Innovative Research Universities

Boosting the Commercial Returns from Research discussion paper – IRU response

Research provides significant benefits for Australians, as individuals, businesses, and communities.

A research system, characterised by innovation, excellence and impact, needs sustainable support from government for universities to work with and respond to research end-users to deliver the benefits of research to individuals, communities and industry.

The Government has made clear its determination to expand the extent of industry driven research that achieves commercial returns as a critical part of its Industry Innovation and Competitiveness Agenda. IRU members are committed to improving industry driven research outcomes, building off their strong research output and capability.

The IRU has identified four crucial issues for the Australian research system each of which address the Government's aims to improve the commercial outcomes from research. They are:

1. Strengthening incentives for **industry driven research** to complement Australia's extensive university led research outputs
2. More focus on **translational research.** Translational research tests the findings of basic research in practical, real world contexts to put the research to work improving products and processes, feeding back the outcomes into the next stages of the underlying research;
3. Encouraging **regional and outer urban research ecosystems** that see research conducted and benefits delivered to communities and industries throughout Australia; and
4. Strengthening Australian interaction with the expanding economies of **Asia** through linked research systems and support for industry in those countries.

The problem

The problem is clear. Australia produces a high level of research; it has a low level of industry take up of the research produced and initiation of research that should be produced. The discussion paper cites the data on this, referring to many recent summaries including the work of the Australian Chief Scientist.

In response we need a fundamental change in approach that engenders a significant increase in industry driven research led from industry while ensuring the existing research capability continues to develop.

The prime focus is to alter the incentives for industry and business to seek out research that can improve their operations and commercial outcomes. The secondary set of issues is to ensure that university researchers are encouraged to pursue opportunities for industry driven research through internal and external incentives that are in balance with the incentives for investigator driven research.

A differentiated suite of schemes within a clear framework will ensure that the diversity of Australian industry is accommodated, with businesses of various sizes and sectors able to access programmes suited to their needs.

The approach would have a fiscal impact through funding more businesses which invest in research of relevance to their success. The outcome should be a significant return on the investment through the outcomes from the industry driven research – the overall aim.

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Once in place it is important to have continuity of schemes with only moderate changes over time to improve effectiveness or targeting. Frequent and significant changes to programmes, which has been common in Australia, decrease industry knowledge and take-up of assistance available.[1]

Structure of response

The major part of the response focuses on how to revamp incentives for industry driven research from the perspective of industry, universities and individual researchers.

The latter sections address in turn the remaining issues identified in the Discussion Paper of:

- supporting research infrastructure, especially in opening access for Australian industry and research organisations to large-scale infrastructure developments in Australia and overseas;
- better access to research through simplifying access for industry to university intellectual property;
- increasing the level of industry relevant research training;
- measuring the benefits of research for industry and community;
- leading the way through the Medical Research Future Fund (MRFF) which provides a source of funds to significantly alter the incentives for commercial translation of research findings into medical products and practices that directly benefit patients.

IRU Recommendations

1. The IRU recommends creation of an industry research incentive program and retention of the existing Research and Development tax incentive to give businesses two options:
   - the tax incentive to offset the cost of internal research and development within a company; and
   - a Government incentives programme to encourage use of the research capability of Australian universities and other research agencies.
2. The IRU recommends continued Government support for industry research Centres targeting important industry wide issues, which is responsive to new and changing demands.
3. The IRU recommends that the Government:
   - consider targeting university incentives to support research for industry and businesses distinct from incentives for research for Government and non-profit organisations; and
   - expand the programmes for industry driven research in line with the increase in activity.
4. The IRU members will examine their internal arrangements to ensure that there is sufficient support for researchers who work with and in industry and recommends a national award scheme to recognise researcher excellence in industry driven research.
5. The IRU argues that priority setting for industry incentives should focus at the potential for commercial success, and not be restricted by assessments of the potential of particular industries.
6. The IRU recommends that the Government proceed with a new roadmap for research infrastructure that considers the importance of regional and outer-urban research ecosystems to support business outcomes across Australia.

