Final Report – ATN Industry Innovation and Collaboration Forums

Funded by the Department of Industry, Innovation and Science

October 2015
Background

Australia performs poorly when it comes to cooperation between industry and universities. Aside from the frequently referenced OECD data where Australia ranks 29th out of 30 OCED countries on the proportion of large business and small the medium enterprises (SMEs) collaborating with higher education and public research institutions on innovation, the matter is further illustrated by one recent survey in which only a minority of industry respondents (15 per cent) and public service respondents (24 per cent) believed that cooperation is well developed in the area of knowledge transfer and technological cooperation between universities and companies. This is in stark contrast with the importance assigned to cooperation for Australia’s future success as a nation within an overwhelming majority of studies.

Australians are right to expect a strong return on their nation’s investment in public research. An increase in industry-university cooperation holds great potential for improving not only the performance of firms and universities that engage in this cooperation but also for Australia as a nation. For example, it has been shown that firms which innovate and source their ideas from research organisations (‘science-based’ innovation) are 34 per cent more productive than those that do not; and that firms that accompany their innovations with collaboration are 31 per cent more productive.

Against this backdrop, the Australian Technology Network (ATN) of universities, with support from the Department of Industry, Innovation and Science, organised four Industry Innovation and Collaboration Forums in the industry domains of: Financial Services; Food and Agribusiness; Advanced Manufacturing; and Mining Equipment, Technology and Services, with the aim of identifying key barriers to university-industry cooperation, as well as areas where cooperation has the potential to deliver major benefits to industry.

Process

The four Industry Innovation and Collaboration Forums each took place over a four-hour period and followed the same structure:

- Welcome, purpose and objective of the Forum;
- Showcasing of examples of successful university/industry cooperation within the industry sector;
- Tours of state-of-the-art research facilities in the host university; and
- Facilitated discussion.

The facilitated discussion was captured and is synthesised into the body of the report as presented below.

Key findings

The key findings emerging from the forums were:

1. There is often a mismatch between the kinds of problems that industry believes universities can solve for them, and what is appropriate for collaborative work involving a university partner; and companies do not necessarily view Australian universities as the likely or principle source of their research solutions.

2. The university sector should offer industry simple, clear and accessible guidance on options for collaboration, with identifiable risk, cost and duration parameters; and clear information as to how to move from light-touch engagement to deeper and more resource-intensive collaboration. Additionally, both sides need to better recognise that it can take significant
time and effort from all parties to build a relationship that is of suitable maturity to underpin success for more involved research collaborations.

3. Poor collaboration to date between research organisations and industry is in part due to Australia’s industry structure, dominated by micro firms and SMEs. Solutions to tackle enhanced collaboration will need to be fit for purpose in the Australian context.

4. Access to robust intelligence and supportive policy and regulatory regimes is key to de-risking investment in industry/university collaborative research.

5. Success in collaboration comes down to individuals. Much more needs to be done to capitalise on the resource that engaged students and skilled graduates can bring to industry, especially micro firms and SMEs; and Australia needs more people who can genuinely work as connectors between industry and the research sector.

Mismatch between the problems industry presents, and what is appropriate for collaborative work with universities.

There was a common misconception at each of the forums about the type of industry problems universities are best equipped to solve. In general, there is a lack of knowledge about what the research sector can offer, and a lack of understanding as to what problems are suitable for universities. The most common forms of industry university cooperation are: commercialisation of R&D results; curriculum development and delivery; entrepreneurship; governance; life-long learning; mobility of academics; mobility of students; and R&D. Among those firms that do cooperate with universities it is common to partake in many of the different forms of cooperation.

While industry-to-industry collaboration is a strength, low levels of interaction between industry and research organisations lead to problems with transition and understanding of next steps (application) of research in industry. Particularly in the Financial Services sector, there were perceptions around universities’ lack of business insight, project management skills, long-term vision and lack of willingness to invest in the necessary relationship-building before heavy-touch projects materialise. This is compounded by the fact that industry perceives universities do not have a clear portfolio of relationship and collaboration offerings easily accessible to industry, with differing risk profiles, cost and duration.

