

University Research Commercialisation Consultation paper

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1 General

It was exactly 20 years ago that a colleague and I completed a project for the Australian Research Council [Mapping The Nature And Extent Of Business-University Interaction In Australia](#). It is quite a comprehensive document and covered a lot of thinking about research commercialisation and carries forward to the present day.

The project covered the critical role of institutions and organisations in enabling commercialisation and knowledge transfer. It led into commencing my PhD thesis in 2000 on [Business, Higher Education and Innovation: Institutions for Engagement in a Mode 2 Society](#) and resulted in some further research and publications supported by DESE (DEST) and DIST (DISR), including:

- [The Feasibility and Efficacy of Commercialising Research Outcomes from Australian Research Council Funded Research Phase 1 and Phase 2](#), with Ernst & Young, 2001. This report addresses many of the issues raised in the University Research Commercialisation Consultation Paper.
- [Best Practice Processes for Research Commercialisation](#), with Professor Ron Johnston, 2003. This report, which draws on the work for the ARC and working closely with Knowledge Commercialisation Australasia and university technology transfer offices, continues to be downloaded extensively.
- [The Emerging Business of Knowledge Transfer: Creating Value From Intellectual Products and Services](#), 2005.
- [Knowledge exchange networks in Australia's Innovation System: Overview and Strategic Analysis](#). 2005.
- [The Role of Intermediaries in Support of Innovation](#), 2007.
- [Digital Steel: the Steel Industry Research Mapping Project](#), and [Attachments](#), 2012. The report provides information and advice on how the steel fabrication sector can obtain greater access to knowledge generated through research in Australian universities and research organisations. It involved over 100 interviews, discussions and conversations with universities, research organisations, professional associations and institutes, intermediary organisations and steel fabrication businesses
- [Australia's Innovation Future](#). Report for the Senate Inquiry into Australia's Innovation System, with Professor Roy Green, 2015.
- [Translating Research for Economic and Social Benefit: Measures that facilitate transfer of knowledge from publicly funded research organisations to industry](#), for the Australian Council of Learned Academies, December 2015. The report provides a comprehensive inventory of the numerous measures across Commonwealth, state and territory governments. In the intervening six years, more measures have been added. Not all measures have been evaluated or best practice identified.
- [Report of the Consultations Program to assist Innovation and Science Australia \(ISA\) develop the 2030 Innovation Strategic Plan](#), 2017. Based on a survey of university, business, government, and intermediary stakeholders, the report addresses many of the issues raised in the University Research Consultation Paper. Of particular significance was the need to *build collaboration and connectedness among stakeholders*.
- [Performance Review of the Rural Innovation System](#), 2018. Drawing on the work for *ISA 2030*, the review describes Australia's rural innovation system's performance and impact, collates and analyses evidence across a range of metrics, highlights areas of strength, and sets out opportunities for improvement to address gaps in the knowledge base.
- [Challenges for Australian Research and Innovation](#), 2020. The Paper argued for much higher university-industry collaboration with a better match of research and innovation priorities supported by the current research investment councils (ARC, NH&MRC, Rural RDCs) and a new Council to invest in engineering and technology research drawing on best practice international frameworks.
- [Rethinking Australian Higher Education](#), 2021. The work addresses the higher education system's need to build human capital and industrial innovation talent.

The major conclusion from all of this is that **research commercialisation is not a linear process** - although the flow from basic research to commercial outcomes is a simple one to portray in diagrams and

PowerPoint presentations. Our research work over 20 years continues to validate the view that research commercialisation is interactive and inductive and fundamentally social in its orientation.

Social capital (networks, credibility and trust) complements the intellectual capital developed through discovery and invention and assists in its adoption, application, *and* continuous updating and refinement.

I have written extensively about comprehending and strengthening university-industry interactions, including [Engagement in an era of industrialisation](#), [Great expectations](#), and [From Transactions to Partnerships in National Innovation Systems](#). It is also reflected in our work on [Smart specialisation](#).

