2022 List of Critical Technologies in the National Interest

IRU response – 30 September 2022

Executive Summary

The Innovative Research Universities (IRU) appreciates the opportunity to make this submission to the Department of Industry, Science and Resources on the 2022 Critical Technologies List.

The IRU welcomes the focus on key technology areas and agrees that research, technology and innovation play a critical role in delivering Australia's future prosperity, security and wellbeing. Open consultation and discussion will be key to the uptake of new technologies across society in ways that minimise risks and maximise benefits for the greatest number of people.

The 2022 review of the Critical Technologies List provides an important opportunity to clarify the purpose of the list and its connection to both broader policy-making across government, and to the research community in universities.

At this stage in the process, rather than suggesting specific technologies that could be added to or removed from the List, the IRU recommends that the following issues be clarified:

- how the list relates to other government lists and how it is intended to be used;
- how broader capabilities that will also be critical for future prosperity, security and wellbeing (such as those in the humanities and social sciences) can be incorporated into this discussion; and
- how discussion of government priorities for Australian technologies/capabilities can be informed by global trends and developments.

The IRU looks forward to engaging closely with the Australian Government on the important role of technologies and technology policy in the national interest.

The IRU incorporates seven research-intensive universities across Australia. The history of our member universities goes back to the 1960s and early 1970s when, under both Liberal and Labor governments, there was an expansion of new forms of higher education and research to meet the needs of the nation. Our universities are committed to inclusive education and innovative research that delivers impact for our communities.

IRU appreciates the opportunity to provide input to the consultation process on the 2022 List of Critical Technologies in the National Interest. It is legitimate for government to set priorities for research, technology and innovation and we welcome the commitment of $1 billion for a new Critical Technologies Fund as part of the Australian Government's National Reconstruction Fund.

IRU believes that a high-quality and effective research and innovation system is critical for the future of Australia. As we emerge from the COVID-19 pandemic, research and innovation will power a new phase in Australia's economic and social development.

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We support the broad framing of the Critical Technologies List and the focus on the role of key technologies in contributing to Australia's "prosperity, security and wellbeing". We understand that the geopolitical landscape for research and innovation has changed in recent years and that the COVID-19 pandemic has led to an increased focus on supply chains and national resilience.

Australia's universities will play an important role in efforts to stimulate "home-grown innovation" and greater resilience. Since their founding, the universities in the IRU have had a strong commitment to access and equity and we believe that these should be important features of any Australian technology policy, in order to ensure that new technologies contribute to social cohesion and wellbeing. We welcome the opportunity to participate in open public consultation on critical technologies.

The use of the current list

The 2022 List of Critical Technologies incorporates seven broad technology areas and 63 individual technologies. The consultation paper states that these are areas that have been identified to support engagement between government and "stakeholders such as the university sector about both the promotion and protection of critical technologies".

However, it is not clear how the list will be used in relation to specific technologies to inform measures designed to promote or protect designated areas. For example, the consultation paper states that this list is intended to "provide guidance on technologies where additional risk management might be required" but then also states that this is not a "list of technologies that will be, or should be, additionally regulated or controlled", or "where Government intends to prevent or limit collaboration with international research partners".

Other government lists (for example, of areas subject to defence export controls) may limit research and innovation activity in specific areas, and universities have established processes in place to ensure compliance with these rules. IRU believes that the Department should clarify how this list interacts with other existing government processes and lists (for example in the Department of Home Affairs to protect critical infrastructure and inform enhanced visa screening), and ensure that there is a feedback loop to universities and the academic community about this to ensure awareness.

If government intends to use this list to prioritise funding support for specific technology areas (for example to prioritise among proposals made by universities to funding agencies such as the Australian Research Council) that should also be clarified, with an opportunity for universities to provide input and feedback.

Other issues for consideration

The seven technology areas on the current list cover a wide range of fields that will be critical for Australia's future, including artificial intelligence (AI), vaccine development and renewable energy technologies. But identifying and prioritising specific areas in this way also raises broader questions about how Australia will be able to ensure that it maximises the benefits for citizens in these areas, while minimising any potential down-side from new technologies.

Capturing the full benefits of these technologies for Australia will require a broad range of capabilities and skills that go well beyond the 63 areas on the list. Prioritising these areas for promotion and protection runs the risk of marginalising other, equally important capabilities, without

which it will be impossible to realise the promise of prioritised technologies. For example, the ten technologies listed under AI, Computing and Communications (including cybersecurity) do not include research into the ethics, regulation, community acceptance or risks of these technologies.

In order to achieve the stated goals of prosperity, security and wellbeing, Australia will require advanced capabilities across a wide range of disciplines, including in the humanities and social sciences. Ethics, law and policy will be critical for our technological future, along with a deep understanding of the societies and economies of the Indo-Pacific and the ways in which they might adopt similar technologies.

Australia lacks a technology and innovation think-tank capability to bring together evidence-based analysis of emerging areas and a multi-disciplinary approach to assessing their application and adoption. This should be developed and should include assessment of the education, skills and training that will be needed. Universities should be involved in this work so that the findings can inform the development of new courses and as well as research.

Discussion of technology priorities should therefore be linked to a broader mapping of critical capabilities for Australia's future. The establishment of the National Reconstruction Fund provides an important opportunity to think about how universities can deliver education, research, technology and innovation in support of key government priorities.

This should also be undertaken in a way that is informed by global trends and developments. Other countries are prioritising critical technologies for their own national objectives, and our decisions about both promotion and protection should be grounded in an up-to-date understanding of the larger global innovation system. For example, major investments are being made in areas such as high-performance computing and hydrogen energy systems by countries in our region, and this should inform how the Australian Government seeks to invest. In some cases, we may decide to develop home-grown capabilities and industries, whereas in others it may be more effective and efficient to partner internationally, linking Australia into larger supply chains.

The data set being developed for the Critical Technology Profiles is a useful step towards a more evidence-based approach to decisions about prioritisation in research, technology and innovation policy. Australian universities conduct research that is high-quality and highly internationalised, with approximately 60% of all Australian academic publications involving international collaborators. By developing an accessible open-source capability that brings together data sets on international research, technology and innovation, university researchers (and businesses) could better see where their capabilities and collaboration fit into the larger system and how they can contribute to Australian Government priorities.