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10th September 2002

Mr. Gary Nairn MP,
Chair,
House of Representatives Standing Committee on Science & Innovation,
R1, Suite 16, Parliament House,
Canberra, ACT, 2600

Dear Mr. Nairn,

Inquiry into Business Commitment to R&D in Australia

Thank you for the opportunity to lodge a submission to the House of Representatives Standing Committee on Science and Innovation, and to its Inquiry into Business Commitment for R&D in Australia. Please accept my apologies for its lateness.

I understand that this inquiry was referred to the Committee by the Hon. Peter McGauran, MP, Minister for Science and has been designed to address three questions:

- What would be the economic benefit to Australia from a greater private sector investment into R&D?
- What are the impediments to business investment in R&D?
- What steps need to be taken to better demonstrate to businesses the benefits of higher private sector investment in R&D?

Background of the Submitter

This writer believes that he may be able to offer an unusual vantage point from which to comment on the above questions.

I have spent much of my working life involved at executive management levels in the Corporate R&D of three Dow-Jones index listed corporations in USA and Europe. These companies are Exxon Chemical Company, AlliedSignal Inc. (which is now named Honeywell Inc.) and Alcoa Inc. All three companies have Australian activities which may include manufacturing operations or, at a minimum, sales offices. However, only one, Alcoa, has continued to perform any really serious R&D in Australia.

I returned to Australia in March 1999 to join the Strategic Industry Research Foundation (SIRF) as its Managing Director after 17 years in USA and Europe. SIRF was a Victorian semi-government entity that drove innovation outcomes from research and technology results. However, in mid-2000, SIRF was closed after discontinuation of its Victorian state government support.

Before leaving USA, I had worked for Alcoa Inc. in Pittsburgh as Director of the Alcoa Technical Center. There, I was responsible for the technical resources of Alcoa's central laboratories and for its significant, corporately sponsored R&D program. However, during most of 1998, I undertook a major assignment to drive a renewed global technology strategy across all of Alcoa's businesses. This ultimately led to a complete reorganization of Alcoa's global technology management system. (Achievements outlined in the Arthur D. Little book "The Innovation Premium", Perseus Press, 1999).

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My industrial career began with the Exxon Chemical Company where I held various assignments in technology management and in new business development in Australia, Belgium and USA. I hold a Ph.D. in materials engineering from Cranfield University of Technology (UK) and M.Sc. and B.Sc. degrees from the University of Melbourne.

In 2000, I was awarded the Industrial Research Institute's (Washington USA) Maurice Holland award for work on "front-end innovation" at AlliedSignal and Alcoa.

Scope of Submission

My company, SciVentures Investments Pty. Ltd., of which I am a co-founder and director, is one of the four recently announced pre-seed fund managers, under the Federal Government's "Backing Australia's Ability" program.

Nonetheless, given my personal experience outlined above, I would like to focus comments in this submission mainly on aspects of industrial R&D, and especially to refer to the strategic role of industrial R&D.

Alcoa's Australian-based Technology Development Position

There is a particular reason for the existence of Alcoa's continued Australian-based technology development capability for its global bauxite and alumina business. The company's endeavour in Western Australia to develop its major bauxite resources in the Darling Ranges had led it to recognize a need for significant technology activities that had to be developed locally in the state. The nature of the bauxite resource and the presence of a unique Jarrah forest over the bauxite deposit was a particular situation that only existed with this resource.

However, the ultimate result, once three world-scale alumina refineries came into production, was a set of world-class bauxite and alumina refining technology skills, based in Western Australia.

These skills have since been deployed as Alcoa's world-wide centre of excellence for technology in this domain. However, while viewing this capability from my Pittsburgh-based role developing Alcoa's global technology strategy, I noted that, as much as I may have wanted the WA-based technology group to succeed as a global technology resource, issues had to be overcome to maintain this role relative to local priorities.

Not all Industrial "R&D" is an "Investment"

To expand on this aspect, Figure 1 (see below) illustrates a hierarchy of various types of industrial technology development activities. These range from support for marketing, as a base level, to the development of next generation, or even broad-based new discovery activities at the higher levels.