In addition to IP licensing and formation of start-ups, commercialisation covers the broader elements of knowledge transfer, including commissioned research (which may form the basis of collaboration), consultancy and expert advice, and students' preparation for productive work industry and commerce. Postgraduate education, particularly around PhDs and research masters, is particularly important in this regard.

I support the proposed elements in the envisaged new model for research commercialisation set out in the Consultation paper, although I would add a new one on "Institutional Strengthening". Specific responses to the discussion questions follow.

2 Responses to discussion questions

Discussion Question	Response
Mission-driven research	
<p>Are Missions the appropriate priority-setting mechanism? Should they be accompanied by smaller, targeted Challenges?</p>	<p>They are <i>an</i> appropriate response.</p> <p>Missions define purpose and goals – what a government or organisation wants to do and achieve, and by when. They should be imaginative and "big picture" designed to make a difference.</p> <p>Accordingly, they must focus on outcomes and results rather than process and activity. In this sense, they have a <i>strategic</i> orientation.</p> <p>Missions should contain smaller, targeted sub challenges that contribute to achieving the overall result.</p>
<p>What criteria should be used to select Missions?</p>	<p>There should be at least two sets of criteria relating to -</p> <p><i>Capturing a "vision"</i> - an identifiable, measurable, and desired result that attracts widespread university, industry, and community support, commitment and imagination. For example, clean growth, global leadership in digital manufacturing, a fairer and more equitable society (all capable of being broken into sub-challenges).</p> <p><i>Addressing an endemic problem</i> - where the causes and solution is known, but <i>the means</i> to effectively resolve it have not been developed. A current example is the link between diet, obesity, diabetes, and cardiovascular disease (sub-challenges would emerge around clinical, public health, and behavioural responses).</p> <p>Criteria should be developed separately for each mission, rather than laying down a generic one-size-fits-all set of rules, giving greater scope for innovation.</p>
<p>Is Australian research sufficiently linked to demand? Where are the opportunities to link supply to demand?</p>	<p>No. My Paper Challenges for Australian Research and Innovation pointed to a 'mismatch' between research commitment in health and medical research relative to commitment to engineering and technology research.</p> <p>There are opportunities to link supply to demand around AI, data and analytics, robotics, visualisation, cyber, clean energy, and net zero emissions.</p>

Discussion Question	Response
<p>How can university researchers identify this demand?</p>	<p>University researchers are not necessarily in the best position to identify demand. Moreover, researchers, acting alone, will tend to focus on supply – technology push.</p> <p>Demand should be reflected in institutional, faculty and institute research plans and priorities based on industry (market) research and analysis.</p> <p>Technology transfer offices and research offices have a crucial role (see below) and should be resourced to do so.</p>
<p>Stage-gated Scheme design</p>	
<p>Is a stage-gated model suited for the Scheme?</p>	<p>Yes, definitely. In addition to the examples cited in the Consultation Paper, stage-gate approaches are used widely in industrial R&D. They provide a discipline on whether a project should proceed, be shut down, or revisited after a review, or when circumstances change.</p>
<p>What is the appetite from industry and private investors to participate in such a Scheme?</p>	<p>Good, based on experience in Agriculture - for example, eradication of FMD, rabbits, drought and pest-resistant crops, work on fruit fly eradication.</p> <p>Industry should be heavily involved in developing missions and strategies.</p>
<p>How should any stage-gating process be defined to ensure any additional incentive is maximised?</p>	<p>The technology readiness framework in the Consultation Paper (proof of concept, scale-up, commercialisation) is well known. However, it reflects a "technology push" approach that may not align with market or end-user demand considerations.</p> <p>In opening the commercialisation gate, mindsets must move from technological possibilities to hard-headed business assessment. A widely used framework used by venture investors involves consideration of –</p> <ul style="list-style-type: none"> ▪ Desirability - What's the unique value proposition? Do people really want this product or service? Does it make sense for them? How much are they prepared to pay? ▪ Viability – Is there the makings of a sustainable business? What has to be true for this business to work? What are the costs? How will it be paid for? Is the management team up to the job? ▪ Feasibility - Is the business model functionally possible in the foreseeable future (e.g. complementary sales, distribution, and service infrastructure, connection to global value chains)? Is it 24/7 reliable? Can quality be guaranteed? <p>This approach would ensure that a technology push perspective can be extended into a business assessment (demand-driven) approach. It could draw together incentives in technology development (R&D) programs with a wide range of business development incentives in Commonwealth and state/territory enterprise development programs.</p>