[1] ACOLA, 2014, The role of science, research and technology in lifting Australian productivity.

7. The IRU recommends a proof-of-concept programme that supports research organisations to translate innovations at early stages of development into commercially viable products attractive to industry investors.
8. The IRU recommends the Government investigate international models of incentives for giving research students industry experience during their research programme.
9. The IRU recommends the creation of a national research impact assessment to provide thorough base line evidence of the extensive benefits from research.
10. The IRU recommends that the Government use the Medical Research Future Fund to transform Government investment in health and medical research through:
    - greater investment in the translation of basic research findings into new products, procedures and processes that will have significant impact on patients and health service providers; and
    - support for the development stages of medical products.

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1. Incentives for industry driven research

Individual businesses

The objective is to stimulate industry driven research, creating a major step change in the level of demand from Australian business and also from businesses internationally. The focus should be to stimulate additional, improved, activity through incentive programs that highlight the value from the use of research as a competitive spur to invest in research and expand current activity.

The Australian Government has consolidated in the Entrepreneurs' Infrastructure Programme (EIP) support for industry costs of research and development. However, the guidelines for the EIP place much emphasis on applicants demonstrating that the product or service development could not occur without programme funding.[2] The result is to focus the programme at, by definition, marginal activity in the hope that it proves more successful than initially expected.

At a smaller scale are State programs such as the Victorian Innovation voucher programmes which are wholly business-led to support research defined by an individual business' need.

A better approach involves real incentives leading to a greater level of industry demand for research.

The current Research and Development Tax Incentive is a demand responsive Government program for the use of research to stimulate innovation. It supports investment in research whether in-house or through external parties.

A parallel incentive scheme would reward industry investment in research through a payment based on the amount invested.

There are potential mechanisms to ensure the scheme ultimately stimulates a major shift in business demand for research while avoiding exploitation of the scheme:

- it would be for investment in research in universities and other research agencies which the research body determines meets the standard definition of research. Universities would claim the industry funds as research income, which is subject to Government audit;
- if funding initially matches a portion of the investment, it could over time be limited to a total pool, from which each business would receive funds in proportion to its contribution to the total of industry research. Government would control the size of the pool to ensure a balance between a viable incentive and total expenditure;
- the funding should be paid to the business after it invests in external research. It would not be a direct payment to the research body; and
- the research activity could be limited to target types of business outcomes, discussed below under 'Targeting and priority setting'.

The IRU recommends creation of an industry research incentive program and retention of the existing Research and Development tax incentive to give businesses two options:

- ***the tax incentive to offset the cost of internal research and development within a company; and***
- ***a Government incentives programme to encourage use of the research capability of Australian universities and other research agencies.***

[2] See the IRU comments at http://www.iru.edu.au/policy.aspx

Incentives for addressing industry wide issues

The IRU supports retention of support for industry research Centres that bring together a significant set of industry research users and researchers, including research students, to pursue issues and opportunities of importance to that industry.

The value of Centres is that they focus on a suite of related industry issues to advantage all with a stake in the area. The approach contrasts with much industry driven research whose emphasis is the need of the particular company involved.

The Government's planned Industry Growth Centres are an example. They would be insufficient if they alone carry the responsibility. The IRU submission to the Co-operative Research Centre (CRC) programme review[3], argues the potential of a criterion-based, demand driven funding model for a renewed CRC scheme to provide for a broad range of centres responsive to developing industry issues.

The IRU recommends continued Government support for industry research Centres targeting important industry wide issues, which is responsive to new and changing demands.

Incentives for universities

Given Australia's success in terms of producing high quality fundamental research well ahead of international benchmarks, the IRU does not support changes to the major schemes that support this activity, including the ARC Discovery programme, the Research Infrastructure Block Grant and the Sustainable Research Excellence block grant. Changes to funding instruments targeting research students could be considered to give greater emphasis to industry linked research training for some but not all research students.

