERD);
- $388 million into wholesale and retail (8% of BERD);
- $264 million into finance and insurance (5% of BERD);
- $218 million into scientific research (5% of BERD); and
- $498 million into 'other' sectors (10% of BERD).[6]

4.7 Greater detail on where BERD is spent appears in Table 4.1 below. Most BERD was spent on experimental development, which confirms the view that 'business commitment to research is for research that will produce short-term gain', usually related to 'the development of new or improved products, processes, materials or services'.[7] The ABS stated that:

> In 2000-01, experimental development was the most significant type of R&D activity undertaken by businesses. Expenditure on experimental development was $3,333 million (69% of total R&D expenditure). Applied research accounted for $1,188 million (25%), while basic research accounted for $304 million (6%). The industry with the highest proportion of its R&D expenditure directed towards experimental development was the wood and paper products industry (92%). Applied research was highest in the industrial machinery and equipment industry (40% of its R&D expenditure) and the scientific industry (38%). Basic

5 *ibid.*

6 Australian Bureau of Statistics (ABS), *Research and Experimental Development, Businesses Australia 2000-2001,* Cat. No. 8104.0, July 2002, p. 15 (Table 8).

7 CSIRO, Submission No. 22, p. 15 and p. 18.

research was low in all industries, with the scientific research industry recording the highest percentage (14%).[8]

Table 4.1: Where BERD is spent

Research field	BERD ($m)	% of total BERD
Computer software	$729	15
Communications technologies	$548	11
Manufacturing engineering	$390	8
Automotive engineering	$349	7
Other information, computing and communication sciences	$309	6
Other engineering and technology	$305	6
Medical and health sciences	$299	6
Resources engineering	$288	6
Information systems	$221	4
Chemical sciences	$174	4
Mechanical and industrial engineering	$163	3
Metallurgy	$158	3
Agricultural, veterinary and environmental sciences	$154	3
Electrical and electronic engineering	$147	3
Industrial biotechnology and food sciences	$129	3
Biological sciences	$122	3
Materials engineering	$103	2
Chemical engineering	$ 73	2
Physical sciences	$ 51	1
Earth sciences	$ 50	1
Mathematical sciences	$ 31	1
Other research fields	$ 31	1
Total [not add to 100 due to rounding]	**$4824**	**99**

Source: ABS, *Research and Experimental Development, Businesses 2000-2001*, Cat. No. 8104.0, p. 15.

4.8 Medium and large firms accounted for most expenditure on R&D by businesses:

> The largest businesses, employing 1000 or more, accounted for 39% of total R&D expenditure (34% in 1999-2000). On average, this was more than $14 million per business undertaking R&D…

8 ABS, *Research and Experimental Development, Businesses Australia, op. cit.*, p. 5.

> Small businesses accounted for 11% or R&D expenditure in 2000-01… and businesses employing less than ten people accounted for 6% of the R&D (5% in 1999-2000). This averaged out at approximately $242,000 for each business undertaking R&D.[9]

4.9 Notwithstanding this finding by the ABS, one SME pointed to a trend among large companies to increasingly use SMEs for their R&D because:

> … they are unable to do the R&D as cheaply as we could do it and, in some instances, are simply unable to do the R&D themselves because of the way they are internally structured—mainly for operations as opposed to R&D.[10]

4.10 Foreign-owned businesses were responsible for over 40% of BERD, with the ABS finding that:

> Within the manufacturing industry, 44% of BERD came from foreign businesses (71% in the case of BERD on motor vehicles, parts and other transport equipment; 47% in the case of BERD on electronic and electrical equipment / appliances). Within the wholesale and retail industries, foreign-owned businesses accounted for 75% of the industry BERD. Within the property and business service industry, foreign firms accounted for 45% of industry BERD. For businesses mainly involved in scientific research, only 8% of industry BERD came from foreign firms.[11]

4.11 Businesses with majority ownership in the United States provided 22% of total BERD in 1999-2000 and businesses with majority ownership in the European Union provided 12%. Other countries provided 8%, with Australian businesses providing the balance (58% of total BERD).[12]

---

9 *ibid.,* p. 6.

10 Mr John Corrigan (Filtra Ltd), Transcript, p. 587.

11 Australian Bureau of Statistics (ABS), *Australia Now: Science and Innovation – Foreign ownership characteristics of business undertaking research and experimental development activity in Australia*, August 2002, pp. 2-5. Reproduced from ABS, *Australian Economic Indicators*, Cat. No. 1350.0, August 2002.

12 *ibid.,* p. 6.

4.12 In terms of where the money for BERD came from, the ABS found that:

> … the business sector provided most of the R&D expenditure itself: $4,337 million (90%) was sourced from Own funds and $78 million (2%) came from Other businesses. The Commonwealth government provided $171 million (4%) while 207 million (4%) came from Overseas.[13]

4.13 Most of BERD was spent in-house:

> Extramural R&D expenditure (payments to other organisations to undertake R&D projects) by businesses was [only] $408 million in 2000-01, of which $343 million was paid to organisations located in Australia and $65 million to organisations located overseas.[14]

4.14 Labour costs accounted for 44% of BERD, with the ABS finding that:

> Labour costs as a proportion of R&D expenditure was low for the Mining industry (22%) and high for the Property and business services industry (61%).[15]

Conclusion

4.15 Business expenditure on R&D (BERD) in Australia is substantial and rising at internationally comparable rates. Most of BERD is spent on experimental development activity. Just under half of BERD is spent in the manufacturing sector but R&D expenditure in the services sector is rising quickly. Foreign firms are responsible for over 40% of BERD. The funding of BERD is largely internally generated from businesses.

13 ABS, *Research and Experimental Development, Businesses Australia, op. cit.*, p. 5.

14 *ibid.*, p. 7.

15 *ibid.*, p. 5.

5

The needs of fast-growing companies and R&D drivers in SMEs

5.1 There is no universally accepted definition of a 'fast-growing' business. The traditional view is that it refers to a company that has high employment growth; however, it could also refer to a company displaying rapid turnover growth. A 1998 study found that 'micro-businesses' (defined as being either non-employing or having less than five employees) were the fastest growing companies, with employment growth of over 4% pa. While small in size, these companies are responsible for major job generation in Australia.

5.2 However defined, fast-growing companies are estimated to comprise only 5% of Australian companies. Science and technology companies fall within this group, with small staff on generally higher than normal salaries. Such companies are motivated by fear of 'technology obsolescence' reflecting the fact that they are:

> … under constant pressure to improve and innovate in order to maintain their commercial viability. On average, 70% of [their] current revenue was from "new" products developed within the last five years.[1]

5.3 In general, the R&D drivers of fast-growing companies are similar to those for SMEs, though they may be assumed to be even more urgent (that is, the general driver to make profits – see below – is heightened for a fast-growing company which needs the revenue stream to pay for its rapid expansion).

---

1 Australian Electrical and Electronic Manufacturers' Association Ltd, Submission No. 68, p. 1.

5.4 The committee was told that there are many drivers of R&D activity in SMEs. The first and foremost is the need for profit. An industry group said that 'companies do R&D because they want to grow and expand, build better markets, have new products and services, and export. Those things are the drivers'.[2] And the CSIRO told the committee that businesses aim 'to improve productivity and grow market share to increase profitability'.[3]

5.5 In order to make profits, a firm must have successfully commercialised its R&D and established its distinctiveness in the market. Various witnesses stressed this point:

> For any existing business to decide to invest in R&D, the initial expenditure produces no income until the R&D is commercialised.[4] SMEs spend most of their time on R&D because they have to keep moving to find market niches.[5] The way in which you maintain or grow that market is to be able to differentiate, to show a value proposition.[6]

> You tend to plateau with existing products, so you need to be constantly putting money into R&D.[7] Companies surveyed [by the Australian Electrical and Electronic Manufacturers' Association Ltd] suggest that their business activities could be sustained for a period of approximately 3.5 years in the absence of on-going R&D. Companies were under constant pressure to improve and innovate in order to maintain their commercial viability. On average, 70% of current revenue was from "new" products developed within the last five years.[8]

> We have been in R&D from day one; that was 25 years ago. We are not a build size but we have always developed our own products… I guess our decision is always: we are going to do it anyway because we have got to; we have got to have

2 Mr Tony Pensabene (Australian Industry Group), Transcript, pp. 130-131.
3 Mr Mehrdad Baghai (CSIRO), Transcript, p. 237.
4 Institution of Engineers, Australia, Submission No. 72, p. 7.
5 Ms Lindley Edwards (Venture Group Ltd), Transcript, p. 584.
6 Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 188.
7 Mr Ian Charlton (Ecosol Pty Ltd), Transcript, p. 510.
8 Australian Electrical and Electronic Manufacturers' Association Ltd, Submission 68, p. 1.

> new products. .. we have got to be out there competing. If we do not do it, we are going to go backwards.[9]

5.6 The availability of capital is a crucial driver of R&D activity but:

> … there are a number of capital gaps because, as the market gets more difficult, funders who have money for rent push their investments further up the value chain [meaning] that emerging and nascent ventures find it hard to access funding.[10]

5.7 For SMEs, this situation often means that they must seek venture capital which, however, may come at a high price because of the uncertainty surrounding the SME's capacity to successfully commercialise its R&D. The Australian Venture Capital Association noted that:

> … the vast majority of SMEs in the venture capital sector experience considerable difficulty in raising capital to fund their operations, let alone fund R&D activities.[11]

5.8 An individual firm is affected by the general level of economic activity in Australia: if the business cycle is down and profits are generally low, then businesses are unlikely to have the funds for R&D; if the times are good for business, then the situation is reversed. This point was made by an industry association which stated:

> If you understand the fact that R&D has a very strong business cycle nature of it, after four years of companies with weak profits and weak business conditions holding off on their R&D activity, and with the economy going so strongly, it inevitably produces a large demand at a point in time.[12]

5.9 The same point was made by SMEs, one of whom told the committee that:

> R&D is something off the side that we spend some money on if times are good. If times are hard, the labs fall off the end, the research staff is on the dole and that is the end of it.[13]

---

9 Mr Kevin Gillman (Queensland Manufacturing Leaders' Group; and Managing Director of AV Syntec Pty Ltd), Transcript, pp. 381-382.

10 Ms Lindley Edwards (Venture Group Ltd), Transcript, p. 580.

11 Australian Venture Capital Association Ltd, Submission No. 31.1, pp. 1-3; also Mr Mark Goldsmith (Australian Venture Capital Association), Transcript, p. 389.

12 Mr Tony Pensabene (Australian Industry Group), Transcript, p. 121.

13 Dr Geoffrey Swincer (Flexichem Pty Ltd), Transcript, p. 517.

5.10 In order to make profits and expand their business, SMEs need to get their products or services onto the market quickly:

> I think our members are now realising that the way to grow the golden egg is to be more innovative, to develop new products and better processes, and to get them to the market quickly, because that is the name of the game in contemporary manufacturing.[14]

5.11 The availability of an export market can greatly assist an SME and thus act as a driver for R&D, especially given Australia's small domestic market. Nearly all SMEs stressed the importance of export markets, as suggested by the following quotations:

> We have only got 18 million people in Australia and three million in New Zealand. What market do we have?... We have to be export oriented and global right from the very beginning.[15]

> The world is our market. The Australian market is simply too small to support a company like ours. I would say that, for every 100 systems we sell, 99 would go offshore.[16]

> If you want to grow a company—and we are talking in this case about fast growth companies…—you have to gain exports. That is where the market is.[17]

> Our nascent organisations need to start looking at export markets a lot earlier than most other countries.[18]

> I should point out that, in 20 years, our company has never done business in Australia; we have been a 100% export business from day one. As a high-tech company, our markets have always been principally in the United States.[19]

5.12 The nature of government incentive programs can boost a firm's access to capital, for example the government's tax offset (cash rebate) is particularly attractive to SMEs because they are so short of equity.[20] And the government's START grant is also attractive to SMEs, one of which stated that it:

14 Ms Heather Ridout (Australian Industry Group), Transcript, p. 128.
15 Dr Patricia Crook (Dynek Sutures Pty Ltd), Transcript, p. 525.
16 Dr Stephen Sykes (Flavourtech Pty Ltd), Transcript, p. 457.
17 Prof. Murray Gillin, Transcript p. 90.
18 Ms Lindley Edwards (Venture Group Ltd), Transcript, p. 584.
19 Dr Ben Greene (Electro Optic Systems Pty Ltd), Transcript, p. 585.
20 Deloitte Touche Tohmatsu, Submission No. 59, p. 11 and p.28.

> … has been crucial to our ability to quickly establish substantial R&D capability of our own in-house… It has also given our customers much greater confidence in us.[21]

5.13 It helps businesses, especially SMEs, if government R&D support measures are administratively simple and not too costly:

> It is difficult for business to deal with the R&D tax concession and related incentives.[22] [There is a] belief that the paperwork required to register for the tax concession scheme is biased towards larger companies, not SMEs.[23]

> Whilst the changes to the [taxation concession] legislation in 2001 were touted as a major boon for business, we believe the associated record keeping requirements are a continuing impediment to applications for the concession.[24]

> [There should be a] reduction in the government charge on patent annuity holdings.[25]

5.14 Government tender and purchasing policies can act as a driver for business R&D, as one SME stressed:

> The Commonwealth government is in a powerful position to foster business innovation by designing tenders and tender processes that are conducive to innovation.[26]

5.15 It is not just access to capital, or access to export markets, that can be facilitated by government programs. They can also foster collaboration with public sector research bodies and thus enable firms (especially SMEs) to access this type of research. The CSIRO stated that:

> Studies of technological innovation, especially in the more rapidly growing industries, inevitably conclude that business research and innovation depend to a very high degree on public sector research.[27]

---

21 Dr Stephen Sykes (Flavourtech Pty Ltd), Transcript, pp. 456-460.
22 Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript p. 189.
23 Deloitte Touche Tohmatsu, Submission No. 59, p. 28.
24 Flavourtech Pty Ltd, Submission No. 78, p. 5.
25 The Australasian Institute of Mining & Metallurgy, Submission No. 3, pp. 5-7.
26 Wave Global Pty Ltd, Submission No. 15.1 (supplementary submission).
27 Mr Mehrdad Baghai (CSIRO), Transcript, p. 238.

5.16 This was said to be particularly the case in Australia because we have 'few large firms' and it is 'only large firms [that] can sustain a significant research effort', stated the CSIRO,[28] which added:

> Firms that build on the outputs of public sector research face reduced levels of technical risk… [and can utilise] public sector facilities that they would not be able to justify constructing for themselves.[29]

5.17 Companies that spin off from public sector research agencies are said to have a high survival rate—and 'survival' is obviously a driver of R&D as no R&D can be done by a company that has gone out of business. The committee was told by an academic that:

> My estimates of the survival rate of these companies after five years are about 75%. Some work… in France gives the same figure. This is significantly higher than the survival rate of other types of new start-ups… [And] they are very quick to establish strategic alliances… They are much more prone to develop these alliances than perhaps established companies seem to be.[30]

5.18 Knowledge of government R&D support measures is another driver of R&D, especially by SMEs which:

> … are often too concerned with the daily conduct of their businesses to know or care about the nitty gritty of taxation benefits for which their company may be eligible.[31]

5.19 Knowledge of industry characteristics and especially of research and market opportunities is another driver of R&D. This knowledge can be facilitated by the 'clustering' of like-minded businesses—governments need 'to stimulate or support networks, particularly among SMEs', said Deloitte Touche Tohmatsu;[32] and the Chief Scientist enthusiastically endorsed clusters, noting that:

> One example [of a productive cluster] is Melbourne's $150 million Monash strip that encourages bright young companies and university research to create new business opportunities. Sometimes the clusters develop around an industry or an idea, even though the companies may be

28 CSIRO, Submission No.22, p. 5.

29 *ibid*., pp. 15-16.

30 Mr John Yencken, Transcript, pp. 87-88.

31 Deloitte Touche Tohmatsu, Submission No. 59, p. 10.

32 *ibid*., p. 24.

> scattered widely. AUSTMINE, consisting of 130 firms spread across the country, now earns $2 billion annually through exports on mineral know-how. Clusters are a key strategy to allow SMEs to move away from the preoccupation of day to day survival and move more to the strategic horizons. Note, however it can take a decade to reap the rewards.[33]

5.20 Access to major international corporations can also be a driver to R&D activity by SMEs, as suggested by one international pharmaceutical firm:

> In a complex global industry such as pharmaceuticals, successful innovation is dependent on strong relationships between global corporations… and smaller R&D-focused companies. To this extent, the presence and activity of global corporations in Australian R&D is critical if small and medium sized Australian companies are to reach their full potential.[34]

5.21 As well as major international corporations, the presence of very large Australian companies can act as a driver of R&D by SMEs—it is 'critical', stated an industry representative, to involve big companies because they are 'going to pull a lot more SMEs behind them'.[35]

5.22 Business R&D is greatly affected (if not exactly driven) by the general macroeconomic environment in which businesses operate. This environment includes the education, taxation, and regulatory systems, each of which is significantly affected by decisions of governments. 'You cannot talk about science and innovation without talking about tax, education and business', said a senior scientist,[36] whose own organisation noted that:

> A whole-of-government approach to increasing business commitment to R&D would span education, R&D, taxation, health, trade, foreign affairs and industry policy.[37]

5.23 This extends to the nature of the intellectual property (IP) regime within a nation, which particularly benefits businesses (especially SMEs) if it incorporates measures to smoothly and swiftly register IP

---

33 Dr Robin Batterham (Chief Scientist), Submission No. 25, p. 2.

34 Merck, Sharp & Dohme (Australia) Pty Ltd, Submission No. 55, p. 3 and p. 7.

35 Dr Edwin van Leeuwen (Intelligent Manufacturing Systems), Transcript, p. 322.

36 Dr Stuart Carr (Australian Nuclear Science & Technology Organisation), Transcript, p. 352.

37 Australian Nuclear Science and Technology Organisation, Submission No. 52, p. 9.

and resolve IP disputes. In this respect, the committee was told by a SME that the current IP regime 'is slow to review disputes' (taking up to five years to resolve IP disputes) and is 'non-committal when it comes to providing mechanisms to expedite the resolution of such conflicts'.[38]

5.24 Lastly, consistent government policies affecting business R&D are a key driver of R&D activity, as suggested by many submitters including the Mining Institute which stated that 'one of the main impediments to private R&D is the ever-changing government initiatives'.[39] The Business Council of Australia expanded on these policies by drawing attention to the fact that 'frequent changes in taxes, subsidies, compliance requirements and the like can undermine efforts to induce higher BERD'.[40]

Conclusion

5.25 The R&D drivers of SMEs and fast-growing companies include the following:

- profit;
- successful commercialisation of R&D;
- establishment of a distinctive presence in the market;
- access to capital;
- the general level of economic activity in Australia;
- speedy access to markets (especially overseas markets);
- government incentive programs and government tender / purchasing policies;
- collaboration with public sector research bodies;
- knowledge of the industry sector in which the firm operates;
- the presence of major international corporations (and large companies generally); and
- the national macroeconomic climate including the education, taxation, regulatory and legal systems.

38 Bosmin, Submission No. 2, p. 2.

39 The Australasian Institute of Mining & Metallurgy, Submission No. 3, pp. 5-7.

40 Business Council of Australia, Submission No. 58, p. 2.

6

Considerations by which major international corporations site their R&D investment

6.1 The committee was told that there are a number of considerations by which major international corporations site their R&D investment, of which the most important are cost and control concerns:

> Multi-national corporations are rationalising operations driven by cost and control concerns… [and are pulling back] to a few centres closer to major markets and centres of management or locations with compelling cost advantages (that is, China).[1]

> Increasing competition and market pressure for cost reduction is expected to result in the paper industry reducing its R&D investment in Australia and overseas… For most companies, R&D investment must be sharply focused and with shorter-term returns than may have been the case in the past.[2]

6.2 A second consideration for major international corporations is the extent to which a country is 'innovation friendly'.[3] This involves factors such as the availability of university / government / commercial research institutions, 'the availability of a world-class telecommunications infrastructure'[4] and 'the capacity for IT

1 Ericsson AsiaPacificLab Australia, Submission 14, p. 4.

2 Australian Paper Industry Council, Submission No. 44, pp. 4-5.

3 Dr Mark Tennyson (Merck, Sharp & Dohme (Australia) Pty Ltd, Transcript, pp. 330-331.

4 Nortel Networks (Australia) Pty Ltd, Submission No. 70, pp. 8-9.

enablement',[5] the presence of 'leading-edge customers to stimulate demand [and] innovation', 'world-class skills availability with a focus on excellence in vocational training / teaching / research', 'culture training in entrepreneurship'[6] and the availability of companies 'that can function as partners when the R&D project requires the use of outside resources'.[7]

6.3 A major pharmaceutical company summed up these factors by saying that, in Australia, 'cost here is very positive [and the] quality [of research] is phenomenal'.[8] Similarly, a global telecommunications equipment supplier said that 'increasingly, Australia is an internationally competitive location for cost and quality'.[9]

6.4 Holden stated that it is the innovative nature of R&D conducted in Australia that is:

> … the essential means by which Holden can compete against larger manufacturers with greater resources [and which enables Holden to] adapt more quickly to market changes and capitalise on the opportunities that change presents.[10]

6.5 This suggests that the capacity to foster 'important seed ideas [and] niche areas of research'[11]—as well as the capacity to develop niche products with relatively small production runs (and to quickly adjust those production runs)[12]—is an important consideration for where major international corporations site their R&D activity.

6.6 The standard of 'pre-competitive research support'[13] is another consideration for major international corporations, since they can tap into that research base and utilise its outputs, both intellectual property (IP) and personnel. 'We source the best R&D wherever we

---

5 Ms Jenny Johnston (Bristol-Myers Squibb Pharmaceuticals), Transcript, pp. 611-612.

6 Ericsson AsiaPacificLab Australia, Submission No. 14, pp. 5-6.

7 Nortel Networks (Australia) Pty Ltd, Submission No. 70, pp. 8-9.

8 Miss Catherine McGovern (GlaxoSmithKline), Transcript, p. 603.

9 Mr James Clarke (Nortel Networks (Australia) Pty Ltd), Transcript, p. 609.

10 Holden Ltd, Submission No. 57, pp. 8-9. Also Federal Chamber of Automotive Industries, Submission No. 73, p. 5.

11 Dr Bill Ketelbey (Pfizer Pty Ltd), Transcript, p. 369.

12 Mr Paul Armarego (Intelligent Manufacturing Systems), Transcript, p. 324: 'One of the reasons Australian companies have often been quite attractive in the IMS field… is their ability to do very highly effective short production runs'.

13 Ericsson AsiaPacificLab Australia, Submission No. 14, pp. 5-6.

can', said BHP, because 'we are a global company'[14]—and Australia does the world's best R&D in the minerals and mining sector.[15]

6.7 A further consideration for major international corporations is an 'empathetic legal / financial / taxation environment'.[16] International companies like a legal system that does not act as 'a disincentive for bigger companies and other players overseas to want to do business or make an alliance with us'.[17] The international corporations look for a legal system that can 'harmonise' with the legal system they are most familiar with.

6.8 An important aspect of the legal system is the adequacy of the IP regime which, in Australia's case, was said to be 'the fourth best country in the world in terms of its IP protection… [and] that gives us an element of security about IP'.[18] Also, international companies find it attractive 'if the legal system for acquisitions and takeovers [is in] line with overseas standards'.[19]

6.9 Similarly, major international corporations look for a financial, taxation and regulatory environment that is familiar to them. In relation to the latter, major international corporations stated that 'there are significant impediments to investment by pharmaceutical companies in the Australian economy… [including] issues of access to market, and pricing and reimbursement processes'.[20] The combined effect of:

> … the Pharmaceutical Benefits Scheme process and price outcomes… mean that we are not in a strong position to lobby our parent company for further R&D investments as we are unable to be confident about the return on that investment.[21]

---

14 Dr Edwin van Leeuwen (BHP Billiton; and member of Intelligent Manufacturing Systems), Transcript, p. 315.

15 Mr Richard Davies (Australian Mineral Industries Research Association International Ltd), Transcript p. 257: 'The Australian mineral industry research is clearly the best in the world'.

16 Ericsson AsiaPacificLab Australia, Submission No. 14, pp. 5-6.

17 Prof. Murray Gillin, Transcript p. 91.

18 Prof. Graham Macdonald (Merck, Sharp & Dohme (Australia) Pty Ltd, Transcript, p. 341.

19 Mr John Yenken and Prof. Murray Gillin, Submission No. 19, pp. 4-5.

20 GlaxoSmithKline, Submission No. 26, pp. 6-8.

21 Merck, Sharp & Dohme (Australia) Pty Ltd, Submission No. 55, p. 4.

6.10 Consistency of government policy is an important consideration for major international corporations when making their R&D investment decisions. They look for 'policy continuity (bi-partisanship) and national consistency (state/federal) to reduce duplication of effort/brand dilution'.[22]

6.11 The clear association of a country with a 'brand' is a consideration for major international companies in choosing where to site their R&D investment. Such a brand can arise from the international identification of a country with particular fields of research but, stated a major pharmaceutical company:

> … the lack of… national coordination of science activities and attraction of R&D investment is an impedient to an "Australian R&D" investment message reaching overseas entities… Australia does not present a united front to the rest of the world in relation to our research capacity.[23]

6.12 Access to markets is another key consideration for major international corporations. This was indicated by Ericsson in its reference (above) to the size of the Chinese market as a key factor in deciding to retain a presence there but not in Australia. It is also spelt out in the following comment by the Taxation Institute of Australia:

> From an international perspective, Australia does not offer the most attractive incentives for multinational corporations to relocate their R&D facilities. As Australia is a relatively small economy, there are no natural reasons for foreign companies to develop full manufacturing and research facilities in Australia. Australia is physically located at the fringe of the Asia Pacific Rim and the distance between Australia and the Asian market is, clearly, an issue. Further, as ASEAN countries are forming a free trade zone with extensive bilateral tax free trade agreements that are currently being negotiated with Japan, South Korea and other countries, Australia may be kept out of this significant market. Therefore, it is possible that multinational corporations may locate their operating hubs for the region in Asia rather than Australia, despite our political stability and advanced communication infrastructure.[24]

---

22 Ericsson AsiaPacificLab Australia, Submission No. 14, pp. 5-6.

23 GlaxoSmithKline, Submission No. 26, pp. 6-8.

24 Taxation Institute of Australia, Submission No. 67, pp. 4-5.

6.13 The conclusion drawn by the Taxation Institute, in light of the above, was that:

> In order to compete with other countries, it is necessary to provide more attractive incentives for companies to locate their operations to Australia.[25]

6.14 So the nature of government incentive programs is a consideration for major international corporations. If they cannot access a particular government incentive, then this may act as a deterrent to R&D investment by those companies. This is the case with access to tax concessions by international pharmaceutical companies which keep their IP overseas—and hence are ineligible for the concession. On the other hand, the PIIP—which has no restriction on where IP is held—has encouraged R&D activity: 'In the first year of PIIP, R&D activity by the eligible companies increased by 29%'.[26] The government's commitment to funds for biomedical research and the introduction of ARC Federation Fellowships, which encourage skilled researchers to return to Australia, have also encouraged R&D activity.[27]

6.15 In a similar vein, Holden pointed out that, though it sees 'the R&D tax concession as the principal funding mechanism… to offset its considerable investment in R&D', the combination of the company tax rate (30%) and tax concession (125%) is a negative consideration because 'in many cases highly innovative programs are unable to pass the business case hurdles due to the lack of financial support for R&D'.[28] Further, the 175% tax concession is of 'of little relevance' because it 'only applies to incremental expense above a base level'—but, said Holden, 'an industry like automotive manufacturing… has a very high, steady rate of R&D expenditure' and so cannot access the concession.[29]

6.16 Because of the globalisation of industry and the fact that countries compete against one another for investments by major international corporations, then the extent to which government incentives in Australia compare to those offered elsewhere are a consideration in investment decisions by international companies. In this respect, two major international pharmaceutical corporations pointed to the

25 *ibid.*

26 Pfizer Pty Ltd, Submission No. 65, pp. 2-3.

27 *ibid.*, pp. 2-3 and pp. 8-9.

