

ADDING TO AUSTRALIA'S CAPACITY

THE ROLE OF RESEARCH UNIVERSITIES IN INNOVATION

A submission from the Group of Eight to
the Review of the National Innovation System

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EXECUTIVE SUMMARY

Australia's future as an innovating country depends fundamentally on our capacity to keep touch with the world's pace setters in discovering and using knowledge. In several areas we can be the pace-setters. In many other areas we should aspire to be a proactive player, as well as endeavouring creatively to absorb, adapt and diffuse ideas and technologies developed elsewhere.

But actually we are being overtaken in even our traditionally strongest areas, and we are struggling to stay in touch with world developments in new and emerging knowledge fields. Other countries are investing more, focusing their investment more strategically, and reforming their higher education, research and research training practices. As a consequence they are achieving higher outputs at higher levels of quality. Unless we do likewise we will be left behind.

Research-intensive universities contribute uniquely to innovation. They are responsible for creating, preserving and transferring knowledge, and for developing talent.

They form international gateways for Australia through the relationships they build primarily through basic research. They provide a culture of support for creativity and risk-taking. They cultivate talent in an environment that values and stimulates intellectual curiosity.

The challenges ahead

The productivity of Australian university research has been increasing over the last decade. Research output volume has risen and research quality, as measured by citations per paper, has risen also. However, there is a widening gap between the costs of activities and government support for research. The productivity cannot be sustained without more adequate investment in the future.

Intellectual talent is highly mobile. Other countries are relying heavily on foreign research students and researchers to fill gaps in their domestic capacity. They focus on quality, through insistence on high standards in research, targeted investments in research infrastructure, incentives to attract top talent, and reforms to graduate training.

In comparison with other advanced economies Australia has a low proportion of highly trained graduates in the workforce overall. There are critical high-end skills shortages in areas of national importance.

The researcher workforce is ageing. Research careers have declining attraction to young people, and the flow of local research-trained graduates is insufficient to replace retirements in several key fields, notably Science, Technology, Engineering and Mathematics (STEM).

There is an urgent need to expand the numbers of Higher Degree by Research (HDR) enrolments in fields of national importance both from Australian and international sources. Additional funds will be needed to grow demand, including more attractive stipends for students.

It is not only about quantity, but also about diversity and quality. The diversification of graduate destinations requires them to develop strong generic skills. There is a need to broaden the skills of graduates through coursework, internships and international study. Additional resources will be needed to extend and enrich periods of research training.

To perform worthwhile research at international standards, researchers must have access to the facilities required to produce outcomes that can make a useful contribution to the world's stock of knowledge. The quality of the physical space for teaching and research is a key determinant of the quality of the research environment and the capacity of institutions to attract and retain outstanding researchers and students.

Data presented in this submission point to concerning trends in the levels of investment in university infrastructure, and in particular research infrastructure.

Within the Group of Eight (Go8) alone, backlog maintenance liabilities for building and support infrastructure are estimated at around AUD1.5 billion. The capital share of total university investment in Research and Development (R&D) has declined from 15.2% in 1990–91 to 6.4% in 2004–05.

Both the business model for funding the teaching of local students and the business model for funding research are deficient in that costs exceed revenues. The current models are sustained only through income generated from international student fees, donations from third parties, deferred capital maintenance, and reductions in service quality. The losses are greatest for the biggest winners of research grants.

We must stop the bleeding. It will deny Australia our lifeline to the future. We will not only fail to attract international talent. Our local talent may go elsewhere.

Responding to challenges

In all these matters there are trade-offs to be made between quantity and quality. The international imperatives put quality first. Australia has no choice but to focus the available investment in those areas where it can perform best.

A major priority is to shore up our capacity for basic research of high quality by international standards. To sustain economic competitiveness Australia cannot rely on a strategy of passive absorption of foreign

technology and skills immigration. To benefit from the public good of world knowledge we have to be actively engaged in cutting edge research. Free riding on the rest of the world's research is not a realistic option—the links between researchers are personal and they are based on informal trading in ideas, techniques and devices. To access and make sense of basic research it is necessary to be a contributing insider to the community of international researchers in a field.

The Go8 recommends:

That the White Paper ensuing from the Review of the National Innovation System articulate the importance of basic research through direct and indirect contributions to innovation.

Australia has relied overly on a government-driven programmatic approach to promoting innovation, as illustrated by the plethora of funding schemes.

The deficit view of universities failing to commercialise science underestimates the indirect ways that universities contribute to innovation, promotes instrumentalism and short-termism in research, and directs effort and expenditure to marginal commercialisation activities at the expense of investment to sustain core capacity.

An alternative approach is for government to 'steer' rather than 'row', that is to set broad framework conditions through regulatory and financial incentives, and leave specific arrangements to be shaped by the responses of firms, universities and other agencies to those incentives as best fit their needs, strengths and circumstances.

A contemporary approach to innovation policy that suits Australia's circumstances will involve less programmatic intervention by government and greater attention to the coherence of policy, regulatory and financing frameworks. The main roles for government—beyond those of creating macro-economic stability and market openness, and investing appropriately in skills formation—are to

sponsor adequately-funded 'open science' and facilitate opportunities for people to combine, share and test ideas.

For Australia to achieve and sustain international competitiveness in university research, funding should be based on the following principles:

- Australia should sustain internationally competitive levels of public investment in research.
- The dual funding system should be continued for university research—incorporating a balance of competitive grants and institutional block payments.
- Competitive funding schemes (of the Australian Research Council (ARC) and the National Health and Medical Research Council (NHMRC)) should fund the full cost of sponsored research.
- While research block grants should be driven by the quality of research performance, institutions should be free to invest these funds according to their individual strategic missions.
- There should be strong incentives for industry investment in research, guided by robust data on institutional capacity and performance.
- Research training must occur only in institutions where research is demonstrably being performed at high levels of quality.
- Funding to support research training activities should reflect the actual costs of providing training in different disciplines.

