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:

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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.

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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

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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

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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

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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]

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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

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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]

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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]

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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

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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]

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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

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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

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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:

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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

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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]

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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

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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.

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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]

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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

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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]

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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.