Australian Academy of Science | NATIONAL COMMITTEE FOR PHYSICS

University Research Commercialisation Scheme Submission
National Committee for Physics

The National Committee for Physics (NCP) of the Australian Academy of Science welcomes the opportunity to make a submission in support of the proposed University Research Commercialisation Scheme.

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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Understanding the laws of nature is fundamental to our ability to harness them for the development of new technologies for the betterment of humankind and the planet. Physics is a discipline that seeks to expand the boundaries of our understanding and has been the enabler for achieving massive social and economic benefits, from medical technologies such as MRI, to the electronics revolution that underlies our modern digital lifestyle.

History has shown that there is a long incubation period for the translation of discoveries in fundamental physics to practical applications. An example is quantum mechanics, which, when formulated in the 1920s, was an esoteric theory only understood by some of the brightest academics in Universities. In the 1960s, quantum mechanics laid the foundation for the development of the modern electronics industry. The multi-stranded network of interacting research endeavours, often multi-disciplinary that tracks from fundamental research to technologically and economically beneficial outcome must be continuously nurtured and facilitated. An initiative to encourage and hasten the translation of fundamental research outcomes in Universities into new technologies for the benefit of the Australian economy and society is supported.

Quantum computing and quantum technologies have been identified as one emerging field of research strength Australia, requiring both support for continuing fundamental research and the translation of fundamental findings to practical devices, opening the way to new industries. Several spin-off companies already established by Australian University researchers are already leaders in this process of translation of quantum technologies.

We now address the five issues raised in the Consultation paper (over page).

1. **<u>Mission-driven research</u>** – *"… based around a Challenge, usually set by a government agency and/or group of experts."*

Many of the spin-off technologies that underly our modern lifestyle and economies have resulted from "blue-sky" fundamental physics research – meaning research conducted with the purpose to better understand the world around us, rather than to address a challenge or a target set by a group of experts. Whilst the latter can address specific immediate priorities for governments and industry, it is very unlikely to result in the "game-changing" new technologies of the kind that blue-sky physics research has led to. Increased mission-driven research would require new investment in the Australian Innovation system to be successful by the measures the Government intends to implement. The schemes referred to in the consultation document that is successfully being implemented in other advanced technology enabled and enhanced economies have resulted from dedicated investment by Governments.

2. **<u>Stage-gated scheme design</u>** – *"The risks involved in the development and commercialisation of very early-stage scientific research are often too high for businesses to justify funding the necessary development …. with many Governments addressing this gap through providing funding for high-risk research."*

Much of the high-risk fundamental physics research in Australia (such as in quantum technology) that has led to several spin-off technologies and companies are funded by the Australian Research Council via Discovery Grants and the Centres of Excellence Scheme. Without these schemes, physics research and its ability to be translated to commercial outcomes would wither, as the risks involved for industry are much too high with "blue-sky" research. Therefore, it is vital that funding for the ARC and the success rates for grant applications be reviewed as part of this process. University researchers are investing large amounts of valuable research time preparing voluminous ARC grant applications that have a low chance of success due to limited funding. The nation is not gaining the benefit of the talent of the applicants.

3. **<u>Incentives for participation</u>** - *"The current university system is incentivised to deliver and reward research excellence more than research commercialisation."*

There is clear evidence that employment and promotion in the university system are based on research excellence (and, to an increasing extent, teaching excellence). University-based research commercialisation relies on academic staff also venturing into finance and management fields for which they are ill-equipped, and traditionally, they have not been rewarded by university workload or performance models. An increased focus on commercialisation of research will require a support structure for such academic staff to fill the gaps in their commercial expertise and a recognition of the redeployment from research and teaching activities in workload and promotion criteria. Elsewhere in the world, success has been achieved by early career researchers and PhD graduates becoming the founders of

companies with strong support from the more senior academic staff who remain in the University. The investment to drive such developments (eg. Scotland, Switzerland) is substantial and should be considered part of this scheme.

4. **Industry-university collaboration** – *"A Scheme may drive broader culture change across the business and university sectors by enabling or incentivising industry-university collaboration."*

The existing ARC Linkage grant scheme provides a mechanism for funding of large-scale, multi-year duration industry-university collaboration. These research grants primarily cover the salaries of fixed-term staff contracted to achieve the project's aims. Any scheme to drive broader culture change has to give due consideration that dedicated, highly educated people are the key requirement for success. The current environment, which has fewer continuing university staff working at an ever-increasing intensity to deliver the increased productivity required of them, and financial support through competitive grants that come in quanta that are too small to provide ongoing employment for highly educated and trained contract staff for periods of reasonable duration is not optimal for the planned outcomes. A focus on the sociology of how to facilitate the desired collaboration most effectively will be beneficial. In other developed nations, the parallel roles of strong government support for fundamental research, as a means to support the highly skilled and capable research staff, and industry and government supported projects via which industry benefits from that skill and capability, appear to be well understood and implemented.

The ARC Linkage grant scheme involves a significant funding contribution from the industry partner. This can mean it is not well suited to the exploration of high-risk translation of university research to commercial outcomes. A scheme that allows industry participation at the early stages of commercialisation of high-risk research at lower financial risk has greater potential to lead high-value technological advances for Australian industry.

5. **Governance arrangements**

The biggest challenge for appropriate Governance of any schemes that are to be put in place is that they operate in an open and transparent manner with clear ethical and procedural guidelines. Robust committee processes remain the best way to achieve this.