28 Holden Ltd, Submission No. 57, pp. 14-15.

29 *ibid.*, p. 15.

'aggressive' nature of the incentives offered by the Singapore government: 'We are losing quite a lot of business from our Australian operation to Singapore', stated Bristol-Myers Squibb; and GlaxoSmithKline decided to site its Asia-Pacific research hub in Singapore, rather than in Australia, because:

> Singapore offered things like training, access to postdoctoral students, easy visa capacities, the capacity for your children to go to school in Singapore more readily, then follow on to university and then actually stay in Singapore.[30]

Conclusion

6.17 The considerations by which major international corporations site their R&D investment include the following:

- cost and control concerns;
- the extent to which a country is innovation-friendly;
- the standard of pre-competitive research support;
- the nature of the legal, financial, taxation and regulatory environment;
- the consistency of government policy and incentive programs;
- the national 'brand' of a country; and
- access to markets.

6.18 The committee notes, in particular, that major international corporations with R&D facilities in Australia have a high regard for the competitive cost and very high quality of Australian researchers.

30 Miss Catherine McGovern (GlaxoSmithKline), Transcript, p. 199. A report commissioned by Medicines Australia, Exhibit No. 27, *Comparing Australian & Singaporean Investment Environments*, lists the special incentives provided by the Singaporean government to attract the pharmaceutical manufacturing sector. The incentives are principally tax based and include exemption from corporate income tax for a period of up to ten years. Singapore aims to become the region's centre for clinical trials and drug development by 2010. Biomedical science is one of four manufacturing industry sectors targeted by the Singaporean government for aggressive investment attraction programs (p. 5).

7

Economic benefit for Australia of a greater private sector investment in R&D

7.1 The Australian and New Zealand Association for the Advancement of Science (ANZAAS) told the committee that:

> Historically, research and development played a vital role in Australia's economic and social development. Without research, primary industries (in both the agricultural and mining sectors) could never have become the great drivers of national development. Australian research and technological innovation have led to internationally important advances in industry, medicine and pharmacology.[1]

7.2 The economic benefit to Australia from a greater private sector investment in R&D is generally stated to be of two kinds: prosperous firms and a healthy economy.[2] Their combination will lead to higher

---

1 Australian & New Zealand Association for the Advancement of Science Inc, Submission No. 37, p. 1.

2 Dr Robin Batterham (Chief Scientist), Transcript p. 466, quoting Lord Sainsbury, Britain's Science Minister: 'Business's ability to innovate is vital to its global competitiveness. It is only by continually developing new products, processes and services that business can gain the competitive edge necessary for the increasingly global economy. R&D is a key component of this, helping to generate the advances that lead to new value-added products and enabling people and capital to be more effective'; Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript pp. 183-184: 'There has been a number of economic studies that have concluded that there is a clear link between technological progress and economic growth… One such analysis estimates that some 49% of economic growth comes from technological progress. Another found that, for every 1% increase in the nation's investment in R&D, there is an increase in productivity of some 0.23%'.

economic growth[3] characterised by increased employment and increased export income,[4] a more educated population,[5] higher paying jobs,[6] greater knowledge transfers,[7] and greater tax revenue for the government from employees and companies.[8]

7.3 These considerations lie behind the Chief Scientist's vision of Australia providing the right conditions for 10% of Australian companies (50,000 companies) to become high-growth companies:

> I want some 50,000 SMEs to grow from one to twenty employees to aspire to grow as have Cochlear, ResMed, Memtec and Radiata (the honor roll of Australian-born global companies…
>
> By growing ten times the number of home grown globally focused companies, the chances of Australia creating a global brand of the ilk of Nokia, increase significantly. The result would be a massive increase in export dollars.
>
> Australia's aim should be to get as many of our companies as we can to the top end of the scale for global SMEs. From that position they can either be sold at a handsome profit, or else go on to become a world brand. Either way the benefit is great for Australia.[9]

---

3 Ms Heather Ridout (Australian Industry Group), Transcript p. 118: 'We identified increasing our R&D effort as one of the fundamental steps needed to drive strong economic growth in Australia'; Australian Paper Council, Submission No. 44, p. 6: 'Innovation generates gains in productivity, spawns new industry and transforms existing businesses'; Dr Stephen Sykes (Flavourtech Pty Ltd), Transcript p. 457: 'If private R&D expenditure was increased in both absolute and relative terms, we would expect to see increased economic growth due to a better balanced, more efficient and more effective national innovation system'.

4 Prof. Peter Gerrand (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 80.

5 Mr Don Larkin (Australasian Institute of Mining and Metallurgy), Transcript, p. 58: 'The challenge for the [mining] industry and the Australian government is to attract these major [international] corporates, which make decisions on a global basis, to invest in R&D in Australia. The flow-on effects from that will be in the education sector, where we can provide the human capital or the skills resources for these global companies to practice world-wide'.

6 Mr Robert Muir (Australian Nuclear Science & Technology Organisation), Transcript, p. 355.

7 Mr John Latham (Pfizer Pty Ltd), Transcript, p. 371.

8 Mr Robert Muir (Australian Nuclear Science & Technology Organisation), Transcript, p. 350.

9 Dr Robin Batterham, Submission No. 25, pp. 1-2.

7.4 The presumption that greater BERD produces prosperous firms needs to be qualified by the realisation that the driver of R&D in any business is profitability (see chapter 5). BERD 'is an investment and will ultimately be driven by perceived returns in the marketplace',[10] meaning that a rational business will only increase its expenditure on R&D if it perceives that to do so will increase its profitability:

> We see we will make more money out of spending on R&D than out of not spending it, and this is why we do it.[11]

7.5 The Federation of Australian Scientific and Technological Societies (FASTS) stated that:

> There have been a number of studies over the last six to ten years which, in a number of major OECD countries, have shown that the return on investment in R&D is of the level of 25-30% direct return [to the individual firm]. Then there is an additional rate of return, which is another 25% on top of that, to raise it to the order of 50-60% return. That is known as a "social rate of return" whereby the indirect benefits of that research, which perhaps were not even envisaged by the original researcher, are captured by other people and turned into new products and new technologies.[12]

7.6 FASTS added, however, that it can 'take five years to realise' these sorts of returns.[13]

7.7 As noted in chapter 2, a higher level of BERD does not necessarily equate to higher productivity—and it is the latter that enables an economy to grow. While R&D can deliver massive productivity gains,[14] this is not necessarily the case. However, BERD is an important part of the innovation system that 'is ultimately the source

---

10 Mr Terrance Lowndes (Commonwealth Department of Industry, Tourism and Resources, Transcript, p. 213.

11 Dr James Fox (Australian Innovation Association), Transcript, p. 181.

12 Dr Ken Baldwin (Federation of Australian Scientific & Technological Societies), Transcript, p. 28. Also Commonwealth Department of Industry, Tourism and Resources, Submission No. 38, p. 3: 'The OECD has demonstrated that R&D contributes to output and total factor productivity growth, and the Productivity Commission estimates that the social rate of return on Australia's R&D is 25-90%. Private R&D expenditures can generate significant spill-over benefits to the economy justifying government intervention to increase investment in R&D and ultimately to increase economy-wide welfare'.

13 Dr Ken Baldwin, *ibid.*, p. 29

14 Mr Richard Clark (Ericsson AsiaPacificLab Australia), Transcript, p. 300.

of economic benefit' via productivity growth,[15] reflecting the findings of many studies suggesting that innovation is 'the single most important ingredient in any modern economy'.[16]

7.8 Further, the presumption that greater BERD produces a healthy economy needs to be qualified by noting that the economy will suffer if firms undertake unprofitable R&D which generates no return. The Productivity Commission observed that 'more R&D is not necessarily better—either better R&D or better for the economy'.[17] The representative of a major international corporation thought that many firms did not sufficiently query even the level of R&D that they were currently undertaking:

> You have to challenge that, if your R&D does not get to an outcomes base—whether that is a better quality of life, or a product or a service—then, overall, what is it for? I do not think we are challenging that enough, to be quite honest. [18]

7.9 Just as firms need to carefully appraise any decision to increase their R&D activity, so governments need to appraise the effect of their incentive measures to ensure that a healthier economy is indeed the outcome. This is further commented upon in Chapter 10 of this report.

7.10 Witnesses drew attention to the economic benefits of particular sectors of the Australian economy that undertake a high level of R&D. One such sector is mining which does the world's best R&D[19] and which massively contributes to the Australian economy: 'the mining technology and services sector… generates about $2 billion of business a year'.[20] The benefits of mining R&D spill over to other sectors of the economy, for example the research into 'cleaning up the mess' from mining activity has led to the development of software and techniques that are 'worth more than the actual materials that were invested'.[21]

---

15 Mr Terrance Lowndes (Commonwealth Department of Industry, Tourism and Resources), Transcript, p. 213.

16 Mr Mehrdad Baghai (CSIRO), Transcript, p. 237.

17 Mr Gary Banks (Productivity Commission), Transcript p. 481.

18 Mr Warren King (Raytheon Australia Pty Ltd), Transcript p. 623.

19 Prof. Tim Napier-Munn (Australasian Institute of Mining & Metallurgy), Transcript, p. 58.

20 *ibid*., p. 59.

21 Mr Toss Gascoigne (Federation of Australian Scientific & Technological Societies), Transcript, p. 30.

7.11 In a similar vein, a major international pharmaceutical company stated that the 'spin-off benefits' of the pharmaceutical industry:

> … were around 4,500 jobs and $550 million worth of benefits that went out into the community [as well as] export products worth around $450 million [and a similar level of local sales].[22]

7.12 Further, the committee was told that the multiplier effect of one dollar of government support for the automotive industry (by way of investment in the Automotive Competitive Investment Scheme or ACIS) 'was in the order of seven or eight times that investment'.[23]

7.13 The CSIRO told the committee that independent research showed great benefits from its R&D:

> Benefit-cost evaluations of CSIRO projects show significant returns:
>
> - 17 manufacturing projects had benefit-cost ratios ranging from 0.5 to 72;
> - seven minerals and energy projects had benefit-cost ratios between three and 39;
> - 12 environment projects had benefit-cost ratios from 0.3 to 29;
> - 29 agri-business projects had benefit-cost ratios of 0.4 to 236.
>
> Results for the four more recent projects were that: Robotic mining had a benefit-cost ratio of 96 and an internal rate of return of 720%; the RoadCrack project had a benefit-cost ratio of 91 and an internal rate of return of 45%; the aXcess Australia low emission vehicle project had a benefit-cost ratio of 130 and an internal rate of return of 51%; the Vesta bushfire control project had a benefit-cost ratio of 81 and an internal rate of return of 70%.
>
> The report concluded that the present value of anticipated benefits from just four successful current triennium projects will be many times CSIRO's total triennium funding.[24]

---

22 Dr Mark Tennyson (Merck, Sharp and Dohme Australia Pty Ltd), Transcript p. 331.

23 Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 193.

24 CSIRO, Submission No. 22, p. 20, citing the Centre for International Economics *Assessing the Contribution of CSIRO*, November 2001.

Conclusion

7.14 The committee considers that the economic benefit to Australia from a greater private sector investment in R&D is considerable, though there are limits to the amount of BERD that businesses will outlay, the principal one being set by the perceived returns in the marketplace.

8

Impediments to higher business investment in R&D

8.1 The impediments to a higher level of business investment in R&D that were identified by submitters and witnesses, and which impact in varying degrees upon BERD, include the following:

- the location of Australia and the relative size of our economy in the global context;
- aspects of the Australian culture and the way that Australia 'projects' itself to the world;
- Australia's industry structure;
- the management 'culture' in Australia;
- the actions of foreign companies;
- the commercialisation of research;
- the challenge of marketing globally;
- the intellectual property (IP) regime;
- the higher education sector;
- the financial sector;
- regulatory activity both in Australia and overseas;
- government policies and programs designed to facilitate R&D;
- financial incentives for scientists and entrepreneurs; and
- a shortage of skills.

The location of Australia and the relative size of our economy in the global context

8.2 Some witnesses stated that an impediment to business R&D was Australia's remote location[1] though others thought this was simply 'an excuse' for not conducting R&D in Australia.[2] There appeared to be some sympathy for the view that:

> We are so far away from key markets and from decision-makers, the stress that is on Australian companies is significantly higher than on companies that are sitting in the US and Europe.[3]

8.3 These factors were said to contribute to 'a gap of confidence' by Australian firms in competing overseas.[4]

8.4 In relation to major international corporations, the 'tyranny of distance' was said to affect the decision-makers in their head offices,[5] meaning that:

> Australia now has to win R&D investments in a highly competitive international market… [in which] most countries have some advantages over Australia.[6]

8.5 Australia's small size (only 2% of the world's R&D is carried out here) was also said to be an impediment to higher business expenditure on R&D.[7] It was forcefully put to the committee that our small size necessitated a focus on overseas sales:

---

1 Dr Stephen Sykes (Flavourtech Pty Ltd), Transcript, p. 461: Australia is 'in a remote location'; also Wildlife Management International Pty Ltd, Submission No. 60, pp. 4-5: 'Our physical isolation' and 'our distance from viable markets is a serious impediment'; Australian Electrical and Electronic Manufacturers' Association Ltd, Submission No. 68. p. 5: Australia is 'a small and isolated economy'.

2 Dr Bill Ketelbey (Pfizer Pty Ltd), Transcript, p. 362: Distance 'is not a problem… [but] it was used as an excuse'; also Dr Mike Elliot (GlaxoSmithKline), Transcript, p. 198: 'I do not take distance as being a reasonable excuse'.

3 Dr James Fox (Australian Innovation Association), Transcript, p. 167; also Wildlife Management International Pty Ltd, Submission No. 60, p. 6: 'Given the constraints on pursuing research in Australia relative to Europe or the Untied states, we suspect this means much higher levels of taxation incentives and much higher levels of real assistance to the private sector than are provided to our international competitors by their respective governments'.

4 Mr Mehrdad Baghai (CSIRO), Transcript, p. 249.

5 Mr Richard Clark (Ericsson AsiaPacificLab Australia Pty Ltd), Transcript, p. 307.

6 Nortel Networks, Submission No. 70, p. 9.

7 Mr Richard Clark (Ericsson AsiaPacificLab Australia Pty Ltd), Transcript, p. 301: 'There is no doubt' that the size of the Australia market militates against R&D in Australia; also

> Our domestic economy is so small that even if you are 30% cheaper you can never make a buck out of R&D, in Australia alone… The commercialisation process requires a critical mass of activity in industry and it requires a recipient of the size to be able to commercialise it… If you do not, from day one, have a mindset that you are going to sell most of your output outside Australia, you are just not going to make it happen economically.[8]

Aspects of the Australian culture and the way that Australia 'projects' itself to the world

8.6 Australia's 'brand' image as a country was said to relate to tourism and sports rather than to business[9] but 'gold medals in the swimming pool will not pay the national debt'.[10] One witness stated that 'culturally, in Australia we accept the hero sportsman, but we are not really quite so sure about business people';[11] and another person said that the main impediments to greater private investment in R&D in Australia:

> … are founded on a long period of lack of national recognition of the importance of R&D to our society. Our sports heroes or artists often gain instant recognition while our technologists are usually inconspicuous. This feature is evident in our various honours lists, "Australian of the Year" and similar opportunities for national recognition.[12]

Taxation Institute of Australia, Submission No. 67, p. 4: 'Australia is a relatively small economy'.

8 Dr James Fox (Australian Innovation Association), Transcript, pp. 165-166.

9 Ms Patricia Berman (Commonwealth Department of Industry, Tourism and Resources), p. 224: 'As a country we are known for certain pleasures—sport and so on—and we are very proud… to be talking about those. We do not have that same pride for other things'; also, Mr Richard Clark (Ericsson AsiaPacificLab Australia Pty Ltd), Transcript, p. 302: 'Perhaps our tourism and sports image overseas actually gets in the way of us having a technological image'.

10 Mr Richard Clark (Ericsson AsiaPacificLab Australia Pty Ltd), Transcript, p. 307.

11 Prof. Murray Gillin, Transcript, p. 97.

12 Bosmin, Submission No. 2, pp. 3-4.

Australia's industry structure

8.7 The large number of SMEs in the Australian economy, and the fact that most SMEs don't undertake R&D (one witness stated that the R&D expenditure of SMEs would be less than 'their electricity bill'[13]), was said to be an impediment within at least one industry sector, that of manufacturing.[14] The committee was told that in 1998 'an astonishingly low number' of Australian companies undertook R&D (fewer than 20 companies spent more than 5% of sales on R&D and only 3,000 companies registered for the tax concession).[15] The Australian Industry Group stated that only 'one in 25' manufacturing companies do any R&D;[16] and only 24% of manufacturing companies have any relationship with universities, CRCs or the CSIRO.[17] Businesses were said not to know what universities have to offer.[18]

8.8 Where they do R&D, the SMEs were said to do it 'just on a one-off basis' rather than continually.[19] The long timeframes involved in R&D were said to not suit SMEs.[20]

8.9 In its 1996-97 survey of technological innovation in manufacturing businesses, the ABS found that 7% of the total turnover of small businesses was spent on innovative activities (on average). Further, the ABS found that the rate of small businesses undertaking technological innovation fell from 1993-94 to 1996-97: from 28% to 22%. Whereas 'almost two-thirds of large businesses had staff dedicated to innovation work', the ABS found that 'less than one-quarter of small businesses had staff dedicated to this work'.[21] The 4% of firms that are very large are responsible for 70% of business R&D,[22] so any reduction in their R&D expenditure has a significant impact on Australian R&D.

---

13 Ms Heather Ridout (Australian Industry Group), Transcript, p.123.

14 Mr Kevin Gillman (Queensland Manufacturing Leaders' Group), Transcript, p. 374.

15 Dr James Fox (Vision Systems Limited), Warren Centre Innovation Lecture, 2002, pp. 9-10 (Exhibit No. 6).

16 Ms Heather Ridout (Australian Industry Group), Transcript, p. 115. This is apparently derived from the ABS *Year Book Australia 2002* which states that 'just over a quarter of manufacturing businesses undertook technological innovation'.

17 Mr Tony Pensabene (Australian Industry Group), Transcript, p. 117.

18 Mr Peter Woodgate (Royal Melbourne Institute of Technology), Transcript, p. 143.

19 Mr Mehrdad Baghai (CSIRO), Transcript, p. 242.

20 Ms Catherine Livingstone (Australian Business Foundation), Transcript, p. 283.

21 ABS, *Year Book Australia 2002*.

22 Mr Tony Pensabene (Australian Industry Group), Transcript, p. 118.

8.10 Some manufacturing companies were said to have 'a fear of collaborating and sharing information', which acted as an impediment to awareness of R&D.[23] The collaboration that does occur can take place at several levels, including in relation to early research activity affecting the whole (or much) of an industry. In the case of mining, the industry research group (Australian Mineral Industries Research Association International) saw itself as 'the seed corn at the front end of pre-competitive work'. However, 'the bulk of the [R&D] work will still be done either on a one-on-one basis with the same researchers or in-house',[24] that is, it is targeted at the level of the individual company. Both stages of research activity need to be examined before concluding that the lack of collaboration by Australian firms is an impediment to business R&D.

8.11 It was said that the food industry in Australia has such low margins that it does not have the funds to conduct R&D but rather, focuses almost entirely on influencing the nature of government regulations affecting the industry.[25] In contrast to the food industry, the rate of return on R&D investment in the pharmaceutical industry is potentially very high, thus encouraging R&D activity.[26]

8.12 The small number of major international corporations in Australia was said to be an impediment to further business R&D.[27] To the extent that these international corporations locate their research laboratories overseas, then Australian postdoctoral students—even if they are working in private business—are tempted to go overseas for

---

23 Mr Angus Robinson (Intelligent Manufacturing Systems), Transcript, p. 311.

24 Mr Dick Davies (Australian Mineral Industries Research Association International), Transcript, pp. 257-262.

25 Mr John Grace (Victorian Council for Knowledge, Innovation, Science and Engineering), Transcript, p. 76: 'The one salient feature of the food manufacturing industry is that it is a very low margin business. Therefore, commitments to spend money on R&D are always impacted by that'; also, Mr John Yencken, Transcript, p. 94: 'A lot of small companies on the food production side… were not at all interested in R&D; they were interested in regulations'.

26 Mr John Grace (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 76: 'R&D in the pharmaceutical industry is very high because… if you do produce something that can demonstrate a benefit, you get a reasonable price for it and therefore the margin is fairly high in those sorts of products'.

27 Mr Terrance Lowndes (Commonwealth Department of Industry, Tourism & Resources), Transcript, p. 219: 'Most R&D is done by large firms… [and] a lot of those [in Australia] are foreign-owned and the multinationals tend to do more of their R&D in their country of origin than they do in other places'.

'the real pressure cooker [research] experience', and many will stay overseas.[28]

8.13 Australia's historical 'legacy of a rather inward-looking manufacturing industry' was said to be an impediment to R&D,[29] reflecting the time when Australia had 'a particularly poor investment environment'[30] and Australians themselves lived in 'a fool's paradise'.[31] This legacy contributes to:

> … that clichéd view of the Australian mindset: that it is risk averse, and that enterprise and entrepreneurship are not as valued as in other cultures such as the United States.[32]

8.14 In general, 'there is a stigma attached to business failure here' that does not exist in the US.[33]

8.15 The overall result of these factors is said to be that Australia is 'not sending a clear message about being innovation friendly'.[34]

8.16 In response to a query about whether Australia's industry structure has led Australian businesses to achieve a lower rate of return on their R&D investment than do businesses in other OECD countries, government officials stated that they were unaware of any evidence to this effect.[35]

8.17 The diminishing proportion of the agricultural sector to the Australian economy appears *not* to be an impediment to R&D activity, in large part because of the success of the rural research and development corporations (RDCs). These have been 'fantastically

---

28 Dr Kevin Fahey (Pfizer Pty Ltd), Transcript, p. 371: 'There are some laboratories around Australia where you could get that [post-doctoral] experience but the real pressure cooker experience is definitely in the big companies in the Northern Hemisphere'.

29 Mr Gary Banks (Productivity Commission), Transcript, p. 488.

30 Dr Bill Ketelbey (Pfizer Pty Ltd), Transcript, p. 361.

31 Mr Peter Cockbain (Institution of Engineers, Australia), Transcript, p. 420.

32 Dr Evan Arthur (Commonwealth Department of Education, Science and Training), Transcript, p. 50.

33 Prof. Tim Napier-Munn (Australasian Institute of Mining & Metallurgy), Transcript, p. 59.

34 Dr Mark Tennyson (Merck, Sharp & Dohme, Australia), Transcript, p. 330.

35 Mr Grahame Cook (Commonwealth Department of Education, Science and Training), Transcript, p. 44: 'We know that private sector returns to R&D in the US are high, but unfortunately we do not have the same type of information for private returns to R&D in Australia… We postulate that perhaps a relatively low BERD to GDP ratio could be a consequence of a lower rate of return here relative to other major OECD countries… but this hypothesis remains untested'.

successful'[36] and are an international model for best practise in generating R&D from thousands of individual farmers.[37]

The management culture

8.18 Some witnesses stated that 'a key reason for the under-investment in BERD is the lack of Chief Executive Officer / Board conviction that innovation is a major driver of business success'.[38] Spending big on R&D was perceived 'as a weakness' by some managers, and many company boards were said to be:

> … more comfortable in authorising multi-million dollar advertising programs or outback drilling programs rather than targeted, market driven R&D aimed at new products.[39]

8.19 Shareholders were said to be reluctant to approve expenditure on R&D, with one SME stating that, although 'we spend between 25% and 40% of our total revenue on R&D [and] would like to spend more', some of the shareholders 'do not want us to spend more on R&D': instead, they want the company to concentrate simply on selling existing manufactured products that are good sellers.[40]

8.20 It was suggested that some businesses were not interested in developing a business plan that incorporated R&D;[41] instead, R&D was perceived as discretionary expenditure that came out of the

---

36 Mr Grahame Cook (Commonwealth Department of Education, Science and Training), Transcript, p. 51.

37 Rural Research and Development Corporations, Submission No. 24, p. 1: 'Informal comment by US expert observers recently indicates that they consider the RDC model as leading world practice for rural R&D'; and also see Department of Agriculture, Fisheries & Forestry – Australia (AFFA), *Innovating Rural Australia 2002: research and development corporation outcomes*, p. 11.

38 Australian Industrial Research Group, Submission No. 53, p. 3; also Prof. Michael Barber (Australian Academy of Science), Transcript, p. 3: SMEs in particular 'do not have the management experience to handle the new types of investment risk involved'; Dr Stephen Sykes (Flavourtech Pty Ltd), Transcript, p. 458: 'I think the most important factor in fostering an R&D culture in [SMEs] is the attitude of senior management. If senior management are committed, the rest will follow'.

39 Dr James Fox (Australian Innovation Association), Transcript, p. 166 and Dr James Fox, (Vision Systems), Exhibit No. 6, p. 8: Australia has an 'underlying culture of asset speculation and punting on "El-Dorado"'.

40 Dr Chris Goddard (GroPep Ltd), Transcript, p. 507.

41 Mr Kevin Gillman (Queensland Manufacturing Leaders' Group), Transcript, p. 381: 'One of the other difficulties is getting companies ready for R&D. I think a lot of it even comes back to a stage before that, in their business planning'.

bottom line.[42] It did not help, said one SME, that accounting standards took no account of R&D:

> There are all these financial measures which boards and managers look at for companies and those measure [return] on investment and all the ratios that they rattle on about, but not one of them talks about R&D. It just does not count.[43]

The actions of foreign companies

8.21 The trend among major international corporations to centralise and review their R&D operations (pulling them back towards the countries in which head office is located), was seen as an impediment to higher levels of business investment in R&D; in the case of Ericsson, this trend has already seen a major R&D facility in Australia closed down.[44] This trend is of concern given the importance of foreign-owned businesses within the Australian economy—they are responsible for over 40% of total business investment in R&D and are particularly important in the automotive, wholesale / retail, electronic / electrical, and property sectors (see Chapter 4).

The commercialisation of research

8.22 Impediments arising from the commercialisation of research are of two kinds: one bearing on commercialisation wherever it occurs and one bearing on commercialisation within Australia.

8.23 In relation to the first, the committee was told that:

> … having ideas is easy and doing research is important but relatively cheap. Commercialisation—making it useful—is incredibly difficult, very risky and very expensive.[45]

---

42 Mr Mehrdad Baghai (CSIRO), Transcript, p. 248: The managers of publicly listed entities are under 'quarterly earnings pressure. That means that if they do not show profitable returns every quarter and an improvement in that, the share market does not look favourably upon that company's stock and management. Therefore, management's attention is on the bottom line. In order to be able to fund significant amounts of R&D, it is going to have to come out of significant earnings. In an environment where those earnings are under pressure, the market usually forces management to cut the easiest thing to cut, which is long-term spending like R&D'.

43 Mr Geoffrey Rohrsheim (Strategic Data Management Pty Ltd), Transcript, p. 517.

44 Mr Richard Clark (Ericsson AsiaPacificLab Australia Pty Ltd), Transcript, p. 296.

45 Prof. Tim Napier-Munn, (AMIRA International Ltd), Transcript, p. 59.

8.24 The CSIRO stated that 'general data on the probability of research leading to a successful innovation does not seem to be available'.[46] The success rate varies considerably from sector to sector, for example, it is very low in the pharmaceutical industry[47] and may be one in ten in the venture capital industry.[48] The CSIRO stated that:

> The cost of converting a research output to an innovation is usually much more than the cost of the research… [and] the risks involved in innovation are greater than the risk of the research having an unsuccessful technical outcome…
>
> This is particularly the case given that business R&D tends to be at the experimental development end of the research spectrum and, in the case of smaller firms, will normally aim at incremental improvements rather than great leaps forward. The technical outcome is often more certain than the commercial outcome; and the consequences of commercial failure are often more severe than the consequences of technical failure, because the necessary investment is greater.[49]

8.25 In relation to commercialisation within Australia, many witnesses suggested that there exists a general inability to commercialise research. It was said that 'Australia has had… a problem of translating good ideas into commercial outcomes';[50] that Australia has 'always had good tech [but has] not formed any serious businesses out of it';[51] and that, 'while Australian research is undoubtedly highly inventive (and is seen to be so, globally), its ability to convert these

---

46 CSIRO, Submission No. 22, p. 19.

47 Pfizer Pty Limited, Submission No. 65, p. 2: 'Investment in developing a new chemical entity (NCE) is costly, high-risk and long-term. The latest estimates are that on average an NCE costs US$800 million to research and develop and takes 12-15 years to bring to market. Once approved, only one in every three new drugs provides a financial return on the investment necessary to develop and register the drug.'

