overview

We have known for several generations that innovation pre-eminently determines our prosperity. Yet innovation only began its prominence as a focus for Australian policy making in the 1980s. In addition to comprehensive policies to wean Australian industry off ad hoc production subsidies and trade protection, the Australian Government developed a range of policies to assist research and development and improve connections between researchers and business. These policies included the 150 percent R&D Tax Concession, Rural Research and Development Corporations and Cooperative Research Centres.

The backdrop for this study is provided by the confluence of four powerful circumstances.

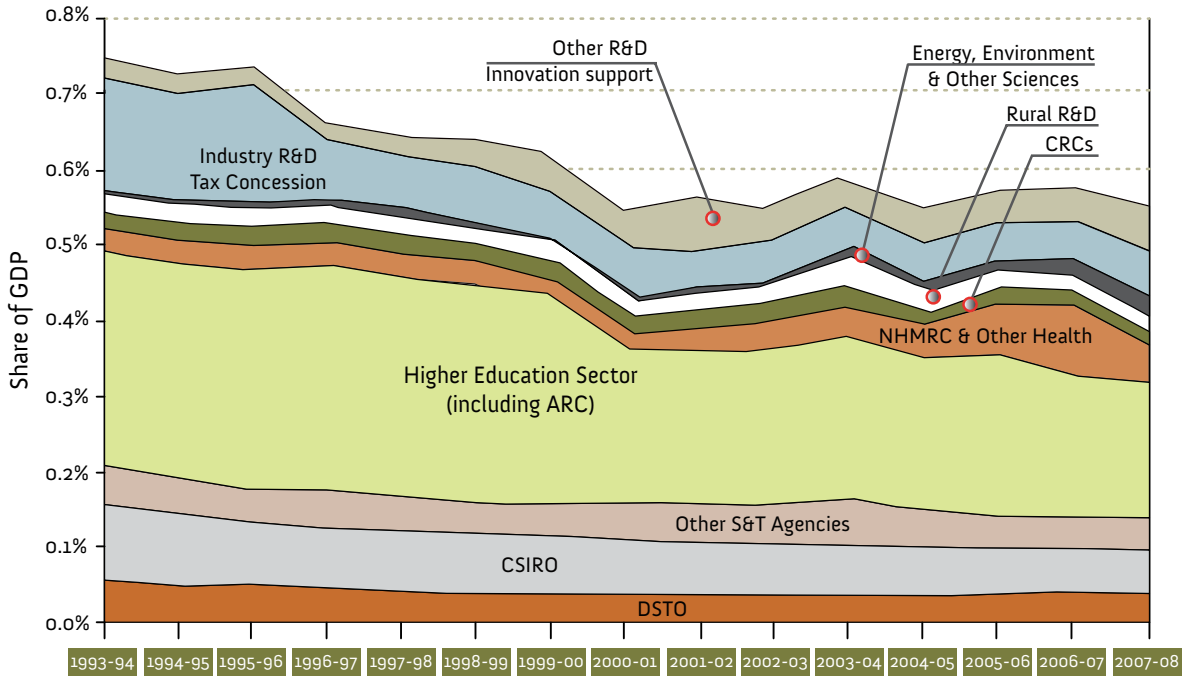
Firstly, the architecture of Australia's existing national innovation system is now a generation old. It requires reappraisal and the policies it comprises require renewal, refurbishment, recasting and in some cases re-imagining.

Secondly, the nature of innovation and our understanding of it is changing fast. In pursuit of a particular idea of innovation the 1980s policy framework sought to increase the supply and accelerate the commercialisation of research, scientific discovery and technological advances. Less attention was paid to improving the capacity of firms to apply the products of science and research, nor to understanding how boosting this capacity could better serve market and customer needs and secure productivity benefits for the Australian community. Commercialisation itself was generally understood to take place within a proprietary production chain largely closed to outsiders. Today innovation is understood to involve

much more than the transmission of knowledge down the pipeline of production from research to development to application. In the age of the internet, with the opportunities for collaboration which it opens up, open innovation is increasingly important.

Thirdly, Australia's focus on innovation policy intensified in the 1980s – after a prolonged decline in our innovation performance, and a commensurate fall in our relative prosperity. This policy focus bore fruit in sharply rising levels of R&D and other forms of innovation. However the rate of improvement has stalled over the last decade and some indicators suggest absolute decline. Furthermore, much of it appears to have been a response to our own policy decisions. As illustrated below, as a share of Gross Domestic Product (GDP), Australian Government support for science and innovation, has fallen by nearly a quarter. Also the number of researchers per 1,000 employees has declined substantially in the last decade, and US patents granted per 1,000 population have plunged from 0.06 to 0.01 (1999–2003). And yet during this time, the public revenue was fed by a torrent of cash from the mineral boom.