The focus should be the programmes already supporting supply of industry focussed research. The Joint Research Engagement (JRE) program has struggled to generate greater levels of industry research funding, which is why this response emphasises improving industry incentives first before the university programs. A related factor is that the JRE funds are fixed, so that growth in industry driven research income does not improve the return to universities.

Should industry incentive schemes be successful it will put pressure on the JRE and the other major funding source for industry-linked research of the Australian Research Council (ARC) Linkage programme. They should be able to grow along with the growth in industry relevant research.

An issue with both is that they target all non-competitive research grant activity, conflating support for research relevant to Government and non-profit agencies with research supporting commercial outcomes. Both are important but have different drivers in the research user organisation.

The need to encourage research from Government Agencies and non-profit bodies remains but through differentiation the Government would be better placed to allow the support for industry driven research outcomes to increase, supporting its focus on improving commercial outcomes from research.

The IRU recommends that the Government:

- ***consider targeting university incentives to support research for industry and businesses distinct from incentives for research for Government and non-profit organisations; and***
- ***expand the programmes for industry driven research in line with the increase in activity.***

[3] IRU, 2014, http://iru.edu.au/media/52856/iru%20response%20to%20the%20crc%20review%20.pdf

Incentives for researchers

It is important to recognise the contribution of individual researchers. The focus on publication output and impact (as measured by citations) used in the Excellence in Research for Australia (ERA) initiative and various international ranking systems has re-enforced the importance of those measures amongst both institutions and individual academics. This has been the case even though ERA results moderate about 4% of the total research block grant pool.

ERA's reinforcement of traditional assessments of standing has been major. Industry driven research clearly has less standing in university culture than research that achieves great recognition amongst other researchers. Altering those priorities, without diminishing the importance of investigator led research, will not be easy.

A parallel exercise to ERA focussed on a considered assessment of the real impact of a university's research may similarly be able to influence the importance given by universities to collaboration with industry. This will be further explored in the Outcomes Measurement section below.

It is important for universities to enable researchers to work with industry and for individuals to forge careers that move between academic and industry roles.

IRU considered the value from an additional stream of academic employment for those who move between academic appointments and industry roles. On balance, university employment arrangements would not be advantaged by a further specialisation but it is important to ensure that academic roles are open in reality to researchers who have taken positions in industry. IRU members will examine their appointment arrangements to ensure that there is sufficient support for people making such moves.

To provide greater emphasis on industry driven research IRU members will also consider the value of some specific leading positions tied to industry driven research and the potential for internal award programs to recognise those most active. Such awards could then lead onto eligibility for national awards in the way there are national teaching and learning awards. For example the Malaysian government has a National Academic Award in the category of commercialisation and product development.

The IRU members will examine their internal arrangements to ensure that there is sufficient support for researchers who work with and in industry and recommends a national award scheme to recognise researcher excellence in industry driven research.

Priority setting ?

A number of recent papers and proposals have supported Government targeting broad areas deemed most likely to provide long term future focussed growth industries for Australia. These include the Government's Industry Growth Centre program, the Business Council of Australia's paper[4] and the Chief Scientist's breakthrough actions for innovation[5]. The EIP guidelines define the industry areas of immediate priority.

In a different way the Government, following through a decision of the previous Government, is looking to focus the R&D tax incentive to contain the cost by focusing the incentive at companies with lower apparent capacity to invest in research. In a world context we need to support all

[4] Business Council of Australia, Building Australia's Innovation System, http://www.bca.com.au/publications/building-australias-innovation-system

[5] Office of the Chief Scientist, http://www.chiefscientist.gov.au/2013/02/breakthrough-actions-for-innovation-released/

Australian companies competing on a stage where businesses with several hundred employees are still relatively small.

It is important not to reduce the flexibility of the Government's industry driven research funding programme to support emerging industries and opportunities. Had a Government 20 years ago focussed industry driven research support on a small number of sectors these would very likely be different to those chosen today.

The industry incentive programmes need to focus on the key outcome of support for ideas with the potential to create a new product or service that have a substantial market opportunity.

