Australian Business Foundation

5th May 2005

Dr Anna Dacre
Committee Secretary
Standing Committee on Science & Innovation
House of Representatives
Parliament House
CANBERRA ACT 2600

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Dear Dr Dacre

Re: Pathways to Technological Innovation Inquiry

In response to your letter of 23 March 2005, the Australian Business Foundation submits the attached response to the call for submissions for the House of Representatives Standing Committee on Science & Innovation inquiry into pathways to technological innovation.

ABF Chair Catherine Livingstone and I would be pleased to address the Committee as appropriate on the issues covered in our submission.

Yours sincerely

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Chief Executive

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HOUSE OF REPRESENTATIVES
STANDING COMMITTEE ON SCIENCE & INNOVATION
INQUIRY INTO PATHWAYS TO TECHNOLOGICAL INNOVATION

SUBMISSION FROM THE AUSTRALIAN BUSINESS FOUNDATION

Background

The Australian Business Foundation (ABF) is an independent business research organisation, founded in 1997 and sponsored by the eminent industry association, Australian Business Limited, to conduct research that advances knowledge and fosters new thinking on Australia's business competitiveness, prosperity and jobs. ABF's body of research focuses on innovation, new forms of competitiveness and opportunities from a knowledge-based economy. Details of the Australian Business Foundation's body of research can be accessed online at www.abfoundation.com.au.

The Australian Business Foundation's submission to the inquiry into Australian technological innovation and pathways to commercialisation will focus on the following elements of the Inquiry's terms of reference:

- successful examples of Australian technological innovation;
- factors determining success and lessons for overcoming impediments and potential failure;
- pathways to commercialisation;
- skills and business knowledge;
- research and market linkages; and
- instructive strategies from other countries.

In commenting on these elements of the terms of reference, the Australian Business Foundation draws on the distilled intelligence from its body of research work, as well as on the findings of specific ABF research studies, particularly those featuring case studies relevant to the Inquiry's interests.

Successful Examples and Factors Determining Success

Drawing on its research, the Australian Business Foundation offers three key pieces of intelligence to illuminate the active ingredients of successful technological innovation and the connections from such innovation to both increased national productivity and greater global competitiveness from Australia. These insights are:

- The prime importance of **customer problem-solving** in successful business innovation, including in pathways to commercialisation.

- The **smart application of knowledge** as a decisive factor both in generating maximum commercial value in individual businesses and in driving long run economic growth.

- **Business transformation** as the key to achieving innovation and successful commercial outcomes, not technology or research of itself.

In the following sections, the Australian Business Foundation elaborates on how this intelligence informs the Inquiry's Terms of Reference, citing examples of successful innovation as appropriate to the reference being addressed.

Pathways to Commercialisation – a wider angle

While recognising that the Science & Innovation Committee has chosen to focus on technological innovation, the Australian Business Foundation cautions against making the error of equating innovation with technology.

The production and global sale of new products based on radical technological advances, or on research and scientific breakthroughs, are often cited as evidence of successful Australian innovation. Examples like Cochlear or ResMed are often quoted. While such success stories have products which are based on emerging, even transformational, technologies, the technology is not the prime reason for the enterprise's enviable performance.

More important is the enterprise's capacity to understand and meet market needs and to solve problems for demanding customers by putting together all the elements needed to build a sustainable and responsive business. Attention to this "market and customer pull" drives faster and more effective commercialisation of the technology.

The Australian Business Foundation contends that Australia's successful innovations have consistently featured an early and pervasive focus on the needs of customers and an ability to find distinctive solutions to problems. Current research by ANU into Australian Innovation Systems by a team led by Don Scott-Kemmis (in which ABF is a partner) illustrates this point. The research points to examples of innovation by customer problem-solving in Australia's success in mining and exploration software, defence electronics, scientific and medical instruments and value-added agricultural products like wine.

This problem-solving character of Australian innovation means Australia is neither typically a technology maker nor a technology taker. Rather, we are a technology integrator, generating and acquiring technologies and combining them to develop value-added products and services that solve problems or offer new opportunities to customers.

Other ABF research takes this argument further to suggest that we are seeing a new pattern of competitive business activity in Australia based on bundling together products and services into new innovative offerings to meet total customer needs. This is detailed in ABF's 2002 study entitled *Selling Solutions: Emerging Patterns of Product-Service Linkage in the Australian Economy* by Professor Jane Marceau et al at AEGIS at the University of Western Sydney.

The process of customising blends of products and services into novel value-added solutions for customers allows firms to compete successfully against cheaper products, shorter product cycles, faster business imitations and saturated markets. In the process, new mixes of technical, managerial and collaboration skills are being generated in the firms themselves. Brevini Australia is a successful innovator of this kind.

