



Australian Academy of Science

A submission to

The National Innovation System Review

**National Innovation Review Expert Panel
Department of Innovation, Industry, Science and Research
Canberra**

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National Innovation System Review - submission by The Australian Academy of Science

1. Identify a set of principles to underpin the role and participation of the public sector in innovation.

The public sector, comprising Australia's publicly-funded education, training and research sectors and supporting systems, is a critical component of any innovation system. Education and training are increasingly important as globally-competitive economies look to advances in science and technology for industry development and wealth creation.

The Academy recommended in September 2007 in *Research and Innovation in Australia: a policy statement* that Australia maintains a long-term commitment to basic research funding in universities. The Academy also reiterates its support for the concept of a research assessment process within the framework of the higher education system, now being developed as the ERA, so long as this is a cost effective mechanism that results in increased funding for quality research.

Our education challenges start with our school education systems. To help create a more innovative community and workforce Australian schools will need to improve teacher training opportunities, particularly in science and mathematics. It is not only those who go on to creative, scientific and highly skilled jobs that benefit from a science education, since all children benefit from being taught to think in a scientific, disciplined way (Davies 2003).

There should be a nationally coordinated set of curricula for the sciences. There has been some action in this area at the primary school level. In 1994, the Academy initiated a programme called *Primary Investigations* that provides primary school teacher resource books and student books, coupled with in-service training and support for teachers, to guide a process of 'hands on' activities designed to stimulate understanding and knowledge of basic scientific principles.

That program was widely regarded as being very successful, and has been further developed as *Primary Connections*, that links the teaching of science with the teaching of literacy in primary schools. The program is a partnership between the Academy and the Department of Education, Employment and Workplace Relations Department of Education, Science and Training (DEEWR). It has been developed in collaboration with a large number of key groups involved with the teaching of science and literacy.

The Academy is very pleased with the positive conclusions of an independent review of the *Primary Connections* program. At this time, more than 80,000 curriculum

resource units have been provided to teachers across all states, territories and jurisdictions. The Academy is now looking at ways in which these models might be extended to the secondary school level, with a national pilot project, *Science by Doing*, supported by DEEWR.

Our universities also need to be able to foster the creative environment which attracts top researchers and scholars for the education and training of the Australian workforce. This workforce needs to be increasingly more flexible and interdisciplinary and prepared for more career changes than in the past.

Research training in our universities and research aimed at our national priorities are other essential components of the public sector. This needs to incorporate increasing levels of collaboration, both national and international, since Australia needs to access the knowledge created globally in addition to the 2% generated by our comparatively smaller population. Further, the physical infrastructure of the universities and other research facilities has been allowed to run down, and will require more targeted funding than the current revenue from the Higher Education Endowment Fund.

Government-supported research, both basic research and applied or user-driven collaborative research, was identified as a leading key input into a country's innovation performance in the 2007 review of the UK Government's science and innovation policies, *The Race to the Top: A Review of the Government's Science and Innovation Policies*. Government-supported research was considered to be second only to the most important input which was considered to be research performed by industry.

Ultimately, strong public sector institutions rely on government funding to provide and maintain the necessary infrastructure and trained personnel for educating future generations.

2. Develop a set of national innovation priorities to complement the national research priorities, ensuring the objectives of research programs and other innovation initiatives are complementary.

There are many definitions for innovation, but the 2007 report by the Canadian government on *Mobilising Science and Technology to Canada's Advantage*, outlined that its actions would be guided by four core principles:

- promoting world-class excellence
- focusing on priorities
- encouraging partnerships
- enhancing accountability

These Canadian principles are aimed at creating:

- A Knowledge Advantage, building on the country's research and engineering strengths, generate new ideas and innovations, and achieve excellence by global standards;
- An Entrepreneurial Advantage, by translating knowledge into practical applications to improve wealth, wellness, and well-being; and
- A People Advantage, by growing its base of knowledge workers by developing, attracting, and retaining the highly skilled people needed to thrive in the modern global economy.

To build a people-advantage in Australia we need to not only train our researchers and scholars, but to develop career opportunities for our early career researchers to build on the national investment in the training for these skilled professionals as the research innovators for the future. In addition to developing future career paths in Australia, it is important to recognise that all leading researchers need to work internationally to broaden their experience and networks. In many areas Australia may not offer the specialised expertise or equipment available overseas, and the funding support for our researchers needs to include opportunities for continued international research and collaboration.

To build a knowledge-advantage Australia needs to increase the intensity of its international collaboration and participation in major projects in Australia and overseas. As a country with a relatively small population and distant from many centres of leading research, international collaboration is an increasing priority at all levels. This needs to include support for collaboration between centres and individual researchers both in Australia and overseas. The government also needs to re-build its overseas science counselor network at its Embassies in established and emerging partner countries in Europe, North America, and in our region. These counselors play an essential role in identifying and developing early opportunities for bilateral and multilateral collaboration, as well as increasing awareness about Australian research strengths and capabilities.

