

# building excellence in national research

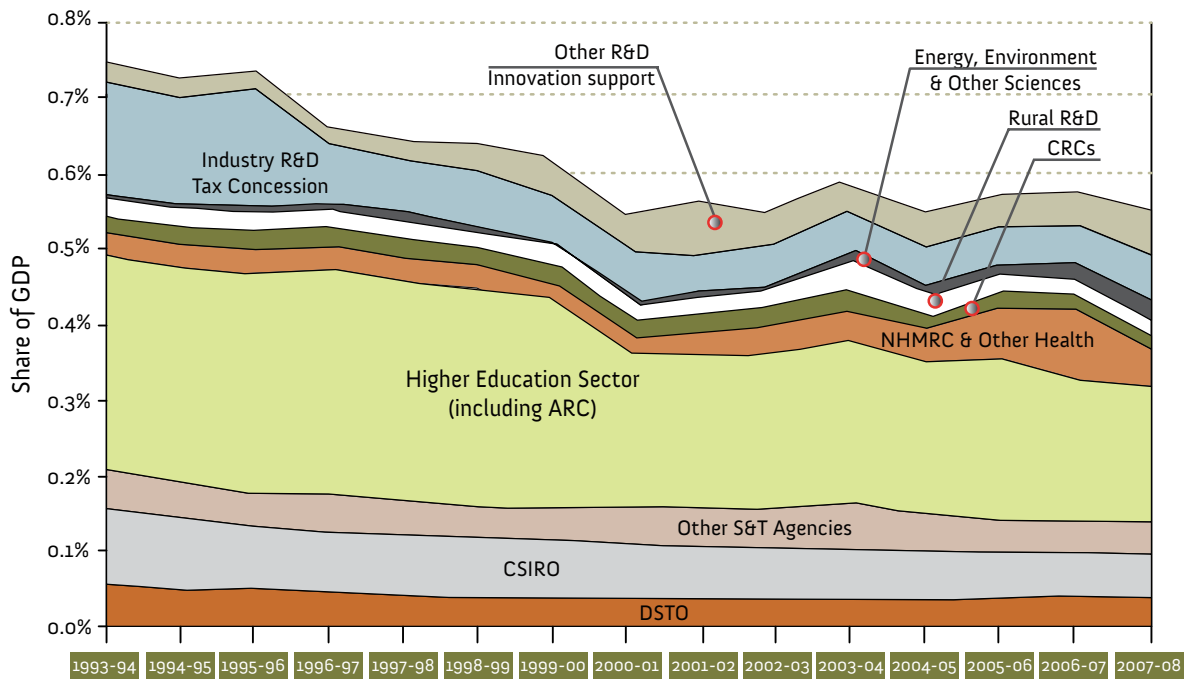
Australia's ability to generate strong productivity growth requires that we perform nationally important research and that we successfully adopt and adapt the 98 percent of innovative ideas that are generated in the rest of the world. A strong research capacity enables Australia to participate on an international stage in fields of global and national importance. Our ability to attract the highest calibre international minds allows us to engage with and contribute to international research at a highly competitive level.

Public support for the research sector should reflect the following aims:

- achieve internationally-recognised excellence in research;
- leverage the best collaborations, domestically and internationally, with both public and private sector researchers;
- develop and attract the best and the brightest researchers, including a world-class cohort of post graduate students;
- ensure that research institutions can respond to emerging challenges and changing circumstance; and
- assure sustainable infrastructure.

To achieve these aims, the resources and mechanisms for funding need to be reformed. Australian Government expenditure on science and innovation in higher education (including ARC), CSIRO and other research agencies in Australia has fallen as a percentage of GDP over the past 15 years (Figure 12) from 0.49 percent of GDP in 1993–94 to 0.32 percent of GDP in 2007–08. Over the same period total Australian Government expenditure on science and innovation fell from 0.75 percent to 0.55 percent of GDP.