Figure 1: Australian Government Expenditure on Science and Innovation, 1993–94 to 2007–08, as a proportion of GDP



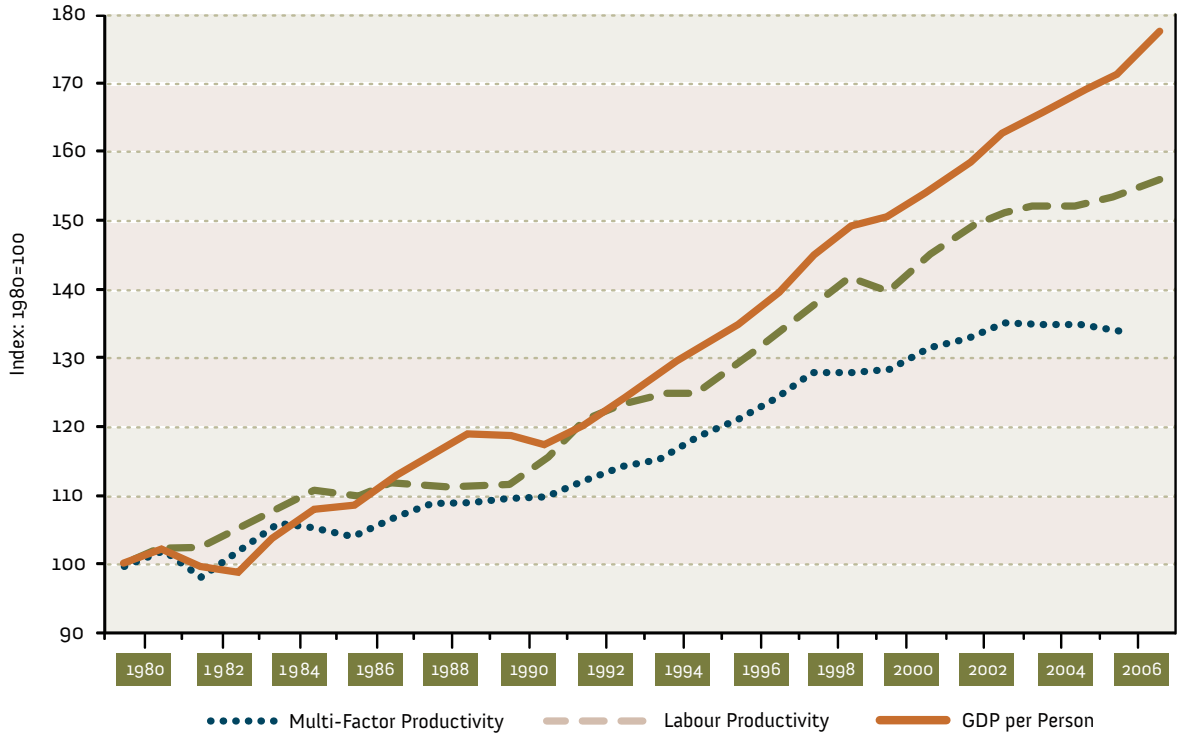
Source: Victorian Innovation Economy Advisory Board, 2006

Finally, the economic geography of global production is experiencing seismic shifts, with two great countries in our region – India and China – transforming themselves into economic giants. They are doing so by embracing openness and trade as we did in the 1980s. But we are observing far more than the phenomenon of economic 'catch-up'. Innovation is pre-eminent in their self-transformation. Around the world small countries like our own which have already grown rich on the spoils of innovation are renewing their commitment and redoubling their efforts – countries like Finland or Singapore and Korea in the Asia Pacific.

The best summary statistic for our success in embracing new and better ways of doing things is productivity growth. Sometime around 2002 Australian productivity went from growing substantially faster to growing substantially slower than the Organisation for Economic Cooperation and Development (OECD) average. Though some of this may be an artefact of increased mining investment, it is unlikely to be the whole story. The conclusion is that, had it not been for the hunger the emerging giants of the developing world have had for our resources, we would have felt the effects of our complacency more directly as stalling living standards.

This report stands for the proposition that we should arrest the slide in our performance and seize the opportunity that our recent prosperity gives us to begin building a more innovative and productive world in which our children will live, to which they will contribute, and which they will pass on in their turn.

