



UNIVERSITIES
AUSTRALIA

DISCOVER LEARN LEAD

Submission to the 'Boosting the Commercial
Returns from Research' discussion paper

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Executive Summary

Universities Australia (UA) welcomes the Australian Government's commitment to research and innovation and their place in securing the future prosperity of the nation and its people. The *Industry Innovation and Competitiveness Agenda* and its related consultation paper, *Boosting the Commercial Returns from Research*, are seeking to identify ways to maximise the impact of Australia's investment in research.

UA supports the goal of improving the translation of Australia's excellent research into benefits for the Australian economy and society, particularly through increasing research–industry collaboration. In this submission UA highlights the need for integrated initiatives as part of an overarching strategy.

We need to bolster the foundations of our system and provide stable, planned investment in the ideas and discoveries that will create a prosperous future. Australia's universities are a vital part of the system and an overarching strategy and investment plan will help us to address national priorities, increase the return on investment and grow our international reputation for research excellence.

As part of this strategy, it is imperative that:

- Support for the fundamentals of the research system is ongoing and stable, with continuing investment in a balance of basic and applied and investigator-led and mission-led research.
- Incentives for research–industry collaboration are robust, fit-for-purpose and balanced to encourage deep and productive engagement.
- A focus on supporting research excellence, wherever it occurs, be maintained.
- An integrated suite of support is provided to drive cultural change in both industry and the research sector in Australia.
- Translation of research in the broadest sense is encouraged and supported.
- Priorities for research are set, with targeted support determined through a strategic process.
- Research training includes greater opportunities for researchers to establish links with industry and to bolster relevant skills.
- Staff mobility between the sectors at all levels is encouraged.
- Holistic, ongoing funding for national research infrastructure is secured.
- Efforts in both domestic and international collaboration are increased, particularly in the priority areas.
- Access to the outcomes from publicly funded research is improved.

The consultation paper canvasses a range of proposals, some of which could fundamentally alter the system of support for research in Australia. There needs to be detailed and ongoing consultation to ensure the best outcomes from this process and to mitigate against negative consequences.

There are also a range of other policy processes and consultations that are interrelated, including the Cooperative Research Centres Programme review, the implementation of the Medical Research Future Fund, the review of independent Medical Research Institutes and the Higher Education and Research Reform Bill. The interactions will need to be carefully considered so that the ultimate policy outcomes strengthen the research system.

UA is committed to working with the Australian Government to ensure that our research efforts continue to contribute to Australia's prosperity and wellbeing.

Introduction

Universities Australia (UA) is the national peak body representing Australia's universities in the public interest both nationally and internationally. Universities make an essential contribution to creating a diverse, sustainable and vibrant economy with opportunities for better jobs and more fulfilled lives. Universities are the only institutions with the remit and capacity to build and link all elements of advanced scholarship, innovation and development—through teaching, research, research training, industry engagement and translation of the results of research into tangible outcomes and commercialisation.

Through universities, Australia is able to access, adapt and adopt research and innovation from the leading researchers, industries and economies around the world. Australia secures access to important international research and development only by conducting high-level research itself and being recognised as a valued contributor to debate, collaboration, development and success. A broad base of research and innovation capability also ensures we can address our unique national challenges.

Australia's universities are proactively working to improve their links with industry. In looking to the future, we need to build on the lessons learnt both domestically and internationally on how to increase industry demand for research and innovation and improve the ease of translation.

The advice provided by the new Commonwealth Science Council will be critical and the university sector stands ready to work with the council and assist with its deliberations. Clear mechanisms for gathering evidence and debating issues will strengthen the role of the Council and increase the visibility of its work. UA also looks forward to working with the National Science, Technology and Research Committee, the officials-level body supporting the work of the Council.

Research–industry linkages and improving the translation of our excellent research capacity into new products and processes have long been issues of concern for Australia. We are not unique in this difficulty: many countries across the world have experienced similar issues and have put into place explicit strategies to improve the flow of knowledge across sectors.

Any strategy will need to consider how to foster active, long-term and multifaceted engagement to produce productive relationships. A key issue is one of scale and the need for initiatives of sufficient size and scope to be transformative. We also need to take into account Australia's industrial structure, comprising a relatively small number of large multi-national companies and a large number of small to medium enterprises (SMEs). Engaging with SMEs requires considerable support and an ongoing commitment, especially in supporting, nurturing, and promoting high-growth potential SMEs.

As highlighted in the *Boosting the Commercial Returns from Research* discussion paper, Australia needs to look at complementary initiatives that address structural issues and encourage both demand for and supply of research and innovation as part of an overarching strategy.