**Figure 12: Australian Government expenditure on science and innovation, 1993-94 to 2007-08 as a proportion of GDP**



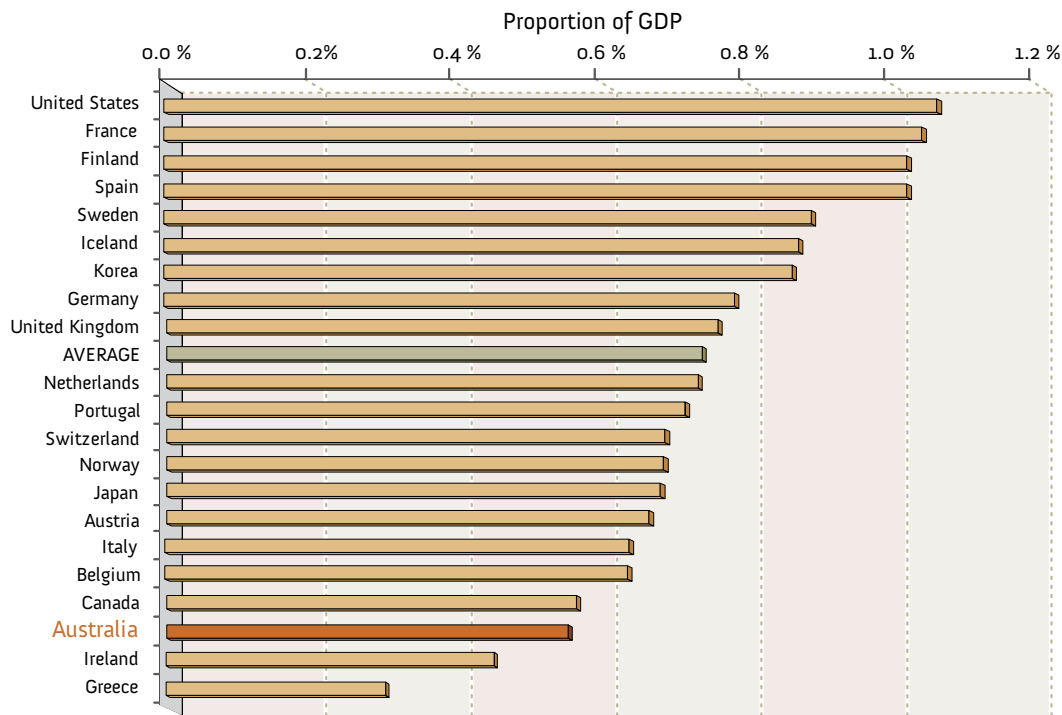
Sources: Budget Data 1999-2000 to 2007-08: DIISR, The Australian Government's 2008-09 Science and Innovation Budget Tables, Table 1, [www.innovation.gov.au/Section/AboutDIISR/Documents/Budget0809ScienceandInnovation.pdf](http://www.innovation.gov.au/Section/AboutDIISR/Documents/Budget0809ScienceandInnovation.pdf) Budget Data 1993-94 to 1998-09: DEST, Science and Innovation Budget Tables, 2001-2 Budget, [http://www.dest.gov.au/sectors/science\\_innovation/publications\\_resources/indexes/previous\\_budget\\_tables.htm](http://www.dest.gov.au/sectors/science_innovation/publications_resources/indexes/previous_budget_tables.htm)

GDP Series: 5206.0 Australian National Accounts: National Income, Expenditure and Product, Table 3. Expenditure on Gross Domestic Product (GDP), Current prices.

Note: There are some relatively minor discrepancies between the two sources of data on disaggregated expenditures for 1999-2000. The more recent source has been used for this year. The item 'estimate of other support from the Australian Government' which appeared in Table 4 for years 2000-04 only has been excluded

By 2006, Australian Government expenditure on R&D had fallen well below the average for OECD countries (Figure 13)

**Figure 13: OECD government outlays on R&D, 2006**



Source: OECD Science and Technology Database, [http://puck.sourceoecd.org/vl=4207297/cl=22/nw=1/rpsv/statistic/s20\\_about.htm?jnlissn=16081242](http://puck.sourceoecd.org/vl=4207297/cl=22/nw=1/rpsv/statistic/s20_about.htm?jnlissn=16081242)

Australia is falling behind developed and emerging economies in its commitment to investment in research at universities, public research agencies and the many government and private bodies conducting public-funded research. To ensure a competitive economy for the twenty-first century, the Australian Government should set a goal of making Australia the pre-eminent location to attract the best researchers and be a preferred partner for international research institutions, businesses and national governments. This will require investment to support and increase the capacity of its research institutions.

