

Quad Technology Business and Investment Forum outcomes report

Overview

1. The Quad has prioritised supporting and guiding investment in critical and emerging technology projects consistent with its intent to maintain a free and open Indo-Pacific.
2. Governments cannot do this alone. Success requires a concerted and coordinated effort between governments, industry, private capital partners and civil society.
3. To explore opportunities and challenges to this success, the *Quad Critical and Emerging Technology Working Group* convened the inaugural *Quad Technology Business and Investment Forum* in Sydney, Australia on 2 December 2022. The forum was supported by the Australian Department of Home Affairs and delivered by the Australian Strategic Policy Institute (ASPI).¹
4. The forum brought together senior Quad public- and private-sector leaders, laid the foundations for enhanced private–public collaboration and canvassed a range of practical action-oriented initiatives. Sessions were designed to identify the key challenges and opportunities Quad member nations face in developing coordinated strategic, targeted investment into critical and emerging technology.
5. Attendees of the forum overwhelmingly endorsed the sentiment that, with our governments, industry, investors and civil society working better together, collectively, our countries can lead the world in quantum technology, artificial intelligence, biotechnology and other critical and emerging technologies.
6. This report reflects the discussions and key findings from the forum and **recommends** that the *Quad Critical and Emerging Technology Working Group* establish an *Industry Engagement Sub-Group* to **develop** and **deliver** a *Quad Critical and Emerging Technology Forward Work Plan*.

Next steps

7. Prior to the 2023 Quad Leaders' Summit, the *Industry Engagement Sub-Group* should deliver a 2023–24 *Forward Work Plan* for the leaders' endorsement. ASPI recommends that the *Forward Work Plan* focus on the following five initiatives to lay the foundations for future engagement and cooperation (refer Attachment A):
 - a *Quad Technology Rulebook* that articulates common standards, ethical and strategic frameworks for critical and emerging technology development
 - a *Quad Emerging Technology Taxonomy* to ensure clarity about language and terminology, as well as clear definitions of the roles of public and private investment in delivering the Quad's agenda
 - a *Quad Emerging Technology Investment Prospectus* and pilot investor 'sandpit' program
 - a pilot entrepreneur start-up pitch program (*FOIP Pitchfest*) to encourage cooperation and collaboration between the Quad start-up industry and investor ecosystems
 - a discussion paper with practical recommendations to facilitate greater people movement and skills development among Quad countries.

Background

8. The obligation to ensure that we maintain a free, open, inclusive and resilient Indo-Pacific requires critical and emerging technology to be governed and operated according to shared interests and values focused on sovereignty, freedom, innovation and security.
9. While those values and interests are longstanding, we face changing parameters of risk and security, particularly in relation to the intersection of economic prosperity and geopolitical threats. This is resulting in a change to the traditional view that all state-to-state economic activity, including trade, is automatically mutually advantageous and an evolution in global innovation policy. Overwhelmingly, the Quad countries are united on the need for increasing tech collaboration, not just among Quad countries but between the Quad and regional partners.
10. The centre of gravity of much emerging technology research and development is shifting from government and academia to industry. Many sectors, including defence industries and technology areas such as cloud computing,² are dominated by a handful of companies. We are seeing a dramatic uplift in capability in areas such as space technology, which will have flow-on effects to, for example, advances in climate technologies.
11. The key is to ensure that those key sectors are not all operating in silos. Governments have increased collaboration but now need to work smarter with industry. Industry needs to better understand the benefits of seeing government as a stakeholder, not just a regulator or, worse, an adversary. Government innovation can benefit from quick lead times in the commercial sector, while industry can benefit from government support and facilitation.
12. Industry-to-industry engagement is also essential. Governments can provide strategic guidance and regulatory guardrails, but the Quad's success in jointly developing critical technologies will be reliant on the combination of independent and collective efforts of industry and non-governmental partners.

13. However, there can be unnecessary barriers to government and industry working together or sharing information and, within industry, the competitive drive to monetise and cement incumbency can create high barriers for new market entrants and also barriers to industry-to-industry cooperation.
14. There is an increased focus for countries to protect their data sovereignty, as the trend of deglobalisation triggered by the Covid-19 pandemic moves out of the physical world and heads online. While cloud internet services may become more localised as developed nations look to protect their citizens' data from criminals, it's important that trusted information sharing between like-minded nations isn't hindered. Sovereignty shouldn't be viewed as mandating all aspects of work and services to be done in-country—individual and collective sovereignty can be increased and maximised by developing not only in-country expertise but trusted partners and resilient supply chains.
15. Discussion between government, the private sector and civil society on these issues is still at a nascent stage. Quad members are asking what kinds of financing models could be developed and what labour and migration flows need policy solutions.³ Important new links are now being forged. The Quad Critical and Emerging Technology Working Group, the recent Business and Investment Forum and the proposed *Industry Engagement Sub-Group* offer new mechanisms to come together to deepen relationships, ask questions and jointly develop solutions.
16. At the conceptual level, those questions include how we define and regulate critical technologies, how we can develop common standards and whether we're preparing ourselves enough to fully harness their capabilities to address future energy, data, economic and health security.