Brevini Australia

Brevini Australia is a Western Sydney-based modern, high performing company that both sells and services planetary gear boxes. Customers are largely in the mining, agriculture and construction industries in Australia and offshore. Chris Bayliss, Managing Director, tells the story of Brevini taking a hard look at how it could ensure its survival and growth in a climate of intense competition, of customers with little loyalty buying on price and the company's profitability becoming marginal.

Brevini changed their approach, transforming themselves from a manufacturer of a single product to a unique and customised total package service provider. They first added value to their gearboxes with new features and capabilities. They then engaged further with their customers in understanding the end uses of the gearbox and became involved in problem-solving and design. They then added services to the package, including maintenance and upgrades.

Brevini's journey proved successful, though not easy. It required a cultural shift in management, sales team changes, major efforts to win customer confidence, a commitment to forming alliances and reorganisation of the capabilities of the business so they could consistently offer a high quality total package of solutions to customers.

The focus on problem-solving and the transformed pattern of business activity are indicators of market-driven, not technology-driven, innovation, evident both in businesses that are technology-based and those that are not. This has implications not only for concepts of commercialisation, but also for the Inquiry's interest in issues of skills and business knowledge and of research and market linkages.

Skills and Business Knowledge

There is mounting evidence from innovation research and case studies that knowledge is becoming an increasingly important factor in business competitiveness and economic growth. This does not just include the knowledge from science and formal research and development, but market intelligence, tacit or technical know-how, knowledge embedded in capital goods, insights from customer and supplier relationships or strategic partners and learning gathered from past mistakes and failures.

Professor Keith Smith of the European Commission Joint Research Centre, writing on Innovation & the Knowledge Economy for the Australian Business Foundation, suggests that unrecognised forms of knowledge and innovation are driving today's economic transformations and growth.

Professor Smith points to strongly performing and growing firms, many in traditional old industries, that are low on research and development, but high on knowledge. Their knowledge comes from learning by doing, by using technology and equipment which gives them new capabilities, and by interacting with others like universities, research and professional bodies, consulting engineers or standards organisations.

While acknowledging the importance of investment in scientific research and development, Professor Smith notes that innovation driven by scientific discovery is a rarity. Rather, firms seek to develop new concepts for products and services based on learning and customer problem-solving. Firms use their knowledge of markets, consumer preferences and demands and customer feedback to create viable and valued business offerings that are superior to their competitors and for which customers worldwide are prepared to pay.

The effective management of knowledge has become a vital tool for business to compete in a faster, tougher and more globalised marketplace. This proposition was explored in a 2003 study for the Australian Business Foundation by Dr Richard Hall of the University of Sydney's Australian Centre for Industrial Relations Research & Training, reported in the two volume study, *Knowledge Management in the New Business Environment.* GPC Electronics, a contract electronics manufacturer based in Penrith, was one case study detailed in Dr Hall's research.

GPC Electronics

GPC designs, manufactures and markets interconnected products and related services for the electrical power, automotive, consumer, communication and contract electronic manufacturing industries, with an impressive client list that includes Nortel, Toshiba, Ericsson, Siemens and Alcatel.

GPC has enjoyed spectacular growth in recent years (revenues have grown at a compound rate of 40% p.a. for the past 7 years) and now employs 450 staff. Knowledge and its effective management has not only been pivotal to GPC's success; more than that, it is a core focus of its company strategy, rather than being treated as a stand-alone initiative.

Like many Australian enterprises, GPC realised that it could never compete in a globalised, fast-paced world economy as a high-volume, low cost producer. GPC needed to distinguish its products and services by harnessing knowledge, in particular, market industry knowledge, market intelligence, process knowledge and supply chain knowledge. GPC competes by its superior use of knowledge, particularly about industry and market trends and customer needs.

GPC's managers characterise the relationship with a customer as a partnership, from which develops a deep and detailed understanding of the customer's business priorities, strategic imperatives and competitive environment. This close-contact, collaborative approach allows GPC to gain a key strategic advantage over its often larger global competitors, because it understands and can respond, even anticipate, its customers' needs more effectively.

Effective knowledge management also allows firms to be nimble and receptive to change. The entire dynamics of the contract manufacturing industry are prone to change every six to twelve months. Given this pace of change, GPC's key management issues tend to be strategic rather than operational, with the aim to rapidly adapt to customers' current specifications and to anticipate customers' future demands.

GPC utilises the knowledge and innovative ideas of individuals in the organisation. Innovation comes primarily from GPC's mid-tier professional ranks, with excellent project management the main focus. GPC sees its main competitive advantage in terms of its capacity for superior management of projects for customers based on a high degree of customer involvement and rigorous, systemised procedures and processes.

GPC acquires most of the new knowledge it needs through professional and industry bodies and associations. These associations provide firms in the electronics industry with an opportunity to develop a critical mass and an effective networking and knowledge-sharing community. Utilising the 'know-who' is an integral part of effective knowledge management for GPC.