The problem with the current public research funding system is *financial* – insufficient resources – and *structural*, given there are few incentives for collaboration and many pressures encouraging fragmentation of effort through endless creation of new research agencies and institutes. In a small country, much money is spent duplicating basic infrastructure and expertise, rather than adding new research capacity.

For the university sector, the single largest provider of research in Australia, the financial strains are particularly acute. Because

competitive research grants to universities do not cover the full cost of the research effort, universities must finance research through internal cross-subsidies drawn from teaching and service income. This contributes to the deterioration in infrastructure and staff/student ratios that has characterised campuses in this country in recent decades. A reasonably robust method for allocation of resource income – a combination of direct competitive grants and supporting block grants – is undermined by inadequate funds available under both categories of research support.

For Publicly Funded Research Agencies (PFRAs), the full cost of research is met within their funding envelopes – the difficulty lies in the magnitude of the funding.

The primary focus of this report is consequently not to promote major structural change, but instead to urge better resourcing of the existing research funding system and to propose minor structural changes where appropriate.

The Panel calls for a transition of the funding mechanism for higher education research and research training to an allocation mechanism based on full costs, the promotion of excellence and specialisation in research, and the matching of the best potential PhD students with the best researchers.

We also support an urgent restoration of public funding of research in universities and government research agencies as a share of GDP to at least 1993–94 levels by 2010, at an estimated initial cost of \$2.2 billion per annum. In the longer term, the Panel calls for levels of funding as a proportion of GDP to match those of the leading economies of the OECD. The target for 2020 should be to match the top quartile of OECD public expenditure on research and development, currently 0.9 percent of GDP.

The Panel considers that long-term planning for, and investment in, research infrastructure acts as a platform for public and private research and is critical to innovation.

Furthermore Australia needs to enhance its capacity to engage internationally, both by opening up current granting programs to international partners and participants and by increasing funding to specific programs in order to leverage investment.

### **Universities**

Universities should be producers of research, not investors in research. The present system requires taxing of teaching programs in an attempt to maintain research performance. Universities' roles within the innovation system include knowledge transmission

(teaching), knowledge generation (research) and knowledge preservation-diffusion.

Universities assist in the preparation of highly productive, workforce-ready professionals, appropriate to the needs and opportunities of the economy and its component industries and sectors. They also train the next generation of researchers who, whether they choose to work ultimately in the university sector, public research institutions or the private sector, aid the diffusion of new knowledge and build innovative capacity.

Universities are also a major source of research and development activity within the Australian innovation system. They are Australia's engine room for discovery and invention and are the principal creators and disseminators of new knowledge. In fulfilling this function the universities are places dedicated to taking intellectual risks, where scholars can test and develop their ideas with peers from around the world.

Universities act both as repositories of existing knowledge and as hubs for the generation and exchange of new knowledge. They have a unique capacity to connect expert and lay views and, through diffusion, to enhance national innovation and understanding. Universities also provide space for open-ended conversations about technological and market opportunities through conferences and workshops and the constant inflow of visiting academics.

Research commercialisation is not a core role for universities. Nevertheless, universities can play a vital role in the commercial process. In cases where the benefits of research are best achieved through commercial engagement, universities should, where possible, attempt to partner with appropriate stakeholders to achieve these goals. Such instances are in the minority and universities more commonly play a role of commercial significance through provision of vital research advancement, workforce training and substantial international links.

### *A sustainable funding system for university research – meeting the full cost*

A significant risk to the quality and sustainability of university research now and into the future is the gap between the funding targeted to research and the actual cost of that research. The nature of the gap at a sectoral level is illustrated by ABS data, which shows that in 2006 Australian universities earned \$2.2 billion for research activities and spent \$5.6 billion on research. The ARC estimates that it funds research projects only to approximately 60 percent of their full direct costs and contribute nothing to indirect costs.<sup>1</sup> Other institutional

<sup>1</sup> Australian Research Council-Submission no. 576

funding sources — Institutional Grants Scheme and Research Infrastructure Block Grants — are insufficient to address the shortfall. A detailed examination of the shortfall and its implications is included in Annex 6.