Mutual challenges

17. Quad countries must work together on the basis of common, liberal–democratic values to maintain and defend the existing international rules-based order. Some key shared challenges discussed at the Business and Investment Forum included:
 - *Cybersecurity*: As reliance on technology increases, the potential for cyberattacks also grows. The Quad countries need to work together to ensure the security of their networks and critical infrastructure.
 - *Ensuring the responsible development and use of critical technologies*: Many emerging technologies, such as artificial intelligence and biotechnology, have the potential to bring significant benefits, but they also carry risks and ethical concerns that must be carefully managed.
 - *Managing the strategic implications of critical technologies*: As emerging technologies become more widespread, they may create new strategic dynamics and challenges for the Quad countries. For example, the use of artificial intelligence in military applications could change the nature of warfare, while the increasing interconnectedness brought about by the 'internet of things' could create new vulnerabilities to cyberattacks.
 - *Ensuring that the benefits of critical technologies are shared fairly*: There's a risk that the benefits of emerging technologies could be concentrated in the hands of a few powerful actors, leading to greater inequality and social unrest. The Quad countries will need to consider ways to ensure that the benefits of those technologies are shared more broadly.

- *Addressing the potential unintended consequences of critical technologies:* It's often difficult to predict the full range of consequences that may result from the development and deployment of emerging technologies. The Quad countries will need to be prepared to address any unintended consequences that may arise.
- *Managing technological disruption:* Emerging technologies such as artificial intelligence, the internet of things and 5G/6G have the potential to disrupt various industries and create significant economic and social changes. The Quad will need to address the challenges and opportunities presented by those technologies.
- *Competition with other countries:* The Quad countries will face competition with other countries in the development and deployment of critical technologies. That could lead to tensions and the need for careful diplomacy.
- *Ethical concerns:* The development and use of critical technologies also raises ethical concerns, such as the potential for misuse. The Quad will need to address those issues and ensure that the responsible development and use of technology are prioritised.

Trade agreements and export controls

18. Trade agreements and changes to export controls, such as the International Traffic in Arms Regulations (ITAR), can potentially help Quad partners to achieve desirable critical and emerging technology outcomes by facilitating technology transfer and collaboration between Quad countries.
19. By relaxing export controls on certain technologies or enabling easier access to licences, Quad countries could potentially increase collaboration and foster innovation in critical and emerging technology sectors.
20. However, it's important to note that changes to export controls and trade agreements also have risks, such as the potential for sensitive technologies to fall into the wrong hands, or for negative economic impacts in certain sectors or regions. It's therefore important to balance the potential benefits and risks of such changes and to develop policies and mechanisms that ensure the responsible development and deployment of critical and emerging technologies.
21. For the Quad partners, trade agreements and changes to export controls could help to achieve desirable critical and emerging technology outcomes by:
 - facilitating the transfer of technology and knowledge between countries, which can support innovation and economic growth
 - promoting collaboration and partnerships between Quad partners in the development and deployment of emerging technologies, which can lead to greater success and faster progress
 - encouraging the development of common standards and regulations for emerging technologies, which can help to promote their widespread adoption and integration into global supply chains.

Success through collaboration

22. Collaboration and partnership are at the heart of the Quad. It is about our governments working together along with the recognition that it's also critical that business, investors, experts and academics are brought into the discussion and encouraged to drive success and security. Each partner has a role to play.

Government

- *Public-private partnerships:* Governments can more proactively partner with private companies to jointly support research and development projects, sharing the costs, encouraging investment and reaping benefits of emerging technology development.
- *Regulation and standards:* Governments can play a role in shaping the development of emerging technologies by setting standards and regulations that ensure the responsible development and use of those technologies.
- *Research and development funding:* Governments can provide more funding for research and development projects in key emerging technology areas, helping to support the development of key technologies and ensuring that they're being developed in free and open societies and that economic opportunity, national security risk and societal benefits are all considered.
- *Talent development:* Governments can invest in education and training programs to help build a strong talent pipeline in emerging technologies, ensuring that there's a skilled workforce ready to drive innovation in emerging and future technology areas.
- *Infrastructure development:* Governments have a role to play in continuing to support the development of critical infrastructure, such as high-speed internet and advanced manufacturing facilities, which can help to enable the development and deployment of emerging technologies.

