

SCIENCE & TECHNOLOGY AUSTRALIA

POLICY SUBMISSION

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2022 LIST OF CRITICAL TECHNOLOGIES IN THE NATIONAL INTEREST

Science & Technology Australia is the peak body for the nation's science and technology sectors, representing 105 member organisations and more than 90,000 scientists and technologists. We connect science and technology with governments, business and the community to advance science's role in solving some of humanity's greatest challenges.

We thank the Department of Industry, Science, Energy and Resources for this opportunity to offer input on the [2022 List of Critical Technologies in the National Interest Consultation Paper](#).

The first [Critical Technologies List in the National Interest](#) was developed in collaboration with the Defence Science and Technology Group and released in 2021. The list featured 63 critical technologies, grouped under seven broad headings. This list is now being reviewed to develop the 2022 List of Technologies in the National Interest.

PURPOSE OF THE CRITICAL TECHNOLOGIES LIST

The consultation paper outlines the purposes of the list are to:

- Promote Australia as a secure nation of excellence for investment, research, innovation, collaboration and adoption of critical technologies – globally and regionally;
- Ensure secure critical technologies supply chains;
- Reach the goal of 1.2 million tech jobs by 2030; and
- Maintain the integrity of Australian research, science, ideas, information and capabilities – enable Australian industries to thrive, and maximise the value for our nation from critical technologies.

Science & Technology Australia advocates that the list be used as a vehicle to bring a positive focus to build key capabilities critical to the national interest and benefit – and not as a tool to impose more red tape, regulation, restriction or curtailment of global partnerships or research efforts.

It is crucial Australia continues to develop sovereign capability in these pivotal areas, and that the nation's research capabilities are backed through comprehensive government support.

The list could also give special consideration to areas in which Australia has a natural competitive advantage, is currently a world leader, or can lead or support our region. For example, climate modelling is not included in the energy and environment section of the proposed list. This is a critical

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capability, and indeed, a regional responsibility, as we face the urgent challenges of climate change, mitigation and adaptation.

The level of granularity in the list, while useful to identify specific technologies of importance, runs the risk of ‘picking winners’ – and potentially sidelining other important research directions. Australia’s STEM research sector is extremely competitive and high quality – to win funding for research in this system is an indication of the important and critical nature of that research.

Science & Technology Australia encourages the Government to acknowledge that this is not an exhaustive list of all the crucial research carried out by Australia’s STEM sector.

UNDERPINNING CAPABILITIES

Equally important as the specific technologies included on the Critical Technologies List are the crucial STEM capabilities that underpin them.

Before a ‘technology’ can be developed, there must be a fundamental basis of STEM capability and understanding. For example, for Australia to continue building strong capabilities in quantum and artificial intelligence, we need a strong pipeline of people with advanced mathematics skills that underpin both of these transformative cutting-edge technologies. This foundational capability is not static – the pool of STEM knowledge is constantly evolving, and STEM research, teaching and infrastructure also requires support and development.

A comprehensive approach to supporting the technologies on the list should also acknowledge the importance of supporting fundamental STEM capabilities – throughout both foundational education levels and at the discovery research level. As noted in a [recent paper by Australia’s Chief Scientist](#), Australia’s success in developing quantum science capabilities has arisen (in part) from strong investment in ‘basic science research without commercialisation requirements’.

While the ‘underpinning science’ areas are included on individual technology profiles, these capabilities could also be recognised more prominently, and noted in the list itself.

A COORDINATED APPROACH TO GOVERNMENT FUNDING AND SUPPORT

Science & Technology Australia welcomes the [Critical Technology Fund](#) announced as part of the Government’s forthcoming National Reconstruction Fund. The Government has also announced [plans to refresh the National Science and Research Priorities](#). It will also be crucial to ensure the technology areas on the list align with those overarching priorities so we can build Australia’s sovereign STEM capabilities in those priority fields.

To have a truly transformative impact, critical technologies policy and funding settings must be considered in concert with all the other areas of government support for STEM research and infrastructure.

These include:

- the national competitive grants systems;
- the National Collaborative Research Infrastructure Strategy;
- Cooperative Research Centres;
- ARC Centres of Excellence;



- Australia’s Economic Accelerator; and
- other measures under the University Research Commercialisation Action Plan.

It is also crucial that consideration be given to how the list will interact with other areas of government policy. For example, the consultation paper clearly states that that the list is **not**:

- ‘a list of technologies that will be, or should be, additionally regulated or controlled
- a list of technologies where the Government intends to prevent or limit collaboration with international research partners’

Despite this, the list is being used to underpin [additional visa and migration measures](#). While the Department of Home Affairs has sought to ensure these additional measures will be applied at a proportionate scope and scale, this will need to be carefully monitored to ensure it does not act as a barrier to great global talent coming to live and work in Australia.

It is crucial to Australia’s national interest to ensure visa and migration policy settings do not deter the very best global talent from coming to Australia to build our sovereign capabilities in the cutting-edge technologies that will secure our prosperity.

Ensuring the list’s purpose is appreciated and understood across all areas of government, and is used to support research and development in the critical technology areas, is essential. This will require targeted strategies that span all levels of education and research as well as industry engagement.

The information in the technology profiles highlights the well-known challenge of the disconnect between Australia’s high research impact but comparatively low venture capital investment and patent holdings. For most of the technologies included in the profiles, few Australian companies hold relevant IP or undertake local manufacturing. Whole-of-government strategies to support industry development in these areas will be key to bolster Australia’s sovereign capabilities.

It is important to consider how industry incentives and policy settings interact to ensure a complementary and cohesive system. These include the research and development tax incentive, proposed patent box mechanisms and measures supporting university research commercialisation.

Science & Technology Australia’s proposed [‘Bench to Boardroom’ program](#) would give additional support to this system. This program would create a constellation of scientist-entrepreneurs who can nurture the university–industry engagement required to build our sovereign capabilities and develop nascent technologies for national benefit.

Responses to the consultation questions are provided below. Please do not hesitate to contact us if we can assist with any additional information.

Yours faithfully,

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President
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CONSULTATION QUESTION RESPONSES

*Are there technologies that should be considered for inclusion or removal from the original List?
What are your reasons for the suggestions?*

The degree of granularity in the list should be carefully considered and reviewed regularly. It is valuable to have such a list to help identify important areas of research that should be supported and promoted – but including highly specific technologies runs the risk of excluding other research capabilities that are also very important to Australia’s future.

As such, it would not be useful to simply list all areas of STEM research carried out in Australia as ‘critical technologies’. However, it is important to note that all research across the STEM sector in Australia is critical to our future – which is the basis on which it is funded through our highly competitive grants systems.

Do you have comments on the individual technology definitions?
Not at this time.

Do you have a view on the frequency of updates to the List?
Given the rapidly-changing landscape and broader context in which many of these technology areas operate, it would be appropriate to review and update the list every two years.

Do you have any feedback on the content of the Critical Technology Profiles?
Not all the critical areas included on the list have a detailed profile – again, the question of the required level of granularity needs to be considered, and a consistent approach applied across all technology areas.

Has the List influenced decisions in your organisation about technology investment or adoption?
As the peak body for the STEM sectors in their breadth across Australia, this isn’t a direct consideration for our operations.

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