Lacking full funding, research is typically subsidised from other revenue streams, including those intended to cover teaching costs. Notably this includes fee income from overseas students. Cross-subsidisation of research from teaching is not sustainable in the longer term, as inevitably a decline in the quality of student experience and outcomes will result. If international students do not receive full value for the fees they are paying, they will tend to choose other countries for their studies. In addition, there are many international market factors that can affect overseas student income that are independent of the research sector. A decline in overseas student income would, under the current funding system, play havoc with universities' research activities.

The absence of full-cost funding is also contributing to inadequate spending on the maintenance of research infrastructure and the commissioning of world-class new infrastructure.

In the United Kingdom, the full economic cost of research is determined by institutions using a transparent approach to costing (TRAC), developed by the UK Government as part of its Transparency Review in 1999. The introduction of the new system has been gradual and has been matched by a substantial increase in the overall level of funding.

An analysis of the full costs of both teaching and research, along with an examination of approaches developed in other countries to address cross-subsidisation, could allow the introduction of a suitable full costing and funding framework for Australian universities.

These approaches need to avoid fragmentation of research effort. Mechanisms for full funding can be designed to provide disincentives towards fragmentation at all levels.

A well-formulated system of full funding can drive greater levels of excellence concentration, making us more internationally competitive and able to take part in research of global significance. The British TRAC model provides an attractive mechanism for rapid implementation of a full-funding approach to university research. It should be combined with incentives to encourage further collaboration across categories of research institutions, so creating the sense of a national research community rather than competing, and largely separate, research worlds.

Finally, funding the full cost of research should not be at the expense of success rates for applications for national competitive grants, or of contraction in the range and depth of research projects

funded. In other words, funding the full cost of research requires significant additional funding over time.

The Panel acknowledges that a separate study has been commissioned by the Department of Innovation, Industry, Science and Research on full funding. The study will seek to identify the direct and indirect costs involved in undertaking research and research training in Australian universities; identify and describe how the direct and indirect costs of performing research and research training are included in competitive research grants and examine ways of closing the gap between the actual costs of conducting research and the funding allocated. A Discussion Paper is expected to be finalised by mid-September 2008.

*Recommendation 6.1: Adopt the principle of fully funding the costs of university research activities and implement through adjustments in funding to block and competitive grant schemes, without compromising grant success rates. Lessons from overseas and current government investigations should provide evidence for the full costs of university research and allow rapid transition to a full-cost funding model.*

#### *Incentives for achieving research excellence*

The design characteristics of an efficient and effective funding mechanism include:

- incentives for academics to pursue high quality research;
- incentives for universities to provide their best and brightest academic staff to pursue research with adequate facilities; and
- matching the best students with the best university research teams.

Current funding arrangements are inadequate on all of these criteria.

The allocation criteria for performance based block funding (as described in Annex 6) place relatively little weight on the prime measure of academic excellence, published research in high quality outlets. Fortunately, the institutions of scientific reputation and prestige provide non-financial incentives for universities and researchers to carry out high quality research. Nevertheless, it is perverse to have a funding system that does not reinforce these incentives.

The long awaited process of Australian research assessment, now known as the Excellence in Research for Australia (ERA) initiative, will provide a mechanism for identification of the best research

groups in terms of the internationally recognised benchmarks of publication quality and citation. If linked to substantial funding, the ERA has the potential to provide strong incentives for quality improvements across the sector through specialisation and concentration of research effort.

To the extent that funding is increased and the allocative criteria for the block grants and funding for research training are aligned to the ERA rankings of research quality, we can expect more high quality research to emerge. Competition amongst universities for quality based research funding can be expected, following the UK example, to encourage academic entrepreneurship which will improve the quality of research through specialisation and concentration of resources.<sup>1</sup>

Rather than debating whether Australia can support two or three 'world-class' universities, the focus should switch to establishing a hundred or more world-class research facilities and research groups across the whole university system. Domestic and international networking should be promoted to ensure that the benefits of specialisation and concentration of research activity spread across the whole of the system. Adopting a principle of full funding of research will support the establishment of networks of research strength, with resources being distributed according to levels of excellence.