Hence, eligibility criteria for incentive led programs should focus on research that addresses clear industry needs for innovation, develops industry capacity to respond, and produces commercial outcomes. It could target the countries of Asia by giving a higher incentive for development of services and products that have an Asian market just as the Government now offers more support for students taking time to study in Asia than in other parts of the world.

The IRU argues that priority setting for industry incentives should focus at the potential for commercial success, and not be restricted by assessments of the potential of particular industries.

2. Research Infrastructure

The IRU supports the directions indicated in the Discussion Paper to ensure research infrastructure supports the breadth of research including industry driven research.

Major research infrastructure is essential as research projects grow larger and research questions more complex. To ensure the infrastructure supports the breadth of research cross Australia industry should be afforded access on the same terms as public sector research organisations.

The renewal of the National Collaborative Research Infrastructure Strategy (NCRIS) remains a priority. The IRU supports a reassessment of existing research infrastructure provision and requirements to reshape the road-map for infrastructure investment so that it covers the needs of innovation active industries.

IRU members show the value of shared research infrastructure. IRU researchers are the main counter to the tendency for Australian research and researchers to concentrate in the inner circle of Australia's capital cities. IRU members were established as research intensive universities in the outer urban areas of Australia's capitals and in major provincial cities to stimulate economic, social and personal advancement.

To achieve the outcomes expected of the universities requires an effective research ecosystem that supports the researchers linking them to researchers elsewhere in Australia and the world. Research conducted for, in and by researchers based in Australia's peri-urban and regional areas will encourage the creation of localised research ecosystems, characterised by engagement between research organisations, industry, government and communities, addressing significant local issues as well as problems of national and international importance. Investment in regional research infrastructure is necessary to support this.

The need to provide infrastructure should be coherent with research infrastructure globally, ensuring Australian based researchers' access to internationally based resources not available here and international researchers access to Australian based infrastructure that is rare or unique. Links with Asia are particularly important here, given the significant investments in research capability in the region and geographic proximity to Australia.

The roadmap then needs the known, long term commitment of resources to give industry and researchers confidence to pursue major issues through long-term research projects capable of responding to discoveries.

The IRU recommends that the Government proceed with a new roadmap for research infrastructure that considers the importance of regional and outer-urban research ecosystems to support business outcomes across Australia.

3. Access to Research

The arrangements to access intellectual property which university researchers create vary from university to university but they are linked by a common desire to see research outcomes used. The challenge for most universities is that there is too little interest in discoveries rather than a desire to withhold them from interested parties.

Use of schemes like Easy Access IP[6] is one option explored by IRU members. Others have similar options for use of research outcomes. There may be legitimate concerns that the legal agreements to implement access to IP may be cumbersome and risk averse dissuading potential business partners. This is an issue which universities need to address. Government could encourage access by focussing on the take up of research outputs by business, and the related commercial outcome, not on the commercial returns generated by universities.

Linking access to research funding to commitments to disseminate intellectual property may help highlight the need to make access easy.

The real challenge is support for translating new ideas into commercially viable ventures through proof-of-concept development, making opportunities which are ready for more risk-averse businesses to invest in.

This is a funding gap in Australia, which risks leaving research either undeveloped or subject to high equity demands from potential venture capitalist investors.

Proof of concept funding for high potential research could address this issue. Internationally, the Scottish Enterprise High Growth Spin-Out Programme offers funding to research organisations whose idea could lead to a Scottish achieving a £5 million turnover or a commercial investment of £10 million within five years, with projected continued growth. The European Research Council (ERC) offers Proof of Concept grants to researchers who have already an ERC grant. Funding of up to €150 000 is available to "ERC grant-holders bridge the gap between their research and the earliest stage of a marketable innovation."[7]

The IRU recommends a proof-of-concept programme that supports research organisations translate innovations at early stages of development into commercially viable products attractive to industry investors.

[6] http://easyaccessip.com/
[7] http://erc.europa.eu/proof-concept

4. Research Training

The IRU looks forward to contributing to the future review of research training arrangements and working with Government's to increase research student exposure to industry.

