Critical Technologies Discussion Paper: Health

The Critical Technologies Policy Coordination Office (CTPCO) was established in the Department of the Prime Minister and Cabinet to provide coordinated, whole-of-government advice on technology developments, opportunities and risks, and to recommend actions to promote and protect critical technologies.

The Australian Government defines critical technologies as:

> *"current and emerging technologies with the capacity to significantly enhance or pose risk to Australia's national interest, including our economic prosperity, social cohesion and national security."*

Australia's ability to harness the opportunities created by critical technologies has significant impacts on our economic success, security and social cohesion[1]. As a coordination policy office, the CTPCO takes a balanced, national interest approach to critical technologies assessment, considering national security risks, opportunities for economic prosperity and impact on social cohesion objectives. The CTPCO aims to:

- ensure Australians have access to cost-effective, safe, secure and inclusive technologies;
- promote Australia as a trusted partner for investment, research, innovation and collaboration;
- support regional resilience and competitive, trusted and diverse technology innovation and international markets; and
- maintain the integrity of our research and capabilities, enable Australian industries to thrive and maximise our sovereign IP.

Aim of consultation with the health sector

The Australian Government, through the CTPCO, is working with a broad range of stakeholders in key sectors to understand which current and emerging critical technologies are key to Australia's future prosperity and stability. The health sector has been identified as an initial focus area for the CTPCO, with further exploration of biotechnology[2] and photonics[3] as specific critical technologies due to the pervasiveness of these technologies across sectors.

We are seeking input from stakeholders, including State and Territory governments, industry leaders and professionals, academia, and international partners to better understand the impact of critical technologies on the health sector to help shape future government policy and decision-making. The purpose of this consultation is to identify key critical technology developments, assess risks to and opportunities in Australia's national interest, and examine the approach of academia, industry and government to critical technologies.

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[1] Social cohesion is the combination of common purpose, shared values (including overarching ethical, regulatory and social frameworks), shared challenges, equal opportunity, and a sense of community ([Department of Home Affairs](#)). In the context of critical technology, how does the identified technology contribute to, create or enhance the sense of community and shared purpose for all Australians.

[2] The use of biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use - United Nations Convention on Biological Diversity.

[3] Technologies that use light, create light or modify light - European Photonics Industry Consortium.

Our current understanding

The Australian health sector plays an integral role in Australian society while also making a significant contribution to the economy. In 2018–19, Australia spent nearly $196 billion on health, accounting for approximately 10 per cent of Gross Domestic Product (GDP).[4]

Critical technologies have the potential to revolutionise Australia's health sector and society as a whole. In the future, critical technologies could significantly improve Australians' quality of life and life expectancy, reduce costs for industry and government, create new employment streams and increase Australia's overall competitiveness and productivity. While these technologies present many possible opportunities for Australia, there may be risks that need to be considered.

Patient access to many products in the health sector is determined by regulatory approval (e.g. by the Therapeutics Goods Administration) and subsequent inclusion in relevant reimbursement schemes (e.g. Medicare or Pharmaceutical Benefits Schemes). The barriers associated with these processes, whilst well understood, are out of scope for this consultation. The CTPCO is particularly focused on the impact on economic prosperity, social cohesion and national security of specific critical technologies.

Critical technologies in the health sector

The CTPCO has identified nine priority critical technologies in the health sector that are likely to have a major impact on Australia's national interest in the next decade. The technologies are at different stages of development: some already have established practical applications, while others are still in the early stages of research. We are seeking input on whether these nine technologies are the right priority areas, their likely development and deployment timeframes, challenges to their adoption, and what opportunities and risks they may present.

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[4] Australian Institute of Health and Welfare, 2020, Health Expenditure Australia 2018–19.