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How should projects be selected?	<p>Selection based on objective, expert, and independent assessment of a <i>problem (need)</i> to be addressed and/or an <i>opportunity</i> to be captured.</p> <p>Projects within Missions must be unique, distinctive, and contain a stretch factor. They cannot be extensions of "science as usual".</p>
How should the success of projects be measured?	<p>Progressive measurement of outputs, outcomes, impacts, and results achieved in relation to purpose. Measures should capture substantial <i>change</i> to pre-existing conditions.</p>
Incentives for participation	
What broader incentives influencing the business and university sectors may influence their participation in a Scheme?	<p>Business, university, and non-university HE providers should be invited to participate.</p> <p>Incentives inevitably focus on resources to commit to capacity building, offsetting costs, increasing returns, and reducing risks.</p> <p>Taxation incentives are attractive to business, while program grants are attractive to universities. The challenge continues to be in assuring efficacy in the process. More public venture capital could be available to address system failures.</p> <p>Before new incentive schemes are designed or copied from overseas, the experience of the many previous and subsequently abolished programs, such as the successful Innovation Investment Funds (IIF) Program and other discontinued commercialisation grants programs, should be fully investigated.</p>
What would motivate businesses, universities or private investors to invest in this Scheme?	<p>For business, risk-adjusted long term return on investment; for universities, assurance of funding for research; for investors capacity to leverage investments into larger portfolios.</p> <p>Brand, reputation, and credibility can also be important.</p>
Aside from co-funding, should universities or businesses have any additional requirements for participation?	<p>Consistency with Board or Council endorsed medium to longer-term strategic plans. That is, participation should not be an "add-on" to gain access to more funding.</p>
Industry-university collaboration	
How may the Scheme incentivise or support better industry-university collaboration?	<p>Incentivisation and support for collaboration can be reflected in selection criteria - as is the case with the CRC program.</p> <p>Participation will be enhanced if application processes are clear, transparent, outcome-oriented, and free from political interference.</p>
Would an Industry PhD program help improve collaboration outcomes?	<p>Industrial PhDs would be an essential design element. University academic boards should be encouraged to design and endorse Industrial PhD programs involving students working in industry and bringing industry projects (subject to effective handling of IP issues). Scholarships should be made available.</p>

