Australian Academy of Science | NATIONAL COMMITTEE FOR MATERIALS SCIENCE AND ENGINEERING

AustraliUniversity Research Commercialisation Consultation Paper

Feedback from the National Committee for Material Science and Engineering

The Australian Academy of Science's National Committee for Material Science and Engineering (NCMSE) commends the government's ambition to establish mechanisms that stimulate, support and facilitate the commercialisation of research. We welcome the opportunity to provide feedback to the University Research Commercialisation Consultation Paper, as follows.

I would be happy to discuss any issues rained in this submission. Please contact the Australian Academy of Science via the National Committees for Science Office (nc@science.org.au).

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Chair, National Committee for Materials Science and Engineering

General Points:

Research excellence is a prerequisite for research commercialisation. Without excellence in fundamental research, there will be no ideas or inventions to commercialise.

The consultation paper asks how to "shift the emphasis" within universities from research excellence to research commercialisation. This suggests the two activities are somewhat independent. Commercial outcomes from research are underpinned by many years of fundamental research. The countries and specific universities cited in the paper all invest heavily in fundamental research. If the focus on commercialisation is at the expense of excellence in fundamental research, there will ultimately be nothing to commercialise. Research excellence must be maintained. Where Australia is underperforming is in establishing and delivering effective mechanisms that can capitalise and commercialise excellent research to deliver benefit to Australian society. The NCMSE welcomes the opportunity to consider how best to achieve this.

Mission-driven research

Points for consideration:

- Mission-driven funding schemes are provided already to some degree by existing schemes such as the CRC and CRC-P schemes, Industrial Transformation Hubs and Innovation Connections etc., albeit on a smaller scale. They play an important role in connecting and facilitating industry-university collaboration and driving research relevant to *existing* industries and national priorities, with significant cash investment from industry. These schemes should be continued, if not expanded.
- Missions should be defined with sufficient breadth and flexibility, so as not to inhibit or prevent the translation of unexpected, breakthrough research outcomes.

- Missions should be aligned with areas of strength in the University sector that, successfully commercialised, have the potential to develop into impactful Australian industry.
- Alignment of commercialisation funding mechanisms with national priorities is important, however, there is also a need for mechanisms that can support the commercialisation of disruptive, paradigm-shifting research, even if this falls outside a Mission.
- Mission driven research has value for commercialisation and engagement with existing industries. Whether and how it can facilitate the generation of new start-up industries based on new research discoveries is less clear.

Stage-gated design

Points for consideration:

- A comprehensive stage-gated design could be extremely useful. It can provide a format for the delivery of different types of funding at different stages of progression to ensure translation of research across all stages to achieve commercialisation. This is currently lacking in the Australian funding landscape. The US SBIR/STTR programs are good examples of such an approach.
- It is noted that stage-gates as part of projects are already provided through existing Federal schemes at the transition points between schemes; such as transitioning from Innovation Connections to SIEF STEM+Business to Accelerating commercialisation. However, these are not integrated within a single scheme.
- The ability to go from concept to product entirely within Australia is invaluable for ensuring Sovereign capability and IP protection. Appropriate manufacturing equipment and prototyping facility support for the various fields is critical.
- A stage-gated structure needs sufficient flexibility to support the diverse nature of research ideas that might be commercialised. This requires mechanisms that have agility in their timing, scale and type of support to ensure fast, cost-efficient and competitive commercialisation.
- In order to support University commercialisation, a stage-gated design needs to be targeted to the sector. University commercialisation needs are different to non-University start-ups.
- There should be a clear roadmap offered to university and industry to go through different technology and manufacturing readiness levels. It should be clear how they proceed from concept to product in market with consistent support.
- Government needs schemes that incentivise Australian industry to develop a less risk-averse culture. To compete internationally, Australian industry needs to be encouraged to accept greater risk at an earlier stage with the promise of greater percentage returns for successful projects. Mechanisms to encourage industry funding at stage 2 should be included. Providing full tax-payer support up to stage 3 leaves almost all the risk with the tax-payer and universities and very little with the industry.