Integrated national strategy

It is important that efforts to improve Australia's innovation performance are undertaken as part of an overarching strategy. This strategy should take into account the differing roles of each of the key sectors and the need for long-term, sustainable support to achieve the desired cultural changes. The fundamental elements of the research and innovation system need to be strengthened and this can only be achieved through reliable and ongoing support as part of a holistic strategy.

In terms of encouraging the translation of research, there are clear lessons that can be learnt from the approaches taken internationally. The United Kingdom (UK) Government has implemented a suite of programs that span the spectrum of research engagement, from establishing knowledge transfer networks to fostering researcher mobility. South Korea and Singapore have also introduced policies to strengthen research–industry collaboration, including funding for technology transfer offices within universities as well as collaboration ‘hub’ infrastructure.

A broad focus on research engagement and translational activities is needed, not just commercialisation, to deliver the best returns on Australia’s investment. In medical research, for example, the primary benefit comes from changes in clinical practice and improvements in the health outcomes. There is currently limited direct support for these activities in Australia and the low levels of indirect support for research has long been identified as an issue.

To drive cultural change in both industry and the research sector in Australia, there needs to be an integrated suite of support that is stable and long-term. Too often programs are introduced with much fanfare, only to be abolished or substantially changed before industry has had a chance to engage with them. Successful schemes are not continued, or are maintained at such a small scale that their effect cannot be anything other than marginal.

Extensive consultation and ongoing monitoring is necessary to ensure that the policy and program changes are achieving the goals of the strategy and not leading to unintended, undesirable consequences. In particular, the interaction of the various initiatives needs to be carefully considered, to achieve the linked system of support that is required. If Australia is to compete on the world-stage, we must also continue to invest in basic research and ensure that the fundamentals of our system are strong.

Prioritisation of research

UA welcomes the setting of national priorities for research. As highlighted in the discussion paper, these priorities need to be determined through a consultative and open process, with expert input from across industry, government and the research sector.

The earlier National Research Priorities (NRPs) were useful in providing high-level goals, but were not effective in creating a critical mass of research effort that addressed the key knowledge gaps under the priority areas.¹ The lessons learnt from the NRPs need to be taken into account in implementing the new priorities. Simply adding priority-focussed selection criteria to existing competitive funding sources is unlikely to achieve the desired outcomes.

Australia can learn from the strategic processes being implemented internationally where specific, flexible funding is used to target the key gaps or barriers in each of the priority areas. One of the benefits from this approach is the ability to leverage existing capacity, achieving greater impact for the level of investment.

¹ DIISRTE 2012, *National Research Investment Plan*, Department of Industry, Innovation, Science, Research and Tertiary Education, Commonwealth of Australia, p. 83.

<http://www.industry.gov.au/research/Documents/NationalResearchInvestmentPlan.pdf>.

Implementing the priorities needs to be undertaken as part of a broader, more strategic approach to supporting the research and innovation system. The interaction between various initiatives and investment processes needs to be carefully considered. In particular, the relationship between the priorities and the areas chosen for the Industry Growth Centres will require further clarification.

The vital role of the humanities and the social sciences must be recognised in determining the priorities and in their implementation. Beyond containing priority areas for research in their own right, such as reducing the causes of crime and social disadvantage, the humanities, arts and social sciences (HASS) disciplines often hold the key to achieving desired outcomes. For example, new medical interventions will not lead to improved health outcomes if they are not adopted by patients, and only HASS research can provide us with a better understanding of those social and behavioural practices that influence patients' uptake of such interventions.

Addressing the priorities will need a balance of strategic, mission-led research and investigator-led research. It will also be important to ensure that there is still support in the system for curiosity-driven research that breaks new ground and pushes the boundaries of our understanding of the world. The very nature of research precludes always being able to determine the outcomes or impact from particular areas of inquiry.

The assessment of existing research activities against the priorities will be particularly challenging considering the complex nature of the research system, the breadth of activity and the limited data sources. It may be more appropriate to identify knowledge gaps and capability needs for the future, with the help of expert advice, rather than taking a data-driven, stocktake-style approach.

In determining the priorities, there could be benefit in placing an additional lens on the process. There is a large range of areas that could be included in a list of priority areas, as was evidenced in the NRPs, but this creates a situation where almost all research can be categorised as addressing a priority. Narrowing the list to those areas where Australian Government leadership and a more strategic approach will create significant additional benefit could be one option. Another option is to select a certain number of the priority areas for targeted intervention for a set number of years, cycling through the priorities at regular intervals.