Discussion Question	Response
<p>Are there skills gaps in academia or business that inhibit collaboration or commercialisation?</p>	<p>Yes. Staff in business and academia tend to have little understanding of how their counterpart organisations operate.</p> <p>There is scope for greater interchange of personnel and establishing stronger business connections. This could include:</p> <ul style="list-style-type: none"> ▪ Appointment of "industry professors" or "professors of practice" under short term and/or conjoint arrangements ▪ Leveraging the contribution and participation of alumni communities ▪ Strategically initiated adjunct and honorary appointment arrangements.
<p>How can we increase collaboration between university researchers and industry, particularly amongst SMEs?</p>	<p>There are many programs across the research sector (e.g. CSIRO, CRCs, DST) designed to increase industry collaboration. These should be examined to see what would work for universities.</p> <p>Consideration should be given to extending aspects of the Entrepreneurs Program, the ARC Industrial Transformation Research Program, and extending the CRC and CRC-P programs.</p> <p>State governments have experimented with “innovation vouchers” to build university and SME connections.</p> <p>Collaboration could be improved by creating a network of UK ‘catapult like’ centres within or adjacent to universities, drawing in working models across the university system, including Cicada innovations, Canberra Innovation Network, Melbourne Connect, Fishburners, UNE Smart Region Incubator, CSU AgriPark, and extending to State government initiatives such as NSW Agriculture’s Gate Program, Brisbane’s The Precinct, and Adelaide’s Tonsley Innovation District.</p> <p>Opportunities may exist to embed collaboration arrangements in property development initiatives currently underway in and around university campuses. Costs of SME participation may be a barrier.</p>
<p>Governance arrangements</p>	
<p>a) What stakeholders should be involved, and where, in the governance arrangement?</p>	<p>Participation across university peak bodies (Go8, ATN, IRU, RUN, and selected non-aligned universities), industry peak bodies, government (Commonwealth/state/territory), and peak professional associations.</p>
<p>b) What type of Governance arrangement is best suited for the Scheme?</p>	<p>With multiple stakeholders, a collegial governance model could be developed with decisions reached on consensus around the merit of proposals.</p> <p>Decisions should be reported on a three-year cycle and updated annually.</p> <p>A small secretariat would support the 'college'.</p> <p>Responsibility and accountability for resource allocation and commitment would appropriately rest with a Minister.</p>

Discussion Question	Response
c) How should projects be selected and managed?	<p>Projects would be submitted by stakeholder members and through consultation processes.</p> <p>Projects would be selected based on meeting criteria and order of priority.</p> <p>Project management would involve annual reporting against milestones and regular external reviews (well established in the CRC program's architecture).</p>
d) How can the Governance arrangement minimise administrative burden whilst also minimising risk?	<p>Governance related reporting can be designed around five to seven KPIs designed to give an overview of how results are tracking concerning benchmarks established in the governance framework.</p>
Institutional capacity building	
a) Is there sufficient institutional capacity for research commercialisation?	<p>Capacity varies considerably across the sector. Some research-intensive universities have well-resourced and highly regarded technology transfer offices (TTOs).</p> <p>However, there has been extensive restructuring and realignment of TTOs over the years, which has created instability and loss of capability and social capital.</p> <p>As research commercialisation is an expensive business, and most universities lose money on it, smaller and less research-intensive universities struggle to develop capacity and tend to give it a low priority.</p> <p>The absence of commercialisation capacity may leave potential commercialisation opportunities untapped. Limited capacity may also mean that universities have unrealistic perceptions about the value of IP and take a transactional approach to negotiating with potential industry partners.</p> <p><i>A new scheme should include funding to support the operation of Technology Transfer Offices in protecting Intellectual Property and developing capabilities for negotiation of licensing and collaboration agreements with industry partners.</i></p>
b) How should capacity building be supported?	<p>Support should focus on strengthening, building, and appropriately investing in university-business engagement arrangements, including but not limited to:</p> <ul style="list-style-type: none"> ▪ Cooperative research centres, including those modelled on, but not part of, the formal CRC program. ▪ The ARC research translation program. • Place-based innovation initiatives, including innovation hubs, precincts, and districts, that facilitate connections and collaboration between universities and businesses. These initiatives cover a mix of <i>incubators, accelerators, co-working spaces, and innovation support activities.</i> • <i>Creating separately funded institutes of applied industrial research</i> connecting universities and industry but not driven by the pressure for citation-based promotion. The model has worked well for medical research institutes.

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c) Is there a place for innovation intermediaries?	<p>There is a place for independent intermediaries and brokers who can initiate and facilitate the creation of sustained connections where system failures can be identified.</p> <p>System failures concern information asymmetries in relation to market opportunities, knowledge of the availability of testing laboratories and scale up facilities, and cost-effective business advice.</p> <p>There have been previous government initiatives, including the Australian Institute for Commercialisation, which continues without Commonwealth funding.</p>