A major priority is to ensure that Australia can perform research at internationally benchmarked standards of quality on a financially sustainable basis. Recognising the full costs of research—the direct costs and the indirect costs of administrative and capital overheads—enables better internal resource allocation, transparency of cross-subsidies, improved asset management and sustainable performance quality.

The Go8 recommends:

- a. That the Commonwealth adopt a policy commitment to funding the full actual costs of research and reflecting differences in individual university research profiles and cost structures.*
- b. That the experiences of the United States (US), United Kingdom (UK) and New Zealand systems in relation to funding the actual costs of research be the subject of cooperative evaluation in mid 2008.*
- c. That a series of pilot exercises be undertaken in a range of fields in a range of universities in 2008 with a view to identifying the principles for a systematic approach to funding the actual costs of research in the future.*
- d. That a systematic exercise be undertaken across universities in 2009 to identify the full costs of research performed.*
- e. That a commitment be given by the Commonwealth Government to have regard to the full actual costs of research in its funding policies and provisions.*

Australia's policy objectives for research training should be to:

- enable universities to attract student candidates of high quality from local and international sources;
- ensure quality of the research training environment;
- provide quality infrastructure for research;
- provide quality student supervision;
- offer opportunities for students to develop broad knowledge and generic research skills appropriate to their varying needs and goals;
- enable students to progress through to satisfactory completion of their programs;
- produce graduates whose research skills and understandings will fit them for the future, wherever they choose to work in the world.

The Go8 recommends:

- a. *That a systematic study of the full costs of research training be commenced in 2009 in parallel with the identification of the full costs of research.*
- b. *That funding for Doctor of Philosophy (PhD) stipends and training places be aligned at four years per place.*
- c. *That the value of stipends for HDR students be increased to provide students with an adequate standard of living while they study.*
- d. *That the Government work with universities to develop funding options to better enable students to spend time at another institution, either in Australia or overseas, during their PhD.*

Australian discussions of human capital formation have tended to focus on the quantitative dimension: how many people are needed in different areas to meet labour market requirements? Less attention has been given to the qualitative dimension: what different types of skills and skill mixes will provide the capacity needed to be internationally competitive and prepared for future challenges?

Diversity is required in the production of graduates to meet demand for varying skills mixes—diversity of expertise, creative and technical capabilities, and generic skills for adaptability to change.

The Go8 recommends:

That government policy should promote diversity through flexible financing mechanisms and information to guide the decisions of prospective students and employers, including information about differences in the capacity and performance of universities.

Australia needs to be smarter in making more cost-effective use of expensive infrastructure and creating greater synergies among researchers.

The Go8 recommends:

That the Government issue a consultation paper for further development of a program to enable academic staff to undertake research at other universities, reflecting the principles outlined in this submission.

An innovative culture is more likely to flourish when the different participants understand and respect their different roles and capabilities.

Much more can be done to increase university interactions with business, particularly small and medium enterprises (SMEs), professional service firms, and with public agencies and community organisations. In view of the multi-faceted character of the problems to be resolved, these interactions need to go beyond the traditional focus on Science and Technology (S&T) links, and involve the Humanities and Social Sciences in integrated ways.

The Go8 recommends:

- a. *That the Commonwealth initiate a new program of funding from 2010, as a component of mission-based funding compacts with universities, with the following objectives:*
 - *to increase the engagement of universities with users of knowledge in business and the public and community sectors;*
 - *to contribute to innovation by meeting regional skills needs, regional graduate retention, research collaboration, technology transfer, spin-off activity, supporting SMEs, analytical services, professional development, and formation of local partnerships.*
- b. *That the new program be based initially on submissions from universities.*
- c. *That program funding in subsequent years be based on a performance-related formula.*

A feature of the Australian economy is the dominance in gross domestic product (GDP) terms of the services sector and SMEs as a share of all firms. Australia has a particular need to raise the level of innovation among

SMEs. Traditional approaches, such as taxation-related R&D concessions, have not worked well for SMEs, particularly in the start-up phase. A more focused approach is for government to offer up-front financial incentives to SMEs to encourage their investment in R&D through universities and publicly-funded research agencies.

The Go8 recommends:

That the Commonwealth provide vouchers for SMEs to redeem through contracted research undertakings with universities, Publicly Funded Research Agencies (PFRA), and other not-for-profit research organisations.

Australia must participate actively, and on a reciprocal basis, with the world's leading centres for research, engaging in ways that open up opportunities for Australian researchers to work with top teams and state-of-the-art infrastructure.

The Go8 recommends:

- a. That the Commonwealth actively explore government-to-government agreements relating to co-investment in major research facilities.*
- b. That the Commonwealth develop a national strategic assessment capacity for future international research collaboration.*
- c. That the Commonwealth assess the appropriateness, against international benchmarks, of mechanisms in place to enable Australian researchers to actively participate in global knowledge networks.*

Evaluation of Commonwealth programs in support of innovation, research and research training has tended to be ad hoc, with a focus on routine reporting of activities and outputs. There is a need for a systematic approach to program evaluation, with a focus on cost-effectiveness and the quality of outcomes achieved.

The Go8 recommends:

That an overall evaluation framework be established for the future innovation strategy the Commonwealth might develop as a result of this review.