Creating stronger incentives for research–industry collaboration

UA supports creating stronger incentives for research–industry collaboration as part of a balanced approach that continues to value high-quality, fundamental research. UA believes that the following principles should be adopted in developing and implementing the specific metrics or indicators:

- The incentives and indicators need to be robust, fit-for-purpose and balanced.
- A suite of indicators is likely to be more effective than one indicator: a suite is unlikely to create perverse incentives and can be customised to different discipline areas.
- There should be a trial period to test the robustness of the indicators before they are applied to funding.
- The administrative burden must be minimised.

There has been a range of earlier work that should be considered as part of this process, particularly the various elements of the feasibility study into assessing research impact.² Determining robust and fit-for-purpose indicators is not a simple process and we need to guard against taking a quick fix approach that will not achieve the desired outcomes. For example, using commercial income as a sole indicator of research translation could undermine universities' non-commercial interactions with industry. These interactions are often the basis of long-term and productive relationships.

UA supports an approach that incentivises engagement with end-users of research more broadly. The report by New South Innovations on engagement metrics provides one option for collecting audited data on engagement income. There are a range of other metrics that could be considered for inclusion in the suite of indicators, such as co-publications, patent citations and professional development courses, but each will need to be tested for its robustness.

International approaches also need to be considered. The UK has had similar issues to Australia in terms of research–industry collaboration, but is now seeing the benefit of many years of investment and policy support. The UK Government has supported a range of interlinked initiatives to increase knowledge exchange. For example, the Higher Education Innovation Fund is helping universities to embed changes and increase the focus on linking with end-users of research both locally and internationally. Funding is awarded based on a suite of metrics, but institutions are also required to submit a strategy on how they will foster greater knowledge exchange.

In looking at the research block grant arrangements, the categories of income and the allocation formulae warrant further discussion and consultation. The current approach creates mixed signals for the sector and makes it more difficult for universities to develop strategic plans that align with the objectives of government funding.

For example, Category I income includes a range of competitive grant programs that primarily fund end-user focused research—such as the programs administered by the Rural Research and Development Corporations. This income is not included in the calculation formula for the Joint Research Engagement (JRE) Scheme. However, the JRE formula does include the number of publications and the student load. The change from the Institutional Grants Scheme to the JRE Scheme has also removed the idea of a dedicated stream of funding to provide base support for research activities.

In a variety of policy documents and forums, inadequate support for indirect costs has consistently been recognised as a serious concern for the Australian system. Indirect costs include the range of commercialisation, engagement and outreach activities that are generally not supported by competitive research grants. The balance of different funding types must be carefully considered as part of any policy discussions relating to changes to the current system of support.

In regards to modifying competitive grant rules to recognise industry-relevant experience, a variation on the Research Opportunity and Performance Evidence (ROPE)³ process could be considered. The

² Department of Education 2014, *Research Impact Assessment*, Commonwealth of Australia. <https://www.education.gov.au/research-impact-assessment>.

³ Australian Research Council 2014, *ARC Research Opportunity and Performance Evidence (ROPE) Statement*, Commonwealth of Australia. http://www.arc.gov.au/applicants/rope_statement.htm.

low success rates and high levels of competition for ARC and NHMRC funding are a contributing factor to the difficulty in rewarding alternate career experience. It may also be appropriate to look at the balance of expertise on competitive grant selection panels, particularly for schemes that are focussed on collaboration or translation of research.

As highlighted in UA's submission to the Cooperative Research Centres Programme Review, a one-size fits all approach to supporting collaboration is unlikely to achieve the desired outcomes. There needs to be the ability to support both tactical responses to short-term industry issues, as well as longer-term, higher-risk research that has the potential to drive significant change for an industry.

The R&D Tax Incentive accounts for over a quarter of the Australian Government's support for science, research and innovation.⁴ Its role in supporting research–industry collaboration could be increased if a premium rebate was introduced for research conducted with a university or other public research institution.

Beyond the Tax Incentive, the level and type of other kinds of direct support need to be considered if we are to foster genuine cultural change in industry. The Industry Growth Centres are an important initiative, but the requirement to be self-sustaining in four years will be difficult to achieve.

The Entrepreneurs' Infrastructure Programme marries a range of support, but there is concern that the level of funding available is not sufficient to meet the demand and that the range of services has been reduced. Other issues, such as the availability of venture capital and the level of entrepreneurial and management skills, also need to be addressed.