48 CSIRO, *op. cit:* 'The venture capital industry finds that despite a very stringent screening process… perhaps only one in ten investments becomes a significant commercial success'.

49 CSIRO, Submission No. 22, pp. 18-19: also Prof. Murray Gillin, Transcript p. 97: 'With the cost of technology, we have a rule of thumb: to do research $1, to do the development $10, to do the commercialisation $100'.

50 Prof. Michael Barber (Australian Academy of Science), Transcript, p. 7; also Dr James Fox (Vision System), Exhibit No. 6, p. 8.

51 Mr Robert Muir (Australian Nuclear Science & Technology Organisation), Transcript, p. 355.

inventions into profitable outcomes is far less well developed'.[52] Individual SMEs supported these views.[53]

8.26 Further, the Chief Executive of a technology incubator noted that Australia spends:

> … large amounts of dollars in the public institutions and in many of the SME-type organisations but we do not spend anywhere near enough dollars in the development and the commercialisation of those developments.[54]

8.27 Commercialisation was said to require a 'completely different set of skills' to those required for the research stage'.[55] Corroborating this view, a survey of the obstacles to scientists commercialising their research conducted by the Federation of Australian Scientific and Technological Societies (FASTS) concluded that among the key obstacles to commercialisation was recognition by scientists that:

> … they lack the skills to handle the commercialisation process, being unused to the ways of industry and of the steps needed to gain private support for their work.[56]

8.28 Solutions proposed by FASTS include the development of formal and informal programs to build the commercialisation skills of scientists and a stronger system of providing advice, including through mentoring groups.[57]

---

52 SciVentures Investments Pty Ltd, Submission No. 62, p. 7.

53 Mr Roger Gibson (Electrometals Technologies Pty Ltd), Transcript p. 556: 'The most difficult part of developing a business of this sort has been the lack of meaningful support in the commercialisation phase. We found it easier to raise money—particularly government or concessional sort of money—when we were a pure R&D company than to find sources of capital for the extremely onerous task of taking a smart product and convincing the market to buy it'; Mr Henry Valk (HCV Wireless Pty Ltd), Transcript p. 557: 'We have found it virtually impossible to raise the next stage of funding after the seed stage, which limits our commercialisation, particularly internationally'.

54 Mrs Roslyn Hughes (Epicorp Ltd), Transcript, p. 582.

55 Mr Andrew Green (Australian Venture Capital Association), Transcript, p. 395.

56 Federation of Australian Scientific and Technological Societies, Exhibit No. 19, *Scientists commercialising their research*, p. 1.

57 *ibid.*

The challenge of marketing globally

8.29 An impediment to greater R&D activity by businesses was said to relate to the fact that only 4% of Australian companies export.[58] The Australian Business Foundation stated that 'we have far too few exporters, we have a R&D brain drain, [and] we have a relatively poor record of commercialising new ideas'.[59] The committee was told that one way to address this problem is to encourage Australian participation in organisations like Intelligent Manufacturing Systems (IMS) which shares knowledge of pre-competitive R&D in manufacturing and processing technologies.[60]

8.30 In the view of one successful Australian company, the commercialisation problem is linked to export and sales:

> The biggest barrier to commercialisation of our R&D… is… getting a sale. Typically, that means outside Australia.[61]

8.31 The importance of a sales market is indicated by the observation of an international corporation that even 'the best innovators in the world really require a key customer to take their product ideas across the chasm'.[62]

8.32 The Chief Executive Officer of an investment bank thought that Australian firms displayed 'a lack of leverage of the existing knowledge base' about accessing markets:

> So many times in Australia everyone has the same problem… [yet we keep] reinventing the wheel… We do not own many distribution channels… [and] it is critical that we find ways to link our emerging businesses and our products into these distribution channels… Quite a number of people have been through the process and somehow we have to capture that knowledge so that people coming up behind them can use it to their advantage.[63]

58 Ms Heather Ridout (Australian Industry Group), Transcript, p. 118.
59 Ms Narelle Kennedy (Australian Business Foundation), Transcript, p. 292.
60 Intelligent Manufacturing Systems, Submission No. 35, pp. 1-6.
61 Dr James Fox (Australian Innovation Association), Transcript, p.172.
62 Mr Richard Clark (Ericsson AsiaPacificLab Australia), Transcript, p. 301.
63 Ms Lindley Edwards (The Venture Group Ltd), Transcript, p. 584.

The intellectual property (IP) regime

8.33 Despite the importance of IP protection—'without IP protection, you have no business at all, absolutely zero,' said one SME[64]—Australia's IP management and protection was said to be 'patchy'.[65] It also was described as:

> … cumbersome and costly—the cost and time required to acquire a patent is too high and too long [and there] is no guarantee that patents and licensing agreements, to protect property rights, will not be circumvented.[66]

8.34 The taxation rules in relation to IP were criticised by a major Australian company as:

> … unrealistic in that they expect corporations to shell out actual cash for IP which is extremely high-risk and which, if it yields any value at all, is likely to do so in the three to five year time scale.[67]

The higher education sector

8.35 Representatives of both businesses and the higher education sector pointed to impediments in this sector that constrained business investment in R&D. A major international corporation stated that the higher education sector acted as a barrier to 'communication and free exchange and interchange of staff' between universities and businesses.[68] Academics agreed, with representatives of the 'Group of Eight' universities stating that there was not 'enough movement, or opportunity for movement, between the business and industry sector and the university sector', and there were no incentives to improve the situation.[69] The result was said to be that, 'in Australia… people are career trapped'.[70]

64 Dr Chris Goddard (GroPep Ltd), Transcript, p. 520.
65 Prof. John Hearn, Submission No. 79, p. 1.
66 Mr Gerry Biddle, Submission No. 32, p. 11.
67 Dr Hugh Bradlow (Telstra Research Laboratories), Transcript, p. 603.
68 Mr Richard Clark (Ericsson AsiaPacificLab Australia), Transcript, p. 298.
69 Prof. David Siddle (Group of Eight Deputy Vice-Chancellors), Transcript, p. 230.
70 Dr Kevin Fahey (Pfizer Pty Ltd), Transcript, p. 366.

8.36 The committee was told that the 'promotion criteria in universities still give very little weight to the R&D achievements that people might get in industry'.[71] Further, 'it is actually becoming structurally more difficult in Australia for people who have had a lot of R&D experience in industry to come back successfully into universities', with the result that industry does not have confidence in academics and so is unwilling to invest funds into the academic sector.[72] It was said to be

> … very hard in Australia for a university person to leave the university, preserve their superannuation… start up a company, fail and then come back to the university. That is not part of our culture.[73]

8.37 Public sector research bodies were said to 'plunder an SME's IP and then use it in other projects without recompense to the originator'.[74] A businessman stated that IP problems on the university side were 'geared against' collaboration with private sector firms.[75] An industry council considered that:

> Negotiations in relation to commercialisation and IP rights are fraught with difficulty, frustrating, unpredictable and arduous to the extent that the process of negotiation itself is a significant achievement.[76]

8.38 Though many universities have made efforts to facilitate the commercialisation of their research, there was said to be a lack of coordination and contact, with the result that their expertise was seen as too fragmented.[77]

---

71 Prof. Peter Gerrand (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 76.

72 Mr Peter Laver (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 75.

73 *ibid.*

74 Mr Michael Turner, Submission No. 30, p. 4.

75 Dr James Fox (Australian Innovation Association), Transcript, p. 169.

76 Australian Paper Industry Council, Submission No. 44, p. 11.

77 Mr Toss Gascoigne (FASTS), Transcript p. 38: 'Our suggestion… was that instead of having 38 universities and 38 commercialisation arms we should have about five commercialisation arms [within Australia] and that any scientist should be able to go to any one that they liked. You would have a slapping together of that expertise'.

8.39 The governance arrangements of universities were described as 'anachronistic', operating 'more like a parliament [or] a caucus' than a board.[78] Although the Commonwealth government provides most of the recurrent funding for universities, it is not represented on their councils.[79] An academic considered that:

> … the governance issues around universities are significant and may well be the most significant issue we need to address in the near future.[80]

8.40 The university grants system was said to deter partnerships with business[81] and, while the Australian Research Council (ARC) was described as 'a good organisation', its grants process was considered to be 'very bureaucratic'.[82]

8.41 Further, tertiary institutions were criticised for not teaching what industry needs, with one major automotive corporation stating that:

> We find that lecturers somewhat enjoy working in the blue-sky region, and… it is the link between… theory and the commercial application that is somewhat lacking.[83]

8.42 A major international corporation also felt that the link between tertiary institutions and 'industry need' is 'rather patchy, especially in undergraduate courses. Quite often the lecturers will teach what they know, not what is contemporary'.[84]

8.43 Overall, university processes were stated to deter private businesses, some of whom have concluded that it is simply too difficult to do business with the public sector in Australia as an Australian

---

78 Mr Peter Woodgate (Royal Melbourne Institute of Technology), Transcript, p. 145.

79 *ibid*: 'The major investor needs to be significantly represented on that governance structure'.

80 *ibid*., p. 146.

81 Mr Morris Lloyd (Grains Research & Development Corporation), Transcript, p. 408: 'If a university wants to create, say, a partnership with an international company to establish a research institution that has a very applied charter and very tight performance indicators, it cannot because it will lose its Research Infrastructure Block Grants Scheme (RIBG) funding. It has to go to the market and go through the tendering process'.

82 Prof. Tim Napier–Munn (Australasian Institute of Mining & Metallurgy), Transcript, p. 62.

83 Mr Brent Dankesreither (Holden Ltd), Transcript, p. 620.

84 Mr Richard Clark (Ericsson AsiaPacificLab Australia), Transcript, p. 305.

company.[85] The general flavour of criticisms about the university sector may be seen from the following quotations:

> The relationships between industry and the higher education system are not deep, they are not mature, and they offer a huge untapped potential to improve the performance of higher education and the performance of industry.[86]

> There is a cultural difference between the two that still needs a lot of attention.[87]

> There is a stigma thing still playing out in Australia [in relation to] placing industry people into universities as visiting professors or whatever.[88]

> Unfortunately, the cultures of the two organisations are sufficiently different in Australia that they really do have a lot of trouble communicating.[89]

The nature of the financial sector

8.44 Some witnesses stated that Australian banks 'don't want small business'[90] causing at least one SME to sell 'the marketing rights to America for [a] machine' that it developed, in order to obtain business finance.[91] It was claimed that Australian banks will not even provide finance for the commercialisation of proven technologies,[92] though this was not the experience of the CSIRO—which stated that it does not have trouble obtaining finance for proposals that incorporate well-developed IP and proven technology.[93] However, the CSIRO noted that, in view of the fact that venture capital is now very

85 Ms Teresa White (Australian Information Industry Association), Transcript, p. 450: 'It is tremendously important to Australian companies that the multinational companies are here, because it is so difficult to do business with, particularly, the public sector in Australia as an Australian company'.

86 Ms Heather Ridout (Australian Industry Group), Transcript, p. 119.

87 Ms Patricia Berman (Commonwealth Department of Industry, Tourism & Resources), Transcript, p. 218.

88 Dr Mark Tennyson and Ms Sara Pantzer (Merck, Sharp & Dohme, Australia), Transcript, p. 343.

89 Mr Peter Laver (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 75.

90 Mrs Suzanne Hudson (S. Hudson & Associates), Transcript, p. 275.

91 Mr Peter Beaumont (S. Hudson & Associates), Transcript, p. 278.

92 *ibid*., pp. 268-270.

93 Dr Jack Steele (CSIRO), Transcript, p. 245.

conservative and it takes a long time to complete a transaction, 'the relative attractiveness of seeking venture capital relative to a licensing deal has changed' toward the latter.[94]

8.45 The venture capital industry itself stated that it takes 18 months or two years to raise a venture capital fund.[95] Though one witness thought that 'the venture capital situation has improved enormously since three years ago'[96] and another stated that 'there is plenty of venture capital around',[97] it appears that the amount of venture capital has halved in the past year.[98] The Australian Venture Capital Association stated that, whereas the 'total venture capital available in the US per head of population was around $33 [in 1998]… in Australia it equalled $1.50'.[99]

8.46 Some witnesses consider that, in general, Australian venture capital is too risk averse and too immature.[100] As a consequence, it was said that SMEs have to get their capital offshore, principally from the United States.[101] It also was claimed that:

> … the venture capital model of preparing a business plan is inappropriate to many SMEs, particularly small business, as market research is often too costly to undertake relative to the size of the opportunity.[102]

---

94 Mr Mehrdad Baghai (CSIRO), Transcript, p. 246.

95 Mr Andrew Green (Australian Venture Capital Association), Transcript, p. 399.

96 Prof. Vicki Sara (Australian Research Council), Transcript, p. 16.

97 Mr John Yencken, Transcript, p. 91.

98 Mr Andrew Green (Australian Venture Capital Association), Transcript, p. 398.

99 Quoted from Australian Research Council, *Research in the national interest: Commercialising university research in Australia*, July 2000, p. 17.

100 Mr Grahame Cook (Commonwealth Department of Education, Science and Training), Transcript, p. 45: 'In comparison to a number of other economies, it is true to say that Australia's capital market at that high-risk, very early stage is not as deep or comprehensive as it might be'; Prof. Graham Macdonald (Merck Sharp and Dohme Australia Pty Ltd), Transcript p. 328: 'A relatively immature section of the Australian economy… may be in the relatively limited ability of venture capital sources to assess with any confidence a biotechnology risk and also a little bit of averseness to taking an informed risk'.

101 Mr Paul Armarego (Intelligent Manufacturing Systems), Transcript, p. 317: 'I can certainly relate… the significant difficulties that SMEs, especially technology start-up SMEs, have in getting capital access in Australia. At the moment I have some involvement in about eight, six of which will ultimately be getting their capital offshore—some years later than it would have happened had they been in the countries from which they are getting it. Predominantly, it seems to be the USA that ends up supplying that kind of capital'.

102 Institution of Engineers, Australia, Submission No. 72, pp. 4-19.

8.47 A further impediment to greater R&D activity by businesses was said to the absence of business angels.[103] Even where such angels are active, they were said to be 'losing interest'[104]—although another witness thought that business angels are still present and active.[105]

Regulatory activity both in Australia and overseas

8.48 Many witnesses stated that regulatory compliance in Australia, and internationally, is a barrier to R&D investment, for example:

- one Queensland electrical manufacturer stated that 'the compliance and approval cost is enormous' to get an electrical product onto the world market;[106]
- an SME stated that 'in the field of biology, the ability of anyone in the private sector to export and import biological samples is unbelievably difficult relative to government institutions—it can take months;'[107] and
- the Veterinary Manufacturers and Distributors Association called for 'the regulatory and bureaucratic hurdles to product registration [to] be minimised'.[108]

8.49 The widespread move in many industries towards adopting global regulatory and technical standards was seen by some witnesses as an impediment to greater Australian BERD in that it has removed one incentive to develop products and services for a uniquely Australian market. For example, global standards in the telecommunications industry mean that local telecommunication companies are not putting the effort into R&D, even if it involves 'whiz-bang

---

103 Mr Gary Banks (Productivity Commission), Transcript p. 482: 'The venture finance industry has been growing quite strongly but not the so-called angels'; Mr Robert Muir (ANSTO), Transcript, p. 353: In Australia 'we have very few [of] what I would call angel investors'.

104 Mr Andrew Green (Australian Venture Capital Association), Transcript, p. 396.

105 Mr Kevin Gillman (Queensland Manufacturing Leaders' Group), Transcript, p. 383: 'The Queensland government has a facilitation for venture capital, and they link with these finance angels'.

106 Mr Bill Stoddart (Queensland Manufacturing Leaders' Group), Transcript, p. 383.

107 Wildlife Management International, Submission No. 60, p. 6.

108 The Veterinary Manufacturers and Distributors Association, Submission No. 56, p. 2, referring to the regulatory 'barriers' raised by the 'National Registration Authority / Australian Quarantine Inspection Service' [AQIS]; also Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 184: A 'key impediment' to private sector R&D is 'regulatory compliance'.

technology', because if it is not compatible with the equipment operating elsewhere in the world (which is what customers want), then it is unable to be sold overseas and hence can't bring in sales.[109]

8.50 This trend is reflected in the declining capital expenditure of a company like Telstra, which spent 24% on capital expenditure in 1980s, 22% in 1990s, and 18.5% last year—meaning that 'the major equipment vendors—the Alcatels, Ericssons, Siemens—are getting very few orders'.[110]

8.51 Witnesses from the pharmaceutical industry stated that Australia's Pharmaceutical Benefits Scheme (PBS) is an impediment to biomedical research for various reasons including the PBS' 'very flat pricing structure'.[111] In making these criticisms, the industry representatives stressed that it did not oppose the PBS itself, just elements of it.[112]

8.52 Also, the committee was told that Food and Drug Administration (FDA) approval is needed to sell a drug in the US (the world's biggest market) and therefore pharmaceutical companies were required to meet all regulatory standards in the US as well as in Australia.[113] The dual regulatory hurdles were said to be considerable and it was suggested that one answer would be for Australian authorities simply to endorse any approval from the US FDA:

> In terms of R&D and the development of biopharmaceuticals, it is almost irrelevant what we do here, because the FDA is all-powerful. If you want to license out any drug, technology

---

109 Mr Richard Clark (Ericsson AsiaPacificLab Australia), Transcript, p. 301: 'People are demanding global standards nowadays. People do not want the local telco to come up with a whizz-bang system, no matter how good it is, if it means they cannot roam to the next state or to the next country. The GSM [Global System for Mobile] standard of mobile telephony has really meant that the major administrations simply have to fall in line with those global standards'.

110 Prof. Peter Gerrand (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, pp. 84-85.

111 Prof. Graham Macdonald (Merck, Sharp & Dohme), Transcript, p. 334.

112 Miss Catherine McGovern (GlaxoSmithKline), Transcript, p. 206: 'I think that there is a myth… that pharmaceutical companies do not support the PBS'; Ms Jenny Johnston (Bristol-Myers Squibb Pharmaceuticals), Transcript, p. 627: 'There have been a lot of furphies going around that the industry is actually targeting the PBS. It has been at pains to state that that is absolutely not the case'.

363, p. 332 transcript p.206, pp.360-363

113 Ms Sara Pantzer (Merck, Sharp & Dohme), Transcript, p. 339: 'We are talking about the biomedical industry where you have to have a global approach, because you do have to run world-wide clinical trials in order to get FDA approval for the drug'.

> or new product and get money back for it, you have to comply with what the FDA says, because that is the biggest market in the world, full stop.[114]

Government policies and programs designed to facilitate R&D

8.53 Witnesses expressed the view that some aspects of government policies and programs designed to facilitate business R&D actually acted as impediments. The most frequent criticism of government policies was of their inconsistency: 'one of the main impediments to private R&D is the ever changing government initiatives on the subject'.[115]

8.54 The criticisms made of the Commonwealth government programs either had a broad focus (the programs in general tended to operate as impediments) or a specific focus relating to a particular program. Both viewpoints are summarised in the following paragraphs.

General criticism

8.55 It has already been noted that some witnesses thought government programs were too oriented towards public sector research institutions to the detriment of private businesses.[116] Government programs were also said to display:

---

114 Dr Chris Goddard (GroPep Ltd), Transcript, p. 529.

115 Mr Bob Beatty (Bosmin), Submission No. 2, p. 1; also Business Council of Australia, Submission No. 58, p. 2: 'Frequent changes in taxes, subsidies, compliance requirements and the like can undermine efforts to induce higher BERD'; Mr Neville Mitchell (Cochlear Ltd), Transcript, p. 606: 'A number of our projects at Cochlear actually have a ten-year horizon: in relation to changes to [government] schemes, sometimes it is awkward to try and adjust to those, particularly in the very short-term'; Mr Kevin Gillman (Queensland Manufacturing Leaders' Group, and Managing Director of AV Syntec Pty Ltd), Transcript, p. 374: One of 'the barriers to R&D amongst smaller firms… [is] the inconsistency of assistance programs and the reliability of programs'; Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 184: 'A key impediment to private sector R&D in Australia… [is] the lack of stability in innovation policy'; Mr Rob Durie (AIIA), Transcript, p. 441: 'For the SMEs, consistent application of government policy is a key issue'.

116 Mr Rob Durie (AIIA), Transcript, p. 441: 'Compared to other countries, very little direct government funding goes to the private sector'; also Submission No. 15 (WaveGlobal Pty Ltd), p. 1: 'Despite the imbalance between research and commercialisation the majority of government programs support research'; Submission No. 60 (Wildlife Management International Pty Limited), Transcript, p. 5: 'Taxpayers' money is used continually to favour research in the government sector, over than in the private sector'; Dr James Fox (Vision Systems Ltd), Exhibit No. 23, *A Proposal to Reverse Australia's Decline in Business*

> … a balance [that] is a bit too much towards project funding rather than towards facilitating the development of the people who can make it all work.[117]

8.56 There was said to be insufficient support for technology diffusion, with one witness incorrectly claiming that 'there are no programs that support technology diffusion'.[118] While such programs do exist, one witness thought they could be made 'more readily available to industry'.[119]

8.57 Another criticism of government programs was that 'the majority of funding appears to be targeted at emerging technologies, not existing ones'.[120] It was claimed that there is an excessive focus:

> … on new knowledge, invention and R&D, rather than…how to improve our technology absorptive capacity… [which] is very closely related to the proportion of research scientists and engineers who work in business. In Australia, this is abysmally low.[121]

8.58 Further on this point, it was stated that there should be government support for 'the application and utilisation' at the local level of overseas-developed technology.[122] Once Australian companies have access to this technology, they can conduct R&D in-house to develop it. One Australian manufacturer stated that 'most of our R&D is in [this type of] product development'.[123]

8.59 The Australian Research Council stated that there is a gap in government programs in relation to what happens at the end of the research activity:

Expenditure on R&D, p. 1: 'The imbalance in Australian R&D spend, biased towards the Government R&D sector, is at the root of our poor commercialisation track record…'.

117 Mr John Yencken, Transcript, p. 93.

118 Mr Kevin Gillman (Queensland Manufacturing Leaders' Group), Transcript, p. 384.

119 Mr Angus Robinson (IMS), Transcript, p. 326: 'Even though people might say that dollar-for-dollar programs are hard to cope with, if they could be made easier to use and understand and there were more pro-active programs of marketing, some of that money could well be spent and used creatively'.

120 Mr Bill Stoddart (Tom Stoddart Pty Ltd, and member of the Queensland Manufacturing Leaders' Group), Transcript, p. 376 (quoting from a submission by his company to the Queensland Minister for Innovation and Information Technology, June 2002).

121 Mr John Yencken, Transcript, p. 86.

122 Mr Bill Stoddart, *op.cit*.

123 Mr Bill Stoddart, Transcript, p. 379.

> In Australia we have strong idea generation at the basic research end and we have commercialisation at the end of the development end, but there is this gap that occurs at the end of the research activity… [which is] critical.[124]

8.60 A further criticism of government programs is that they are not long-term: 'we do not get consistent and long-term support', stated an industry association.[125] For example, the Innovation Investment Funds have only a four year commitment;[126] funding of the BITS program is 'only for four years, until June 2004… [which] is much too short;'[127] the START program is funded only until 2006;[128] the COMET program is funded only until June 2005;[129] and the BIF program is funded only to 2003-2004.[130]

8.61 There were many criticisms of government programs for being too complex and costly[131]—for example, it was said that 'it cost $3,000 to claim $3,500'.[132] The programs were said to be suitable only for big

---

124 Prof. Vicki Sara (Australian Research Council), Transcript, p. 16.

125 Mr Rob Durie (AIIA), Transcript, p. 445.

126 Mr Grahame Cook (Commonwealth Department of Education, Science and Training), Transcript, p. 45: also Mr Rob Durie (AIIA), Transcript p. 445: 'In Australia we have had [this] program for four years and we may be looking at going for four again, but governments need to make long-term commitments'.

127 Flavourtech, Submission No. 78, pp. 16-17.

128 Chapter 3; also Ms Catherine Livingstone (Australian Business Foundation Ltd), Transcript p. 294: 'Coming back to the SMEs issue, and just to use the START program as an example, research decisions are made… with longer time-frames. When you have programs such as the START program, companies cannot adjust in those timeframes to change their R&D program to address that lower funding where they expected funding'.

129 *Summary of AusIndustry Products* AusIndustry, 5 February 2003.

130 *ibid.*

131 Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 189: 'It is difficult for business to deal with the R&D tax concession and related incentives'; Mr Graham Carew (Taxation Institute of Australia), Transcript, p.154: There is a lot of paperwork [and when companies] look at the small value of the concession, they quite often say that it is not worth their while to claim the R&D'; Dr James Fox (Australian Innovation Association), Transcript, p. 179: 'The compliance reporting for the tax concession at 7 cents in the dollar is a pain the butt. Frankly, I am sure a lot of companies walk not just because of the paperwork side but because it involves you tangling with the Tax Office and the Industry Department in way which… just says, "Gee, for that level of benefit, do we really need to stick our head up on that sort of stuff?"; Mr Rob Durie (AIIA), Transcript, p. 441: 'The second area of concern to SMEs is the complexity and time-consuming nature of engaging with government programs'; Mr Tony Harrison (Yaltara Software Pty Ltd), Transcript, p. 514: SMEs find that the programs are 'not easily accessible for them'.

132 Australian Electrical and Electronic Manufacturers' Association, Submission No. 68, pp. 4-5.

businesses[133]—for example, 'it only became worthwhile when the company grew larger'.[134]

8.62 The grants programs were called 'a beauty contest' by one witness.[135] In order to obtain grants, it was necessary, stated many witnesses, to engage consultants to prepare the application forms.[136] One witness claimed that it took many man-hours to manage the grants system.[137] The perception of some SMEs that the grant application process is cumbersome and costly is conveyed by the following observation:

> The major problem that SMEs face in the research area is that the funds that we apply to the government for are relatively small in relation to those given to large organisations, and the time spent getting one of those grants ranges between eight weeks and 12 months. The applications are also expensive. Smaller companies cannot spend 12 months wasting their time applying for a grant.[138]

---

133 Dr Ralph Lattimore (Productivity Commission), Transcript p.486: 'About one in five firms employing under 20 persons see business programs as generally suitable only for big businesses. About one in five small firms did not have knowledge of programs at all and 20% thought too much paperwork was required… If you go to the bigger businesses, this is not a concern: paperwork compliance is not a concern for taking up programs'; AIIA, Submission No. 74, p. 19: 'Some SMEs feel that government R&D programs are tailored more to larger businesses and are difficult for SMEs to access;' Mr Tony Pensabene (Australian Industry Group). Transcript, p. 126: 'Right across the board, when you look at government programs and services and the degree of administrative burden that small companies have to carry, it is consistently reported that that is a barrier. The tax side in particular is seen as imposing obligations on small companies'.

134 Australian Electrical and Electronic Manufacturers' Association, Submission No. 68, *op. cit*.

135 Mr Rob Durie (Australian Information Industry Association), Transcript, p. 441.

136 Mr Gary Banks (Productivity Commission), Transcript, p. 486: 'This question about it being hard to find out what to do, particularly for small enterprises, I think is a very important consideration. That is why these consultants make a reasonable living, because their job as specialists is to come in and do that sort of thing. Small firms cannot afford to employ that kind of person full-time. BHP or another large company could have a whole department being responsible for the interface with government on these kinds of subsidies'; Mr Rob Durie (AIIA), Transcript, p. 448: 'You need a consultant now in order to prepare your application'; Dr Stephen Sykes (Flavourtech Pty Ltd), Transcript, p. 464: We used a consultant 'to facilitate the process' of applying for a START grant because 'we felt we would have a better chance if we had good advice on how to set out the application'.