The PMSEIC 2006 Working Group report on *Australia's Science and Technology Priorities for Global Engagement* develops this need further and should be part of the input into your review.

3. Identify regulatory and other barriers to innovation and recommend ways to minimise these.

The stop/start nature of many government programs and initiatives work against the development of longer term strategic plans by the industry and research sectors. Both these sectors can be frustrated by short-term initiatives which do not allow for longer term appointment and retention of skilled staff, and for commitment of additional resources to larger scale projects for concept and prototype development.

In addition, the Garnaut Climate Change Review Interim Report, released in February 2008, makes a case for public contributions to infrastructure investment to assist the development of low-emissions technologies for Australia's energy sector. This identifies a broader need for some government support for infrastructure establishment for emerging technologies, following a closer examination of the many stages in the

innovation chain from discovery to the realisation of a commercial product or application.

The NCRIS program is one example where longer-term planning is required. For a number of the capabilities the technical infrastructure will only be in place towards the end of the five-year term and presently there are no resources for operation, maintenance and further development.

4. Examine the scope for simplifying and reducing program duplication and ensuring that any support provided is well-targeted and easy to access.

The Academy welcomes the government's plan to review the 169 programs it has identified across all governments aimed at supporting innovation. A review should be aimed at reducing duplication, rationalising the application processes so that unnecessarily complicated and time-consuming application processes are not a disincentive for industry, and small businesses in particular.

5. Consider the appropriateness, effectiveness and efficiency of the Research and Development (R&D) Tax Concession Scheme in promoting innovation and make recommendations to improve innovation outcomes.

The Academy remains concerned that the level of BERD remains well down in the bottom half of OECD countries. Australia is in 20th position at a level of 0.9% of GDP. Sweden heads the list at 3.0% and the average for all OECD countries is 1.5%.

In the recent review of the UK Government's science and innovation policies, *The Race to the Top: A Review of Government's Science and Innovation Policies*, the single most important input was considered to be research performed by industry.

The Academy recommended in its 2007 policy statement on *Research and Innovation in Australia* that Australia increases its support for the national R&D effort to ensure that it retains an internationally competitive science capability to underpin the nation's industrial, commercial, environmental and economic position among leading world economies.

It is important to offer significant tax incentives to small and medium companies that have a high innovative technology component. At present large companies often have the resources to make use of what are, sometimes, quite bureaucratic schemes, while the SMEs that most need help find it difficult to get. It is particularly important to fund research where we already have a lead, and where the environment might be protected, such as solar power and the development of crops that are drought-resistant.

In addition, in many cases involving SMEs, expecting substantial co-payments is a disincentive to the early stages of innovation.

6. Consider ways to improve the governance of the national innovation system to support higher expectations of government agencies and industry.

Government has a leadership responsibility for creating the right environment across Australia for the growth of innovative industries.

The government is in a strong monetary position to create and fund a major *National Innovation Strategy* over the next decade to benefit all Australians. The government has a substantial budget surplus arising from tax revenues from the resources boom and land and other taxes from the strong growth in property values and transactions. In addition, it is estimated that the carbon emissions trading scheme could generate additional revenue of \$7-\$20 billion by 2020. Together these provide a sound basis for long-term investment in the science and technology that should underpin Australia's future.

Bureaucratic approaches can limit the ability of both academic and industrial researchers to attempt to find and implement the very innovative solutions that are often the most productive and valuable to society. While all accept that regulation for safety is required when there are real risks, there appears to be an increasing willingness on the part of Governments and institutions to hamper research with regulations which are without meaning and have no scientific or technical justification. An obsession with "conflict of interest", with privacy, or with any project that uses genetic technology is found to a much greater degree in Australia than in the United States, Canada, India or China, and blocks innovation.

7. Assess the appropriateness, effectiveness and efficiency of the Cooperative Research Centres (CRC) Program and make recommendations to improve innovation outcomes.

The CRC program has developed into an essential part of Australia's R&D program for establishing critical mass through collaboration between complementary research groups and collaboration with industry partners. However there are a number of initiatives which could be considered to improve innovation outcomes from CRCs. These include a review of the intellectual property guidelines for concept development and commercialisation of research arising from CRCs.

The Academy agrees strongly with the Government that public good should be reintroduced into the range of activities by which a CRC is assessed. The CRC system should increase its scientific, commercial and financial flexibility so that overlapping but distinct criteria could operate for different situations, although a component should always include a strategy to claim technological leverage and sustainable employment.

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