Figure 2: Components of Growth in Australian Living Standards



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database, January 2008, www.conference-board.org/economics/. Via Steve Dowrick.

An innovation action plan for Australia:

Building the platforms; Exercising policy levers; Creating the connections

Entrepreneurial firms and innovative workplaces

Innovation is about far more than the funding of research and science, or even of that and commercialisation. Australia thrives only if a critical mass of business enterprises and workplaces are consistently innovating – not just with next generation products, inventions and technologies, but in their operations, organisation, relationships and business models.

Business innovation today is not an easy thing to do and to sustain. We live in a connected, global knowledge economy, where ideas, capital and even people can be accessed with the click of a mouse. So what makes a business novel, distinctive, valued by paying customers and hard to copy really counts. Competing on innovation and knowledge is decisive to successful business performance for firms and to sustainable prosperity for nations.

It is vital that Australia is well endowed with innovative firms and workplaces. The key to this is deftly enhancing the opportunities and environment for business enterprises to innovate.

To do this we must be alert to the hidden realities of business innovation and the changing face of innovation that is no longer the province of the lone inventor or adept technologist. Innovation in the first decades of the 21st century is more open and pervasive, characterised by skill in collaborating and making connections so that knowledge flows and grows, and so becomes available to meet customer and community needs.

In such a world innovation policy is a central aspect of economic policy. This requires a significant recasting of Australia's innovation policy to give priority to strengthening innovation at the point where business enterprises and workplaces engage with their markets and customers. Reflected in recommendations for new business innovation and collaboration programs designed for productivity benefits, the end goal is nothing less than innovation-led prosperity for Australia.

Australia's talent pool: Human capital and social networks

Knowledge and skill – in modern jargon human capital – is at the heart of the rise of humanity. Increasing our knowledge and improving our skills is not just a foundation of our economic prosperity. It is also central to broader human goals and to the pursuit of happiness and satisfaction in our lives.

High quality human capital is critical to innovation. Equipping our people with the skills to innovate is essential, not only for the generation and application of new knowledge, but also to use and adapt the knowledge produced elsewhere. Using the admittedly imperfect yardstick of the level of funds dedicated to public education, it is also an area in which our commitment has been waning, even absolutely as a share of our own economy, but far more emphatically so compared with other countries. For most of the post-war period Australia was one of the leading OECD countries in its commitment to education, as measured by the share of public expenditure. By 2003, however, Australian public expenditure on education had dipped to 4.7 percent of GDP, below the OECD average of 5 percent.

Building high quality human capital requires attention at all levels of education: from early childhood education and schooling, through vocational education and training and higher education, and into the workplace.

It is most assuredly the case that high quality education is about far more than funding, a point made vivid by the fact that we have doubled the resources spent on each child at school since the 1970s with scant improvement in measured outcomes. For this reason we acknowledge the substantial range of human capital reforms being progressed within our federation and, in this context, lend support to these reforms. Even so, it is imperative that our educational institutions do receive adequate funding and it is likely this will require a substantial increase in funding as a share of GDP.

We also recognise the importance of the human capital reforms currently in contemplation to the innovation reform agenda. These often span portfolios, jurisdictions, sectors and disciplines requiring carefully considered approaches and complex solutions.

Collaboration between all involved parties – something that cannot be delivered without a degree of bi-partisan consensus – will be essential if we are to adequately address the human capital challenges we face.

Information flows, market design and freedoms to innovate

Markets in which people compete for private gain can only come into existence against a backdrop of shared practices and expectations. Because these 'rules of the game' are a public good, governments are unsurprisingly involved in their provision and enforcement. Often the most efficient and innovative solution to an emerging problem is to develop a market – as Australia and other countries are doing with emissions trading.

We can also alter the rules of the game to improve market outcomes. Information is crucial to functioning markets and is not well provided in many markets, particularly for expert services. Governments can improve information flows and support innovation and economic efficiency by encouraging disclosure, assisting markets for reputation to develop, and by ensuring that the information and other 'content' that they fund is freely available to maximise its use and the value that others can add to it.

Intellectual property is also critical to the creation and successful use of new knowledge – particularly the 'cumulative' use of knowledge as an input to further, better knowledge. In this regard, particularly in new areas of patenting such as software and business methods, there is strong evidence that existing intellectual property arrangements are hampering innovation. To address this, the central design aspects of all intellectual property needs to be managed as an aspect of economic policy. Arguably, the current threshold of inventiveness for existing patents is also too low. The inventive steps required to qualify for patents should be considerable, and the resulting patents must be well defined, so as to minimise litigation and maximise the scope for subsequent innovators.