137 Mr Morris Lloyd (Grains Research &b Development Corporation), Transcript, p. 403.

138 Mr Elmo Jacob (Newton Pty Ltd), Transcript p. 584.

8.63 Some witnesses expressed a contrary view to that above. They said that, rather than favour large businesses, the government programs actually favoured small start-ups *to the detriment of* larger firms.[139]

The taxation concessions

8.64 Many businesses, both SMEs and large companies, stated that the tax concessions were an impediment to higher levels of business R&D. Though the general tax concession of 125% was said to 'positively influence R&D spending',[140] it was also said to have only a 'marginal' effect on encouraging businesses to undertake more R&D than they would do anyway.[141] Further, its main users were said to be mature companies, especially in the mining and farming sectors.[142] Even firms spending large amounts on R&D stated that they were deterred by 'issues around compliance' (that is, meeting all the requirements).[143] The 125% concession was not enough, said many witnesses:[144] it should be 150%[145] or 175%[146] or 200%.[147] Other

---

139 Mr Morris Lloyd (Grains RDC), Transcript, p. 404: 'I think that it is inappropriate… [that] our current incentives are aimed at the small start-ups'; Victorian Council for Knowledge, Innovation, Science and Engineering, Submission No. 29, Attachment B *Discussion Paper on R&D Incentives*, pp. 5-7: The programs in *Backing Australia's* Ability have a 'bias towards small firms' whereas the 'benefit from incentives should result in equity for all applicants, regardless of company size'.

140 Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 185.

141 Dr Robin Batterham (Chief Scientist), Transcript, p. 468: 'My own opinion… is that, in the large company areas, the taxation concession is somewhat marginal in terms of any additionality' of R&D; Mr Gary Banks (Productivity Commission), Transcript, p. 485: 'By and large the evidence seemed to be that most firms regarded the tax concession as something which gives them a little bit more of cash flow but did not really fundamentally affect their R&D decision-making. That was at 150%'; Mr David Michel (Bovis Lend Lease), Transcript p. 610: 'In terms of external drivers of innovation… R&D tax concessions are a driver but have marginal impact'.

142 Mr John Boshier (Institution of Engineers), Transcript, p. 419: 'We found that the major users of the R&D tax credit are the mature companies, particularly the mining industry… In fact, farming and mining were the predominant users of the R&D tax credit'.

143 Mr Robert Clark (Holden Ltd), Transcript, p. 628: 'The compliance burden associated with the current R&D tax concession… is a significant issue for most organisations. As the level of the tax concession has reduced from 150% to 125%, the offset benefit associated especially with the larger spenders in terms of maintaining the requirements around the R&D tax concession are difficult to justify at times'.

144 Representatives of SMEs like Dr Andrew Swincer (Flexichem Pty Ltd), Transcript, p. 517: 'I think 125%... is too low'; Mr Peter Fitzgerald (Wickham Tooling and Plastics), Transcript, p. 541: 'We feel… that the cost of getting all the information together is really not worth the 25%'; Mr Brett Reaby (Phasefale Pty Ltd), Transcript, p. 540: 'I find that, at 125%, it is barely worth the effort'; Mr Tony Harrison (Yaltara Software Pty Ltd): 'For SMEs and micro businesses, the 125% R&D incentive really is not an incentive at all'.

witnesses pointed out that, because it applied only to labour and other costs (but not to plant costs), it acted as an impediment to further R&D.[148]

8.65 The 125% tax concession was said to be inadequate in *international* terms, and hence would lead companies, especially those with multinational connections or intentions to market overseas, to examine the incentives available in other jurisdictions'.[149] Australia was said to 'have got so much going for us, but it does not stack up against a tax incentive offered by Singapore'.[150] It was pointed out that, for foreign companies:

Representatives of large Australian companies like Dr Hugh Bradlow (Telstra), Transcript p. 603: A 'significant inhibitor… is the reduction of the tax concession from 150% to 125%'.

Major international corporations like Holden Ltd, Submission No. 57, p. 15: 'The impact of the [R&D tax concession] is insufficient to enable decisions to invest in very high-risk R&D'.

Professional financial bodies like Deloitte Touche Tohmatsu, Submission No. 59, p. 14: 'The 125% tax concession does not adequately provide the support and incentive to Australian companies to undertake R&D in Australia'.

Representatives of business groups like Dr James Fox (Australian Innovation Association), Transcript p. 165: 'Unfortunately, the value of the [tax] concession has drifted down'; Veterinary Manufacturers and Distributors Association, Submission No. 56, p. 1: 'The current level of tax deductibility of 125% is too low to be regarded as an incentive for our industry to invest more in R&D'.

145 Australian Geoscience Council, Submission No. 20, p. 4: 'We favour a return to the simple 150% tax benefit for R&D'; Australian Electrical and Electronic Manufacturers' Association, Submission No. 68, p. 4: 'An increase to a 150% concession was considered as being a significant incentive'; Australian Information Industry Association, Submission No. 74, p. 12: 'The R&D tax concession should be restored to 150%'; Australian Paper Industry Council, Submission No. 44, p. 2: We recommend 'restoration of the 150% R&D tax incentive'; Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 186; Dr Lincoln Wood (BAE Systems Australia), Transcript, p.608: 'We would like to see a return to the 150% tax concession scheme'.

146 Ms Heather Ridout (Australian Industry Group), Transcript, p. 119: 'I think the 175% issue was right'; Mr Graham Carew (Taxation Institute of Australia), Transcript, p. 158: 'If there was a general rate of 175%, we would probably be back in the race'.

147 Mr John Barber (Sigtec Pty Ltd), Transcript, p. 537: 'A 200% tax incentive for general R&D… would… prove far more effective in encouraging more R&D'; Institution of Engineers, Submission No. 72, p. 19: the R&D tax concession could allow 'a 200%-250% concession'.

148 Deloitte Touche Tohmatsu, Submission No. 59, p. 16.

149 Mr Graham Carew, (Taxation Institute of Australia), Transcript, p. 151.

150 Ms Sara Pantzer (Merck Sharp and Dohme Australia Pty Ltd), Transcript, p. 336; also Prof. Susan Serjeantson (Australian Academy of Science), p. 8: One reason why SmithKline Beecham 'decided to base itself in Singapore rather than in Australia… [was that] Singapore was offering some particular taxation concessions'.

> The R&D that is done in Australia is discretionary R&D. It does not have to be done here; it can be done in Malaysia or in other parts of the world. If we do not have a fair R&D tax concession as compared to those other countries, that R&D will be done in those other countries. We will miss out on the employment and the increase in our IP.[151]

8.66 Some witnesses considered that the tax concessions were themselves an impediment to business R&D, with one saying that:

> … the sooner you can disengage the R&D incentives system from the tax system the better because it is driven by the wrong things. The amount of money it costs the government could be spent more effectively if it were a rebate scheme.[152]

8.67 The 175% incremental tax concession was described as 'crazy' by one SME because it penalises companies with a steady rate of R&D expenditure:

> It is particularly annoying to see that new companies can now come in and gain 175% on a low base, whereas we have been trying, since 1980, to maintain a steady R&D commitment which is at least 10% of our turnover.[153]

8.68 The Australian Paper Industry Council and Telstra expressed similar concerns.[154] Further, the requirement for a three year history of R&D activity before claiming the 175% incremental tax concession precludes start-up companies from accessing it, and so was criticised by some witnesses.[155] However, other government schemes exist for such companies.

---

151 Mr Carew, *op.cit.*, p. 154.

152 Mr Peter Laver (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 79.

153 Mr Brett Reaby (Phasefale Pty Ltd), Transcript, p. 540.

154 Australian Paper Industry Council, Submission No. 44, pp. 2-12: 'The calculation of the premium deduction is complex for example, the effect of applying the calculation methodology is to penalise companies for varying their R&D expenditure from year to year by more than 20%'; Dr Hugh Bradlow (Telstra), Transcript p. 603: 'The recent law changes do not allow companies like Telstra to benefit from the… [incremental tax concession] because the way our R&D fluctuates makes it very unlikely that we will see that sort of growth' in our R&D expenditure.

155 Including Mr Sergio Duchini (Deloitte, Touche and Tohmatsu), Transcript, p. 186.

The PreSeed program

8.69 While some witnesses thought that the PreSeed funds 'are a great initiative',[156] others criticised the PreSeed Fund program because it applies only to public sector R&D and provided no funds for the pre-seed needs of businesses. For example, Telstra stated that:

> We are not eligible for the pre-seed funds, which we find somewhat frustrating, because commercialisation is an extremely high-risk activity, and the best way in which government can support industry is to reduce the risk of that activity.[157]

8.70 Another witness had 'reservations' about the PreSeed program because 'it involves giving away equity at that point, as opposed to the United Kingdom Challenge Fund and the Scottish Proof of Concept funding'.[158]

The START program

8.71 While the START program received fulsome praise from most witnesses,[159] it was criticised by others on three grounds. The first ground was that it is only 'for small enterprises… [and yet] the most successful developers of new technology have been significant companies with substantial existing cash flows'.[160] The 'start-up spin-off model' of company success that underlines START was said by one witness to be 'a high-risk model' because it attracts high-cost and inexperienced venture capital rather than more traditional forms of finance.[161]

---

156 Mr Andrew Green (Australian Venture Capital Association), Transcript, p. 392.

157 Dr Hugh Bradlow (Telstra), *op.cit.*; also Mr Clarke (Industry Research and Development Board), Transcript, p. 499: 'Remember that the pre-seed [program] has a very significant boundary which is only for public sector R&D'.

158 Mr Arthur Yencken, Transcript, p. 89.

159 See paragraph 10.38 for examples of witnesses praising the START program.

160 Mr Peter Laver (Council for Knowledge, Innovation, Science and Engineering, Victoria), Transcript, p .83.

161 Mr Morris Lloyd (Grains RDC), Transcript, p. 404: 'Start-ups by their nature, particularly in Australia but less so in the US, will tend to access what I call inexperienced capital and / or they will tend to access venture capital, which has very high demands for a return of 20% plus or more, and will have a philosophy of quick exit—getting out early if things are not looking good'.

8.72 The second criticism made of START was that it, and other programs, 'suffer from one thing: you have bureaucrats trying to pick winners'.[162]

8.73 The third criticism of START was that tax concessions were considered to help SMEs more than did grants. One SME 'that has been around for 15 years' stated that:

> R&D for small businesses, micro-businesses, should be handled through the tax system and we should get rid of the grant system… Our feeling about the R&D situation at present is that people are better off biting the bullet, doing it themselves and forgetting about the R&D grants.[163]

8.74 The Graduate START program was criticised for being poorly promoted[164] and hence impeding business use of the scheme.

Public sector research bodies dominating the CRCs and RDCs

8.75 Several witnesses stated that the private sector was deterred from accessing CRCs, and even some RDCs, because their management arrangements were oriented too much to the pure science side of research and were too concerned with IP issues,[165] leading to CRCs being 'totally under-utilised' by SMEs[166] and to private industry seeing itself as being not sufficiently involved 'in making the decision on those [public sector] spends'.[167] The remedy, said one witness, was to ensure that all public sector expenditure on R&D is contestable.[168]

8.76 It was said that the CRCs were 'too dominated by the universities and the high end',[169] with the Group of Eight universities being particularly dominant: the 'Group of Eight universities command

---

162 Mr Graham Carew (Taxation Institute of Australia), Transcript, p. 156.

163 Mr Robert Campbell (Precision Metals Pty Ltd), Transcript, p. 578 and pp. 587-588.

164 Ms Leanne Hardwicke (Institution of Engineers, Australia), Transcript, p. 426.

165 Mr Morris Lloyd (Grains RDC), Transcript, p. 403.

166 Mrs Suzanne Hudson (S.Hudson & Associates), Transcript, p. 277.

167 Dr Fahey (Pfizer Pty Ltd), Transcript p. 370. Similarly, Mr Clark (Ericsson Australia) stated: 'There are lots of good things about CRCs and lots of confusion surrounding them, as well. The governance structure of some of them is somewhat cluttered, which makes it very difficult to influence the direction and gain access to the intellectual property… We have some experience in Europe of perhaps a slightly better model… [involving] what are basically CRCs but the industrial partners actually become real participants in the research work' (Transcript, p. 303).

168 Mr Rob Durie (Australian Information Industry Association), Transcript, p. 442.

169 Mr Kevin Gillman (Queensland Manufacturing Leaders' Group), Transcript, p. 381.

about 57% of all the income from CRCs that flow to universities'.[170] It was said that 'universities are tending to be very successful in grabbing the agendas [of CRCs] and the funds and perhaps dominating the government's arrangements'.[171] In short, CRCs were said to be:

> … inappropriate mechanisms for SMEs and R&D [because] their focus tends to be long-term and SMEs are unable to sustain investments over long periods… With respect to public research agencies, SMEs do not tend to have the size to influence or leverage off the research agencies [and] access is not generally business-friendly.[172]

Financial incentives for both scientists and entrepreneurs

8.77 The CSIRO stated that there were some barriers to it providing motivation and incentives to scientists in the promotion of the commercial work,[173] and universities expressed concern about the treatment of fringe benefits:

> If a university asserts ownership of IP rights of its staff and it then confers a benefit on staff in the form of equity in a start-up company, we have technically given them a fringe benefit for which we would be liable.[174]

8.78 One witnesses felt that the absence of tax concessions for 'persons retraining from one industry sector to another', as distinct to the situation involving people 'retraining within one sector', was an impediment to higher levels of R&D.[175]

---

170 Prof. David Siddle (Group of Eight Deputy Vice-Chancellors), Transcript, p. 225.

171 Mr Peter Woodgate (Royal Melbourne Institute of Technology), Transcript, p. 143.

172 Dr Patricia Crook (President, Business South Australia; and Managing Director of Dynek Pty Ltd), Transcript, p. 513.

173 Mr Mehrdad Baghai (CSIRO), Transcript, p. 239: 'We have an issue about how to motivate and provide incentives to our scientific members in the promotion of the commercial work'; also Pfizer Pty Limited, Submission 65, p. 12: 'Currently CSIRO employees are prohibited from taking equity in companies started up to exploit IP generated by them within CSIRO'.

174 Prof. David Siddle (Group of Eight Deputy Vice-Chancellors), Transcript, p. 225.

175 Mr Richard Clark (Ericsson AsiaPacificLab Australia), Transcript, p. 297.

8.79 Australia's personal tax structure was said to be an impediment to higher R&D on a number of grounds. One ground involved attracting expatriates,[176] with one witness stating that:

> You are not really going to get really smart people coming here who lose half of their income and pay the top marginal tax rate once they start earning US$30,000.[177]

8.80 Another ground of criticism was that the capital gains tax (CGT) was too high and is not internationally competitive.[178] Witnesses also stated share options were excessively penalised[179]—they 'are taxed to hell', said one witness.[180] The treatment of share options was said to be the 'biggest single barrier to commercialisation' of research.[181]

A shortage of skills

8.81 Several witnesses said that Australia does not produce enough engineers, scientists and technologists—'For love nor money, we cannot get a technician in Queensland', stated one company[182]—and further, that people being trained in these professions are not receiving training in how to read a balance sheet or in how new technology might be commercialised.[183] However, the

176 Mr Andrew Green (Australian Venture Capital Association), Transcript, p. 388: Australia needs to attract back from overseas 'high-powered people who [however] are asked to make considerable sacrifices in terms of salary'.

177 Ms Heather Ridout (Australian Industry Group), Transcript, p. 132.

178 Mr John Boshier (Institution of Engineers), Transcript, p. 414: 'I would lower CGT. I would provide a means by which entrepreneurs who create and who are committed to their businesses do not need to face CGT to the degree that they do now'.

179 Mr Rob Durie (Australian Information Industry Association), Transcript, p. 446: 'In that final area of share options, we have still not been able to get any attention to that issue as it affects capital raising and remuneration in technology start-ups'.

180 Mr John Yencken, Transcript, p. 97.

181 Mr Andrew Green (Australian Venture Capital Association), Transcript, p. 388.

182 Mr Gillman (A.V. Syntec), Transcript, p. 382; also Dr Stephen Sykes (Flavourtech), Transcript, p. 461: 'One problem is that in Australia we do not produce enough engineers, scientists an technologists'; Mr John Boshier (Institution of Engineers), Transcript, p.417: 'Part of the problem is that, in schools, engineering is not taught… we do not think enough money is spent on raising awareness of engineering in schools'.

183 Dr Robin Batterham (Chief Scientist), Transcript, p. 475: 'I think that engineers and medical scientists and biologists and so on need exposure to, as a minimum, how to read a balance sheet and, secondly, how commercialisation of new technology is so important and what is involved in it'; Mr Arthur Yencken, Transcript, p. 86: 'The proportion of research scientists and engineers who work in business… in Australia… is abysmally low: it is 26% in the latest ABS figures'; Prof. Murray Gillin, Transcript, p. 92: in the US people do MBA programs 'because they want to learn how to actually create new ventures. That is different to our normal MBA program'; Dr James Fox (Australian

Commonwealth Department of Education, Science and Training thought that Australia's skills base was not a problem.[184]

8.82 Also, some witnesses stated that the process of bringing skilled people into Australia was 'long' and 'painful',[185] and that there was a perception that Australians:

> … were not friendly to immigrants, that we were not friendly in terms of welcoming their children into schools. Some states are charging real fees for their schoolchildren [in contrast to the free public education available to Australians].[186]

Conclusion

8.83 While the evidence outlined in this chapter details impediments to a higher level of business investment in R&D, the committee does not necessarily endorse any particular comment or criticism. The committee's view of action that should be taken to address the issues is set out in the following two chapters.

Innovation Association), Transcript, p. 178: greater knowledge of financial matters 'amongst some of the scientists would be good'; Mr Tony Strasser (IMS), Transcript, p. 316: 'A lot of undergraduate training does not entail R&D and innovation per se'; Prof. Peter Gerrand and Mr Peter Laver (Victorian Council for Knowledge, Innovation, Science and Engineering), Transcript, p. 77: 'You cannot ultimately build very strong R&D-based industries unless you have children… making decision to go into science, engineering technologies et cetera', yet 'too many kids are getting turned off science in the middle years'; Mr Bill Stoddart (Tom Stoddart Pty Ltd), Transcript, p. 377: 'over the last decade we have fond it increasingly difficult to source quality young people to fill our apprenticeship programmes'.

184 Mr Grahame Cook (Commonwealth Department of Education, Science and Training), Transcript, p. 44.

185 Dr John Kikkert (Comlabs Systems and Designs Pty Ltd), Transcript, p. 510; also Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 192: 'there are issues associated with the granting of appropriate visas'.

186 Prof. Susan Serjeantson (Australian Academy of Science), Transcript, p. 8.

9

Steps that might be taken by the Commonwealth government in order to better demonstrate to business the benefits of higher private sector investment in R&D

9.1 The material in this chapter is organised under the following headings, which themselves are derived from consideration of the evidence presented to the committee during its inquiry:

- increasing awareness of the importance of innovation and commercialisation;
- identifying national research priorities;
- encouraging major international corporations to conduct R&D in Australia;
- improving the take-up of overseas R&D by Australian companies as well as the recognition of R&D conducted overseas by Australian companies;
- encouraging exporting;
- encouraging industry associations and clusters;
- increasing the capacity of SMEs to access capital;
- improving financial incentives for individuals to conduct R&D and commercialise the outcomes of research;
- improving government tender and purchasing processes;

- reducing regulatory barriers to business R&D; and
- improving accounting standards and practices so as to better recognise the significance of R&D.

Increasing awareness of the importance of innovation and commercialisation

9.2 The committee acknowledges that, despite government initiatives like the National Innovation Awareness Strategy (which includes activities like National Science Week and the Prime Minister's Science Prizes) and private sector initiatives like the Design Awards,[1] there still appears to be 'little recognition of the achievements and benefits of Australian innovators by the public at large, and by our captains of commerce'.[2] It was suggested that the Australian government should publicly recognise successful 'technologists' in a manner similar to Australia's treatment of sporting heroes.[3] This would go some way towards addressing the Chief Scientist's call for:

> … communicating stories linking science to innovative practices to new products / marketing' so that the wider public gains an 'appreciation of what the science base can deliver.[4]

9.3 It would also be useful, said an SME, if there were 'presentations from industry leaders who have achieved demonstrable success as a result of increased investment in R&D'.[5] In short, the government could consider introducing prizes for Australia's 'most notable technologists' or the large companies 'that most assisted an inventor to commercialise their product'.[6]

---

1 See the products described in the Australian Design Awards publications, Exhibit Nos. 10-15. Also see Australian Design Awards, Submission No. 61, p. 2.

2 Design Institute of Australia, Submission No. 42, p. 6.

3 Australasian Institute of Mining and Metallurgy, Submission No. 3, p. 3.

4 Dr Robin Batterham, Submission No. 25, p. 3.

5 UPSIDE Solutions, Submission No. 23, p. 9. Also Intelligent Manufacturing Systems, Submission No. 35, p. 6: 'The most effective tool to market the IMS program to Australian business has been the formulation of case studies where businesses have undertaken R&D resulting in demonstrable benefit. The formulation and dissemination of such success stories, with examples drawn from and targeted to industry segments, would help stimulate other businesses into investigating R&D opportunities relevant to them. These stories provide the cultural icons for others to aspire to and emulate'.

6 Bosmin, Submission No. 2, p. 4.

9.4 The committee notes that the Prime Minister's Science, Engineering and Innovation Council was advised recently that Australia lacked entrepreneurial managers with the appropriate blend of business management skills and experience and knowledge of high-growth ventures.[7] Some of the suggestions to address this issue include:

- fostering greater networking by 'not just top company people but research people, academics, CRCs, SMEs and big corporations' in activities that include 'training, visits, interactive activities and even partnerships';[8]
- 'a stronger system of providing advice [to those researchers endeavouring to commercialise], through mentoring groups or strengthening the technology transfer skills of research organisations';[9]
- establishing 'a National Entrepreneurial Mentoring Group strongly supported by the Prime Minister… [to] raise the profile and recognise the value of entrepreneurship to the Australian economy';[10]
- 'education programs within undergraduate engineering and science courses on the subject of commercialisation';[11]
- promoting education programs 'for senior executives and company analysts' about the role of innovation in successful businesses';[12]
- incorporating information about commercialisation in undergraduate engineering and science courses;[13]

---

7 Australian R&D Review, December 2002, p. 3, referring to a paper entitled *Management Skills for High-Growth Start-Up Companies: Unleashing Australia's Entrepreneurial Potential*.

8 Prof. Murray Gillin, Transcript, p. 93.

9 Federation of Australian Scientific and Technological Societies, *Scientists commercialising their research*, by Toss Gascoigne and Jenni Metcalfe, FASTS Occasional Paper Series, No. 2, April 1999, Exhibit No. 19 (Executive Summary).

10 Australian R&D Review, December 2002, p. 4, referring to a paper entitled *Management Skills for High-Growth Start-Up Companies: Unleashing Australia's Entrepreneurial Potential*.

11 Australian Industrial Research Group, Submission No. 53, p. 3; also Dr Robin Batterham (Chief Scientist), Transcript p. 475: 'I think that engineers and medical scientists and biologists need exposure to, as a minimum, how to read a balance sheet and, secondly, how commercialisation of new technology is so important and what is involved in it'.

12 Australian Industrial Research Group, *ibid.*

13 *ibid.*

- 'making accountants aware, and making sure accountants are making their clients aware, of what is available' in relation to R&D incentive programs;[14]
- encouraging 'greater mobility and movement between the academic community, the research community and the business community';[15]
- encouraging the return of expatriate Australians with 'experience of start-ups' and 'good established contacts with major players'.[16]

9.5 The committee considers that all of these suggestions have merit and would go some way toward equipping scientists and technologists with 'the skills and ability to move freely between industry and public sector research institutions.'[17] (Suggestions relating to improved mobility between researchers and businesses are addressed in Chapter 10 of this report.)

Recommendation 1

9.6 **The committee recommends that, in order to increase awareness of the importance of innovation and commercialisation, the Commonwealth government:**

- **promote case studies which show the success of companies that have benefited from R&D;**
- **introduce a system of prestigious awards to recognise individuals and companies that successfully commercialise their inventions;**
- **encourage, and facilitate where appropriate, the formation of mentoring groups to provide advice to researchers and businesses about commercialisation; and**
- **conduct education programs about taking a new product to market.**

14 Mr Tony Harrison (Yaltara Software Pty Ltd), Transcript, p. 534.

15 Ms Narelle Kennedy and Ms Catherine Livingstone (Australian Business Foundation), Transcript, pp. 290-291.

16 Mr John Yencken, Transcript, p. 91.

17 Federation of Australian Scientific and Technological Societies, *Australian Science: Investing in the Future*, 2002, p. 4 (Exhibit No. 18).

9.7 The COMET program recognises the importance of mentoring as a means of commercialising R&D in small, start-up companies (see paragraphs 3.37-3.40). The program assigns a private sector business manager / adviser to a company to assist with business planning, market research and intellectual property strategies. It would be useful if the mentoring aspects of the program could be extended to the widest possible number of SMEs.

Recommendation 2

9.8 **The committee recommends that the Commonwealth government expand the mentoring services available to small and medium-sized enterprises beyond those currently offered by the COMET Program.**

9.9 An essential aspect of greater awareness of innovation will come from the widespread use of the ABS surveys of innovative activity that are in preparation (see chapter 2). These surveys are expected to cover non-technological innovation, such as organisational and managerial innovation, as well as technological innovation. The committee considers that these surveys are essential for increasing our level of knowledge about the amount (and nature) of innovative activity in Australia, especially if they incorporate information about 'the costs of innovation (and their breakdown into R&D and other components), the extent of linkages between firms and research institutions… and the use (or non-use) of relevant government programs'.[18] However, the committee was concerned to learn that the surveys are 'subject to available funding'.[19]

Recommendation 3

9.10 **The committee recommends that the Commonwealth government ensure that the Australian Bureau of Statistics undertakes surveys of innovative activity in the Australian economy, such surveys to include details of the non-technological innovation that is taking place in Australia.**

---

18 Australian Bureau of Statistics (ABS), *Newsletters: Science and Technology Statistics Update*, Bulletin No. 7, December 2002, p. 10.

19 *ibid.*

9.11 Further to the issue of ABS information-gathering, the Australian Mineral Industries Research Association International (AMIRA) called for more detailed information about the effects of business R&D expenditure on the whole economy, not just the particular industry sector in which the business operates:

> There is more that could be done in correlating what industry sectors are doing with their field of research and with their socioeconomic objective, and then you can start to see some interesting crossovers, such as that the minerals industry spends more on environmental R&D than any other industry sector in the country.[20]

9.12 AMIRA gave as an example R&D developments in the gold industry which led to:

> … spin-offs into new sectors such as environmental monitoring by remote sensing, start-ups in aeromagnetics, software and instrumentation and digital data processing.[21]

Recommendation 4

9.13 **The committee recommends that relevant industry associations, in conjunction with the Australian Bureau of Statistics, identify the economic benefits of research 'crossovers' such as that between the minerals/mining sectors and the environment sector.**

9.14 An important activity that will foster greater knowledge of the importance of innovation is the Commonwealth government's initiative, announced in November 2002, to 'map' Australia's 'innovation landscape' in order to obtain 'a comprehensive overview of the Australian science, technology and innovation system as a whole', both public and private. In announcing the initiative, the Commonwealth Minister for Education, Science and Training stated:

> This exercise will be conducted in cooperation with state and territory governments, industry and the research community and other interested parties… The work will draw on existing material such as that produced during the development of *Backing Australia's Ability*. These include the Review of National Research Priorities, the Higher Education

20 Mr Dick Davies (Australian Mineral Industries Research Association International), Transcript, p. 254.

21 Australian Mineral Industries Research Association, Submission No. 40, p. 2.

> Review, the Review of Teaching and Teacher Education, the Report by the Chief Scientist in November 2000 and the Report on the Innovation Summit Implementation Group.[22]

9.15 The committee joins the Chief Scientist in commending this initiative.[23]

Identifying national research priorities

9.16 The committee notes the recent announcement by the Prime Minister of four 'national research priorities' covering 'an environmentally sustainable Australia, promoting and maintaining good health, frontier technologies for building and transforming Australian industries, and safeguarding Australia'. The Prime Minister's announcement followed consultation with his Science, Engineering and Innovation Council and extensive public consultation. The four research priorities are 'a signal' about where the government's research focus lies,[24] and:

> … give us an opportunity to go across the whole of government so that the different agencies… can get collaborative acts together to focus on these priorities.[25]

9.17 The Chief Scientist indicated that the government would review the way in which 'individual agencies, the ARC, CSIRO, DSTO, and so on,' adjusted to these research priorities.[26] This will provide the opportunity to implement a whole-of-government approach to the research that is undertaken by Commonwealth agencies, including developing ways to deal with 'any structural impediments or other issues likely to limit [the capacity of agencies] to respond'.[27] This should satisfy the call by the Australian Academy of Science for the

---

22 Media release by Dr Brendan Nelson MP entitled *Mapping Australia's Innovation Landscape*, 21 November 2002.

23 Dr Robin Batterham (Chief Scientist), Transcript, p. 470: 'The mapping exercise… should be taken fairly seriously as a way of identifying some strengths and weaknesses and where we might go'.