By harnessing organisational and individual knowledge, GPC Electronics is able to respond effectively to the challenges posed by rapidly changing markets and advances in technology and stay ahead of the pack.

Research & Market Linkages

The Australian Business Foundation believes that when examining successful technological innovation, the importance of incremental change and continual small improvements typically are under-estimated.

Incremental innovation often involves proficiency in dealings with markets and customers, along with competency-building and learning by firms and their managers. It is far more then just exhorting technologists to embrace entrepreneurial attitudes and commercial flair. Incremental business innovation generates commercial value by deliberate and long term strategies and procedures. These must support investment in the enterprise's distinctive capabilities, eg training and skills acquisition, recruitment, organisational design, technology transfer, sales and marketing proficiency, specific production and managerial capabilities and so on.

The significance and impact of incremental innovation is demonstrated in a series of case studies prepared for the Federal Government's Science & Innovation Mapping Study by Dr Lyndal Thorburn of Innovation Dynamics (then called Advance Consulting & Evaluation) and Dr John Langdale of Macquarie University, entitled *Embracing Change: Case Studies on How Australian Firms Use Incremental Innovation to Support Growth, September 2003.*

Firstly, their definition of the elements of incremental innovation from Koberg et al (2003) are informative; they identify four elements:

- Procedural – management-determined innovations in rules and procedures.

- Personnel-related – innovations in selection and training policies and in human resources management practices.

- Process – new methods of production or manufacturing.

- Structural – modifications to equipment and facilities and new ways in which work units are structured.

The case study companies had all introduced one or more of the foregoing elements of incremental innovation over the preceding two years. Most had introduced innovations in at least three of the four areas.

They were motivated to do so by customer demand, the need to manage growth, the desire to expand markets, to differentiate themselves from their competitors or to improve their internal operations.

The principal direction of the resultant innovation for most of the case study firms was higher quality or customised products and services, followed by niche markets and taking a lead on new products or services.

The following summaries are drawn from case studies described by Thorburn & Langdale.

Incremental Innovation Examples

- **Codarra Advanced Systems** (Canberra) is a technology and management consulting company in communications, IT and software engineering mainly for the defence industries. Codarra spent $1million to develop an Unmanned Aerial Vehicle for reconnaissance and surveillance in the field to differentiate itself from its competitors. It seeks not theorise, like most consultants, but practices what it preaches. It added a manufactured product to its services business – not because of customer demand, but because the company's knowledge of the market and its skills identified an unmet need that they could fill and serve to build new markets and position themselves as industry leaders at the same time. Similarly, Codarra started training programs (bundling additional training services with their consultancy services) to position themselves as experts and to have a ready market of those they had trained to come back and buy consultancy services from them.

- **Forest Enterprises Group** (Tasmania) was primarily a management investment company for plantations. Their incremental innovations took the form not only of improving the investment product in response to expressed needs of their customers and financial planning advisors (with a single payment upfront and no management fees), but by creating new business entities (one a state-of-the-art saw milling facility allowing greater value added downstream wood processing and the other a joint venture in a timber export processing plant). Their business developments took them closer to the end user where they could realise more value and take advantage of their vertical integration for competitive pricing of their timber.

- **One World for Children** (North Geelong, Victoria) is a child care centre, which has innovated in a highly-regulated industry by adding new attributes to their service that satisfied an unmet and unarticulated customer and community need. One World for Children has introduced longer daily operating hours; began opening on Saturdays as a play centre and meeting place for parents and children offering specialist programs like music and baby massage; revolutionised the grouping of children into family groups in rooms of 20 children, not the norm of segmenting by age group with designated carer ratios; added kindergarten sessions for 3 year olds and 4 year olds which can be used independently of the child care; now offers a highly interactive website for online enrolments and data update, chat room for parents and e-training for TAFE students; and also now provides consultancy services to other child care centres on its family group model. These innovations have deepened the company's skill set and capabilities, added to their financial viability by working their resources and facilities harder, and demonstrably differentiated their services from their competitors, which also has resulted in them accessing new markets and revenue generators.

- **Soft Edges** (Port Macquarie, NSW) manufactures high performance swimwear and sportswear garments for elite athletes including the Australian Olympic womens hockey and basketball teams, winning contracts for Atlanta and Sydney and now exporting to North America. The drivers of their competitiveness are high quality and customisation, together with major investment in their sales and marketing operatons. These are backed by a computer system that avoids previous high error rates in translating customer specifications to the final product. They have by-passed retail outlets, where their product could not compete against cheap imports. They consider themselves now not just a manufacturer, but a manufacturing/marketing hybrid serving a personalised clientele.