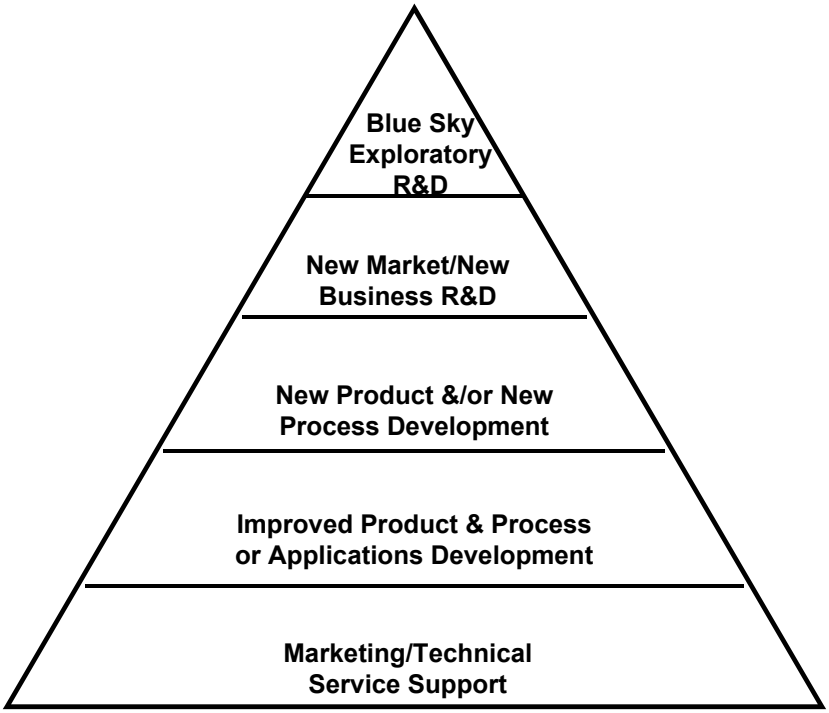


Figure 1: Industrial R&D/Technology Pyramid

In industry, usually marketing technical service activities are conducted at the business unit level and in many global corporations are supported regionally, due to the special needs of local markets. Generally, such technology support has to be regarded as an ingredient in the "cost of goods sold" – i.e. it is viewed as a sales expense rather than as an investment.

Of course, such market exposure may lead the business unit to recognize needs for improved products, processes or applications. Some of this work may be then undertaken by the local market technical service groups, although any special

requirements will often be transferred to product development groups that may exist closer to manufacturing or even to a strategic research group that would usually be sited close to the company's headquarters. When this activity protects existing sales, often it is regarded as an expense. Only when the capture of new market share, or new customers, can be addressed could it be seen as more of an investment.

Product or process activities requiring greater research or pilot plant specialization are even more likely to be based closer to considerable R&D investment, which, generally, in most global corporations will be found near to the global or regional headquarters.

When it comes to new business or new market R&D, or to any blue-sky exploratory research and development that a corporation may choose to consider, it is unusual to see such next generation or breakthrough activity supported remotely from strategic corporate business decision-making.

Thus Figure 1 also effectively indicates that, at the base level, technology support is likely to be highly distributed around the world in a global corporation, whereas, at the more futuristic or strategic level, the activity is more likely to be found closer to headquarters.

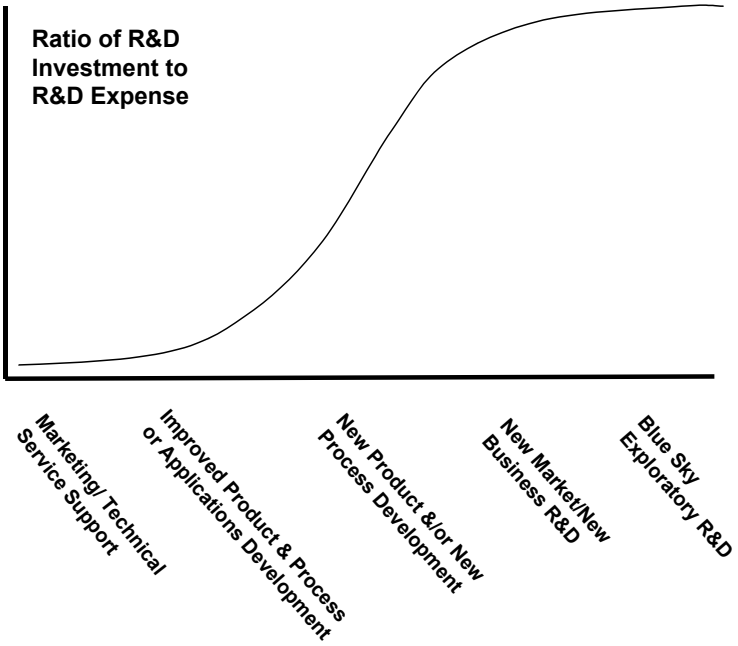


Figure 2: Industrial R&D spending: An expense or a strategic investment?

Figure 2 schematically outlines a typical corporate strategic view regarding what technology development should be seen as a cost, and which might be regarded as an investment.

Often it is suggested that R&D should be regarded as an investment by a business, rather than as a cost. However, based on the above discussion of the various industrial technology activities that may be typically encountered, it should be evident

to the reader that some activities are more easily considered as an expense, while others may have characteristics more aligned with strategic investment.