The complementarity and scale of the initiatives to increase research–industry collaboration as part of a larger strategy is critical if we are to address this issue in the long-term.

Supporting research infrastructure

Research infrastructure is a critical part of ensuring excellent and transformative research, including for industry. Recurrent funding for national and landmark level research infrastructure is an issue that needs to be addressed. UA welcomes the Australian Government's commitment to undertake a reassessment in this area, but is concerned that the continuing uncertainty is already compromising the viability of these facilities and damaging our international reputation.

The principles for investment pioneered through the National Collaborative Research Infrastructure Strategy (NCRIS) and enshrined in the Strategic Framework for Research Infrastructure Investment need to be the basis for this reassessment and future funding allocations. By considering capability needs at a national-level and providing funding through a flexible, strategic and collaborative process, NCRIS achieved a step-change in the impact of Australia's research infrastructure.

One of the clear benefits from this approach has been the development of networked facilities that improve ease of access by industry. As the facilities have matured, industry use has increased and research organisations are attracting national and international collaborators through their ability to access cutting edge infrastructure.

⁴ Australian Government 2014, *Science, Research and Innovation Budget Tables 2014–15*, Commonwealth of Australia. <http://www.industry.gov.au/AboutUs/Budget/Documents/SRIBudgetTables2014-15.pdf>.

By creating national-level capability, the efficiency and effectiveness of the investment has been greatly increased, attracting significant co-investment, reducing duplication and ensuring facilities are used to their full potential. The holistic funding provided by the Australian Government has also supported specialist staff who make sure users get the most benefit from the research infrastructure. These highly qualified technicians are particularly important in supporting industry users.

It is essential that ongoing funding is secured for Australia's priority research infrastructure. We need to ensure that the policy and program design builds on the lessons learnt both nationally and internationally. Providing funding for both the capital and operational costs in a sustainable package is vital for the effectiveness of national and landmark level facilities.⁵ A solely user-pays approach that expects facilities to be self-sustaining has consistently been demonstrated as inefficient and ineffective. In addition, this approach simply cycles money through the system and reduces the ability to aggregate funding and make strategic decisions about Australia's research infrastructure needs.

Providing better access to research

Australia's universities are proactive in supporting the commercialisation and translation of their research into economic and social returns. They employ specialist staff, run dedicated commercialisation and technology transfer offices and provide training to staff to support outreach and entrepreneurship. Commercialisation and translation of research rarely follows a linear progression from discovery to impact. The variety of pathways and the differing needs of collaborative partners require fit-for-purpose, flexible approaches to achieve successful outcomes.

Competitive grants rarely provide funding to support the management of intellectual property (IP) and there are limited funding sources in Australia to support the further development of an idea into a useable end product. The difficulty in Australia of achieving a commercial proof-of-concept and then moving to full product development, often called the 'valley of death', is well documented. The 2014–15 Budget decisions to reduce the funding available for commercialisation and innovation will further erode our ability to bring new ideas to market.

To improve access to research, it is important to not only look at commercialisation but also at other pathways to end-use of research. For example, the primary benefit from investment in medical research is improved clinical practice and patient outcomes. Investment in research achieves the greatest gains for a country where there are substantial spill-over benefits. Researchers need to be encouraged to consider all types of possible end-use of their research, not just commercialisation, and to actively disseminate their research.

As highlighted earlier in this submission, UA is concerned about the possible perverse incentives and unintended consequences from the use of inappropriate metrics. Linking research funding to income from IP arrangements in isolation is likely to lead to undesirable behaviours that do not promote deep and productive relationships with industry.

Universities need to be supported to increase engagement with end-users in general, to reduce obstacles to commercialising IP and to improve the entrepreneurial and engagement skills of staff.

⁵ House of Lords Science and Technology Committee 2013, *Second Report: scientific infrastructure*, The Crown. <http://www.publications.parliament.uk/pa/ld201314/ldselect/ldsctech/76/7602.htm>.

Incentive structures should not encourage universities to hold on to IP that they do not have the capacity to commercialise. Alternate approaches, such as Easy Access IP⁶, are improving the transfer of knowledge between universities and industry and demonstrate the benefits of open innovation. By offering research discoveries, inventions and IP to companies and individuals for free, universities are turning more research into products and services that benefit our economy and society.

The proposal to establish an online point of access for ‘commercially-relevant’ research is worth consideration, but UA questions how this will be defined. Relevant international approaches, such as the UK’s Gateway to Research, do not attempt to categorise research in this way, but seek to improve the discoverability and accessibility of all publicly funded research. The possible commercial outcomes from fundamental research are difficult to predict and limiting the scope to only commercially-relevant research could reduce the impact of the site.