Research capability and platforms

Australia's ability to generate strong productivity gains requires that we perform nationally important research and that we successfully adopt and adapt 98 percent of innovative ideas that are generated in the rest of the world. This Review calls for an urgent restoration of public funding levels for research in universities and government research agencies. It calls for the adoption of full funding for the costs of research at universities and increased funding for universities and government research agencies such as the Commonwealth Scientific and Industrial Research Organisation, the Australian Institute of Marine Science, and the Australian Nuclear Science and Technology Organisation, so that by 2020 we match the top quartile of OECD countries in public expenditure on research and development. A strong and sustainable public research sector requires universities to be providers of research, not investors in research.

Currently research in universities is not fully funded under competitive grants programs such as the Australian Research Council (ARC) and performance-based block grants, and so it is typically subsidised from universities' other revenue streams, most particularly from the teaching of full fee paying overseas students. This cross-subsidisation of research from teaching profoundly undermines both activities, the former by short-changing it, with the upshot of leaving it subject to the uncertainties of international markets, and the latter by undermining its international competitiveness.

We should accordingly move towards full funding of research. But this should not be at the expense of current success rates in ARC competitive grant schemes which are already under-funded. Neither should there be a contraction in the range or depth of research projects funded. Funding the full cost of research will accordingly require significant additional funding over time. However, because there has been a significant decline in the level of government support for research as a share of GDP over the past twelve years, the extra funding would do little more than allow 'catch up' with other OECD countries.

It remains the case that a significant portion of research funding should be aligned with national priorities as they emerge. Currently, carbon abatement and water conservation are good examples but priorities can change dramatically over relatively short periods of time, so flexible and proactive funding mechanisms are essential. We must also ensure that our most globally competitive industries, such as mining, agriculture, education and tourism, receive adequate research funding support to keep them at the cutting edge.

Transforming and rationalising tax incentives

Since its inception the R&D Tax Concession has been subject to several problems. Instead of being tackled directly in the design and funding of the central concession, those problems have typically been tackled by establishing additional programs.

While the Concession offers no benefits to firms until they are in tax profit, many of Australia's most innovative start up firms remain cash strapped and in tax loss for many years. The R&D Tax Offset was established to deal with this, effectively providing cash to tax loss companies, but it remains hemmed in by very tight targeting to small firms.

The assistance the Concession has provided has also varied with the tax rate. With the reduction in the rate of concession from 150 to 125 percent, the Concession provides relatively low levels of assistance and not surprisingly this strongly constrains the extent to which it induces additional business R&D. Further, the Concession is accounted for 'below the line' and so is often invisible in company financial decision making.

As one of the Review's roundtable participants put it, the concession is 'underpowered and overcomplicated'. We need to tackle these perversities.

The Review proposes the transformation and rationalisation of the suite of available tax concessions. The International and Premium schemes should be terminated and the basic concession increased and recast as a 40 percent tax credit.

For small firms we propose increasing the rate of assistance further, as well as lifting the turnover threshold which defines 'small firm' tenfold – from $5 million to $50 million – and removing the expenditure threshold on R&D altogether.

These changes would transform incentives for business investment in R&D.

Market facing innovation programs

Firms and people are fundamental to successful innovation. Government has an important and strategic role to play in facilitating this innovation where it is confident, firstly, that there are structural impediments to markets doing the work and, secondly, that government involvement will generate more benefits in addressing these problems than it will generate in collateral costs.

One mechanism is the provision of direct market facing programs to support innovative firms. Program assistance should be coordinated and targeted to the various identifiable stages of an innovative firm's life.

The current suite of government market facing program assistance should be designed to focus on:

- building the capacity of firms to absorb and incorporate new knowledge;
- facilitating collaboration – especially between firms and universities and publicly funded research agencies; and
- improving capital market development.

To help firms build capacity to absorb and incorporate new knowledge, a new program to assist innovative firms in the high-risk early stages of proof-of-concept and development is required, together with an expansion of the Enterprise Connect program to build innovation performance and capacity in firms, and to allow access by services firms.

The Cooperative Research Centres (CRC) review emphasised the value of collaboration for productivity and recommended the maintenance of a portfolio of collaboration and linkage programs and the reconfiguration of the CRC program with additional funding. In addition to the portfolio of collaboration programs, we recommend the introduction of an innovation voucher system to facilitate linkages between small and medium sized enterprises and the research community.