The IRU response to the review of the CRC programme explored the CRC's important role in delivering industry capability to research students. This remains one of the few mechanisms to address Australia's low proportion of researchers working in industry when compared to other developed nations.

It will be worthwhile for the review to consider schemes employed internationally. The Canadian Industrial R&D Internship Program (IRDI) matches "graduate students and post-doctoral fellows with private sector host organizations for private sector research internships. The interns will work on research projects jointly developed by the private sector host organization and their academic supervisor."

The ERC, under the Marie Skłodowska-Curie Actions, offer:

- European Industrial Doctorates, where a research student spends at least 50% of the research programme in the private sector; and
- Innovative Doctoral programmes, where the research institution offers innovative research training with international, public-private sector or interdisciplinary dimensions in partnership with other organisations.

Such schemes may not in and of themselves lead to an increase in the number of researchers based in Australian industry. They would however be significantly more capable of working with and for industry during over their careers, be they based in industry or a public sector research organisation. The goal for the Government is not necessarily greater industry employment of researchers, but better industry use of and engagement with research.

The IRU recommends the Government investigate international models of incentives for giving research students industry experience during their research programme.

5. Outcomes Measurement

The IRU strongly supports the measurement of the full range of benefits arising from Australian research. Research quality, as ably assessed by the ERA exercise, is only one part of assuring Australian governments and taxpayers of the value of their investment in research. It would emphasise the importance of much research having such outcomes.

The Excellence in Innovation for Australia (EIA) trial demonstrated that it is possible to produce valid assessments of the outcomes from research. If undertaken nationally it would provide a solid base line about the benefits from research over the past decade or more, which could be renewed at regular but lengthy intervals.

Publishing the assessment would provide some balance to ERA, altering internal importance valuing of industry driven research.

Greater understanding of how research is translated into commercial outcomes and other applications may permit use of data indicators. However, a focus solely on the relative achievement

of commercially driven income[8] is not likely to alter status perceptions greatly. Those data sets already drive the Joint Research Engagement programme, with limited perceptible change.

The IRU recommends the creation of a national research impact assessment to provide thorough base line evidence of the extensive benefits from research.

6. Medical Research Future Fund

The Government's creation of the Medical Research Future Fund (MRFF) demonstrates a specific and long term commitment to research that will directly impact on the health of Australians and the effectiveness of Australian health services. Australian Universities have a particularly strong track record in health and medical research. All IRU members undertake research assessed as being above or well above world standard in the health and medical fields, with a strong emphasis on effective improvement in health outcomes.

In the first half of the 2000s funds for the health and medical research through the National Health and Medical Research Council (NHMRC) doubled but the approach to distribution remained largely as before. The amount of research increased, the proportion of unsuccessful applications returned to past levels.

We need a new approach for the Fund.

It is a major opportunity for the Government to change the way in which health and medical research funding is allocated, providing lessons for other areas. To date most discussion assumes the allocation of a much greater pool of funds rather than the potential to reset how such research is supported to achieve good outcomes for Australians. However there are some more considered options:

- The South Australian Scientist of the Year Professor Graeme Young has called for more investment on the implementation of existing research findings and knowledge[9]. His is one example of the need to transform existing knowledge into practice, reflecting back onto the research from the results.
- The Australian Private Equity and Venture Capital Association has proposed support for the development stages of medical products through a translational research fund.[10]

The IRU recommends that the Government use the MRFF to transform Government investment in health and medical research through:

- ***greater investment in the translation of basic research findings into new products, procedures and processes that will have significant impact on patients and health service providers; and***
- ***support for the development stages of medical products.***

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[8] For example as proposed by the Australian Academy of Technological Sciences and Engineering
[9] http://blogs.flinders.edu.au/flinders-news/2014/06/03/act-on-existing-research-first-urges-professor-graeme-young/
[10] Australian Private Equity and Venture Capital Association, Submission to Senate Inquiry into Australia's Innovation System http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Innovation_System/Submissions