24 Prime Minister John Howard MP, Transcript of a media conference about national research priorities, 5 December 2002, p. 4.

25 Dr Robin Batterham, Chief Scientist, Transcript of a media conference about national research priorities, 5 December 2002, p. 4.

26 *ibid*.

27 Information obtained from the Commonwealth Department of Education, Science and Training web site: www.dest.gov.au/priorities/implementation.htm, accessed on 11 March 2003.

Commonwealth government to improve the coordination of policy 'across portfolios' in order 'to generate innovative policy solutions'.[28]

9.18 Also, it would provide the opportunity to address the problems of Commonwealth agency coordination outlined by the local pharmaceutical industry:

> With the [United States] Food and Drug Administration, at least you have one agency with multiple departments which you go to for veterinary, human and genetically modified organism products, but in Australia you go to the National Registration Authority for veterinary, you go to the Therapeutic Goods Administration for human goods and you go the Office of the Gene Technology Regulator for recombinant organisms.[29]

9.19 In various other areas, agencies are being encouraged to adjust their research activities in line with Commonwealth priorities, for example, for some time RDCs have been required to integrate the government's priorities for rural R&D into their corporate plans;[30] a portion of Australian Research Council funds are required to reflect national priorities;[31] and the CSIRO has adopted its *Flagship* program of national research priorities.[32] While none of these measures go as far as Japan which, stated the Executive Director of an international corporation, funds 30% of a firm's R&D 'where the project is deemed to be in the national interest',[33] they indicate a growing trend to link research activity to nationally identified priorities.

---

28 Australian Academy of Science, Submission No. 45, p. 8.

29 Dr Meera Verma (BresaGen Ltd), Transcript, p. 52.

30 Commonwealth Department of Agriculture, Fisheries and Forestry, Australia, Submission No. 76, p. 7: The Commonwealth government's priorities for rural R&D are sustainable natural resource management; whole of industry approach; biotechnology; increases in trade and market access; clean and green image; food safety; and improving our human resources (*ibid*).

31 'Funding in ARC priority areas in Discovery-Projects and Linkage-Projects Round One', available online at: www.arc.gov.au/pdf/Priority_areas.pdf, accessed on 12 May 2003. The four priority funding areas for 2003 were complex/intelligent systems; genome/phenome research; nano- and bio- materials; and photon science and technology. Also Mr John Boshier (Institution of Engineers, Australia), Transcript, p. 423.

32 Mr Mehrdad Baghai (CSIRO), Transcript, p. 243: 'What we are trying to do is organise scientists from across the different divisions to focus on… eight public policy areas which we feel are incredibly important to the nation's agenda'.

33 Mr Brendan McManus (NEC Australia Pty Ltd), Transcript, p. 621.

9.20 The identification of national priorities necessarily involves the states and local governments. Cooperation between the Commonwealth and state governments was said to be essential because 'we are too small a nation… to allow silo mentalities to rule'.[34] The existing level of cooperation was described as good.[35]

9.21 The committee was informed about a number of successful state government initiatives to attract R&D investment, such as the new Motorola Australia Software Centre in Western Australia[36] or to state programs to encourage innovative activity, such as the South Australian Bio Innovation Program,[37] the Victorian Science and Technology Infrastructure Fund[38] and the Queensland Innovation Start-Up Scheme.[39] Further, South Australian SMEs praised their state government's Centre for Innovation, Business and Manufacturing which assists SMEs, including micro-businesses, to prepare grant applications and also provides them with some funding.[40]

9.22 In relation to state government programs, one international corporation expressed the view that:

> State governments have been much more successful in branding their states as smart states… than we have been at the federal level.[41]

34 Dr Robin Batterham (Chief Scientist), Transcript, p. 472.

35 Ms Patricia Berman (Commonwealth Department of Industry, Tourism and Resources), Transcript, p. 222.

36 Prof. Michael Barber (Australian Academy of Science), Transcript, p. 3 and pp. 9-10.

37 Mrs Ann Nelson (Bio Innovation South Australia), Transcript, p. 508.

38 Mr Peter Laver (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 74. In August 2002 the Victorian government announced $59 million in grants for 16 projects under the second round of the Science, Technology and Innovation (STI) Infrastructure program (*R&D Info*, 5 August 2002) and it announced further funding of $310 million for STI initiatives in its 'Victorians. Bright Ideas. Brilliant Future' statement (*R&D Info*, 8 November 2002).

39 *Australian R&D Review*, December 2002, p. 15.

40 Mrs Ann Nelson (BioInnovation South Australia), Transcript, p. 527: 'The Centre for Innovation, Business and Manufacturing is a part of the state government that deals with the small business community'; Mr Geoffrey Rohrsheim (Strategic Data Management Pty Ltd), *op cit.*: The Centre for Innovation, Business and Manufacturing 'is fantastic'.

41 Mr Alex Gosman (GlaxoSmithKline), Transcript, p. 204.

9.23 The committee's attention was also drawn to measures by local governments to encourage innovative activities, sometimes by acting as information exchanges for local businesses (for example, the Frankston and Kingston Councils in Melbourne[42]) and sometimes by grouping Commonwealth, state and local facilities in the one location to facilitate the dissemination of information about R&D programs (for example, Sutherland Shire Council in NSW).[43] Local councils can also encourage 'clusters' in specific research areas, such as the Victorian Biotechnology Councils Network[44] and the Western Sydney IT cluster. The latter has even established a presence in a Singapore technology hub in order to give Western Sydney IT companies a springboard into Asia.[45]

9.24 Among the submitters calling upon the Commonwealth government to establish national research priorities were a state government,[46] a financial association,[47] professional bodies,[48] a public sector research agency[49] and business groups.[50]

---

42 Another example is the Shoalhaven Industry and Business Association Inc., Submission No. 27.

43 Mrs Suzanne Hudson (S. Hudson and Associates Pty Ltd), Transcript, p. 279: Sutherland Council in southern Sydney has 'funded an area… where the Austrade person, the [AusIndustry] person, the Business Enterprise Centre person and some facilities are all located on the one floor. They all talk to each other'.

44 *Australian R&D Review*, February 2003, p. 12.

45 *Australian R&D Review*, November 2002, p. 12.

46 Queensland Government, Submission No. 71, p. 1: There is a 'lack of consistency in regard to government research priorities'.

47 Mr Graham Carew (Taxation Institute of Australia), Transcript, p. 159: Australia should 'target particular industries' for special treatment in order to enable Australia to 'promote itself as a centre of excellence in certain technologies'.

48 Mr John Boshier (Institution of Engineers, Australia), Transcript, p. 414: 'There should be a national strategic approach to R&D… It is our view that Australia needs a long-term technology plan, which should include a comprehensive statement of national priorities for science, engineering and also technology research'.

49 Mr Robert Muir (Australian Nuclear Science & Technology Organisation), Transcript, p. 348: 'We have to get on the radar screen in terms of global science and technology' by establishing 'areas of national focus'.

50 Australian Paper Industry Council, Submission No. 44, pp. 2-12: We need 'to identify key R&D sectors for further development in advancing Australia's potential to foster and nurture niche R&D opportunities'.

Recommendation 5

9.25 **The committee recommends that the Commonwealth government, in consultation with the states:**

- **identify key R&D sectors for further development;**
- **encourage state governments and local councils to promote R&D within their jurisdictions; and**
- **assist the efforts of local governments to encourage small and medium sized enterprises to share information about research and commercialisation.**

9.26 The committee acknowledges the view of some witnesses that an important national priority involves increasing the number and skill levels of engineers, scientists and technologists.[51] Specific suggestions were that people retraining from one industry sector to another should be eligible for the same tax concessions as currently exists for re-training within the one sector,[52] and that group training schemes such as the HunterNet Scheme be encouraged (it allows 'graduates to move between companies [thus] gaining practical training experience').[53]

9.27 The Institute of Engineers added that 'engineering should be encouraged in primary and secondary schools, and private industry should be more involved in curriculum development' in universities.[54] Two science-based organisations called for the reduction, or even removal, of the Higher Education Charge (HECS) from science courses to encourage young people to enter these areas.[55] The IMS supported this suggestion.[56] The committee agrees that specific action is needed to encourage young people to take up technology-oriented careers.

51 Mr John Boshier (Institution of Engineers, Australia), Transcript, p. 414: 'A skilled engineering workforce is essential… [but] at present Australia is importing a significant number of engineers every year'; Holden, Submission No. 57, pp. 8-9: 'Some of Australia's industry is technically inadequately prepared to compete in the global market place;' Dr Stephen Sykes (Flavourtech), Transcript, p. 461: 'Probably the main problem facing all SMEs... [is] too low an output of technological professionals'.

52 Ericsson Asiapacificlab Australia, Submission No. 14, p. 3.

53 Mr John Boshier (Institution of Engineers, Australia), Transcript, p. 414.

54 Institution of Engineers, Australia, Submission No. 72, pp. 4-19.

55 Australian Geoscience Council, Submission No. 20, p. 4; also Dr Stuart Carr (Australian Nuclear Science & Technology Organisation), Transcript, p. 347.

56 Dr Edwin van Leeuwen (Intelligent Manufacturing Systems), Transcript, p. 314.

Recommendation 6

9.28 **The committee recommends that the Commonwealth government, in conjunction with the states:**

- **assess the efficacy of current efforts to improve students' knowledge of, and interest in, technology-oriented careers, with a view to introducing specific schemes to encourage young people to undertake the study of engineering and technology; and**
- **promote the interest of school students in such careers by publicising the achievements of successful engineers and technologists.**

Encouraging major international corporations to conduct R&D in Australia

9.29 The general view of submitters was that major international corporations contributed more to the Australian economy than they took out, and hence they should be encouraged to undertake R&D in Australia.[57] The Chief Scientist stated that:

> R&D done by multinationals in Australia is worthwhile because it has all sorts of impacts apart from just doing more R&D: it is in the number of people who are available; it is in the training; it is in the notion that we might provide more postdocs.[58]

9.30 Similarly, the Australian Business Foundation said that:

> Not only must we attract foreign multinational corporations for their jobs and money, we must attract them with the explicit purpose of transferring intangible knowledge and skills to Australian firms through research and training institutions, suppliers and customers. This will then enable further building of our R&D capacity, global management expertise and exports.[59]

---

57 Australian Geoscience Council, Submission No. 20, p. 4; Ms Narelle Kennedy (Australian Business Foundation), Transcript, p. 283; and Federation of Australian Scientific and Technological Societies, Exhibit No. 18, *Australian Science: Investing in the Future*, p. 12.

58 Dr Robin Batterham (Chief Scientist), Transcript, p. 473.

59 Australian Business Foundation, Exhibit No. 25, *Friend or Foe? Leveraging Foreign Multinationals in the Australian Economy*, p. 9.

9.31 In order to encourage international corporations, the Chief Scientist suggested that the Commonwealth government should offer:

> … special deals such as offsets programs (90% of R&D would otherwise be in the country of head office), by encouraging States and Territories to focus on their niche areas of expertise to collaborate for both their advantage and that of Australia… [This was because] company size and its ownership have a significant effect on R&D intensity in some sectors and shed light on reasons for companies' performance / differences.[60]

9.32 The Academy of Science agreed with the suggestion of an offset program.[61] Further, an industry association suggested that, in order to compete against other countries, for example, Singapore ('where a 200% concession is available'), the Commonwealth government should consider enticing major international corporations to site their R&D investment in Australia by offering up to a 200% tax concession.[62] Also, it was suggested that the Commonwealth government could encourage R&D investment by waiving royalty payments in return for an increased investment in R&D (as was done in the case of Cochlear).[63]

9.33 The committee notes that in September 2001 the Commonwealth government announced a funding package for Australia's local film industry that includes a refundable tax offset whereby eligible firms that complete film production in Australia can claim the offset. The Department of Communications, Information Technology and the Arts stated that 'the tax offset has been designed to keep Australia competitive in an increasingly global film production environment'.[64] A similar use of the refundable tax offset as a means to encourage international corporations to site their R&D investment in Australia may be appropriate.

---

60 Dr Robin Batterham, Submission No. 25, p. 3.

61 Australian Academy of Science, Submission No. 45, p. 5: The government 'should consider implementing a formal offset program when giving assistance to major industrial developments' whereby such assistance is contingent upon technology transfer to Australia (usually in areas that are 'linked to domestic R&D aimed at customising and refining a core technology'.

62 Australian Information Industry Association, Submission No. 74, pp. 12-13.

63 Information obtained from the AusIndustry web site, *'Commonwealth government and Cochlear agree on increased R&D investment,'* www.ausindustry.gov.au / content / azindex.cfm, accessed on 20 February 2003.

64 Commonwealth Department of Communications, IT and the Arts, *Annual Report 2001-02,* p. 32.

9.34 Submitters also suggested that large international companies needed more detailed information about the nature of research that is taking place in Australia if they are to convince their head offices of the merit of establishing facilities in this country[65]—such information is not easy to come by at the moment, stated one international company.[66] In this respect, the committee notes that the 'revamped' Invest Australia has been instructed to:

> … be more strategic in targeting firms and other potential investors and in using the Commonwealth's resources for maximum exposure.[67]

9.35 However, an industry association thought that Invest Australia should consult major international corporations about the nature of the information that is most useful to their efforts to encourage a favourable decision by the head offices to invest in Australia, and adjust its promotion efforts accordingly.[68] This should comprise part of an overall strategy by the government to actively 'manage' the relationship with major international corporations, in order to encourage them to remain in the country.[69]

---

65 Australian Electrical and Electronic Manufacturers' Association Ltd, Submission No. 68, pp. 6-7.

66 Mr David Bolt (General Manager, Intel Pty Ltd, and member of the Australian Information Industry Association), Transcript, p. 443: 'There is a challenge and quite an expense in identifying the research that is going on at an appropriate level for the due diligence process. That takes a fair bit of investment up-front to delve into the current projects and get a close enough understanding about what is going on, with a view to whether that is a viable research project for the multinational company to get engaged in'. Also Ms White (Australian Information Industry Association), Transcript, p. 452: 'You might happen across a research project going on inside a university that is tremendously important and could be world-beating in a project you are working on in industry. Ninety-nine times out of a billion you do not come across it, do not know about it, do not know it has ever existed'.

67 Information obtained from the Commonwealth Department of Foreign Affairs and Trade web site: www.dfat.gov.au/toos/archive/2002/ch4.html, accessed on 10 March 2003.

68 Ms Heather Ridout (Australian Industry Group), Transcript, p. 134.

69 Ms Catherine Livingstone (Australian Business Foundation), Transcript, p. 288; also Nortel Networks, Submission No. 70, p. 9: 'Acquiring an R&D investment is not a one-off win for Australia; on-going attention to retention of the investment is essential'.

Recommendation 7

9.36 **The committee recommends that the Commonwealth government seek to attract major international corporations to site their R&D facilities in Australia and actively manage an on-going relationship with these companies by:**

- **considering the use of a refundable tax offset whereby major international firms choosing to site new R&D investment in Australia can claim the offset;**
- **regularly meeting with the major international corporations already resident in Australia so as to refine, where necessary, the government's support programs in order to retain those companies' R&D investments; and**
- **incorporating input from international corporations into the operations of InvestAustralia.**

Improving the take-up of overseas R&D by Australian companies as well as recognition of R&D conducted overseas by Australian companies

9.37 The importance of encouraging the take-up of overseas R&D was put by the Commonwealth Department of Industry, Tourism and Resources in the following way:

> For a small country such as Australia, a potentially important influence on productivity and output growth is the effect of improvements over time in the quality and technical content of imported inputs (technology transfers) and other research spill-overs from other countries. Benefits of foreign R&D are likely to flow to Australia through the import of improved machinery, equipment and supplies from overseas and the interaction of foreign and Australian researchers. After taking both of these factors into account, the [Productivity] Commission found that a one per cent rise in foreign R&D stocks would raise Australian multi-factor productivity by between 0.028 and 0.08 %, yielding an economy-wide rate of return to foreign R&D of 8-23%.[70]

70 Commonwealth Department of Industry, Tourism and Resources, Submission No. 38, p. 4.

9.38 Australian businesses also urged the committee to recommend steps to improve the take-up of overseas R&D.[71] The Australian Mineral Industries Research Association stated that it utilises both government and private sector funding from 30 organisations to facilitate access 'to the 98% of global R&D that occurs outside Australia'.[72] The take-up of overseas R&D, suggested one industry association, would be facilitated by the introduction of 'tax incentives for companies to access state-of-the-art overseas "core technology"'.[73]

9.39 The committee notes that the government's Innovation Access Program includes measures like the InnovationXchange (see paragraph 3.17) that increase access by Australian researchers and firms to global research and technologies. Such information is also passed on by Austrade at regional seminars within Australia. It would be useful to coordinate the provision of information about global research and technologies within one national program.

Recommendation 8

9.40 **The committee recommends that the Commonwealth government, as part of a program to support the take-up by Australian businesses of R&D that is developed offshore, consider developing programs to familiarise businesses with overseas research.**

---

71 Submission by Tom Stoddart Pty Ltd to the Queensland Minister for Innovation and IT, Jude 2002, reproduced in the Transcript, p. 376: Though 'we invest a significant amount of our funds into R&D each year… [between] 3-5%... it is oriented more towards the product development side rather than research… Most of the research [affecting the company] is… done abroad and it would be unlikely that there is sufficient critical mass in Australian industry to support cutting edge research in this area. However, the application and utilisation of this technology locally is necessary if we are to continue to compete internationally'; also Mr Dick Davies (Australian Mineral Industries Research Association International), Transcript, pp. 264-265: 'I think it would be very difficult to get manufacturing industries like the furniture industry, which is not famous for doing R&D, to go straight into supporting R&D programs. There needs to be a transition program to culturally accustom them to the benefits of technology. The sensible thing to do, if you are in that situation, is not to reinvent the wheel but to buy in, or have some mechanism for buying in, what is available internationally and, having done that, perhaps decide that you need to start to tailor-up things to your particular circumstances. Making the leap from no research to supporting start ups or CRCs or whatever is very difficult'.

72 Australian Mineral Industries Research Association International, *op cit*.

73 Australian Paper Industry Council, Submission No. 44, p. 10.

9.41 An industry association thought that 'removal of the 10% limit on overseas R&D that can be deducted' would encourage Australian businesses, whether SMEs or major international corporations, to undertake overseas R&D where appropriate.[74] The same association suggested that Australian subsidiaries of global companies which conduct R&D in Australia, though manufacturing offshore, should be eligible for the tax concession, provided that these companies can show a demonstrable benefit to Australia.[75]

9.42 The committee is aware that, subject to IRDB approval, some overseas R&D activities may be eligible for the tax concession if the activities cannot be carried out in Australia and if no more than 10% of the total expenditure on an R&D project relates to overseas R&D activities. However, the 10% limit is a problem to at least one Australian company heavily reliant on R&D (Cochlear) which stated that:

> … the eligibility of overseas research is absolutely vital, with 97% of our sales overseas… [because] we need to link into the universities that we work with overseas and participate in some of the work which they are doing over there… [but] we keep bumping into that 10% rule [despite the fact that] all the benefits [of our research] are going to come back to Australia.[76]

Recommendation 9

9.43 **The committee recommends that the Commonwealth government waive the current 10% limit on overseas R&D that can be deducted, for investments of demonstrable benefit to Australia and where no equivalent domestic R&D provider is available.**

Encouraging exporting

9.44 The committee accepts that, 'for Australian companies to grow, they need to look to overseas opportunities'.[77] Many SMEs are already exporters, including of high-technology products to the United

74 *ibid*.

75 *ibid*; also Australia-Israel Chamber of Commerce, Exhibit No. 9, *The Economic Benefits of Innovation Policy: Lessons for Australia from Israel's Experience,* p. 6.

76 Mr Neville Mitchell (Cochlear Ltd), Transcript, p. 605 and p. 623.

77 Australian Paper Industry Council, Submission No. 44, p. 5.

States.[78] The committee acknowledges the government's commitment to double the number of exporters by 2005;[79] and notes that some states have made similar commitments (for example, Victoria).[80] The committee acknowledges the various government measures to foster exports.

9.45 The committee notes widespread praise for recent changes to Austrade that increase its effectiveness in promoting Australian exports (Austrade is 'terrific', said a large exporter).[81] However, one witness regretted Austrade's unwillingness to act (as it did in the 1980s) as the prime contractor for major export orders, thus providing valuable protection for the smaller Australian companies that formed part of a contracting consortium.[82]

9.46 The same witness suggested that Australia's exports of high technology products and processes to the US would be facilitated by the adoption of a scheme similar to a Canadian government program which identifies 'US government procurement programs that are coming in the next two-three years and [then] focuses its own requirements to be ahead of those programs'.[83] The result was said to be that Canadian companies 'win an amazing proportion of those programs'.[84] The committee considers that such a program could be useful for Australian high-tech companies seeking to sell in the US market.

9.47 Two further issues of concern about encouraging exports were raised by witnesses. One concerned the Export Market Development Grants Scheme (EMDG) which provides direct financial assistance in the form of taxable grants to SMEs to assist their export promotion activities. It is paid as a 50% subsidy for marketing and promotion expenditures, with eligible SMEs able to receive eight grants of up to $200,000 in total. The scheme is fixed at $150 million per annum. In

78 For example, Dr Ben Greene (Electro Optic Systems Pty Ltd), Transcript, p. 585: 'As a high-tech company, our markets have always been principally in the US.'

79 The Hon Mark Vaile (Minister for Trade), *Knowing and Growing the Exporter Community*, Austrade 2002, Foreword p. 3; also Ms Heather Ridout (Australian Industry Group), Transcript, p. 128: 'The government has committed itself to a target of doubling the number of exporters by 2005'.

80 *Australian R&D Review*, February 2003, p. 12.

81 Dr James Fox (Australian Innovation Association), Transcript, p. 175; also Ms Heather Ridout, *op cit.*: 'Austrade has a new chairman and a new chief executive officer, and it now seeking to develop real alliances with organisations such as the Australian Industry Group to drive a stronger export culture in Australia'.

82 Dr Ben Greene (Electro Optic Systems Pty Ltd), Transcript, p. 599.

83 *op.cit.*, p. 585.

84 *ibid.*

2000-01 there were about 3,000 recipients, with the average grant being around $46,000.[85]

9.48 The committee was told by one Australian exporting company that 'the EMDG for us meant that in a year we could typically add an extra person outside the country, so it was very powerful for us'.[86] Another witness stated that, in view of the importance of promoting exports, it was 'wrong' to cap the scheme.[87]

9.49 The second issue of concern to some witnesses was the importance of negotiating suitable trade agreements that guarantee access by Australian exporters to other markets, for example, the Federal Chamber of Automotive Industries stressed that:

> … the Chinese and ASEAN markets present a significant export opportunity for the Australian industry if improved access to these markets is secured through either multi-lateral or bi-lateral trade agreements.[88]

9.50 The committee notes the efforts of past and present Commonwealth governments to pursue a range of strategies to increase market access for Australian exporters, including through the World Trade Organisation and through bilateral free trade agreements (such as that with Singapore).

Recommendation 10

9.51 **The committee recommends that the Commonwealth government, as part of its efforts to increase the incentives for Australian firms to export, consider the following actions:**

- **increase the cap on the Export Market Development Grants Scheme to, at the least, maintain its real value;**
- **introduce a program to inform Australian high-technology companies about government procurement programs in other countries. For example, the United States government**

85 Information obtained online at: www.austrade.gov.au (export grants), accessed on 12 May 2003; and Department of the Parliamentary Library (Information and Research Services), *Export Market Development Grants Amendment Bill 2002*, 29 May 2002, pp. 1-2.

86 Dr James Fox (Australian Innovation Association; and Managing Director, Vision Systems Ltd), Transcript, p. 174.

87 Ms Heather Ridout (Australian Industry Group), Transcript, p. 128.

88 Federal Chamber of Automotive Industries, Submission No. 73, p. 19.

procurement programs (in advance of the release of actual tenders by US agencies); and

- **accelerate the negotiation of trade agreements that facilitate access by Australian companies to overseas markets.**

Encouraging industry associations and clusters

9.52 Collaboration between companies can involve industry clusters as well as the CRC model which focuses on getting the IP 'out of the university sector back into industry'.[89] Another model, said the IMS, involves the 'funding of clustered companies that have agreed on commercialisation of an R&D plan'.[90] The Federation of Australian Scientific and Technological Societies (FASTS) thought that SMEs in industries with common interests should be encouraged to collaborate when seeking research funds[91] or, said another witness, when common problems have been identified (especially at the state level).[92] The Queensland Manufacturing Leaders' Group considered that greater use of industry associations would encourage the 'exchange of technology and ideas... and [break down] the secretiveness that occurs in some competitive work'.[93]

9.53 The committee is particularly interested in projects that encourage collaboration by SMEs within the one industry, including in relation to pre-competitive R&D. The Federation of Australian Scientific and Technological Societies suggested that governments should encourage SMEs in industries with common interests to set up research funding bodies via voluntary sector levies, along the lines of the rural Research and Development Corporations:

> These funding bodies can then consider specific research proposals from universities, government and private organisations that relate to generic areas of interest for the industry, rather than for proprietary applications.[94]

89 Mr Angus Robinson (member of Intelligent Manufacturing Systems, and Chief Executive of the Australian Electrical and Electronic Manufacturers Association), Transcript, p .322.

90 *ibid.*

91 Federation of Australian Scientific and Technological Societies, Submission No. 51, p. 8

92 Prof. Murray Gillin and Mr John Yencken, Submission No. 19, p. 4.

93 Mr Bill Stoddard (Queensland Manufacturing Leaders' Group), Transcript, p. 379.

94 Federation of Australian Scientific & Technological Societies, Submission No. 51, p. 8.

9.54 In order to encourage 'more generic research and encourage businesses to pool their contributions', it was suggested that the government consider:

> … defraying [the] expenses of industry-funded research organisations to develop and broker research projects for SME client companies.[95]

Recommendation 11

9.55 **The committee recommends that the Commonwealth government:**

- **encourage small and medium-sized enterprises in industries with common interests to set up research funding bodies via voluntary sector levies; and**
- **develop a program (perhaps along the lines of the highly successful rural Research and Development Corporations) to financially assist such research bodies.**

Increasing the capacity of SMEs to access capital

9.56 The committee is pleased that the Commonwealth government's Venture Capital Limited Partnerships (VCLP) program commenced in December 2002. The program is designed to attract certain non-resident tax-exempt funds for investment in Australian businesses. It provides for a limited partnership to apply to the Pooled Development Funds Registration Board for registration as a VCLP[96] and, if successful, for the VCLP 'not [to] be taxed as a company but [to] be a flow-through vehicle for taxation purposes',[97] meaning that capital gains or losses will flow straight through to end-investors rather than venture fund managers. The Australian Venture Capital Association (AVCAL) stated that:

> Such limited partnership structures are the investment vehicles of choice in all major venture capital industries worldwide… [The new structures] mean that large overseas pension funds and others looking at Australia know they can

95 Mr Gerry Biddle, Submission No. 32, p. 15.

96 *Summary of AusIndustry Products* AusIndustry, 5 February 2003.