There is a global and systemic funding gap in the availability of capital for early stage ventures and thus the maintenance and extension of the Innovation Investment Fund and Pre-Seed Fund programs supporting capital raising by early stage companies is essential. To further strengthen the growth of high technology and innovative service-based firms, support should be given to organisations of angel investors to help increase networking and the Commercialising Emerging Technologies (COMET) program should be continued.

Any development of the venture capital market must proceed from a basis of full information. Such data has only recently been collected in a disaggregated level necessary for appropriate and reliable statistics to be available. To maintain the required level of data for the effective tracking of the venture capital market, the Australian Bureau of Statistics (ABS) needs to be appropriately resourced.

Innovation within Government

One of the enduring advantages markets have over governments is that innovation can come from anywhere. CEOs of large companies and individuals running their own businesses are each free to improve what they do, and if they lower costs and/or better satisfy consumers, they have a good chance of being successful.

Government retains hierarchical authority structures. With many policy innovations to their credit, Australian governments have typically performed well at engineering top down innovation. But at the 'coal face' they have been less good at harnessing the insights of officials further down the chain of command and consumers of government services.

In the age of the internet, and indeed of Web 2.0[1], there is less excuse than ever for governments not to do all in their power to cultivate innovation from the 'bottom up'. Yet the very nature of what governments are seeking to achieve determines that their efforts must be experimental and exploratory. For this reason we recommend a suite of low cost measures to inculcate a culture of innovation in our public sector from the bottom up.

They include:

- A body to operate as;
    - an advocate for those within the public or private sectors who seek to innovate but who are stymied by government culture, practices, structures, or regulation.
    - a source of funds and skills for the development of innovative approaches to public policy and/or service delivery, the running of randomised policy trials and government tendering that maximises the scope for innovation in supply of goods and services to government.
- The use of the Council of Australian Governments (COAG) reform payments to make the most of our federation by encouraging a virtuous circle of innovation, experimentation and evaluation amongst the states and territories, which will help us learn what works and what does not.

National Innovation Priorities

A key task for this Review was to identify a set of National Innovation Priorities to complement the broad National Research Priorities already in effect. To this end, the Panel engaged in widespread consultation with industry groups and other parties around the country. From this it classified areas for attention in terms of:

1. areas under the direct control of the public sector; and
2. areas whereby public innovation could spillover into complementary private sector innovative efforts.

The list of priorities identify specific areas that would leverage Australia's distinctive geography, economy and capabilities.

In terms of the public sector priorities we identified the following areas: agricultural and food security, climate change mitigation and adaptation, population health, solutions in tropical environments, and applications to utilise broadband infrastructure (especially in health, education and public data access). In terms of stimulating

1 Web 2.0 is a term describing changing trends in the use of World Wide Web technology and web design that aim to enhance creativity, information sharing, and collaboration among users. http://en.wikipedia.org/wiki/Web_2.0

complementary private sector innovation, the following areas deserve attention: resource industries, space and astronomy, finance and risk management, and marine industries. To manage and coordinate these priorities with those for research in public innovation programs, it is recommended that the proposed new National Innovation Council (discussed below) be charged with ongoing evaluation and identification of synergies across programs.

Institutional alignment

The Review process has demonstrated shortcomings in the institutional framework that underpins the innovation system. There is a lack of policy coherence reflected in a fragmentation of innovation resources across government and between state, territory and federal governments. There is a focus on the short term in resource allocation.

A new institutional framework is required to enhance leadership and improve coordination across the innovation system. Such a framework needs to span ministerial and jurisdictional boundaries and encompass a broad range of policy areas. It needs to focus on coordination without centralisation, due to the importance of maintaining specialised roles and functions across the system.

To achieve the coherence, flexibility and responsiveness necessary for effective innovation policy, the system requires a 'central brain'. To fulfil this role a new National Innovation Council (NIC) is proposed. The Council would be charged with taking a helicopter view of the innovation system and providing strategic leadership. It would oversee the broad innovation agenda recommended by this Review. Chaired by the Prime Minister, it would replace the current Prime Minister's Science, Engineering and Innovation Council (PMSEIC) and would be supported by a high level Office of Innovation Assessment.

Governments must also improve the execution and coordination of operational program delivery. To maximise the impact of public investment in innovation, governments must work in a complementary way. To achieve this, the Review has proposed a framework of principles for innovation interventions for adoption by States and Territories, as well as the Australian Government.