The writer believes that the current inquiry into business commitment to R&D in Australia might find it informative to review data concerning the deployment of R&D funds according to a model such as the one shown by Figures 1 and 2.

Additionally, a view on how this distribution alters with business sector should also be extremely useful in such a consideration.

Assuming that the model of Figures 1 and 2 is accepted, then it will be recognized that the potential impact of Australian industrial R&D dollars spent in these different areas may have very different potentials for outcomes of benefit to the economy.

In a similar manner, it might also be suggested that the use of single measure of industrial R&D spending (BERD) may not offer a sufficiently definitive metric of the impact of business commitment to R&D in Australia.

Australian Industrial R&D: Corporate Position or Business Unit Role

Over the past two decades, there has been a dramatic increase in focus across industry globally towards major improvements in business efficiency. This "operational excellence" activity has been driven into every aspect of a business, including the efficiency of its technology operations. In all cases, the objective has been to maximize the outcomes available and the value contribution of the operational unit concerned

Thus, at the level of a remote business unit in Australia, driven by the strategic goals of a corporate headquarters based in USA, Asia or Europe, it will be evident that corporate focus will be on cost reduction at the business unit level and that this should be expected to directly impact technical support expense reduction, and, therefore, from the Federal Government's point of view, may be a root cause for "reduced Australian private sector investment in R&D".

Increasingly, as a direct result of globalization, many businesses operating in Australia are managed and controlled remotely and thus the experience of the past decade or two of decreased Australian industrial R&D spending (at least for established companies in traditional market sectors) should not be too surprising.

However, assuming that the model of Figures 1 and 2 is accepted, it will be recognized that the potential impact of Australian industrial R&D dollars spent in these different R&D/technology activities may have quite different potentials for outcomes of benefit to the economy.

Economic Benefit versus Impediments

Thus, it might be asked whether increased private sector investment in R&D would bring greater economic benefit to Australia?

Clearly, it depends on the type of R&D that forms the "investment".

If this increased Australian-based R&D activity was focused on the development of next generation technology for a global industry, then considerable benefit could accrue.

However, it should be recognized by the standing committee that there are various benefits that are available in other countries that might lead a global corporation's strategic decision makers to place such critical strategic research and development elsewhere.

Perhaps this is best explained by example:

In Australia, existing Federal government support for R&D has an effective ceiling. Larger corporations, e.g. those with greater than AU$50 million annual sales, do not fully benefit from the potential available from START program support for example. However, in USA, such a ceiling is not so readily evident. At AlliedSignal (then, with US $12B annual sales), I managed a US$7MpA Federal government cost-shared R&D portfolio for breakthrough programs that the business could not otherwise have justified easily. Later, at Alcoa (then with US$14B annual sales), I managed US$5MpA of Federal funding in a cost-shared R&D portfolio.

The most significant Alcoa program in this portfolio was aligned with the development of inert anode aluminium smelting, which has the potential to offer very significant green house gas reduction coupled with lower cost Al production. This game-changing global R&D program for the aluminium industry has enormous potential, but even for Alcoa, with its very significant global market position in Al, the support of the US federal government provided it with a major boost in confidence to undertake this multi-year, high risk, high investment program.

Another Alcoa example involved a critical aspect of alumina refining. While US government support was obtained to undertake a program in USA, similar support for the Western Australian research group was not available. While the WA-based group, may have had the greater capability to undertake the program, the provision of US government support was a driver in the strategic decision regarding where the work ultimately had to be undertaken.

Potential for Industrial R&D Policy Impact

Given the above two examples (and others that could be cited here), I believe that the Australian Federal Government should consider a global benchmarking program to assess how large multinational corporations decide on the geographic positioning of their major strategic corporate research programs and the influence of any national R&D policies and related financial support on those decision processes. Such a study might also consider whether there are differences in the parameters that drive these considerations across various industry sectors

While it seems likely to the writer that such Australian government policy considerations might not have any great impact upon technology support for marketing, or for improved product/process development activities for any Australian company (as, I understand, the AIRG submission provided to you already suggests), it may well have a more significant impact upon the undertaking of larger, strategic endeavors, which the writer contends are more likely to have the sought for, long lasting, national economic benefit, given their successful completion.

Demonstration of Benefits of Business Investment in R&D

The Federal government's innovation/commercialization support program under "Backing Australia's Ability" contains many highly valuable elements – e.g. BIF, START, COMET, and the R&D Tax concession. To a considerable extent, it appears that the focus of these elements has been strategically positioned to support the evolution of Australian businesses across emerging elements of the Australian economy.