- **The Bureau** (Adelaide, South Australia) started life as a typesetting and graphic design company and in the face of a declining printing industry and the rise of digital print technology, often introduced by machine manufacturers, they morphed their business into on-demand publishing. Innovators in a traditional industry, The Bureau used their more extensive industry knowledge to identify gaps suited to the new digital printing medium. Their on-demand publishing innovation allows anyone who writes a book to have it published. The Bureau targets Writers Clubs, retirees telling their own life stories and publishers who want to outsource. They have taken a lead in the reinvention of their business model and perhaps of their industry.

The end game for all these firms is to respond to internal and external cues and to innovate extensively as a result. Customers are key sources of innovative new ideas and possibilities. The right staff, well-handled, are crucial to innovation and growth. New facilities and equipment are commonly used to support change and extensive and intelligent use of information and communications technology is integral to long lasting business improvements. Perhaps most importantly, it is an enterprise's ability to learn, (ie to create, discover, use and re-use knowledge and turn it into distinctive capabilities) that solves a real problem imaginatively and in a way that generates resources to sustain the enterprise's growth.

A final example, particularly focusing on research and market linkages, is provided in the 2004 research study commissioned by the Australian Business Foundation, *Commercialising Australian Biotechnology* by Professor Michael Vitale of the Australian Graduate School of Management.

This study sought to understand more about the process of commercialising Australian biotechnology innovations, including critical success factors and barriers. The report paints a picture of the harsh business reality for these early start-up technology-based SME's. Professor Vitale finds the sector hampered by a lack of capital, a shortage of experienced management staff, and often incomplete or inconsistent public policies which result in company formation too early in the life of biotechnology ventures.

Among the critical success factors identified by the senior executives of the longest-established biotechnology companies interviewed for this study were:

- Adoption of a "hybrid" business model, which includes some sort of short term cash-generating activities to fund the long term discovery process.

- Concentrating on niche markets and products to maximise returns from limited capital.

- Focusing on global markets from the outset, with attendant concentration on market intelligence, branding and customer service offshore, while seeking to capture value for the Australian operation.

Professor Vitale's recommendations assume that Australian biotech SME's must grow or die. Professor Vitale is of the opinion that SME's in Australia can't afford the level of research and development that is the lifeblood of the biotechnology sector – they either get the early research right and grow to significant size as part of international value chains, or they get the research wrong and disappear. Consequently, the study makes a small number of recommendations for accessing the funds, skills, infrastructure and market opportunities that allow the Australian biotechnology sector to grow beyond embryo stage.

Lessons from other countries

The Australian Business Foundation draws the Committee's attention to a paper currently being prepared for ABF by Professor Goran Roos and Oliver Gupta which analyses the national innovation systems of two leading Nordic countries, Finland and Sweden, and compares them to Australia, with a view to identifying more robust approaches for improving Australia's innovation capacity.

Professor Goran Roos is Chairman of Intellectual Capital Services Ltd, a London-based research and consulting organisation, and holds Professorships at Cranfield University, Helsinki School of Economics and the Melbourne Business School.

The starting point of Goran Roos' work for the Australian Business Foundation is the critical importance of innovation as a driver of economic growth in developed economies. He contends that world economic growth is being increasingly dominated by knowledge-intensive goods and services and a key element for competing in knowledge-based economies is the "interconnectedness" or linkages between individual firms, research, education and financial institutions and government, that serve to diffuse and capitalise on this distinctive knowledge.

Professor Roos defines national innovation systems as the way in which a nation's universities and research bodies, financial system, monetary policies and private firms work together to influence the development and utilisation of new knowledge and learning. Nations can take deliberate action to shape the character and results of their national innovation systems.

Based on his analyses of Finland and Sweden, Professor Roos points to the following characteristics of successful national innovation systems:

- Recognition of the need and cohesive, deliberate action by governments to invest optimally in each of the elements of the innovation system, and in the way the structure works together as a whole. Too often, innovation policies focus on single components only like research and development investment or access to venture capital.
- An economy which is flexible and adaptable, with a commitment to reform and a global focus.
- The existence of demanding sophisticated leading-edge customers.
- A high level of networking among innovators, and the existence of robust industry clusters.
- Improved linkages between science and industry.
- An increasingly diversified base of research and development performers.
- High business and government expenditure on research and development.
- A supportive financial system.
- Above average rate of investment in education, research and innovation.

It should be noted that these success factors go beyond the characteristics and actions of individual firms to the robust operation of economy-wide institutions and policy settings.

Conclusion

The key message from the Australian Business Foundation's body of research to this Inquiry is that it is the capacity to solve customer and community problems imaginatively, using a firm's distinctive knowledge and with continual incremental improvements to their capabilities and business offerings, that are the vital ingredients for sustained long-run successful technological innovation and commercialisation. Public policy settings should be focused on creating the conditions that foster such successful innovative behaviour in Australian businesses.

May 2005