*Recommendation 6.2: Base the distribution of research block funding to universities on success in winning national competitive grants and on evidence of excellence in research, such as the research quality rankings to be produced by the Excellence in Research for Australia initiative.*

### **Australian Government Research Agencies**

Australian Government research agencies (including CSIRO, AIMS and ANSTO) have significant roles in the innovation system, as sites for basic, strategic and applied research in areas of national priority and as partners with universities and industry.

In the past two decades the research capacity of the agencies has been substantially reduced. This is evident in the reductions in staff numbers in CSIRO from 7,168 in 1985 to 6,331 in 2007. Within this next year approximately 100 further positions will be lost. Some

<sup>1</sup> A 2003 UK Department for Education and Skills report, *The Future of Higher Education*, pointed out that: "Concentration brings real benefits, including better infrastructure (funding excellent equipment and good libraries), better opportunities for interdisciplinary research, and the benefits for both staff and students which flow from discussing their research and collaborating in projects." The OECD has also picked up on this trend in a number of member and non-member countries. The Organisation's 2005 report, *Innovation Policy and Performance: A Cross-Country Comparison*, offers several examples of both the benefits arising from concentration of research and the problems arising from lack of concentration, noting particularly that fragmentation can lead to limited resources being spread too thinly, leading to an overall decline in research performance.

reductions will be made in lower priority research portfolios but the closures of regional laboratories and the concomitant losses of staff in the agribusiness sector will impose substantial costs on industries of the sector. The Panel regards these particular reductions in Australia's research capacity as regrettable in the context of global food shortages and the potential for CSIRO's research to produce more nutritious food in an environmentally sustainable way and have immense positive effects on the health of millions of people around the world. The debilitation of research support has also led to a serious reduction in CSIRO's capacity to carry out strategic basic research and the associated application research central to successful partnerships with companies.

Such constraint around collaboration has serious consequences. Linkages with business are necessary to turn research into new products and increased productivity in areas such as:

- the manufacture of new therapeutic goods;
- sustainable plant and animal food production; and
- the manufacture of innovative materials and devices.

Linkages with government policy and operational agencies are necessary to turn research into national benefit in areas such as:

- land and environment management;
- emergency detection and response;
- population health data analysis; and
- response to climate change.

In 2006–07 the AIMS received a funding increase of \$5 million over 4 years, which amounted to 5.6 percent increase per year compared to the 2005–06 levels. The increase — to undertake research in north west Australia — was the first increase in research operating funding since 1993. Over previous years, cost increases and ongoing efficiency dividends had eroded the AIMS budget and despite an active program to manage costs efficiency, AIMS has reduced research capacity. Redundancies were implemented in 1996 and again in 2006. In both instances the reduction in staff levels was greater than 10 percent.

Reducing AIMS' research capacity does not make sense given the mounting pressures on exploration for energy and mineral resources and the growing pressures from population growth, agriculture and human use impact on our coastline.

In the case of the ANSTO the impact of reduced funding in the recent budget has been particularly severe because a large part of its expenditure is fixed operating costs for its facilities. The reductions have meant that only 24 percent of ANSTO's appropriation is being spent on research, and research staffing is being reduced from 300 to 250. ANSTO is also closing some facilities that have been used extensively by other organisations which are also losing access to the nuclear science and technology expertise resident in ANSTO.

*Recommendation 6.3: Develop a strategy to support the strengthening of publicly funded research agencies (PFRAs) within the National Innovation System over time, including urgent restoration of funding levels.*

*Recommendation 6.4: In the short term, increase funding both for the PFRAs and the university research system to at least match the proportion of GDP that was allocated to them in the mid 1990s. In the longer term the goal should be to match investment levels of leading OECD economies.*

#### **Coordination and collaboration across the Australian public research system**

Australia — representing only 2 percent of the world's knowledge-generating capacity — needs to recognise the importance of international collaboration in terms of growing innovation capacity, enhancing participation in global knowledge networks, and increasing the impact of Australian research in the international arena. Most Australian universities and research agencies are already involved internationally through their research and publication activities, but there is room for Australia to enhance its capacity to engage internationally both by opening up current granting programs to international partners and participants and by increasing funding to specific programs in order to leverage investment.