97 Information obtained from the AusIndustry web site: www.ausindustry.gov.au, accessed on 10 March 2003.

> retain their tax exempt status and work within familiar legal structures. To date, it's just been too expensive and hard [for them] to invest here. AVCAL expects $1 billion in new capital to enter Australia over the next five years as a result of the reforms.[98]

9.57 Some witnesses suggested that, notwithstanding the introduction of the VCLP, it would be useful to take another step, namely:

> Governments need to implement policies to encourage superannuation funds to play a greater role in the provision of venture capital.[99]

9.58 This was said to be particularly relevant given that the timeline for a return on venture funds was five to ten years, so for individuals wishing to participate in venture capital 'it is best done through their super funds where they can manage the time horizon better'.[100]

9.59 One SME suggested that 2%-5% of Australian superannuation funds should be 'quarantined' for the purpose of 'developing smaller businesses in this country'.[101] It was suggested that 'the smarts… [or successful SMEs] will more than compensate for the failures that come along'.[102]

9.60 The committee is aware that a number of Australian superannuation funds are choosing to invest a percentage of their money into smaller companies[103] but it would be useful if superannuation funds were made more aware of the attractiveness of investing in research-oriented SMEs.

---

98 Media release by the Australian Venture Capital Association (AVCAL) dated 12 December 2002.

99 Institution of Engineers, Australia, Submission No. 72, pp. 4-19; also see Federation of Australian Scientific and Technological Societies, Exhibit No. 18, *Australian Science: Investing in the Future*, p. 11.

100 Mr Andrew Green (Australian Venture Capital Association), Transcript, p. 394.

101 Dr Alan Ferguson (Bio Pharma Pty Ltd), Transcript, p. 567.

102 Mr Graham Heilbronn, Transcript, p. 568. Mr Heilbronn, who is President of Commerce Queensland and also Chair of a venture capital company, added: 'By way of an example, there is a 40% profit margin on the companies we are looking at [for funding by the venture capital company]—and they are coming in. There are plenty of them out there'.

103 For example, Dr Roger Lehmann, Transcript, p. 569: 'I am an established company, and we have had good success with superannuation funds. We approached one of those to take up ownership of shares within our company, and we were successful in that approach'.

Recommendation 12

9.61 **The committee recommends that the Commonwealth government investigate ways to better demonstrate to Australian superannuation funds the opportunities arising from investing in Australian small and medium-sized enterprises that conduct R&D (recognising the primary fiduciary duty of the funds to maximise returns to their members).**

9.62 The committee notes the existence of Commonwealth government programs to encourage venture capital into innovative areas (Pooled Development Funds program and the Innovation Investment Funds program—see chapter 3). The Pharmaceutical Industry Investment program (PIIP) is another program designed to encourage venture capital into a specific industry. Whilst useful, the Institution of Engineers thought that these measures 'have not, as yet, been enough to keep pace with our international competitors'.[104] The Institution considered that additional venture capital could be encouraged by:

> … allowing R&D tax deductibility for interest and dividends earned by investors in trusts and/or Funds set up specifically for investment in R&D.[105]

9.63 The Institution's proposal would build on the existing Pooled Development Funds (PDF) Program which enables registered PDFs and their shareholders to be taxed at a lower rate on income generated through PDF activities (paragraph 3.44). Whereas the PDF program applies to SMEs in general, the Institution's proposal would apply to *R&D activities only*, and would extend to all sizes of firms. The committee considers that the proposal warrants more detailed examination.

Recommendation 13

9.64 **The committee recommends that the Commonwealth government consider a scheme, along the lines of the current Pooled Development Funds Program, to enable Funds or trusts whose *sole* purpose is to invest in R&D activities, to receive concessional tax treatment.**

---

104 Institution of Engineers, Australia, Submission No. 72, p. 8.

105 *ibid.*, p. 9.

Improving financial incentives for individuals to conduct R&D and commercialise the outcomes of research

9.65 In order to improve the financial incentives for individual researchers and entrepreneurs to establish companies based on R&D outcomes, many witnesses called for:

> … more generous tax treatment of share options, deferral of taxation (including capital gains tax) and other measures to encourage and support individuals to take up equity in start-up companies based on innovations.[106]

9.66 The Business Council considered that:

> … the incentives for researchers to take the risks involved in spinning off ideas are not adequate. Incentives need to be changed so that they ensure public research institutions actively promote IP spin-offs and stronger personal incentives to motivate the entrepreneurial instincts of researchers are needed.[107]

9.67 Other witnesses supported the view that an important way to 'induce' scientists to 'bring their science out to form a company around it' is to provide those scientists with 'equity in their own company'.[108] Further, the committee was told that, whereas the issue of share options used to be just for top managers, many firms 'are now rolling those share options right down through the infrastructure'.[109]

106 Group of Eight, Submission No. 34, p. 5; also Pfizer Pty Limited, Submission 65, p. 12: 'It is generally in the interests of all parties that the inventor/s remain associated with the early stages of commercialisation of IP… To reward their continued commitment and to encourage entrepreneurship, the inventors and key staff are frequently offered or seek substantial equity in the start-up company, often in the form of share options. It is imperative that such equity be treated for tax purposes as notional and not subject to the tax laws until realised… [because] many start-up companies fail'.

107 Business Council of Australia, Submission No. 58, p. 2.

108 Dr Kevin Fahey (Pfizer), Transcript, p. 368; also see: The Warren Centre for Advanced Engineering, Exhibit No. 6, Text of the 2002 *Warren Innovation Lecture*, delivered by Dr James Fox (Vision Systems Ltd), p. 12; and Federation of Australian Scientific and Technological Societies, Exhibit No. 18, *Australian Science: Investing in the Future*, p. 5.

109 Dr Kevin Fahey (Pfizer Pty Ltd), Transcript, p. 368.

Recommendation 14

9.68 **The committee recommends that the Commonwealth government make further changes to employee share option arrangements to boost the financial incentives for researchers to commercialise their research outcomes (possibly by removing the requirement to pay tax upfront on the issue of shares in a start-up company).**

9.69 In relation to capital gains tax (CGT), the government's recent changes were welcomed, with one witness stating:

> The recent changes whereby you can elect to only have 50% of the gain taxed, assuming you hold the shares or the investment for more than 12 months, is positive… [and] is good in international terms as well.[110]

9.70 However, the Federation of Australian Scientific and Technological Societies thought that a tapered CGT rate should apply to high-technology industries for the reason that:

> Typically, new high-tech companies do not show profits for several years because of the need to reinvest in growth. As a result, venture capitalists can only reap returns by exiting the investment and realising capital gains.
>
> A tapered CGT rate, reduced annually in proportion to the length of time the asset is held (as in the UK), would attract investment without destabilising either the long-term prospects for high technology industry (due to speculative movements of capital), or long-term social equity. This tapered rate should be strictly targeted to high technology industries.[111]

Recommendation 15

9.71 **The committee recommends that the financial incentive for researchers, and those commercialising research outcomes, be improved by considering the introduction of a *tapered* capital gains tax in relation to assets held in new high-technology companies (whereby the tax is reduced in proportion to the length of time an asset is held).**

---

110 Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 194.

111 Federation of Australian Scientific & Technological Societies, Submission No. 51, p. 6.

Improving government tender and purchasing processes

9.72 The concern of some SMEs that they 'do not get a significant share of federal government business'[112] was said to reflect the fact that the government was:

> … not particularly supportive of its native industry in its own procurement decisions. We will often choose products from overseas when there is a product that is equivalent, and sometimes better.[113]

9.73 Further, it was said that Australian government departments do not appreciate the importance of encouraging SMEs to undertake research to meet the needs of those departments:

> You can read *Backing Australia's Ability* or any of those documents, but when you go and deal with a government department most people would never have heard of it.[114]

9.74 Yet the government can provide 'the first step that a company needs in the commercialisation process, that is, a first customer, a reference site, a place where they can do trials and things'.[115]

9.75 The Australian Business Foundation called on governments to ensure that their purchasing polices foster the involvement of SMEs[116] and an SME noted that:

> The Commonwealth government is in a powerful position to foster business innovation by designing tenders and tender processes that are conducive to innovation.[117]

9.76 Similarly, the Institution of Engineers called on the government to act as an 'informed client' in ensuring that it purchased 'innovative solutions' because:

> Government can take a really important lead role here in being an informed buyer. When you look at how much the government spends in defence industries, in roads, water infrastructure and all the other infrastructure such as telecommunications, yes, it is very important that the

112 Mr Brand Hoff (Thiri Pty Ltd; and Chairman of the Knowledge-Based Economy Board), Transcript, p. 586.

113 Mr Martin Harwood (Tower Software Engineering Pty Ltd), Transcript, p. 592.

114 Mr Roger Martindale (The Distillery Pty Ltd), Transcript, p. 593.

115 Mr Brand Hoff, *op.cit.*, p. 585.

116 Ms Narelle Kennedy (Australian Business Foundation) and Ms Catherine Livingstone (Australian Business Foundation), Transcript, pp. 290-291.

117 Wave Global, Submission No. 15, supplementary submission.

> government deliberately tries to push the boundary but it must be informed in doing so.[118]

9.77 The committee was urged by an SME to encourage 'government research institutions [to] push as much research as possible into the private sector'.[119] In this regard, attention was drawn to United States government procurement programs that support small business. Specific mention was made of the Small Business Innovation Research Program (SBIR), which ensures that a portion of federal R&D contracts are awarded to SMEs.[120]

9.78 Under the SBIR program, a number of United States federal departments and agencies (including Defence, Energy, Health and Human Services, and Transportation) are required to reserve a portion of their R&D funds for award to small business. These agencies designate R&D topics and invite proposals. Following submission of proposals, agencies make SBIR awards based on small business qualification, degree of innovation, technical merit, and future market potential. Small businesses that receive grants begin a program which involves several phases and, ultimately, leads to commercialisation of research results and the use of private sector or non-SBIR federal funding.[121]

9.79 The committee notes the potential benefits of the SBIR, including the potential for such contracts to assist small businesses attract additional private sector support and to grow. With reference to experience under the SBIR, one SME stated that:

> If you have the US government as your first contract before you are even incorporated, the angel money falls out of the sky.[122]

9.80 A program of this type might help to 'breakout IP that is locked up in government institutions'.[123] Also, an SBIR-type program would

---

118 Mr John Boshier (Institution of Engineers, Australia), Transcript, p. 425.

119 Wildlife Management International Pty Limited, Submission 60, p. 5.

120 Dr Ben Greene (Electro Optic Systems Pty Ltd), Transcript, pp. 591-95.

121 Information obtained from the web site of the United States Small Business Administration: www.sba.gov/sbir/indexsbir-sttr.html accessed 23 April 2003.

122 Dr Ben Green, *op.cit.*, p. 591.

123 Dr Greene, *op. cit.*, pp. 593-594: This would be 'very healthy for the economy and very health for the country, because you break out IP that is locked up in government institutions which, although they are innovative and perform very well, just do not deliver the return to the economy'.

demonstrate the commitment of the government to small business, noting the remarks of one SME that the government:

> … could send the message to our whole economy, and it does not have to use billions of dollars to do it. The body language of [the government] is incredibly important in this country; it is much more important relatively than it is in the US.[124]

Recommendation 16

9.81 **The committee recommends that the Commonwealth government facilitate the involvement of small and medium-sized enterprises in government tender and purchasing processes by:**

- **incorporating a weighting within those processes which recognises the need to promote innovative activity; and**
- **investigating the establishment of a competitive small business set aside program, modelled on the United States Small Business Innovation Research Program, in which government agencies would be required to contract a portion of their R&D funds to small and medium-sized enterprises.**

Reducing regulatory barriers to business R&D

9.82 The committee notes the concerns of witnesses about regulatory barriers to R&D investment that were outlined in chapter 8. The Australian Nuclear Science and Technology Organisation (ANSTO) stated that:

> A more consistent regulatory system would be an international competitive advantage for Australia. Different regulations across State and Federal jurisdictions complicate compliance and in doing so raise costs to business and reduce the return on investment. Relevant areas of regulation include consumer protection, dangerous goods and standards.
>
> In addition, greater consistency or homogenisation of regulation with the USA and the European Union (EU) would reduce business and research costs. The process of registering products and devices through the Therapeutic Goods Administration, for example, could be made more

124 *ibid.*

> efficient and effective by further strengthening recognition agreements between Australia, the USA and the European Union.[125]

9.83 The committee concurs with this view. Further, the committee considers that regulatory provisions should be reviewed, not only to minimise barriers to innovative activity, but to actually incorporate incentives for research and the take-up of new technology, for example, 'innovation in pharmaceuticals would be stimulated by the provision of larger Pharmaceutical Benefit Scheme [PBS] payments to the first new drug in a class of drugs'[126] or by the introduction of 'a stratified reimbursement system depending on the urgency of the medical need for the drugs'.[127]

9.84 Action along these lines would stimulate pharmaceutical research by large international corporations and SMEs, for both are affected by the existing PBS pricing structure:

> I think the issue for Australian companies developing [pharmaceutical] IP is that if they get it on the market here they also suffer the same low prices that we do as a multinational corporation. The issue is around reward for innovation.[128]

9.85 The committee was told that 'new health regulations and environmental objectives can provide an incentive for Australian industry to carry out more R&D or require that it does so,'[129] for example, having to meet a prescribed legislative target for reducing CO_2 emissions can stimulate R&D in this area.[130] The committee considers it essential that every effort be taken to ensure that Australian regulations actually foster, not impede, the conduct of research and take-up of new technology.

---

125 Australian Nuclear Science and Technology Organisation, Submission No. 52, p. 7.

126 *ibid*.

127 Prof. Graham Macdonald (Merck, Sharp and Dohme), Transcript, p. 334.

128 Ms Sara Panzer (Merck, Sharp and Dohme), Transcript, p. 338.

129 Australian Nuclear Science and Technology Organisation, Submission No. 52, p. 7.

130 Prof. Ian Rae, Transcript, p. 104-111; also Dr Cook, Transcript, p. 14: 'The R&D initiatives supported by the Australian Greenhouse Office has been of particular interest regarding efforts to reduce energy, to recycle waste and to reduce carbon dioxide production… A New South Wales government initiative focused on reductions in energy consumption, particularly electrical energy, has also been welcomed'.

Recommendation 17

9.86 **The committee recommends that the Commonwealth government minimise regulatory hurdles for businesses to conduct and take-up R&D by:**

- **promoting greater regulatory consistency across all tiers of Australian government;**
- **encouraging international harmonisation of regulations, especially with respect to Australia's major trading partners, and when negotiating new trade agreements; and**
- **ensuring that Australian regulations facilitate research and the take-up of new technology.**

9.87 While not directly a regulatory issue but rather one bearing on the cost of accessing government-held information, the committee considers that governments, both Commonwealth and state, should make every effort to reduce the cost to businesses of obtaining information from governments. A good illustration concerns access to spatial information which, in the Commonwealth's case, is available at the cost of transferring the information but, in the case of the states, is charged at the cost of acquisition. The minerals industry described the Commonwealth's approach as 'a very positive thing to do'[131] while the current state policies were described as 'a significant impediment to the growth of our industry'.[132]

Recommendation 18

9.88 **The committee recommends that the Commonwealth government, through the forum of the Council of Australian Governments (COAG), improve the public's access to spatial information by encouraging the states to make their spatial data available to the public at the cost of transferring the information, rather than at the cost of acquisition.**

9.89 In relation to the future of the pharmaceutical industry in Australia, companies, both large and small, called for the Pharmaceutical Industry Investment Program (PIIP) to be extended beyond its current expiry date of July 2004 because this would demonstrate the

131 Ms Sarah Vandermark (Australian Mineral Industries Research Association International), Transcript, p. 263.

132 Mr Peter Woodgate (Royal Melbourne Institute of Technology), Transcript, p. 139.

Commonwealth government's commitment to the long-term future of the industry in Australia[133] and 'raise Australian science on the radar screen' of head offices.[134] It was claimed that licensing agreements may bring in significant payments[135] and that Australia could become 'a base for Asia and the rest of the world'.[136] The Productivity Commission's recent review of PIIP found that it:

> … has been effective in stimulating R&D and, to a lesser extent, value added in production. It has also had broader benefits for the capabilities of the industry, for example, by shifting R&D to more complex areas.[137]

9.90 The Productivity Commission recommended a modified pharmaceutical support scheme focussed wholly on encouraging R&D and:

> … open only to pharmaceutical firms with products listed on the PBS; [to] have several entry and exit points for participants to allow for the 'vicissitudes' of drug breakthroughs; [to] have competitive entry based on beneficial activity that would not otherwise occur; [to] have a duration of five or six years; and [to] maintain capped funding.[138]

9.91 The committee is sympathetic to the continuation of a modified PIIP scheme along the lines suggested by the Productivity Commission.

Improving accounting standards and practices so as to better recognise the importance of R&D

9.92 Some witnesses expressed the view that 'the innovative aspect' of business activity should be 'reported' in company accounts.[139] R&D

133 Dr Kevin Fahey (Pfizer Pty Ltd), Transcript, pp. 365-367.

134 *ibid*., p. 361.

135 Prof. Graham Macdonald (Merck, Sharp & Dohme Pty Ltd), Transcript, p. 339.

136 Mr John Latham (Pfizer Pty Ltd), Transcript, p. 367.

137 Productivity Commission, *Evaluation of the Pharmaceutical Industry Investment Program*, January 2003, available online at: www.pc.gov.au / research / studies / piip / finalreport / piip.pdf, accessed on 12 May 2003.

138 *Australian R&D Review*, February 2003, p. 7.

139 Prof. Chris Fell (Federation of Australian Scientific & Technological Studies), Transcript, p. 23: 'You have all heard of the triple bottom line: financial return, community impact and environmental impact. We believe that the innovative aspect should also be looked at and reported on;' also Australian & New Zealand Association for the Advancement of Science, Submission No. 37, p. 3: 'One initiative which may be desirable would be a

activity should be accorded 'its true value in accounting terms', said one firm,[140] and ANZAAS stated that the annual reports of companies should be required to itemize their investment in R&D, for:

> If R&D were routinely documented it would be easier for shareholders to question directors on progress in this field.[141]

9.93 The government was urged to 'support international standards for the valuing of IP in company accounts' and to adjust Australian accounting standards 'so that R&D expenditure is reported in internationally comparable ways'.[142] The Chief Scientist expressed support for moves by the Australian Institute of Company Directors and the Australian Institute of Commercialisation to raise the importance of innovation by finding ways of:

> … treating the innovation assets… the same as the bricks and mortar… [that is,] to treat intangibles with the same rigour as they treat tangibles.[143]

9.94 The committee notes that Australia is committed to the adoption by 2005 of accounting standards issued by the International Accounting Standards Board. This will facilitate the 'harmonisation' of accounting standards. At the same time, the committee thinks it would be useful if company accounts and reporting mechanisms could indicate the nature of innovative activity undertaken by those companies.

Recommendation 19

9.95 **The committee recommends that the Commonwealth government, financial bodies and businesses harmonise Australian accounting standards to ensure that:**

- **they are not at odds with our major competitors;**
- **they are able to show the value of intellectual property held by a business; and**
- **they are able to indicate the innovative activity of the firm.**

---

change in company reporting requirements such that investment in R&D has to [be] itemized and explained in annual reports'.

140 S Hudson & Associates, Submission No. 12, p. 4.

141 Australian & New Zealand Association for the Advancement of Science, Submission No. 37, p. 3.

142 Australian Industrial Research Group, Submission No. 53, p. 3.

143 Dr Robin Batterham (Chief Scientist), Transcript, p. 469.

9.96 The committee notes that the R&D tax concession is aimed at influencing company behaviour by reducing the after-tax cost of R&D activities. However, a major international corporation told the committee that 'the key decision-makers that control and manage the R&D function are generally motivated by key performance indicators not related to income tax expense.'[144] The company added that:

> Tax expense tends to be managed independently by the finance function and is rarely factored into the R&D budget or the performance measurement process.[145]

9.97 In order to make the R&D tax concession benefit more visible and meaningful to those within companies responsible for setting and allocating R&D budgets, GlaxoSmithKline (GSK) and Pricewaterhouse Coopers suggested that it be transformed 'into a legal form which allows the benefit to be recorded as operating income for accounting purposes', without actually converting the concession into a cash grant.[146]

9.98 This proposal would involve AusIndustry issuing an 'R&D entitlement' or credit to the company, which could be recorded as operating income, but the credit would be offset against the company's tax expenses. The economic benefit of the concession would therefore be recognised as income, rather than simply as a decrease in tax expense, and this could then be allocated amongst various departments within the company. The benefit of this proposal is that it would:

> … put the benefit directly in the minds of the business managers, instead of tax managers, by directly reducing the cost of R&D to those managers, and by positively impacting before tax KPIs. Initial research into the likely effect of this proposal suggests the benefits could be dramatic.[147]

9.99 The suggestion by GSK and PricewaterhouseCoopers was strongly supported by participants in a roundtable meeting of large companies, with one representative stating that:

> In a business where the R&D decisions are effectively made by business managers, as opposed to senior management of

144 GlaxoSmithKline, Submission No. 26.1, p. 19.

145 *ibid.*

146 *ibid.*

147 *ibid.*

> the company, there is enormous benefit in the proposal that is being put forward because the individual business unit managers in the current environment do not see the tax concession benefits as flowing through to their bottom line, and that influences their decision making.[148]

9.100 The committee considers that the GSK proposal may stimulate greater recognition, particularly within major international corporations, of the benefits of undertaking R&D in Australia. The proposal would not distort company results and involves minimal additional cost to the Commonwealth.

Recommendation 20

9.101 **The committee recommends that the Commonwealth government, in order to stimulate greater recognition within companies of the benefits of the tax concession, allow the R&D tax concession to be treated by the company receiving it as a benefit to be recorded as operating income for accounting purposes (and offset against the company's tax expenses).**

148 Dr Hugh Bradlow (Telstra), Transcript, p. 167.

10

Steps that might be taken by the Commonwealth government in relation to specific R&D programs, in order to better demonstrate to business the benefits of higher private sector investment in R&D

10.1 The material in this chapter is arranged under the following headings which, like the material in the preceding chapter, is derived from consideration of the evidence presented to the committee during its inquiry:

- improving the consistency of R&D programs;
- improving administration of the programs;
- evaluating the R&D programs;
- improving the general (or flat) tax concession;
- adjusting the incremental or 'Premium' tax concession;
- raising awareness of the cash rebate (tax offset) program;
- improving the START program;
- improving the BITS incubator seed fund program;
- improving collaboration between the public and private sectors;
- adjusting the ARC *Linkage* program; and
- reconsidering the definition of R&D.

Improving the consistency of R&D programs

10.2 The lack of consistency in the government's R&D programs was criticised by a diverse range of organisations (see chapter 8), with the Chief Scientist bemoaning that:

> We do not have a consistent approach to outcomes in our R&D and its commercialisation, particularly in government funded research agencies and universities. You see it in all sorts of ways: the triennial funding for the major research agencies and, for that matter, for the universities in how their research moneys are handed out… [And] the language of outcomes is very varied.[1]

10.3 The committee considers that it is in the interests of Australian businesses for the government to commit to long-term R&D support programs, thus providing greater certainty about the future of the programs and enabling businesses to properly plan their R&D investments. It also demonstrates the government's long-term commitment to improving the amount of R&D undertaken in Australia. In this regard, the committee commends the present bipartisan support for R&D incentives.

Recommendation 21

10.4 **The committee recommends that businesses be provided with greater certainty about the continuity of the Commonwealth government's R&D support programs, by ensuring that the programs are maintained for rolling periods of not less than five years.**

Improving administration of the programs

10.5 The anxiety of SMEs at the 'plethora of paperwork' and 'onerous reporting demands' involved in registering for the tax concession and applying for R&D grants and assistance[2] concerned the committee, which is sympathetic to the observation by the Australian Industry Group that:

> When you have a situation where small companies need to call in R&D tax consultants to assist them with filling in their

1 Dr Robin Batterham (Chief Scientist), Transcript, p. 471.

2 Mr Michael Turner, Submission No. 30, pp. 1-2.

> grant application forms, it does raise issues such as ways to make it simpler and easier for companies to apply.[3]

10.6 In addition to the length and complexity of forms, companies also expressed concern at:

- the number of government agencies either requiring or seeking information from companies about their R&D activities, and the similarity in the information that is sought (for example, the duplication of data requirements by AusIndustry and the Australian Taxation Office (ATO) in the administration of the tax concession);
- the variation in reporting cycles across agencies; and
- inconsistency in the definition of terms used in forms relating to R&D across agencies.[4]

10.7 In response to these concerns, the committee notes with approval the steps that have been taken to reduce the administrative burden on companies, such as the reduction in the amount of data required from industry in the 2003 tax concession registration form. The committee also notes that DITR, ATO and the Australian Bureau of Statistics are undertaking further work to streamline and harmonise data collection for the 2004 year, and that the ATO and AusIndustry have recently established an R&D Tax Concession Administration Consultation Group. The Group aims to regularise consultation with stakeholders on administration issues relating to the operation of the tax concession.[5]

10.8 In addition, Deloitte Touche Tohmatsu offered praise for recent initiatives that include the following:

> Firstly, there is the holding of regular consultative committees whereby AusIndustry and the ATO representatives meet with interested parties to discuss the R&D tax concession, its administration, its effectiveness and the needs for change. Secondly, there is the preparation of a draft guide to the R&D tax concession which is now available on the AusIndustry web site. I believe this is an excellent initiative… [because it]

3 Mr Tony Pensabene and Ms Heather Ridout (Australian Industry Group), Transcript, p. 126.

4 Mr David Gaul (CEA Technologies), Transcript, p. 589.

5 Australian National Audit Office, *R&D Tax Concession*, Audit Report No. 40, April 2003, pp. 14-16.

> seeks to provide tangible examples of what this definition of innovation actually is [in light of] a number of Administrative Appeal Tribunal (AAT) cases… Thirdly, there is the AusIndustry visitation program, under which a commitment has been made by AusIndustry to visit all first-time registrants for the R&D tax concession… The on-going improvements to the AusIndustry web site also need to be commended. The web site is an excellent access point to a range of relevant data and programs.[6]

10.9 The committee also notes that AusIndustry assigns a case manager to companies before they are given a copy of the substantial START program application form, thereby helping the company to ascertain if they are eligible for START assistance prior to committing the considerable resources required to complete the application process. The case manager also remains as a point of contact for companies needing further assistance in completing the form.

10.10 While the committee is aware of the complexities in consolidating data requirements across government agencies, such as the issues associated with the confidentiality and disclosure of information about applicants, nonetheless the committee believes that every effort should be made to minimise the application and reporting burden placed on companies seeking to register for the tax concession, or to apply for R&D grant assistance.

Recommendation 22

10.11 **The committee recommends that the Commonwealth government simplify and minimise the data requirements of companies registering for the tax concession or applying for R&D grant assistance, and specifically:**

- **reduce the number of government agencies requiring information from companies seeking R&D assistance (when possible, to a single contact point), with the agencies utilising enhanced data-sharing;**
- **minimise the length and complexity of registration and application forms;**
- **synchronise reporting cycles across agencies; and**

6 Mr Sergio Duchini (Deloitte Touche Tohmatsu), Transcript, p. 185 and p. 195.

- **ensure consistent use of terms and definitions of terms in forms relating to R&D across agencies, including the Australian Bureau of Statistics.**

10.12 The Australian Academy of Science drew attention to the Canadian *Preclaim* Project under which:

> People who are in small business can get advice from government officers before they start their R&D [The *Preclaim* Project] was introduced as one means of reducing an important risk associated with undertaking R&D [by SMEs]. The government officers discuss in advance which R&D projects will be eligible for… tax credits… [It] is not an advanced tax ruling… [but simply] an indication of the [potential eligibility of the] work and this is one simple, cost-effective way in which government can help encourage business investment in R&D, especially in small businesses.[7]

10.13 The committee is attracted to such a scheme and considers that the Commonwealth government should assess its potential.