Incentives for participation and **Industry-University collaboration**

Points for consideration:

- There is no person more motivated to commercialise research than the inventor of that research. Most university researchers want to see their research bring societal and financial benefit.
- An effective Research Commercialisation Scheme needs a mature understanding of the fundamental barriers to commercialisation experienced by academics and universities. These include:
    - Lack of expertise of academics and university managements in research translation – realising patents, start-ups, accessing venture capital, business systems etc.
    - Lack of time to invest in research translation – academics core activities, namely teaching and research, already consume much more than a full working week.
    - Limited or no control and/or ownership of IP by the academic (inventor).
    - Academic workload models and career progression do not recognise:
        - The time taken to establish commercial partnerships and networks, which can be extremely lengthy.
        - Low publication outputs on industry based projects, particularly precarious for researchers on short term contracts.
        - Outputs and outcomes of commercially-focused activities.
- It should be natural for careers to transition between industry and academia without being adversely impacted, as is common in other countries. Re-entry into academia can be difficult as the experience is not recognised in terms of traditional academic outputs. This negative perception and assessment resides both within universities and also within grant funding schemes.
- Countries with successful research translation records and high tech start-ups and SMEs have an ecosystem of supporting industries (often small scale), such as instrument makers, software developers, electronics designers, glass-makers etc. These provide the critical skills and capabilities that can build a proof-of-concept product out of an initial research idea. Australia does not have this depth or breadth of underpinning design and manufacturing capability, limiting opportunities to develop products to proof-of-concept stage.
- Relatively few Australian industries employ staff with sufficient research background to understand and engage with university research leaders. Industry, industry leaders and industry representative organisations often lack an understanding of the benefits and mechanisms by which academic research can grow their business.
- Australia's innovation-active companies are low in number. Relative to other countries, there is often limited understanding amongst industry leaders and industry organisations as to how high-tech industries succeed, coupled with a low appetite for risk.

Proposals to address the above:

1) Establish targeted fellowships schemes to achieve the following:

    a) A fellowship scheme to provide university researchers with the capacity to focus on commercialisation or entrepreneurial activities. This needs to be flexible in scope, length and funding, to accommodate different commercialisation stages and needs. The turn-around time from application to outcome needs to be short.

    b) A fellowship scheme to enable university/industry researchers to undertake internships or sabbaticals within a relevant industry/university, respectively. This should be available to every career level, from early (PhD) to senior career stages, and across a range of timeframes, (e.g. from 3 months to 3 years) depending on need. Besides solving industrial significance problems, this will help build linkages and understanding, provide employment pathways and entrepreneurial experience, particularly for young researchers. Current PhD scholarships and postdoctoral grant funding is time-limited, discouraging opportunities for internships within industry.

2) Employ mechanisms to encourage universities to recognise industry engagement as a legitimate academic activity in workload and promotion models and to provide targeted investment to support industry engagement and commercialisation. An example of such a mechanism might be to include industry engagement in quality measures, such as ERA, not at the expense of research excellence but as a complement to it.

3) Consider different IP ownership models that offer more incentive to the academic inventor to commercialise their research.

4) There is a need for researchers to have access to high quality, expert advice, mentors and facilitators to support the establishment of start-ups, engagement with patent offices, venture capital firms etc as appropriate. This expertise is rare, not just within the university sector but also within some industries. How to provide the right expertise in the right format at the right time is challenging. A few thoughts:

    - Consideration might be given to a government-funded advisory and facilitation service, with mechanisms to link with mentors in relevant sectors.
    - Universities need to engage support staff with exceptional commercialisation expertise and experience who have the connections to facilitate and enable partnerships at every stage of commercialisation.
    - Universities and/or industry might offer training programs in entrepreneurship/incubators etc for younger researchers – the leaders of the future.

5) Industry needs to be incentivised to employ research literate staff who can understand and realise the potential offered by university research expertise that is relevant to their industry needs.

Governance arrangements

Governance arrangements need to be developed in consultation with the Chief Scientist, the Australian Academy of Science, Australian Academy of Technology and Engineering, CEOs of ARC, NHMRC, CRC, University DVC-Research and industry representative organisations.