Many Asian countries currently have significant investment capital available. Mechanisms for appropriate provision of research funding should take into account the opportunities for engagement that exist in Asia, linking where ever possible our programs to take advantage of growth. Australia's

proximity and unique interactions with the Asia-Pacific region present an extraordinary opportunity to engage in rapidly advancing markets.

The funding proposals recommended by the Review need to avoid fragmentation of research effort. Mechanisms for full funding can be designed to provide disincentives towards fragmentation at all levels. A well-formulated system of full funding would promote excellence and innovation throughout the research sector, strengthen Australia's research workforce through the retention of our leading researchers, or by attracting our researchers back to Australia, make us more internationally competitive and enable Australian researchers to play a leading role in research of global significance.

Australia has particular strength in medical research, as indicated by strong citation rates. This strong performance is despite significant fragmentation that has developed between medical research institutes and universities. Australia's position could be strengthened internationally by providing strong incentives and implementing mechanisms that would remove this fragmentation by encouraging the streamlining of smaller independent medical research institutes through the strategic collaboration, or through amalgamation of some institutes with universities. This would aim to improve the efficiency and effectiveness of the sector by bringing together teams of researchers into multidisciplinary centres of excellence producing high quality health and medical research outcomes.

*Recommendation 6.5: To build concentrations of excellence, encourage collaboration and achieve better dissemination of knowledge, introduce additional funding support for university and other research institutions to partner with each other and with other research organisations (national and international). Discussions about additional levels of support should occur during the projected round of compact negotiations.*

*Recommendation 6.6: The implementation of new incentives around national challenges, including water, carbon emission reduction and related climate change and environmental initiatives needs to avoid further fragmentation of responsibilities and encourage consolidation.*

*Recommendation 6.7: Australia should enhance its capacity to engage internationally by opening up current innovation granting programs to international partners and participants.*

*Recommendation 6.8: The NHMRC should be resourced to deliver incentives designed to rationalise and consolidate Australia's health and medical research sector, including universities and independent medical research institutes, to achieve efficiency and effectiveness of the sector.*

As new national innovation priorities are agreed, the Australian Government will need to revisit the current research priorities. An important question will be how to frame new initiatives that build significant additional research capability in areas of priority. The current Collaborative Fund associated with CSIRO's Flagship programs is a good working example. A further model worth consideration is the establishment of National Priority Research Centres (Box 2), an idea developed by Australia's Chief Scientist Dr Jim Peacock. This program is summarised below and described in detail in Annex 6.

## Box 2: National Priority Research Centres

We need to build research collaboration among our best researchers, provide careers for our top young scientists and attract the best mid career researchers from across the world.

These goals could be achieved by:

- Establishing virtual National Priority Research Centres (NPRCs) primarily focused on basic research but with roadmaps for development and uptake of new knowledge and intellectual property into innovative industries.
- Supporting our most distinguished researchers in a collaborative program approved by international peer review. Elite teams would be drawn from universities, CSIRO, other publicly-funded research agencies (PFRAs) and medical research institutes, and would involve international collaborations.
- Providing critical investments in human resources and elite capability building.
- Supporting the centres for a period of at least ten years, providing careers for our best young scientists as well as attracting high performing young scientists from around the world.

The proposed National Priority Research Centres (NPRCs) could build on the current strengths of Australian science while addressing its shortcomings. The NPRCs could be based on collaboration. In a sense they would be similar to the Cooperative Research Centres, but with a focus on strategic basic research.

Many of the most urgent problems we face require novel approaches which facilitate collaboration across the traditional boundaries of disciplines, including those between the 'hard sciences' and the humanities and social sciences. The Centres would be interdisciplinary.

The proposed NPRCs would enable direct research partnership between the most outstanding researchers in the university and research agency systems.