Recommendation 23

10.14 **The committee recommends that the Commonwealth government continue to simplify the various R&D programs and consider the introduction of a version of the Canadian *Preclaim* Scheme whereby businesses can get preliminary advice about their eligibility for the government's R&D schemes.**

Evaluating the R&D programs

10.15 There were many calls for the Commonwealth government to improve its assessment of the various R&D programs, including in relation to whether public expenditure on R&D may sometimes substitute for expenditure that businesses would otherwise do on their own initiative, and also to establish whether the overall benefit of programs like the tax concession outweigh the costs. Some of the organisations calling for such studies were government agencies and others were industry associations, as indicated by the following:

7 Prof. Sue Serjeantson (Australian Academy of Science), Transcript, p. 5.

There is a major need for more up-to-date research on the returns to R&D in Australia.[8]

The performance of Australia's general support measures for R&D should be reviewed within five years… to ensure that there is appropriate general support available for R&D undertaken by Australian industries.[9]

The Commonwealth Government [should] work with States and Territories to develop a national econometric model to estimate the impact of increased R&D expenditure in selected industries.[10]

[In relation to the R&D tax concession program,] performance measures primarily focus on inputs and outputs, rather than providing direct assessment of the effect of the concession in increasing investment by eligible companies in defined R&D, a key objective of the program.[11]

It would be prudent to evaluate the outcome of [the 175% premium deduction] in the near future to ascertain its effectiveness… [There should be] an inquiry to examine the benefits of any tax incentives in generating tax revenue through increase in employment; increase in corporate tax revenue through improvements in competitiveness and cost reduction; [and] increase in consumption tax revenue through greater economic activities.[12]

While it may be too early to determine the effectiveness of the BITS incubator program it does appear that it has enabled small emerging ITC companies to undertake more R&D than would otherwise have been possible. AIIA would encourage the Government to quantify the impact of this program on the level of R&D being undertaken.[13]

---

8 Commonwealth Department of Education, Science and Training, Submission No. 64, p. 3.

9 Productivity Commission *Review of Automotive Assistance Position Paper*, June 2002 p. 63, quoted in Holden, Submission No. 57, p. 11; and Federal Chamber of Automotive Industries, Submission No. 73, p. 16.

10 Queensland Government, Submission No. 71, p. 18.

11 Australian National Audit Office, *R&D Tax Concession* (performance audit), Audit Report No. 40, 2002-2003, p. 19.

12 Taxation Institute of Australia, Submission No. 67, pp. 3-5.

13 Australian Information Industry Association, Submission No. 74, p. 17.

10.16 The Chief Scientist described efforts to measure the success of R&D as 'contentious', both in Australia and overseas. He stated that 'simple outcomes measures are not yet available' and that the challenge 'is to design a system that establishes performance outcomes, rather than the easier to measure inputs'. This requires the identification of 'some surrogates for productivity', such as the effect of R&D on sales per employee or value added to the firm.[14]

10.17 The Commonwealth Department of Industry, Tourism and Resources cautioned that:

> In considering estimates of the response to increased R&D expenditure [it is important] to be aware that such increases can come only at the expense of expenditure on other capital, and that a decrease in other capital may have offsetting negative impacts. The key question is whether additional R&D expenditure will enhance productivity by more than the negative impact of the corresponding fall in expenditure elsewhere.[15]

Recommendation 24

10.18 **The committee recommends that the Commonwealth government ensure that regular evaluations of the R&D support programs take place, including assessment of the effect of tax concessions on the R&D outcomes of businesses.**

Recommendation 25

10.19 **The committee recommends that the Commonwealth government encourage the development of measures that can serve as 'surrogates for productivity'. This would lessen dependence on Business Investment in R&D (BERD), which is a measure and not necessarily a good indicator of productivity, as well as contribute to the clearer identification of the results of government grants and subsidies, and provide fuller information of the success of converting research to innovation.**

---

14 Dr Robin Batterham (Chief Scientist), Submission No. 25, p. 3.

15 Commonwealth Department of Industry, Tourism and Resources, Submission No. 38, p. 9.

10.20 One way to obtain more direct information about the effect of the tax concessions would be to ask companies to complete one further question in the ABS survey of business activity, the question being to estimate the increase in the company's turnover that was generated by the concession. This 'would start the process of finding out how much benefit we are deriving' from the concession.[16]

Recommendation 26

10.21 **The committee recommends that, in order to better assess the effect of R&D support programs (including the tax concessions), the Australian Bureau of Statistics add a question to its business survey form asking companies to estimate the increased turnover generated by their use of the tax concession and/or other R&D support measures.**

Improving the general (or flat) tax concession

10.22 R&D is defined in section 73B(1) of the *Income Tax Assessment Act* as:

> a) Systematic, investigative and experimental activities that involve innovation or high levels of technical risk and are carried on for the purpose of:
> —acquiring new knowledge (whether or not that knowledge will have a specific practical application)
> —creating new or improved materials, products, devices, processes or services
>
> b) Other activities that are carried on for a purpose directly related to the carrying on of activities of the kind referred to in paragraph (a).

10.23 This definition has applied since 26 July 1996. As from 1 July 2002, a further aspect of the definition of R&D is subsection 73B(2BA) which reads:

> Activities are not covered by the definition of research and development activities in subsection (1) unless they are carried out in accordance with a plan that complies with any guidelines formulated by the [Industry Research and Development] Board (IRDB) under section 39KA of the *Industry Research and Development Act 1986* that are in force at the time.

16 Mr Graham Carew (Taxation Institute of Australia), Transcript, p. 157.

10.24 The requirement for R&D Plans has been introduced:

> … to reinforce the need for companies to think strategically about their R&D activities as a critical and on-going part of their business; support the successful management of R&D projects…; and clarify the nature of the records necessary to substantiate R&D claims.[17]

10.25 Companies do not need to submit their R&D Plans to the IRDB but must keep them as part of the company's records.

10.26 The Plan guidelines developed by the IRDB were criticised by the Australian Academy of Science because they do not force a firm 'to deal explicitly with the investment risks they will face and how they intend to deal with them'. The Academy stated that, whereas:

> … large companies are already familiar with the need to carry out formal investment appraisals [involving the identification of] technical risk factors and risk mitigation strategies [this is not the case for smaller companies, especially SMEs].

10.27 The Academy considers that identifying the investment risks 'would improve the effectiveness of the tax subsidy and help to limit inappropriate claims for the tax concession'. As well, it would:

> … provide a more "evidence-based" basis for case law regarding eligibility to receive the R&D tax concession' and hence reduce the current uncertainty which may deter SMEs from even applying for the concession. Such a requirement 'could be facilitated by the IRDB providing an Excel template for carrying out… net present value estimates and associated guidance.[18]

10.28 The Academy does not consider that net present value (NPV) estimates should be required in all cases but suggests that they be optional. The IRDB, however, could call for NPV estimates if it wished to challenge a request for tax eligibility. An important benefit of this approach was said to be that:

---

17 *Fact Sheet: A new guideline for R&D Plans 2001*, obtained from the AusIndustry web site: www.ausindustry.gov.au, accessed on 17 July 2002.

18 Australian Academy of Science, Submission No. 45, pp. 3-11.

> It would help to limit the extent to which the R&D tax concession simply substitutes public sector investment (in the form of tax revenue foregone) for private sector investment.[19]

10.29 The committee concurs with the Academy's view.

Recommendation 27

10.30 **The committee recommends that the Industry Research and Development Board (IRDB) review the current guidelines for R&D Plans (required when registering for the tax concession) to provide that the Plans specify the technical risk factors and outline the risk mitigation strategies. To reduce the compliance burden on companies (especially small and medium-sized enterprises), the IRDB should provide a spreadsheet or similar template for carrying out net present value estimates and provide associated guidance.**

10.31 The committee was told by science-based bodies that patent applications and IP protection are key steps in the process of commercialising R&D and so should be an allowable R&D deduction:

> IP rights are an important factor in protecting the research investment of knowledge-based economies. Currently, IP rights allow exclusive licensing of technology to organisations that take on the development of products requiring further investment; these rights thus act as an incentive to commercialisation of new technology… Australian scientists and technologists must protect their IP via the patent system and by appropriate strategic alliances with industrial partners.[20]

> The same tax incentives should apply to patent applications as to R&D investments.[21]

10.32 The committee appreciates the importance of obtaining a patent in order for a researcher or a company to access venture capital. It would help the commercialisation of R&D if the cost of obtaining the patent could be brought into the R&D tax concession scheme.

---

19 *ibid*., p. 11.

20 Federation of Australian Scientific & Technological Societies, Submission No. 51, p. 6.

21 Australian Geoscience Council, Submission No. 20, p. 4.

Recommendation 28

10.33 **The committee recommends that the Commonwealth government evaluate and consider extending the tax concession to cover the cost of intellectual property protection and patent applications for businesses that have already qualified for the tax concession.**

Adjusting the incremental or 'Premium' tax concession

10.34 While some witnesses thought that the 175% incremental tax concession was 'a step in the right direction', the current eligibility criteria were said to 'severely limit the effectiveness of this initiative'.[22] These criteria include the exclusion of certain non-labour related R&D expenditure,[23] the requirement for a continuous registration history with AusIndustry,[24] and the requirement for R&D expenditure as a proportion of turnover to increase over time.[25] The committee agrees that it is timely to review these constraints.

Recommendation 29

10.35 **The committee recommends that the Commonwealth government review the current eligibility criteria for the incremental tax concession to ensure that they maximise the conduct and take-up of business R&D, in particular, that the government consider the inclusion of essential non-labour R&D expenditure in relation to eligibility for the incremental tax concession.**

---

22 Deloitte Touche Tohmatsu, Submission No. 59, p. 16.

23 Council for Knowledge, Innovation, Science and Engineering, Victoria, Submission No. 29, Attachment B, p. 6: The concession 'does not apply to additional investment in plant and equipment'; also Deloitte Touche Tohmatsu, Submission No. 59, p. 2: The government should 'remove the exclusion of non-labour related components in the calculation of the 175% incremental premium'.

24 Mr Graham Carew (Taxation Institute of Australia), Transcript, p. 151: 'start-up companies… are severely disadvantaged by the lack of the three-year history'; also Deloitte Touche Tohmatsu, Submission No. 59, p. 2: The government should 'allow companies access to the 175% incremental tax concession immediately on incorporation without the need to wait three years'.

25 Council for Knowledge, Innovation, Science and Engineering, Victoria, Submission No. 29, Attachment B, p. 6: 'So companies that are moving from the R&D phase into production are likely to fail the test' as will companies 'that conduct R&D in a "lumpy" manner that fits industry production cycles, for example, [the] automotive' industry.

10.36 The committee notes the many concerns about the level of the base tax concession (see chapter 8) and the many suggestions for it to be replaced by a graduated tax concession based on one or more of the following criteria:

- the percentage of a firm's sales revenue that is spent on R&D:

> You can take the same pool of money [that is currently foregone by the government in the form of tax concessions] and weight it so that if you spend more than 8% [of sales on R&D] you get a 200% deduction, if you spend more than 5% you get 150% deduction, if you spend more than 3% you get 125% deduction and if you spend less than 3% you get nothing because actually that is just background. A company spending 1% or 2% would be doing that whether there is a tax concession or not…
>
> Anybody who is spending 6%, 7% or 10% will probably have the characteristics of the companies that you are trying to encourage… The cost to the purse is the same as it is now and you are not in the business of picking winners. I think it is a really simple re-weighting of the tax concession to deliver everything you need;[26]

- the percentage of a firm's revenue that is spent on R&D, for example, providing significant tax concessions for 'businesses or institutions investing in R&D intensive start-up companies (say, greater than 50% budget on R&D)';[27]
- the correlation between a firm's R&D expenditure and the national research priorities (there should be higher tax concessions 'to the R&D priorities that the government is presently identifying'[28]) or to

---

26 Dr James Fox (Australian Innovation Australia), Transcript, p. 171. Similarly, FASTS suggested that 'the present R&D tax concession [should] be replaced by a sliding scale. When companies invest a higher proportion of their company turnover in R&D, they should be rewarded with a higher percentage deduction. For R&D intensity greater than an upper level of say 5%, the deductibility should be at least equal to the 175% upper BAA rate to be internationally competitive, while the lowest rate e.g. for less than 1% R&D intensity, could attract less than the current 125% deductibility. Rather than simply rewarding companies in the year of the increased R&D level, the deductibility rate should be determined from the R&D percentage year-by-year' (Federation of Australian Scientific & Technological Societies, Submission No. 51, p. 5).

27 Institute for Molecular Bioscience, Submission No. 69, p. 3.

28 Mr John Boshier (Institution of Engineers, Australia), Transcript, p. 423; also Dr Gerry Biddle, Submission No.32, p. 12, who submitted that the government should 'enhance tax deductibility and provide accelerated depreciation schedules for projects focussed on national priority areas'.

those 'particular industries' in which Australia is trying to 'promote itself as a centre of excellence in certain technologies';[29]

- the correlation between a firm's R&D expenditure and high-growth areas (there should be 'perhaps some re-balancing to favour the high-growth areas at the expense of the longer-term relatively stable areas');[30]
- the correlation between a firm's R&D expenditure and the level of innovation—a major international corporation (Holden) suggested utilising a base subsidy for research associated with 'a "like-for-like" vehicle replacement..., an improved assistance rate... for a vehicle of a type not previously made in Australia... and [a high rate for] a vehicle of a type not previously made anywhere in the world';[31]
- the extent to which the R&D is undertaken by an SME in collaboration with a public sector research agency—the CSIRO suggested that SMEs collaborating with public research agencies could be given:

> ... a higher level of tax concession for collaborative projects with public sector research agencies and universities... [for example] it might be possible to subject earnings from activities involving such joint R&D to a reduced marginal tax rate or a tax holiday for the first few years;[32]

- the extent to which the R&D is conducted by a public sector research body—the Group of Eight suggested that the government should:

> ... increase the rate of R&D tax concession for R&D conducted by universities and public science agencies [because] where industry-funded research is conducted by universities and public science agencies there is an additional public good benefit through the development of additional expertise and facilities in the universities and research agencies, provision of additional research training

29 Mr Graham Carew (Taxation Institute of Australia), Transcript, p. 159.
30 Dr Robin Batterham (Chief Scientist), Transcript, p. 469.
31 Holden Ltd, Submission No. 57, p. 17.
32 CSIRO, Submission No. 22, p. 29.

> opportunities, and closer linkages. These benefits justify a higher rate of tax concession.[33]
>
> [The Group of Eight added that the government should] provide tax incentives for industry investment in research infrastructure wholly or partly for use by universities or public science agencies. There would be mutual benefits if industry had greater incentives to invest in research infrastructure that is shared with, or ultimately used solely by, universities or public science agencies. Appropriate incentives could be a cost effective way of increasing private investment in this area.[34]

10.37 There are pluses and minuses in each of these suggestions but their common theme is that *it is useful to have an incremental tax concession* and to have one that *encourages the maximum possible R&D*. The committee considers that the various proposals warrant careful examination by the government. In particular, the committee draws attention to the desirability of encouraging those companies that already do a great deal of R&D and that maintain a high R&D expenditure relative to company turnover. At present, such companies are unable to access the incremental tax concession (see paragraphs 8.67 and 8.68).

10.38 The committee notes that 'the premium that was introduced with *Backing Australia's Ability* was the first attempt… [to introduce a system in which the government] disproportionately reward[s] greater commitment' to R&D.[35] A member of the Industry Research and Development Board thought that 'it is going to take a little while to learn how that works, so it is a little hard to say whether another variant on the premium would be better'.[36] The committee concurs with this observation.

Recommendation 30

10.39 **The committee recommends that the Commonwealth government, once the existing R&D programs have been fully evaluated, consider adjusting the present incremental or 'Premium' tax concession by:**

33 Group of Eight, Submission No. 34, pp. 5-6.

34 *ibid.*

35 Dr Laurie Hammond, (Industry Research and Development Board), Transcript, p. 500.

36 *ibid.*

- **ensuring that companies already conducting a high R&D expenditure relative to their turnover are eligible for the concession (thus maintaining the incentive to do R&D); and**
- **considering linking the tax concession regime to the national research priorities and/or to the particular industries in which Australia wishes to promote itself as a centre of excellence and/or to the high-growth areas of the economy and/or to whether the business is a small or medium-sized enterprise and/or to whether the R&D is undertaken collaboratively by the private and public sectors.**

Raising awareness of the cash rebate (tax offset) program

10.40 The cash rebate (tax offset) was praised by SMEs[37] and industry associations.[38] However, some witnesses thought that:

> The addition of the R&D tax offset to the R&D tax concession scheme is a great piece of news that has not been sufficiently advertised. As the new scheme has as its centrepiece a cash rebate, which is highly attractive to SMEs, this could have been the subject of a specific marketing campaign to advertise this change.[39]

10.41 The committee concurs with this view.

Recommendation 31

10.42 **The committee recommends that the Commonwealth government enhance its promotion of the cash rebate (tax offset) program, especially to small and medium-sized enterprises, and industry associations.**

---

37 For example, Mrs Roslyn Hughes (Epicorp Ltd), Transcript, p. 579: 'A number of our companies would not be alive today if it were not for the tax rebate scheme.'

38 For example, Mr Rob Durie (Australian Information Industry Association), Transcript, p. 451: 'We have had a lot of very positive feedback about [the rebate approach]; not just about its very nature, but about how seamless the process is. That seems to work very well.'

39 Deloitte Touche Tohmatsu, Submission No. 59, p. 11. In its 2002 Business R&D survey, the Australian Industry Group found that 'more than half (53%) of small companies were not aware of the cash rebate, specifically aimed at encouraging and assisting R&D among smaller firms', Exhibit No. 20, *Research and Development Expenditure and Drivers in Australian Manufacturing*, 2002, p. 11.

10.43 Several witnesses criticised the current thresholds for access to the tax offset program which are companies with a group turnover under $5 million and group expenditure on eligible R&D of up to $1 million. It was said that these requirements are 'unduly restrictive and limit the ability of newly created entities emerging from Australia's universities to fund their R&D activities'[40]—the turnover level is just 'ridiculous', said one SME.[41]

10.44 Deloitte Touche Tohmatsu suggested that the threshold of ownership should be raised 'to a controlling interest (that is, more than 50%)' and the eligibility threshold raised to $5 million.[42] The latter would recognise the fact that:

> The average R&D spend [in the biotechnology sector] for private and unlisted core biotechnology companies for 2000-01 is estimated to be $3.3 million and [is] projected to increase to $4.4 million in 2001-02'.[43]

10.45 The committee considers that there is a case for the government to review the current eligibility thresholds for the tax offset program.

Recommendation 32

10.46 **The committee recommends that the Commonwealth government evaluate and consider adjusting the eligibility thresholds for access to the tax offset program.**

Improving the START program

10.47 The temporary discontinuation of the START program in April 2002 was criticised by many witnesses, and it appears to the committee that government officials should have been quicker to adjust START once the 'signals' of higher than anticipated demand came through.[44]

40 Deloitte Touche Tohmatsu, Submission No. 59, p. 17.

41 Dr Meera Verma (BresaGen Ltd), Transcript, p. 519.

42 Deloitte Touche Tohmatsu, Submission No. 59, p. 2; also see Australia-Israel Chamber of Commerce, Exhibit No. 9, *The Economic Benefits of Innovation Policy: Lessons for Australia from Israel's Experience*, p. 6.

43 Deloitte Touche Tohmatsu, Submission No. 59, p. 19.

44 Ms Catherine Livingstone (Australian Business Foundation), Transcript, p. 295.

But the program itself was praised by SMEs,[45] the IRDB,[46] and the IMS.[47] The committee agrees that:

> Demand for this scheme has demonstrated the considerable willingness of SMEs to take advantage of incentives offered by government [thus indicating that] such polices are appropriate.[48]

10.48 However, it was pointed out that the program is designed for small firms rather than large ones, and that:

> … only 1,300 companies will be eligible over the five years of the program, meaning that assistance will not be available to a significant proportion of established SMEs.[49]

10.49 A major international corporation suggested that large firms should also be eligible to apply for START funding provided they spent 'at least $10 million of research' in Australia and 'commit[ted] the funds 'to joint projects with SMEs and the tertiary institutes'.[50]

10.50 In view of the success of the program, it appears to the committee that there is a case for the government to regularly review the total program funding to ensure that more companies can access START.

10.51 In chapter 5 the committee noted that one factor influencing business expenditure on R&D was the general level of economic activity in Australia—if times are good for business and profitability is up, then there is more funding available for activities such as R&D. This fact led one SME to suggest that 'the government could, without additional cost, introduce a counter-cyclical pattern to R&D

---

45 Dr John Kikkert (Comlabs Systems and Designs Pty Ltd), Transcript, p. 510: 'We are the recipient of a START grant [which will make the difference between us plateauing, which we can now see because the products we have will only take us so far, and us making it to the next level, which will be the international level'; Mr Charlton (Ecosol Pty Ltd), Transcript p. 511: 'We have had very good experiences with the START grants'; Dr Verma (BresaGen Ltd), Transcript, p. 507: 'The START grant scheme is very useful for groups like us. I have to say three cheers for having got that started again, because it really helps you leverage your cash position today'.

46 Prof. Don Nicklin (Industry, Research and Development Board), Transcript, p. 496: START is 'a huge success'.

47 Mr Tony Strasser (Intelligent Manufacturing Systems), Transcript, p. 325.

48 Mr Gerry Biddle, Submission No. 32, p. 12.

49 Council for Knowledge, Innovation, Science and Engineering, Victoria, Submission No. 29, Attachment B, p. 5 and p. 7.

50 Mr Brendan McManus (NEC Australia Pty Ltd), Transcript, p. 625.

subsidies'.[51] The Taxation Institute, however, opposed using tax concessions in this way.[52] Leaving aside the use of tax concessions, the committee considers that some of the R&D support programs could usefully be adjusted to support innovative activity, especially by SMEs, during a general economic downtime (one example might be an increase in the amount of START and COMET funding).

Recommendation 33

10.52 **The committee recommends that the Commonwealth government review its ongoing level of funding for the START program, in light of significant demand and the program's great success in assisting the establishment of small and medium-sized enterprises. Increased funding of programs like START and COMET might be particularly appropriate at times when the general profitability of business is constrained by a downturn in economic activity.**

10.53 One witness from a government research agency referred to a Netherlands' program whereby:

> … early-stage ventures are given grants and if the venture is successful, then… the grant has to be paid back. If the venture is unsuccessful, which it is most of the time, then it is considered to have been a grant. The message being, 'We're glad you tried. You learn from your mistakes. Let's move on and try it again.'[53]

10.54 It is possible that a program of this kind might complement the existing START program and assist the government's efforts to demonstrate to businesses the benefits of conducting more R&D.

51 Wave Global, Submission No. 15, supplementary submission.

52 Mr Graham Carew (Taxation Institute of Australia), Transcript, p. 159.

53 Mr Robert Muir (Australian Nuclear Science and Technology Organisation), Transcript pp. 353-354.

Recommendation 34

10.55 **The committee recommends that the Commonwealth government expand the grants-based START program by introducing a scheme that provides loans to early-stage companies, with the requirement that those loans be paid back if the venture is successful (but which enables the loans to be converted back to grants if the venture is unsuccessful).**

Improving the BITS incubator seed fund program

10.56 Though the BITS program was praised by witnesses,[54] the Australian Information Industry Association (AIIA), which represents the ICT sector (87% of whose firms employ four people or less), drew attention to the fact that 'the nominal value of their government funding [was] eroded by tax' and noted that:

> Since the BITS program began, venture capital companies have retreated from the high- risk, early-stage seed funding that BITS incubator tenants require, to safer later-stage investments. This has revealed a major shortcoming in the current limit of a maximum investment of $450,000 in any project by the BITS' incubator seed funds. Individual projects under the program typically require a $1.5 to $2 million initial seed capital investment. Before the market retreat this could be sourced from the venture capital sector, but that is not the case currently. Consideration should be given to changing the investment guidelines to take account of this change in the market.[55]

10.57 A pilot evaluation of the BITS Incubator program (dated February 2003) found that it has been successful when measured against international standards, though the 'demand for incubation continues to exceed the capacity of the BITS incubators to provide assistance' and, further, that:

54 For example, Federation of Australian Scientific & Technological Societies, Submission No. 51, pp. 7-8.

55 Australian Information Industry Association, Submission No. 74, pp. 16-17: 'Private sector incubators funded under the BITS program have found the nominal value of their government funding eroded by tax, which has forced some into investment arrangements that are sub-optimal and driven by tax considerations. The tax status of these incubators should be reviewed.'

> … the gap between the level of funding that the BITS incubators can provide and minimum venture capital investments has… created problems.[56]

10.58 The committee considers that, in view of the demand for incubation and the general downturn in the ICT industry, it is opportune to review the minimum eligibility threshold and the taxation status of the seed funds.

Recommendation 35

10.59 **The committee recommends that, in relation to BITS incubator seed funds, the Commonwealth government consider:**

- **increasing the current eligibility threshold of $450,000; and**
- **review the existing taxation treatment of the seed funds in order to maximise the encouragement of R&D by businesses.**

Improving collaboration between the public and private sectors

10.60 The committee notes the many expressions of concern about it being:

> … very hard in Australia for a university person to leave the university, preserve their superannuation and various other things, start up a company, fail and then come back to the university. That is not part of our culture and it is not part of the taxation and superannuation systems.[57]

10.61 It would be useful if the employment conditions for scientists were made sufficiently flexible to allow them to be seconded into industry and start-up companies, with a guarantee of being able to return to their original positions in public research institutions.[58] The Chief Scientist stated:

---

56 The Allen Consulting Group, *BITS Incubator Program—Pilot Evaluation*, prepared for the Commonwealth Department of Communications, Information Technology and the Arts, February 2003, pp. vii-viii.

57 Mr Peter Laver (Council for Knowledge, Innovation, Science & Engineering, Victoria), Transcript, p. 75. The Australian Industry Group also noted that 'only 24% of manufacturing firms undertaking R&D activity had collaborated with a public R&D facility – a university, the CSIRO or a CRC' in 2002, Exhibit No. 20, *op. cit.*, p. 10.

58 The Warren Centre for Advanced Engineering, *op.cit.*, p. 12.

> With flexibility in superannuation provisions, researchers will not lose their financial base when they pass through a failure, a step quite common in the process of commercialisation.[59]

Recommendation 36

10.62 **The committee recommends that the Commonwealth government encourage universities to implement more flexible arrangements for university superannuation to remove an impediment to the movement of researchers between the public and private sectors.**

10.63 Greater mobility and movement between the academic community, the research community and the business community would also be facilitated by sabbatical exchanges,[60] the placement of 'final-year university business students' in SMEs on R&D projects 'on a no-fee basis',[61] and wider promotion of the Graduate START program whereby students are placed 'into industry to specifically research current issues facing particular companies'.[62] It also would be facilitated by the FASTS proposal for:

> … an extension of the present R&D START Scheme, which would make available 100 postdoctoral positions in industry each year. These positions would be funded in the same way as R&D START Graduates, that is 50/50 by government and industry in open competition, but could be independent of collaborations with universities.[63]

10.64 The FASTS proposal was estimated to cost $9 million per annum once the scheme was in full operation.[64]

10.65 In addition, greater movement of personnel between the public and private sectors would be facilitated by the use of 'tax rebates and other incentives to encourage businesses to specifically employ

59 Dr Robin Batterham, Submission No. 25, p. 2.

60 Mr Gerard Biddle (Royal Melbourne Institute of Technology), Transcript, p. 148; also Federation of Australian Scientific and Technological Societies, *Scientists commercialising their research*, by Toss Gascoigne and Jenni Metcalfe, FASTS Occasional Paper Series, No. 2, April 1999, Executive Summary (Exhibit No. 19).