Finally, improved data collection and better monitoring and review are crucial. Innovation measurement and research capabilities need to be strengthened. Mechanisms to ensure rigorous and consistent evaluations of innovation programs must be developed. The capacity to do this would be enhanced by the establishment of a National Centre for Innovation Research to advance knowledge of the innovation system.

Conclusion: Venturous Australia

Venturing means enterprise and a major, bold undertaking. It also connotes being forward looking and prepared to seize opportunity. This is the innovative spirit we need to nurture in all Australians.

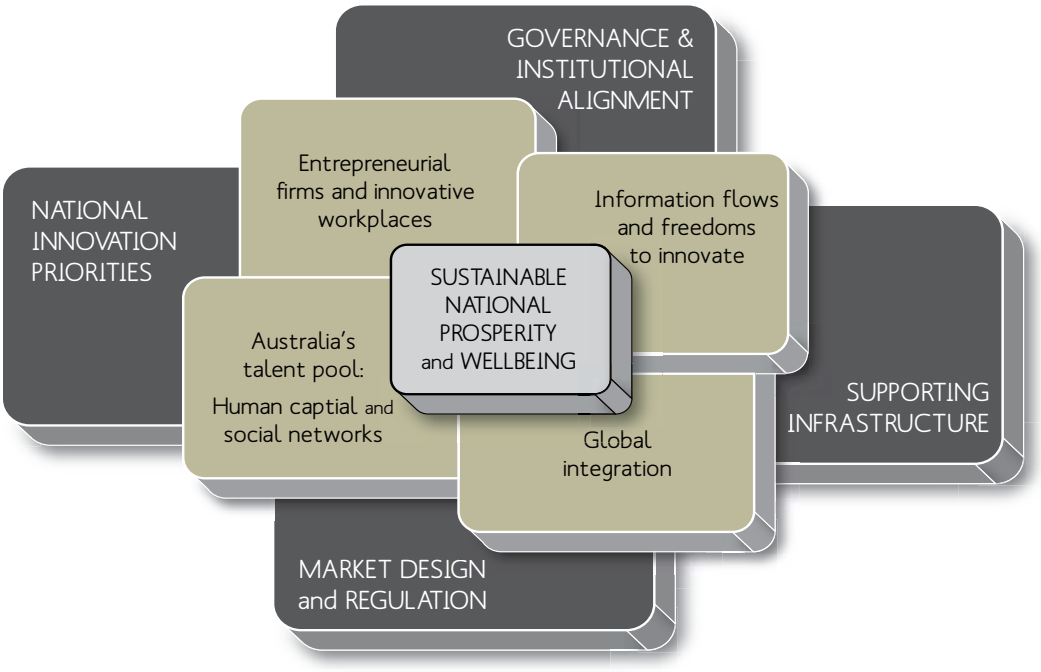
At a time when the importance of innovation to our prosperity is clear, this Review has provided the Australian community with a wonderful opportunity to shape the future innovation landscape.

The Panel has been impressed by the enthusiasm of participants in the Review process and delighted by both the quality and quantity of contributions made.

The breadth of the task of looking across the entire national innovation system was somewhat daunting. The Review received over 700 submissions, and conducted a series of roundtable seminars on specific issues. Pressures of time and space in the report have prevented us from fully reflecting all of the excellent material and input received. We have, however, attempted to capture most of it in a series of annexes that will be published on the internet. Some of these annexes include suggestions for further action in specific areas, which will be brought to the attention of relevant parties.

We have enjoyed the opportunity to hear and discuss the many and varied ideas on how the national innovation system could be improved in order to meet the challenges facing Australia, both now and into the future.

Figure 3: The innovation landscape



Source: Terry Cutler

So now is the time to shape our national innovation system to ensure that it enables us to meet all the challenges we face. We will know we have succeeded when:

- Productivity is again growing above the average of high income countries;
- Our people and workplaces are well equipped with the skills to innovate;
- Increasing numbers of Australian businesses are investing in innovation to secure their competitive future;
- Consumers are sufficiently well informed to demand the highest standards with firms innovating to meet them;
- Those with new ideas feel they have the freedom to develop them.;
- Australian businesses and research organisations are actively involved in international collaboration;
- Australia's innovation system is properly coordinated and integrated with our national innovation priorities;
- The cost of research is fully funded in Australian tertiary institutions, which also face strong incentives to specialise in research excellence;
- Research and development tax incentives are rationalised and the basic concession increased;
- Markets are better enabled through the improved flow and transparency of information;
- A new culture of innovation is embedded within the public sector; and
- There is a single body effectively coordinating the innovation activities of public sector research agencies.