The centres would not uproot our best researchers from their present institutions but instead engage them for an agreed percentage of their time, 50 percent or more, in involvement in the Centres' collaborative programs.

Dr Jim Peacock – Chief Scientist

## Research training and support for students

The current system of funding research training in Australian universities has major problems in attracting the best students and matching them with the best researchers.

The best students have lucrative job market opportunities, so the current low level of the Australian Postgraduate Award (APA) stipend at \$20,007 per annum for three years is not a strong incentive to commit to undertake the costs involved in devoting four or more years to a PhD and indeed has become barely adequate to support a reasonable standard of living. The growth in the stipend rate in recent years has failed to keep pace with that of either the Consumer Price Index or full-time adult weekly ordinary time earnings.

At its current rate in 2008 (approximately \$385 per week), the full-time APA stipend is only marginally above the Henderson poverty line for the March quarter of 2008, which for a single person working is \$378.08 per week (equivalent to \$19,660.16 per annum).<sup>1</sup>

The level of support provided by an APA (up to 3.5 years) is not consistent with research training place allocations under the Research Training Scheme (4 years) and does not reflect the mean completion time for a full-time PhD of 5.4 years. Consequently, there is a gap of up to 12 months where students are unable to access income support under the APA scheme, at one of the most critical points in their research training. Such inadequate levels of support hinder timely completion (along with the underlying quality) of the research degree by obliging students to take up external employment to support their living costs while completing their studies. Evidence published by Universities Australia suggests a significant number of research students are under financial stress.

More detailed evidence on the inadequacy of the level and length of the APA stipend is presented in Annex 6.

The Research Training Scheme mechanism, which awards the funding of the PhD stipends and research training costs at an institutional level places most weight on historical funding. This can result in a mismatch whereby some strong research groups are unable to offer significantly more scholarships than weaker groups and some talented students miss out on the best supervision.

In addition, it is increasingly recognised that Australian research students need opportunities to interact with their peers internationally: this will not only improve their research training, it will also set the foundation for participation in global knowledge networks throughout their careers.

<sup>1</sup> Published by Melbourne Institute of Applied Economic and Social Research, University of Melbourne. <http://www.melbourneinstitute.com/labour/inequality/poverty/default.html>

*Recommendation 6.9: Funds currently distributed under the Research Training Scheme and Australian Postgraduate Award (APA) schemes should be allocated to institutions on the basis of demonstrated excellence in research based on the research quality rankings that will be produced by the Excellence in Research for Australia Initiative.*

*Recommendation 6.10: The research quality rankings from the Excellence in Research Australia initiative should be made publicly available to promote matching of the best research groups with the best doctoral students.*

*Recommendation 6.11: The APA annual student stipend should be raised to at least match the current APA(I) stipend of around \$25,000 – and then indexed by average earnings; at the same time, the length of support provided under an APA should be increased to 4 years.*

*Recommendation 6.12: Early career research fellowship schemes that incorporate up to two years of supported research experience in another country should be introduced.*

#### **Assuring a sustainable base for Australian research: infrastructure**

A number of responses to the Review, and to the review of the National Collaborative Research Infrastructure Strategy (NCRIS) Roadmap, have indicated that a coordinated, collaborative and strategic approach to research infrastructure investment is required. While such an approach is emerging, for example through NCRIS, national coordination across different levels of investments, and the institutions managing these, is needed. Government should endorse the existing National Research Priorities and request funding agencies and program managers to examine these and provide a road map of funding priorities in relation to research funding, research training and research infrastructure. There is an ongoing need to support both the landmark and smaller infrastructure needs of the Australian research community and to do so in a more coordinated way, but currently, there is an overwhelmingly episodic and ad hoc approach to funding infrastructure for research in Australia.

A National Research Infrastructure Committee, which would be a subcommittee of the National Innovation Council described in Chapter 12, would provide for more efficient funding of research infrastructure and clear progress towards achieving Australia's overall research goals. The Committee would drive and undertake strategic planning and mapping across all categories of research infrastructure and contribute policy advice to Government.