However, the scale of established business sectors in the Australian economy should not be overlooked. It is evident that only a few % of annual growth in the mining sector, which is primarily export driven, may offer an opportunity as large as say the Australian wine industry in total. Therefore, a demonstration of the value of R&D outcomes in expanding the scale of export growth for large, established Australian industries deserves continued attention.

I believe that global corporations usually will not decide (and, evidently, have not decided, in the past) to place their strategic R&D programs in Australia simply because of lower R&D costs (which some have regarded as an Australian competitive advantage). Their key drivers will be based on the existence of a truly differentiated, highly competitive R&D capability, which is closely coupled with proven expertise in taking research outcomes through to commercial value.

While Australian research is undoubtedly highly inventive (and is seen to be so competitively, globally), its ability to convert these inventions into profitable commercial outcomes is far less well developed. As an example of this issue: at the academic and/or federally funded research institute level, it appears that most publicly funded research findings are licensed externally, quite early in their development, and often to foreign interests before proper identification of the potential for real value contribution from the research outcome can be established.

To capture the potential value available from Australian inventiveness, it has been contended that a major gap has to be closed that can drive publicly funded researchers to only be content when they see their results become successful Australian start-ups, rather than to accept early licensing opportunities as a satisfactory conclusion. The writer contends that one initiative in this direction is the establishment of the "pre-seed fund" program.

Broader Potential Role of Skilled Industrial Researchers/Business Developers

I have observed that, in the USA, a large number of highly skilled, industrially trained, innovation-oriented researchers and new business developers (perhaps after retirement) spend significant time in support of publicly funded R&D commercialization. It is contended that this may be a key differentiator relative to Australia.

It will be recognized from Figures 1 and 2 that relatively few industrial R&D workers are ever involved in strategic initiatives that can drive new business, new product, and/or new market endeavours. Thus they may lack the type of experience and background that are necessary to properly support new business start-ups from publicly funded, breakthrough technology outcomes. However, it is my view that the

skills required for successful technology commercialization are ones that can only be effectively mentored and developed through real world experience.

Therefore, even beyond the direct economic value that more effective industrial R&D might bring to Australia, there may be a wider potential value to be derived from the development of industrial research in Australia beyond the technical service, improved product or process support level (i.e. the R&D expense type of activity) towards more strategic initiatives (where R&D may become an investment in a corporation's future). It is real experience in this level of activity that is required to build the industrial R&D and new business development support base. In turn, that evolved skill set might help develop more effective innovation from the publicly funded research sector.

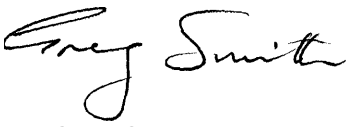
Closing Remarks

I hope that the above provides sufficient demonstration that not all R&D should be considered an "investment". Some is clearly business expense. Therefore, the impact of more strategic "investment-oriented" industrial research on the Australian economy should be a key point of focus in the considerations of the committee, the writer believes.

There may be real value in a globally competitive, federal government program to support the industrial implementation of strategic research activities. Such a program should be driven towards breakthrough outcomes of global market significance that may provide an effective discriminator for Australian industry. Thus, as a first point of examination, a study is suggested to provide global benchmarking of different national government initiatives that influence strategic business decision makers concerning the placement of breakthrough research programs.

One alternative that may be worth considering could be some form of a "Federation Fellow"-like program that is oriented towards successful commercial developers or to new technology business development managers, who may wish to return to Australia. It may be that such people see greater incentive in a highly competitive and supportive commercial environment, however, than in government-funded positions.

Yours sincerely,



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Greg is the co-Founder and Director of the recently-formed, pre-seed fund company SciVentures Investments Pty. Ltd.

Since mid-2000, he has operated two start-up companies: One, entitled Genesis Tech Ventures Pty. Ltd, was established jointly with Ross Chessari. It has an emphasis is on the development of high technology-based start-ups from research outcomes including taking these start-ups through to capital raising. His second, separate, start-up initiative, The IP Factory Pty. Ltd., works with early stage companies to develop globally competitive patent portfolios that then enhance these companies' valuations.

Greg returned to Melbourne early in 1999 to join the Strategic Industry Research Foundation (SIRF) as its Managing Director after 17 years of work in various companies in USA and Europe. SIRF was a semi-government entity that drove innovation outcomes from research and technology results. However, in mid-2000, SIRF was closed after discontinuation of its Victorian state government support.

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Earlier in 2001, he was a member of both the Federal Government's Major National Research Facilities committee. Greg is a member of the Federal Government's Industrial Research & Development Board. He is the Chairman of the start-up pharmaceutical intermediates company, Chirogen Pty. Ltd., and a Director of RPO Pty. Ltd. (formerly called Redfern Polymer Optics Pty. Ltd.)