The Financial Services sector discussion was characterised by a low level of maturity and experience as relates to collaborating with universities – the difference with similar discussions in other global financial hubs like London, New York and Chicago was striking, even allowing for the fact that the financial services industry generally considers the importance of universities as low as a source of knowledge for innovation. During the forum, this sector focussed strongly on the role for universities in educating graduates and upskilling sector professionals.

This contrasted to the discussion in the Food and Agribusiness forum, where commentary from a range of industry participants suggested that innovation collaboration with universities is not viewed always a value-adding activity. The sector is challenged by low productivity improvements in both the return-to-scale and return-to-size aspects, as well as rising external costs which mean that the input and production costs are higher than the perceived value from innovation. Furthermore, perceptions around the high switching costs and barriers to exit present activities were seen as a disincentive to innovation. From the primary producers’ perspective, it was commented that there is no easy switch to another commodity on the land in which they are already invested. There was also a focus on new-to-firm innovation, suggesting that companies are more comfortable seeking and adapting solutions that already exist and hence are not as driven towards university research collaboration. There is further a perceived lack of funding as well as a lack of awareness of what universities can do. This sector exhibited a high degree of expectations that government would assist in different ways. The forum introduced a number of participants to new thinking about alternate
ways to use innovation to their advancement— for example through market differentiation and value-adding commodity outputs.

In both the Advanced Manufacturing and METS sector, a low level of ongoing interaction between universities (research) and industry was noted as causing problems with taking innovations to market through the ‘valley of death’. In particular, it was noted that more success would be likely if universities invested in ‘foresight’ activities, with personnel of appropriate industry insight housed internally to the university sector to help them identify the challenges for various industry sectors 5 and 10 years hence. There should be better mobility between universities and industry for this to occur.

Universities should do more to clearly outline for industry the options for collaboration, with identifiable risk, cost and duration parameters.

Many participants noted the different risk profiles of Australian research organisations and industry as a significant barrier to innovation. Achieving a common understanding of risk and the associated trade-offs is critical, and cases of successful collaborative approaches to innovation were identified when both the partners had ‘skin in the game’. The management of Intellectual Property through models that facilitate and expedite collaborative arrangements plays a crucial role. Companies must continually make assessment of the trade-off between risk and reward for their investment in collaboration. It was suggested that policies and initiatives should have a focus on de-risking and streamlining to tip that balance.

As part of the collaborative process, both parties need to consider the various pros and cons on the spectrum of straightforward contract research or a consultancy through to a genuine long-term research partnership, and the associated intellectual property considerations. Furthermore, universities need to educate industry about the kind of problems the university sector can solve and the range of collaborative options available ranging from light-touch (e.g. short term student placements) to heavy-touch (e.g. collaborative research projects).

Poor collaboration between research organisations and industry to date is in part due to Australia’s industry structure, dominated by micro firms and SMEs.

A lack of medium sized companies and multi-nationals within Australia emphasises the importance of SMEs in the Australian innovation ecosystem. It is important to note that this also often results in an incomplete supply–chain, and a reduction in demand on improvement and innovation. Collaboration within priority areas is often driven through industry-to-industry efforts.

In contrast, the METS sector is well placed with $90 billion in gross revenue and a higher proportion of large businesses to SMEs relative to other sectors in the Australian economy (23% ‘large’ companies; 77% SMEs). In a survey by Austmine, 39% of respondent companies collaborated, of which 42% stated that they collaborated with universities.