It must also be acknowledged that the dissemination of research and implementation of open access policies are not cost free. Ensuring a national approach that achieves a step-change in accessibility to both research and the underlying data will require Australian Government leadership and appropriate resourcing.

Increasing industry relevant research training

The distribution of the research workforce in Australia has been highlighted as an issue for the absorptive capacity of industry and a barrier to research–industry collaboration. Unlike many other nations, the majority of Australia’s researchers are employed in the higher education sector. Anecdotally, the issue of the ‘work readiness’ of our research graduates has been raised, along with a perception that a PhD only delivers a narrow set of skills.

A number of countries have developed specific programs to help researchers establish links with industry early in their career and increase their broader skills. Denmark’s longstanding Industrial PhD Programme places the student in a private company, with their time divided equally between the university and industry during their research. Malaysia’s Industrial Attachment Programme is similar in nature. The UK’s Knowledge Transfer Partnerships program is a three-way partnership between industry, universities and graduates. These programs result in benefits for all parties: the researcher develops a broader and deeper skill set and industry links, thereby increasing their mobility, while knowledge transfer becomes embedded within the universities and industry.

There are a range of models being used in Australia to increase the industry relevance of research training that should be considered for broader application. The Australian Technology Network of Universities’ Industry Doctoral Training Centre, the ARC’s Industrial Training Transformation Training Centres and the Cooperative Research Centres all provide useful examples that should be considered.

Another issue is the lack of recognition of the skills provided through a higher degree by research (HDR) and their applicability to a broad range of employment areas. HDRs provide candidates with critical analysis skills, strategic thinking skills, communication skills, and the ability to synthesise

⁶ New South Innovations 2014, *Easy Access IP*, The University of New South Wales.

<http://www.nsinnovations.com.au/easy-access-ip>.

knowledge to achieve an outcome. These skills are transferable and are key to the success of many businesses and employers.

In undertaking the long-awaited review of research training, it will be important to consider not only how to broaden the skills acquired through research training, but also the fundamental issue of maintaining the reputation of our HDRs internationally, particularly in light of the proposed cuts to the Research Training Scheme. The quality of training is vital for our research reputation and in turn our attractiveness as a destination for international students. Any changes to the standard structure of a PhD may also have implications for the duration and the method of assessment.

Beyond research training, mobility of staff between academia and industry at all levels is needed to increase collaboration. Exchanges between mid-career and senior staff facilitates the sharing of knowledge and deepens the engagement between the sectors.

Measurement of outcomes

UA welcomes the proposal to improve the measurement of the outcomes from investment in research in industry and the public sector. The most recent comprehensive assessment of public support for science and innovation by the Productivity Commission concluded that:

There are widespread and important economic, social and environmental benefits generated by Australia's \$6 billion public funding support of science and innovation ... Multiple strands of evidence establish that the benefits of public spending exceed its costs.⁷

This report also acknowledged the difficulty in measuring the outcomes from research. As highlighted earlier in this submission, the development of metrics is a complex area that requires significant testing and consultation. In order to minimise the administrative burden, existing data collections and processes should be considered in the first instance. The fundamental question of 'what we are trying to measure or assess and why' needs to be answered to inform the design of the methodology. International comparability will also need to be considered.

Capturing the full range of benefits from investment in research, from improved environmental management, more efficient services, to better health outcomes, should be the goal. An approach that only considers benefits that can be monetised will exclude key benefits from investment in research and limit our ability to respond to new and emerging challenges.

Capitalising on the Medical Research Future Fund

The Medical Research Future Fund constitutes a significant new investment in medical research. Its implementation will have a range of effects on the research system as a whole and needs to be carefully considered. In particular, UA is concerned about the level of funding to support the indirect costs of research if the funds are primarily distributed through competitive grants. The indirect costs of research include the commercialisation and translation activities that will be fundamental to the success of the fund in driving the uptake of Australian medical research.

⁷ Productivity Commission 2007, *Public support for science and innovation*, Research Report, Commonwealth of Australia, p. xvi. <http://www.pc.gov.au/projects/study/science/docs/finalreport>.

The related issues of research infrastructure, research training and specific funding to support uptake and commercialisation also need to be considered to ensure maximum return from this investment. Medical research relies on having a strong research sector more generally, with a base of excellence in underpinning disciplines. Australia will not be able to capitalise on this investment if the fundamentals of the research system are not maintained.