The Committee's role would involve consultation with the research community, including universities, publicly funded research agencies, not-for-profit research agencies, industry and government agencies at Commonwealth, State and Territory levels. The Committee would assist in determining the priorities, allocation and delivery arrangements for infrastructure so as to provide a greater return to the nation and enable world-class research.

The importance of research infrastructure in underpinning research outcomes cannot be overstated and this was picked up by several submissions to the Review<sup>1</sup>:

*National infrastructure drives collaboration and enhances the quality of research undertaken and shared infrastructure avoids underutilised equipment and experts. Without this infrastructure, time and energy are detracted from the focus on research.*

Research infrastructure is owned, operated and used by a range of organisations in the higher education, government, non-profit and business sectors. An effective national research infrastructure base needs to invest in, and draw together, the facilities, data and expertise provided by all of these sectors. One way of approaching infrastructure investment issues is by considering the scale of investment involved.

Smaller items of infrastructure (investments of, say, less than \$5 million) tend to have largely local implications and can often be progressed independently by an individual institution, or in limited collaboration with other organisations.

Investments of between \$5 million and \$60 million generally tend to have national implications for research capability. When making substantial investments of this sort it is important to prioritise investment decisions on the basis of their strategic impact for the nation. The implementation and conduct of such projects often benefits from collaboration among multiple research organisations.

<sup>1</sup> E.g. University of Melbourne – Submission no. 136; Australian Synchrotron – Submission no. 577; iVEC – Submission no. 422; Smart Internet Technology CRC – Submission no. 275; Trevor Cole – Submission no. 59; Heart Foundation – Submission no. 570

Investments of greater than about \$60 million (landmark infrastructure) have national, and often global, implications that require collaboration among institutions and detailed consideration by relevant levels of government. Despite the fact that landmark infrastructure investments have major strategic implications for Australia's research capability, no formal process exists to identify, prioritise and assess these projects.

As a guide, the National Research Infrastructure Taskforce (NRIT) noted that Australian Landmark Facilities are typically large-scale, complex facilities that serve large and diverse user communities, are generally regarded as part of the global research capability, and engage national and international collaborators in investment and in access protocols.<sup>1</sup> Such facilities normally involve significant funding for the design and development phase, large capital expenditure for the construction phase and significant ongoing operating costs.

Landmark infrastructure usually involves either the provision of pervasive infrastructure that is embedded throughout the national system or the establishment of a research facility that will be a 'one-off' for Australia; such as the Australian Synchrotron or the Square Kilometre Array.

*Recommendation 6.13: Establish a National Research Infrastructure Committee to advise on strategic directions in funding of national research infrastructure including landmark infrastructure.*

*Recommendation 6.14: To ensure a sustainable research infrastructure strategy into the future, extend funding for a successor program to the National Collaborative Research Infrastructure Scheme (NCRIS) for 10 years including capital and operational support of \$150 to \$200 million per annum. The remit of such funding should explicitly include support for the humanities, social sciences and creative arts as well as the sciences.*

<sup>1</sup> The Final Report of the National Research Infrastructure Taskforce 2004, p.63

In summary, strength and diversity in our research sector are underlying requirements for Australia's productivity growth and future prosperity. Ongoing reduction of government support for the public research system (Universities, PFRA's and medical institutes) is contrary to the importance placed on a strong research base by other OECD nations. The total expenditure on R&D in Australia is comparable to OECD countries with the lowest investment in this area.

Public sector research in universities is substantially subsidised by other income sources. Introduction of a sustainable system of full cost funding is urgently required. To this end, international lessons such as those presented by the UK should be carefully considered. Full funding must be achieved without any reduction of research quality or adverse effects to our research workforce. Research excellence should also be supported to a greater extent, with particular emphasis being placed on directing research higher-degree students to locations of high performance.

Australian Government research agencies have received substantial budget cuts in recent years. These programs should be augmented immediately to strengthen national outcomes.

Improved collaboration and coordination across the elements of the public research system needs urgent attention both in basic and application research areas.

The provision of high quality infrastructure, its operation, access and maintenance are of critical importance to the research strength of the national system. A National Research Infrastructure Committee will enable better inter-disciplinary, inter-institutional and inter-agency cooperation; guaranteeing infrastructure for the future.