One way of countering Australia’s issue of company size is by aggregating and pooling areas of strength across and within sectors. Research efforts need to be centred on solving problems collectively i.e. via centres of excellence (industry doesn’t care so much about sovereign university issues, they just want to access the best research capability wherever it might be). It was noted across the forums that Australia needs more models and resourced structures for different players to work together. From a government perspective, effort can be made to channel funding to specific industry problems where individual companies do not have scale to address in order to bring SMEs into the fore. This issue remains pertinent even for sectors with proportionally more large corporates, such as METS, given that ‘game changing’ technology challenges often fall beyond the scope of a single player to address. Furthermore, it was suggested that there could be flexibility in funding contribution depending on the size of a firm (e.g. in-kind contributions may be more appropriate for SMEs).
Additionally it was observed that all too often, innovation activities and discussions are undertaken by the small proportion of converted companies who are already innovation-active. It will be critical to widen the net of participating companies in the nation’s innovation ecosystem, many of whom are not visible to those who can provide support, nor the policy makers who develop initiatives arguably targeted at them. More needs to be done to identify, map and then engage with ‘innovation-potential’ companies who are not currently actively part of key ecosystems.

**Access to robust intelligence and supportive policy and regulatory regimes is key to de-risk investment in industry/university collaborative research.**

It was repeatedly suggested that government needs to support the innovation process via procurement practices whereby they act as a lead customer, particularly enabling long term, high risk ‘research-to-market’ activities in areas of critical importance to the nation such as defence and health. The UK Small Business Research Initiative (SBRI) and US Small Business Innovation Research (SBIR) program were cited as examples where this has worked successfully. It is argued that this would turn Australia into a country that invests in its own ability to generate innovative solutions, rather than adopt them.

In the Food and Agribusiness domain, provenance and the traceability of food was highlighted as a key area were Australia has a competitive advantage in the Asian market. It was suggested that Australia should establish a consumer insight centre to enable us to be more responsive and hit the mark in relation to desired tastes, health issues, convenience, and freshness and drive the technologies to support that (e.g. environmentally sustainable systems and manufacturing systems). Such an approach has been adopted by Singapore with the Asia Consumer Insights Institute, established in 2011 as an initiative of the Singapore Economic Development Board. The initiative aids businesses to build unified customer focussed strategies and create value in the areas of innovation and new market developing, including linking through to relevant research organisations and institutes. It was noted that Australia would benefit in developing a provenance approach to food and value-added product production, leveraging its reputation as a safe and certified producer. Government regulation will be critical in supporting the sophistication of our food provenance systems.

There was also a call for Australia to create overarching 10 year visions for different sectors that allow industry, universities and government to all work together in achieving long term goals. It is hoped that the Industry Growth Centres will help achieve this but it was noted that bipartisan support would be required to achieve longer term objectives and engagement, and that all parties need input. It was suggested that stable policy environments would help mediate perceived risk in entering industry-research relationships, especially those facilitated through government supported programs.

There may be value in developing a national R&D Scoreboard, and/or an Innovation Index, along the lines of similar entities that have been in operation in the UK for many years. Entities such as R&D scoreboards can create an evidence base for the precept that innovation drives growth and profitability, showing that companies that concentrated on organic growth through investment in R&D with associated capital investment and market development, are more likely to have increased shareholder returns, and has been important in driving company behaviour.

Similarly, a national Innovation Index could look at investment in intangible assets, such as design, organisational improvement, training and skills development, software development, advertising and market research, as well as the more traditional R&D, as measures of innovation investment, giving evidence as to why these ‘soft’, or ‘intangible’ innovation elements can make a difference in achieving a successfully innovative enterprise.

**Relationship building is a key determinate for success in industry-research partnerships.**
A strong theme cutting across the discussions was the importance of developing relationships and recognition that a long lead time is often required (approximately 3 years) to build trust before the maximum value from a collaboration can be fulfilled.

In this process, it was commented that universities and researchers need to be able to clearly communicate their capacity and value proposition. The Financial Services forum participants particularly had a low degree of confidence that the collaborative relationship would yield what they needed within required time and resource constraints.

Embedding industry practitioners into universities was noted as one way of bridging the cultural gap between the sectors. However, significant change needs to occur at the senior leadership level to develop innovative cultures and mind-sets. Here, researcher mobility will be important, alongside Research Training System industry elements, as a pipeline towards getting more PhD qualified people into CEO and senior industry roles, so they understand the process and the university world better.