61 Mr David Clark-Murphy, Submission No. 8, p. 1.

62 Institution of Engineers, Australia, Submission No. 72, pp. 4-19.

63 Federation of Australian Scientific & Technological Societies, Submission No. 51, p. 8.

64 Mr Toss Gascoigne (Federation of Australian Scientific & Technological Societies), Transcript, p. 35.

graduates in auditable R&D activities in-house'.[65] Further, the simple step of holding regular meetings between research bodies (such as the CSIRO) and the companies that are currently doing a large amount of R&D in Australia would encourage greater collaboration[66] on the basis that 'if you have got a winner, you keep backing them'.[67]

Recommendation 37

10.66 **The committee recommends that the Commonwealth government increase the incentives for researchers to work in businesses by:**

- **promoting the Graduate START program more widely;**
- **providing within the Graduate START scheme an option whereby up to an additional 100 post-doctoral students could be placed in businesses with the cost shared equally between government and business;**
- **encouraging research bodies such as the CSIRO to regularly meet representatives of the companies that currently conduct a high level of R&D in Australia; and**
- **consider the use of tax rebates to businesses employing new graduates in R&D activities.**

10.67 A major international corporation suggested that the programs to encourage movement of personnel between public and private sectors should go one step further, namely:

> Selected PhD or other researchers [should] undertake a scheduled rotation of work with a university or other academic institution, a relevant research-based private company in Australia, a similar organisation overseas and a government body. The learnings from this would result in Australia having ambassadors, or "research brokers", for local research who grasped the entire collaborative process from the academic, research, business and government perspectives.

65 Mr Gerry Biddle, Submission No. 32, p. 3; also Royal Australian Chemical Institute, Submission No. 28, p. 3.

66 Dr James Fox (Australian Innovation Association), Transcript, p. 168.

67 Ms Heather Ridout (Australian Industry Group), Transcript, p. 119.

> People who participated in a rotational program like this would be invaluable to Australia. Their knowledge of decision making in relation to the location of research sites would be helpful in attracting additional research resources to Australia. Collaborations could then be brokered both within Australia and also between domestic research and international institutions and companies.[68]

10.68 Such "research brokers" (on the academic side) would complement business people with specific skills in managing SMEs and small, fast-growing companies. These 'incubator resource people' could 'act as case managers for technology improvement in existing SME businesses' as well as in start-ups and spin-off companies.[69] This is particularly important in the biotechnology / pharmaceutical sector, said a major international corporation.[70] The Royal Melbourne Institute of Technology (RMIT) utilises two such people (one funded by the state government) but considers that 'there needs to be far more people providing diffusion coordination roles, that is, individuals who understand the business psyche but also understand how to develop R&D propositions'.[71]

Recommendation 38

10.69 **The committee recommends that the Commonwealth and state governments take steps to increase the number of "research brokers" and technology diffusion coordinators in universities, industry associations and professional associations.**

10.70 Businesses were generally critical of the way in which public sector research institutions 'try to hold on to IP'. The research bodies were said:

> ... to have little incentive to do commercial research and remain too cautious in terms of commercialisation of ideas and spinning off new research ventures'.[72]

---

68 GlaxoSmithKline, Submission No. 26, pp. 8-9.

69 Prof. Murray Gillin and Mr John Yencken, Submission No. 9, pp. 4-5.

70 Pfizer Pty Ltd, Submission No. 65, p. 6.

71 Mr Peter Woodgate (Royal Melbourne Institute of Technology), Transcript, pp. 135-136.

72 Business Council of Australia, Submission No. 58, p. 2.

10.71 It would be useful, stated one large Australian business heavily dependent on R&D, if research funding by the ARC and other bodies specified that 'it is okay to have closed programs'.[73] The same business considered that:

> Universities talk the talk, but they are not yet really up to walking the walk in dealing with the IP thing and the publishing thing—which is a cultural thing on their side of the fence to get right.[74]

10.72 The committee was struck by the fact that the Australian Research Council (ARC) agreed with the substantive part of these criticisms. Like businesses, the ARC too considers that 'university funding arrangements and reward systems… can act as a major cultural barrier to the commercialisation of university research'.[75] The ARC suggested that:

> A model for achieving significant change in the culture in Australia towards the commercialisation of university research could be to ensure in the conditions of award for an ARC grant that the researchers hold the licence to exploit the IP arising from the research. This could stimulate more entrepreneurial behaviour by researchers by motivating them to seek financial rewards.[76]

10.73 The ARC also suggested that:

> Universities need to have flexibility to offer options to researchers pursuing commercial lines of work. A more decentralised industrial relations environment in universities would allow institutions to tailor terms and conditions of employment and reward structures to suit the particular circumstances and needs of collaborative ventures involving institutions and business partners.[77]

10.74 Further, the ARC observed that:

> A more far reaching structural option for facilitating collaboration between universities and industry is the introduction in Australia of the American practice at research

---

73 Dr James Fox (Australian Innovation Association; and Managing Director, Vision Systems Ltd), Transcript, p. 174.

74 *ibid*., p. 169.

75 Australian Research Council, Submission No. 50, pp. 11-12.

76 *ibid*.

77 *ibid*.

> institutions of allowing staff to earn funds above their normal salary for up to three months each year, often through consultancy agreements with industry, establishing a spin-off company or through the conduct of research funded through the National Science Foundation (NSF) or the National Institutes of Health (NIH) or another source.[78]

10.75 The committee agrees with a business group that it would be useful if the government developed 'a set of guidelines that provide for consistency, transparency and fairness in conducting negotiations for public-private R&D collaborative projects'.[79]

Recommendation 39

10.76 **The committee recommends that the Commonwealth government, business associations and the universities improve the way that intellectual property is handled by industry and universities by taking the following measures:**

- **developing guidelines for public/private R&D collaborative projects;**
- **considering the introduction of appropriate revenue-sharing conditions into the award of some Australian Research Council (ARC) grants to enable researchers and universities to hold the licence to exploit their intellectual property; and**
- **the ARC considering making 'closed' R&D programs eligible for ARC grants (if only under certain specified circumstances).**

10.77 The governance arrangements of universities were sharply criticised by many witnesses (see chapter 8). The committee notes that the recent Commonwealth Budget contained proposals aimed at addressing some of the governance issues affecting the universities. The Minister for Education, Science, and Training (the Hon Dr Brendan Nelson MP) recently announced a 'Review of Closer Collaboration between Universities and Major Publicly Funded Research Agencies'. The review will encompass all Australian public universities and the four large Commonwealth research agencies,

78 *ibid.*

79 Australian Paper Industry Council, Submission No. 44, p. 11.

including the CSIRO.[80] It would be appropriate for the review to take into account the diverse ways in which these organisations can assist SMEs. The CSIRO stated:

> One of the major impediments to business investment in R&D is the financial capacity of firms, including SMEs. CSIRO supports SMEs through its research services (and by providing access to national facilities at marginal cost). However, in many cases the limited ability of SMEs to pay for the work they require has meant that CSIRO has had to subsidise its services. For this reason, and as part of our own business development strategy, we are starting to experiment with more flexible arrangements to help SMEs use our services. For example, we will consider alternative fee arrangements for some of the services we deliver. These might include mechanisms (such as the use of royalty streams, revenue / profit sharing or success bonuses) that share the risk and rewards of the research. These mechanisms are possible given the scale and diversity of our operations and the large portfolio of projects that we manage at any one time. We are able to spread the risk in a way that individual SMEs would find impossible. In effect, these mechanisms transform our relationship with SMEs from one of customer / supplier to a partnership.[81]

10.78 The committee supports efforts to encourage Commonwealth research agencies to work with businesses in conducting R&D projects. One option for the Commonwealth agencies is to provide equity for these projects. However, as the CSIRO suggests, other options exist. They should all be considered as part of the Review of Closer Collaboration.

Recommendation 40

10.79 **The committee recommends that the Commonwealth government's 'Review of Closer Collaboration between Universities and Major Publicly Funded Research Organisations' examines how to encourage the research bodies to 'partner' with small and medium-sized enterprises, including the provision of equity.**

80 Dr Brendan Nelson 'Research Collaboration Review Announced', media release dated 26 May 2003

81 CSIRO, Submission No. 22, p. 28.

10.80 The current system of Research Infrastructure Block Grants was criticised because 'it depends on a competitive and open process' whereas business prefers to establish 'stable, strategic alliances based often on commercially sensitive undertakings'. Also, the grants go:

> … to the academic entity through the university's accounts rather than being in any entity that has been created to hold the assets or the interests of a partnership between a university and a private company'—and yet the latter are 'the way of the future…
>
> [Further] the classic grants system tended to be quite a bureaucratically intensive and paper-based, high-transaction sort of system… We worked out for our own organisation that the traditional grants system of operation was creating some ten man-years of work every year.[82]

10.81 A better model was said to be one that:

> … encourages universities to create entities and partnerships with well-established companies that allow money to go through without the need for there to be an open and public tender where there is a commercially sensitive technology involved.[83]

10.82 The committee is sympathetic to these observations.

Recommendation 41

10.83 **The committee recommends that the Commonwealth government encourage universities to take the following measures to improve their governance arrangements so that they are less averse to commercialisation of their research:**

- **facilitate the flow of block grants to their associated business entities rather than through the university's financial system;**
- **allow for flexible funding arrangements where commercially sensitive technology is involved; and**
- **permit their staff to earn income above their usual salaries.**

82 Mr Morris Lloyd (Grains Research & Development Corporation), Transcript, pp. 402-403.

83 *ibid.*, p. 405.

10.84 The ARC also suggested that it would be useful if it made:

> … available to venture capitalists information held by the ARC on research which has been judged as being high quality and which is likely to deliver national benefit. Access to this information could assist venture capitalists to make decisions about whether or not to pursue the owners of intellectual property of research sponsored by the ARC, with a view to investing in the commercialisation of that research. By making this information available through a searchable database, the ARC would be performing, in the national interest, the role of a broker between the performers of the highest-quality basic research in Australia and the users of that research.[84]

10.85 The committee considers that it would be beneficial to the nation if the ARC publicly released the information it holds on high-quality research.

Recommendation 42

10.86 **The committee recommends that the Australian Research Council make publicly available the information it holds on research which has been judged as being of high quality and which is likely to deliver national benefits**.

10.87 While generally CRCs were seen as 'extremely successful',[85] they were criticised by some witnesses. A major Australian corporation stated that:

> They tend to complicate the contractual arrangements we have with external research agencies through their multi-party nature [and so] we tend to prefer bilateral arrangements.[86]

10.88 An international IT company said that CRCs are 'not up with developments in international standards'.[87] And even a CRC thought

84 *ibid*., p. 12.

85 Australian & New Zealand Association for the Advancement of Science, Submission No. 37, pp. 2-3; also Prof. Tim Napier-Munn (Australian Mineral Industries Research Association International), Transcript, p. 70: In relation to CRCs, 'by and large… they have been very successful and are a good mechanism for government… to get some good leverage… [by forcing] universities, industry and CSIRO to work together'.

86 Dr Hugh Bradlow (Telstra), Transcript, p. 603.

87 Mr Brendan McManus (NEC Australia Pty Ltd), Transcript, p. 613.

that the CRC program had so far failed to 'encourage a culture of R&D strategy in business', which continues to view R&D investment as 'opportunistic and project-based as opposed to R&D that is strategic and capability-focussed'.[88] This was also of concern to the CSIRO.[89] A possible reason, stated Telstra, was that 'less than 20% of the overall CRC budget' is sourced from businesses.[90]

10.89 The committee agrees that strategic and capability-focussed R&D 'is where Australia must focus if it is to reap the real benefits of government R&D support through linking with and leveraging strategic business R&D investment'.[91] At the same time, the committee concurs with the observation that:

> … the newer CRCs are very much user-driven… where the users are integrated into prioritizing, reviewing and decision making… [and that this] is one of the recent successes of this venture.[92]

10.90 One CRC representative thought that the CRC program would be 'more business friendly… [if] the current need for long-term commitments to be a full party of a CRC (seven years)' was reduced, as it is 'unrealistic in the volatile business environment'[93] and is particularly so for SMEs—most of which are unable to take such a long-term perspective. This CRC also observed that, whereas the CRC program began 'by involving state and territory government agencies as its industry / research user partners', it is now 'increasingly engaging with business', including many SMEs.[94] The CRC pointed out that the latter:

> … can make very valuable non-cash contributions of in-kind resources… in particular, through contributions of expertise and resources for commercialisation and research application.[95]

---

88 CRC for Sensor Signal and Information Processing, Submission No. 7, pp. 1-2.

89 CSIRO, Submission No. 22, p. 17.

90 Dr Hugh Bradlow, *op cit.*, p. 620.

91 *ibid.*

92 Mr John Yencken, Transcript, p. 90.

93 Cooperative Research Centre for the Conservation & Management of Marsupials, Submission No. 33, p. 2.

94 *ibid.*, p. 1.

95 *ibid.*, p. 2.

10.91 The committee is aware that recent Commonwealth government changes to CRC policies go a long way toward meeting the request by some witnesses that the process of assessing bids for CRCs should give 'some weighting… to those bids that make a particular focus on how they are going to engage SMEs in the on-going CRC process'.[96]

Recommendation 43

10.92 **The committee recommends that the Commonwealth government promote the involvement of small and medium-sized enterprises (SMEs) in Cooperative Research Centres, especially by way of non-cash contributions and through associations representing a number of SMEs within an industry.**

10.93 A further issue of concern to the committee was that over half of the money expended by CRCs on universities goes to the Group of Eight universities (see paragraph 8.76). It is important that the smaller universities, many of which are regionally based, are encouraged to take part in the CRC program. AusIndustry (the body responsible for administering the CRC program) should keep this matter under review.

Recommendation 44

10.94 **The committee recommends that AusIndustry monitor the expenditure by CRCs on projects involving the universities to ensure that the smaller, often regionally-based universities are able to participate fully in the CRC program.**

10.95 Government officials noted that the rural Research and Development Corporations (RDCs) are evolving toward a more commercial model involving the creation of spin-off companies.[97] However, the Executive Manager of the largest RDC considers that RDCs will not continue to do well unless they become more:

> … commercially competent [and learn how to] generate revenue through such mechanisms as royalties… assignment of IP and / or hold licences, divestment of intellectual property

96 Mr Rob Durie (Australian Information Industry Association), Transcript, pp. 442-443.

97 Mr Gavan Cattanach (Commonwealth Department of Agriculture, Fisheries & Forestry), Transcript, pp. 432-436.

> that for one reason or another the RDC does not wish to hold, service fees to partners… [and] publications and information products… [This requires managers who do not fear entering] contractual relationships with the private sector [and who are competent in] working with private capital.[98]

10.96 It was suggested that 'a targeted approach of putting people with those kinds of skills for interface into the private sector in senior and controlling positions of those organisations can achieve a lot'.[99]

Recommendation 45

10.97 **The committee recommends that the Commonwealth government encourage Research and Development Corporations to increase their commercial expertise by:**

- **employing managers with commercial skills;**
- **establishing commercial entities based on their research; and**
- **possibly registering a greater number of entities under the Corporations Law.**

Adjusting the ARC *Linkage* program

10.98 The ARC expressed concern about the existence of a 'critical gap' for very early phase commercialisation (such as developing a prototype) of the outcomes of an ARC grant. Despite the government's recent pre-seed programs, the ARC stated that:

> We are still left with the gap for the researchers of the type we fund to develop the prototype or the proof of principle that they can take to the pre-seed funds to develop further.[100]

10.99 The ARC considers that if this gap can be addressed, the chance of venture capital coming in would increase substantially. The ARC stated that:

> One way of addressing this is to provide almost an extension of our current industry linkage programs that would allow

98 Grains Research and Development Corporation, Submission No. 17, p. 6.

99 Mr Morris Lloyd (Grains Research & Development Corporation), Transcript, p. 403.

100 Prof. Vicki Sara (Australian Research Council), Transcript, pp. 15-16.

> the quality researchers we fund to go one step further, which often, in our discussions with researchers, is a matter of $50,000 or $100,000. [101]

10.100 The proposed program would involve the development of:

> … an additional stream within the ARC's *Linkage* program… which would enable a university researcher to seek funding to commercialise an outcome from a *Linkage* project, which involves an industry partner. This could be done in situ or by the researcher spending time outside the university working with the industry partner. The ARC believes these initiatives could be implemented for less than $30 million per year.[102]

10.101 The committee is aware that a prototype can be developed under the existing arrangements applying to a START grant. This can also occur in collaboration with existing agencies (for example, the CSIRO). The committee considers that greater publicity for these avenues of developing a prototype would be useful.

Recommendation 46

10.102 **The committee recommends that the Commonwealth government:**

- **promote the opportunities for very early phase commercialisation by university researchers (such as developing a prototype) under the existing R&D programs; and**
- **encourage the study of commercialisation as part of the relevant undergraduate courses.**

Reconsidering the definition of R&D

10.103 At several points in this report, the committee has noted issues involving the current definition of R&D that is used by the ABS for compiling figures on R&D and by the Australian Taxation Office / IRDB for determining eligibility for the government's R&D programs. Chapter 2 pointed to difficulties in compiling international - and even national - statistics on R&D and also pointed out the limitations on what business expenditure on R&D (BERD) actually

101 *ibid.*

102 Australian Research Council, Submission No. 50, pp. 9-10.

measures. Chapter 6 drew attention in passing to the fact that the definition of R&D used to determine eligibility for the tax concessions differed to that used in the PIIP with respect to the need to retain IP in Australia—and whereas the former hindered investment in Australia by international pharmaceutical companies, the definition used by the PIIP encouraged it. Also, earlier in this chapter, the committee made two recommendations that bore on the definition of R&D. One was that the Commonwealth government develop measures that can serve as 'surrogates for productivity' in a better fashion than the current emphasis on BERD. The other was that the Industry Research and Development Board (IRDB) review the current guidelines for R&D Plans (required when registering for the tax concession) to provide that the Plans specify the technical risk factors and outline the risk mitigation strategies.

10.104 There remain some other definitional issues.

10.105 The definition of R&D in the *Income Tax Assessment Act* uses the terms 'innovation or high levels of technical risk' and 'new knowledge'. 'Innovation' is defined in Section 73B (2B) of the Tax Act in a negative way: 'Activities are not taken to involve innovation unless they involve an appreciable element of novelty'. The IRDB's *Guide to the R&D Tax Concession* states that:

> 'Novelty' is understood to mean "newness" or "something new or different". Therefore, if the core R&D activity involves something which is either appreciably new or appreciably different to that which existed in that industry at the time that the activities were undertaken, then the "original thinking" within this activity is likely to satisfy the legislative requirement for innovation.
>
> The Board assesses the novelty of claimed R&D activities primarily against technology commonly used in the relevant industry sector in undertaking similar product or process developments… The Board takes into consideration… [whether the new device, product or process is] likely to be considered by experts in the field to be clearly different to the industry standard... The eligibility of each claim needs to take into consideration factors such as the area of technology the claim relates to, the current state of knowledge in the public domain of technology, the commercial and technical

> realities of assessing this information and the technological progress made by the claimant company.[103]

10.106 Section 73B(2B) of the Tax Act defines 'high levels of technical risk' as:

> i. The probability of obtaining the technical or scientific outcomes of the activities cannot be known or determined in advance on the basis of current knowledge or experience; and
>
> ii. The uncertainty of obtaining the outcome can be removed only through a program of systematic, investigative and experimental activities in which scientific method has been applied, in a systematic progression of work (based on principles of physical, biological, chemical, medical, engineering or computer sciences) from hypothesis to experiment, observation and evaluation, followed by logical conclusions.

10.107 The degree of complementarity between 'innovation' and 'high level of technical risk' is acknowledged by the Board which states:

> If there is uncertainty of outcome, then it is likely that some original thinking would be required to resolve the uncertainty, and the original thinking would be evidence that the *innovation* test had been met. Conversely, it is unlikely that original thinking would be required if the outcome was already known on the basis of current knowledge or experience.[104]

10.108 The Academy of Science considers that the requirement to show that 'the probability of obtaining the technical or scientific outcome of the activities cannot be known or determined in advance on the basis of current knowledge or experience' is 'the root cause of ambiguity over eligibility for the R&D tax concession (and of what does and does not constitute R&D)'.[105]

10.109 The Academy observed that the Canadian definition of 'eligible' work in the context of applying for a tax concession 'includes incremental improvements to existing technology'.[106] Under such a definition, it is

---

103 *Guide to the R&D Tax Concession*, available online at: www.ausindustry.gov.au, accessed on 15 May 2003, p. 53.

104 *ibid*., p. 54.

105 Australian Academy of Science, Submission No. 45, p. 11.

106 Prof. Sue Serjeantson (Australian Academy of Science), Transcript, p. 14.

likely that clinical trials, or even market research, might be classified as R&D. Both of these activities have given rise to problems in Australia.[107]

10.110 The Academy suggests that, 'in the long-run', the current Section 73B(2B) (i) be replaced by a new section along the following lines:

> Whilst it may be possible to estimate the probability of obtaining the technical or scientific outcome on the basis of current knowledge and experience this probability is sufficiently low that the investment is unlikely to go ahead without the benefit of a special tax treatment for the investment.[108]

10.111 The Academy considers that the revised wording would cover R&D investment that was:

> … aimed at achieving some types of incremental technical change in products and processes. Many companies innovate effectively by making a series of small incremental improvements in their products and processes and achieve this precisely because an incremental approach reduces technical risk (and hence their investment risks) when compared to 'big push' projects. This point applies in particular to the ICT area and other technologies that involve highly complex inter-dependent systems in which innovation is best carried out via many small 'evolutionary' steps. It applies also when innovating by adapting existing plant.[109]

---

107 Dr Meera Verma (BresaGen Ltd), Transcript, p. 533: 'Time and time again we get caught in this trap when a clinical trial gets the response: "I'm sorry, that doesn't fit under R&D". But it does, because if it falls over in clinical trials, you do not have a product'; Holden, Submission No. 57, p. 17: The definition of R&D should cover 'the costs of market determination / market research to ensure adequate understanding of the potential opportunities.' Also Dr Graeme King (Nortel Networks Australia Pty Ltd), Transcript, p. 619: 'The more you get towards the "D" end, the more you will be put under the microscope about the suitability of your activities for R&D concession which seems a shame. It seems a shame to have to try and convince someone that what you are doing is taking that product to a real income stream'; Australian Minerals Industries Research Association, Exhibit No. 24, Centre for International Economics, *Minerals: Our Wealth Down Under*, p. 31: R&D 'is becoming more focused on incremental measures that improve market performance' and that there has been a 'worldwide trend towards shorter term applied R&D'; Dr Lehmann, Transcript, p. 558: We are 'developing our products and improving our way of doing things'[and in doing so] 'we really have to be careful about which bits [of R&D] we claim and which bits we do not claim.'

108 Australian Academy of Science, Submission No. 45, p. 11.

109 *ibid*., p. 4.

10.112 The committee agrees that it is in Australia's interests to encourage incremental innovation and, further, that this should not be confined solely to 'high-tech' products or ideas. It should also encompass small businesses in the services sector, for example, small food processing companies that are experimenting with ways to increase the shelf life of their products. Such companies justifiably consider that they are conducting R&D.[110]

10.113 The committee considers that the combination of the change to R&D Plans required by the IRDB (see earlier in this chapter) and the amended definition of 'high levels of technical risk' (as outlined above) would encourage more business investment in R&D.

Recommendation 47

10.114 **The committee recommends that, in order to reduce ambiguity about eligibility for the R&D tax concession and to facilitate R&D that involves *small* innovative steps, the Commonwealth government consider amending Section 73B(2B) (i) of the Income Tax Assessment Act broadly along the following lines: 'Whilst it may be possible to estimate the probability of obtaining the technical or scientific outcome on the basis of current knowledge and experience, this probability is sufficiently low that the investment is unlikely to go ahead without the benefit of a special tax treatment for the investment.'**

10.115 Finally, the committee turns to the issue of whether a less technology-focussed definition of R&D should be adopted. Many organisations pointed to their focus on services rather technologies—even a major Australian company like Telstra noted that it is essentially 'a service business [whose] role is to assemble complex technology assets and to offer them as systems and services'.[111]

10.116 In view of the number of SMEs in Australia, the increasing importance of the service sector and the great amount of innovative activity that is taking place in the economy and which is not technology-based (see chapter 2), there appears to be a case for re-examining the current technology-oriented definition of R&D.

---

110 Mr Mike Ratcliff (Temptation Bakeries Pty Ltd), Transcript p. 539: 'A major theme of our R&D is increasing shelf life. We have taken the shelf life of one product from one week to a month and increased sales ten-fold'.

111 Dr Hugh Bradlow (Telstra), Transcript, p. 602.

Recommendation 48

10.117 **The committee recommends that the Commonwealth government review the current definition of R&D to ensure that its technological orientation continues to be relevant to the type and extent of innovation occurring in Australia and, in particular, that it recognises the importance of R&D in the services sector.**

Gary Nairn MP

Chair

A

Appendix A - List of Submissions

Submission	Organisation/Individual
1	Mr Crellin (Senior consultant, Neo Knowledge)
1.1	Mr Crellin
2	Mr Beatty (Principal, BOSMIN)
3	The Australasian Institute of Mining & Metallurgy
4	Mr Ruthven (Chairman, IBISWorld Pty Ltd)
5	Water Corporation of Western Australia
6	Mr Nelson (Director, foreseechange)
7	Cooperative Research Centre for Sensor Signal and Information Processing
8	Mr Clark-Murphy (Murdoch University)
9	Mr Hemlof
10	Australian Industry Group
11	Australian Cotton Cooperative Research Centre
12	S Hudson & Associates Pty Ltd
13	Australian Business Foundation
14	Ericsson Australia
15	Wave Global Pty Ltd
15.1	Wave Global Pty Ltd

16	Office of the Minister for State Development, Tourism and Small Business (Western Australia)
17	Grains Research and Development Corporation
18	Dr Wynn-Hatton
19	Emeritus Professor Gillin and Mr Yencken
20	Australian Geoscience Council Inc
21	Cooperative Research Centres Committee
22	Commonwealth Scientific and Industrial Research Organisation
23	UPSIDE Solutions (Industrial design consultants)
24	Rural Research and Development Corporations
25	Dr Batterham (Chief Scientist)
26	GlaxoSmithKline [GSK]
26.1	GSK
27	Shoalhaven Industry & Business Association
28	The Royal Australian Chemical Institute Inc
29	Non-Ministerial members of the Council for Knowledge, Innovation, Science and Engineering Victoria
30	Mr Turner
31.1	Australian Venture Capital Association Limited
32	Mr Biddle (Royal Melbourne Institute of Technology)
33	Cooperative Research Centre for the Conservation & Management of Marsupials
34	The Group of Eight Limited
35	Intelligent Manufacturing Systems
36	Mr Henderson (Director, Innovation & Business Development Pty Ltd)
37	Australian & New Zealand Association for the Advancement of Science (Inc)
38	Commonwealth Department of Industry, Tourism and Resources

39	Ms Inkster
40	Australian Mineral Industries Research Association
41	Cooperative Research Centre for Eye Research and Technology
42	Design Institute of Australia
43	National Health and Medical Research Council
44	Australian Paper Industry Council
45	Australian Academy of Science
46	Mr Rice
47	AOK Innovations Pty Ltd
48	Australian Academy of Technological Sciences and Engineering
49	Minerals Council of Australia
50	Australian Research Council
51	Federation of Australian Scientific & Technological Societies
52	Australian Nuclear Science and Technology Organisation
53	Australian Industrial Research Group
54	Australian Vice-Chancellors' Committee
55	Merck, Sharp & Dohme (Australia) Pty Ltd
56	The Veterinary Manufacturers and Distributors Association (Inc)
57	Holden Ltd
58	Business Council of Australia
59	Deloitte Touche Tohmatsu
60	Wildlife Management International Pty Limited
61	Australian Design Awards
62	SciVentures Investments Pty Ltd
63	Department of the Premier and Cabinet, Government of Western Australia

64	Commonwealth Department of Education, Science and Training
65	Pfizer Pty Limited
66	Commonwealth Industry Research and Development Board
67	Taxation Institute of Australia
68	The Australian Electrical and Electronic Manufacturers' Association Ltd [AEEMA]
68.1	AEEMA
68.2	AEEMA
68.3	AEEMA
69	Institute for Molecular Bioscience, University of Queensland
70	Nortel Networks
71	Queensland Government
72	The Institution of Engineers, Australia
73	Federal Chamber of Automotive Industries
74	Australian Information Industry Association
75	NSW Forest Products Association Ltd
76	Commonwealth Department of Agriculture, Fisheries and Forestry
77	Flexichem Pty Ltd
78	Flavourtech Pty Ltd
79	Professor Hearn
80	Medi Herb Pty Ltd
81	The Heilbronn Group
82	RollsPack Pty Ltd