Technology	Description	Application example
Biomaterials	Materials that interact with the biological system for medical applications, such as implants (bone plates, joints, sutures) and devices (pacemakers, blood tubes).	Ceramic replacements of hip joints.
Computational chemistry	Computational prediction of the properties of chemicals used for the discovery of materials, drugs, chemical compounds and reaction mechanisms/synthetic routes, including using quantum computing.	Systems able to predict the effects of compounds, allowing faster development of novel medicines.
Diagnostic and automatic biochemical analysis technologies	Emerging technologies for diagnosing cancer, heart disease and other conditions. These enable more personalised patient care through automated techniques.	Optimised medicine dosage based on real time blood analysis and disease monitoring.
Gene technology a. **Genomic and genetic engineering/ analysis/ sequencing/editing**	Introducing foreign genetic material, reorganising existing genetic material, or constructing the entire genome of an organism from fragments of synthetic DNA or RNA. Includes technology related to stem cells.	Development of novel vaccines.
b. **Synthetic biology**	Biology enabling the production of new synthetic biological compounds and systems that can be designed to behave according to a defined specification.	Synthetic production of difficult to extract biological compounds.
Medical countermeasure products	Drugs, vaccines and diagnostics that may be used to counter the effects of a biological, chemical or radiological attack, or a naturally occurring emerging disease.	A chelation agent to help the body more rapidly excrete radiological materials.
Molecular robotics	Nanoscale tools that could revolutionise fields from cancer diagnostics to materials science.	Nanoscale systems to target and remove specific cells in the body.
Neurotechnology	Methods and instruments that enable a direct connection of technical components (electrodes, computers or intelligent prostheses) with the nervous system.	A system which allows a person to control a wheelchair through a direct interface from their brain.
Nuclear medicine and radiotherapy	Development and implementation of diagnostic, therapeutic, and theranostic radioisotopes, including proton and heavy ion therapy, for the detection and treatment of cancer and various ailments.	New treatments of low treatment success cancers using high volumes of previously unused radioisotopes.
Precision medicines	Development of targeted therapies specific to the individual characteristics of each patient, including their genetic and biological makeup, the environment in which they live and how they live their life. Includes analogues of the human body and synthetic drugs.	A system which includes tissue from a patient so that specific dosage requirements for medicines can be determined to minimise side effects.

Note: The above technologies are in alphabetical order.

Discussion questions

The CTPCO is seeking your insights on the future of critical technology in the health sector. We are particularly interested in hearing whether you believe we have identified the key critical technologies in the health sector, what you consider to be major opportunities and risks, and how government, industry, academia and end-users can work together to approach critical technologies.

The questions below indicate some of the key issues that the Government are considering. We welcome your input in response to the questions, via written submission to ContactCTPCO@pmc.gov.au or via the CTPCO Stakeholder Consultation Survey.

1. What are the priority critical technologies, current and emerging, in this sector over the next 10 years? Are these reflected in the list provided in the discussion paper?
2. Have you identified or experienced any supply chain issues associated with critical technologies?
3. How fast are critical technologies taken up in this sector? What are the barriers to uptake?
4. Which critical technologies present the best opportunity for commercialisation in Australia?
5. What will happen if we does not adopt critical technologies in this sector?
6. What impact do you think critical technologies will have in the future in this sector? For example, on national security, economic prosperity and social cohesion (e.g. ethical or moral considerations).
7. How should government, industry, academia and end-users work together to assess the impact of critical technologies in Australia?
8. What opportunities and risks do you see from biotechnology and/or photonics?
9. Is there anything else you want to say about the approach to critical technologies in Australia?

For more information, please contact the CTPCO at ContactCTPCO@pmc.gov.au.

Privacy Collection Notice

The Department of the Prime Minister and Cabinet (the Department) is collecting your personal information, as part of the stakeholder consultation being conducted by the Critical Technologies Policy Coordination Office (CTPCO) to understand which current and emerging technologies are key to Australia's future prosperity and stability and inform whole-of-government policy development.

Participating in the stakeholder consultation and providing the requested information is voluntary. Information you provide in your response, including personal information, may be disclosed to the Australian Government and third parties who provide services to the Department, for the purposes of informing and supporting the work of the CTPCO. This information may also be used to communicate with you about your response and the consultation process

Personal information contained in your response may be included in CTPCO reports to the Australian Government and related briefings within the Australian Government. Aggregated information received from responses, including key themes and statistics about responses received, may be included in CTPCO reports, such as the Stakeholder Consultation Summary and other reports published by the CTPCO.

You will be provided with the option to select in the stakeholder consultation whether you prefer to remain anonymous in any public materials. If you elect to remain anonymous, no identifying information will be published in public materials.

The Department will only use or disclose your personal information for a different purpose where we have obtained your consent, or where we are authorised or permitted to do so under the *Privacy Act 1988* (Cth).

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