In order to broker the cultural differences between research organisations and industry, we need to examine the incentive structures in both sector. It was noted that other parts of the world have far higher proportions of industry-experienced professors and other personnel who are engaged and rewarded professionally on the basis of their connection to, and understanding of, the needs of industry. The cultural shift in Australia is happening slowly with CSIRO has recently dropping the publication of academic papers and citations as key KPIs. R&D tax incentives were suggested as one way of tackling this issue.

In terms of visibility and taking an active role in the innovation chain, universities and researchers need to be seen as a pipeline supplier of ‘resources’ (i.e. knowledge) to businesses. Students are a great industry feeder- they are relatively easy to arrange to cross the borders in terms of mobility between sectors (e.g. industry placements) and provide great connectivity back to researchers in their universities. It was noted that since foundational skills are paramount in sectors such as Advanced Manufacturing, university education should provide the basic pillars alongside the appetite and tools for lifelong learning, and curiosity driven problem solving. Work Integrated Learning could be a major focus for developing entrepreneurship, commercialisation and industry-ready skills.
The following are industry and university-tested principles of engagement identified at the forums:

Principles of Engagement

- Ensure that researchers speak the language of business.
- Ensure that research teams are interdisciplinary in nature.
- Ensure that the research team have good project management skills.
- Invest in building trusted relationships and accept that this may require a significant time investment before maximum value is met on both sides.
- Educate industry in what good research problems look like.
- Ensure the transfer of staff between the sectors (both ways) on all levels.
- Before seeking collaboration, companies should ensure they have top-management commitment, and absorptive capability, understanding of timelines and resource commitment, understanding of the risk profile and willingness to stay the course.
- Ensure that university KPIs are aligned to simultaneous achievement of excellence and relevance.
- Educate the research team members in how to simultaneously produce industry relevant output and academically relevant output.
- Put in place differentiated KPIs for different types of collaborations.

Conclusion

As a result of the key findings discussed above, a number of key policy recommendations have been developed:

Recommendations

1. Whilst the nation needs an overarching innovation strategy, innovation policy must also be broken-down by sector- each sector faces unique challenges and opportunities, and exhibits varying degrees of maturity in relation to industry/ research sector collaboration.

2. Significant work needs to be done to ensure industry better understands the nature of the problems that universities can solve for industry, and how; along with greater clarity and strengthening of the relative roles of Publicly Funded Research Organisations such as CSIRO, and universities.

3. Australia needs more targeted resourcing of industry-focussed research, with a more strategic, market-led approach to government support for key technologies in areas where Australian industry can commercially take advantage

4. Australian universities must work more collaboratively within the sector, so that research offerings for industry are bolstered and strengthened, clustered around genuine areas of excellence (here ‘excellence’ very clearly includes the value of the research to industry), and so that research efforts can address grand challenges for individual industry sectors, where no one company or university has the critical mass or depth of ability/resourcing to achieve ‘game changing’ innovations.
5. A strengthening of prior observations that incentive structures for the university sector to engage with industry are fundamentally lacking, and that addressing this is critical.

6. Government can monitor and incentivise industry to invest better in R&D and innovation through development of an R&D Scorecard and/or an Innovation Index.

7. It will be critical to identify, map and better engage with SMEs that exhibit ‘characteristics of innovation’, but who are not currently engaged or connected to the research sector. This will both better inform resourcing of the nation’s innovation effort, and deepen the depth of national participation in innovation.

---

1 OECD data (2013) based on Eurostat (CIS-2010) and national data sources; referenced in Department of Education and Department of Industry, Boosting the commercial returns from research (2014).


6 Only 5% of financial services firms cooperate with universities as relates to R&D in the UK but 3 times that number looks at universities as an important source of information for innovation activities (Haskel, J., Hughes, A., & Bascavusoglu-Moreau, E. (2014). The Economic Significance of the UK Science Base).


9 https://sbri.innovateuk.org/

10 https://www.sbir.gov/about/about-sbir