Industry

- *Invest in research and development:* Industry has a key role to play in supporting research and development initiatives to advance the development of emerging technologies and bring them to market.
- *Collaborate with other stakeholders:* Industry can work more closely with governments, think tanks, universities and other civil-society stakeholders to foster open and transparent dialogue about the development and deployment of emerging technologies. This can help to build trust and ensure that all stakeholders have a voice in the process.
- *Educating the public:* Industry can play a greater role in educating the public about the potential benefits of emerging technologies, although that should not, of course, gloss over any challenges. Industry can also work to address any concerns or fears that people may have, especially about emerging technologies, by putting out factual and useful information that helps build understanding.
- *Engage with regulatory bodies:* Industry can work with regulatory bodies to establish clear and fair regulatory frameworks for the development and deployment of emerging technologies. That can help to create a more stable and predictable environment for innovation.
- *Invest in education and training:* Industry can invest in, and partner on, education and training programs to ensure that the workforce is better prepared for the jobs of the future and has the necessary skills to succeed in emerging technology areas.
- *Tapping into private capital providers:* Venture-capital firms can help companies and research institutes develop and bring technologies to market and often have experienced professionals on their teams who have unique networks and can provide guidance and expertise to the companies they invest in. That can help those companies to navigate the challenges of developing and commercialising emerging technologies.

Civil society

- *Educate the public:* Like industry, civil-society organisations can play a greater role in educating the public about emerging technologies and their potential impacts, opportunities and challenges. That can help to build support for the responsible development and deployment of those technologies.
- *Advocate for ethical standards:* Civil-society organisations have a key global role to play in advocating for the development and adoption of ethical standards for emerging technologies, such as standards for the responsible use of artificial intelligence or biotechnology.
- *Engage with policymakers:* Civil-society organisations have a key role to play in engaging with political decision-makers, policymakers, regulators and media to ensure that the interests of the public are considered in the development and deployment of emerging technologies.
- *Promote transparency:* Civil-society organisations can work to promote transparency and accountability in the development and deployment of emerging technologies and can encourage companies and governments to be more open about their activities in this area.
- *Support research and development:* Civil-society organisations can support research and development initiatives that focus on the responsible development of emerging technologies and can provide funding or other resources to help those efforts succeed.

Conclusion

23. Critical and emerging technologies have the potential to transform the Indo-Pacific region and will continue to have strong impacts on economies, societies and security. While many of those technologies are still in the early stages of development and haven't yet reached their full potential, they've already begun disrupting existing industries and creating new ones and will fundamentally change the way people live and work.
24. The Quad Technology Business and Investment Forum highlighted the importance of the Quad Critical and Emerging Technology Working Group and the need for the Quad, and its Indo-Pacific partners, to focus on the implications of critical technologies to ensure that they're developed and deployed in a responsible, strategic, coordinated and ethical manner.
25. As part of that effort, the Quad, with partners, should also share information on how such technologies could be used by those without our responsible, ethical standards. This is the constant need for the Quad to generate opportunities while countering risks.
26. Success will require a dedicated body (the *Industry Engagement Sub-Group*) that has the authority to develop and deliver a forward work plan that clearly outlines the role each party has to play and provides practical initiatives.

Attachment A: Critical and emerging technology forward work plan recommendations

The proposed *Industry Engagement Sub-Group* should seek endorsement of a 2023–24 *Forward Work Plan*, which will outline priorities for the sub-group and a timeline for their delivery.

ASPI recommends that the Forward Work Plan be focused on building the following foundational initiatives.

1. A Quad Technology Rulebook

- The Quad Technology Rulebook will articulate common standards and ethical and strategic frameworks for critical and emerging technology development. Global technology standards help to ensure that different technologies are compatible with each other and can work together effectively. They also help to set the boundaries for the private sector by establishing rules and guidelines for the development and use of technologies.
- Setting global technology standards can be a complex and time-consuming process, as it involves the participation and input of many different stakeholders, including industry, government, academia and civil society. It's important for the stakeholders to work together and ensure that the standards that are developed are fair, transparent and in the best interests of society as a whole.
- The rulebook should include shared statements of ethical principles regarding the development and use of priority technologies. Being articulated by free and open democracies, those ethical principles will lend weight to the promotion of Quad technology standards.

2. A Quad Emerging Technology Taxonomy to ensure clarity of language and terminology, as well as to include clear definitions of the roles of public and private investment in delivering on the Quad's agenda

- An emerging technology taxonomy can be used to help understand the landscape of emerging technologies and to identify trends and patterns in the development and deployment of those technologies. It can also be used to inform investment and research strategies and to guide policy decisions.
- This should include an articulation of the role of government as an investor, either directly through a fund, through co-investments with industry or through indirect subsidies and incentives.
- There are many ways to classify emerging technologies, and different taxonomies may use different criteria or categories. Some common categories that may be used in an emerging technology taxonomy include 'field of application', 'developmental stage', 'level or type of impact', 'degree of novelty' and so on.

3. A Quad Emerging Technology Investment Prospectus and pilot investor sandpit program

- Individual Quad countries have their own investment programs or initiatives to support the development of emerging technologies. For example, the United States has a number of government agencies and programs that support research and development in emerging technologies, such as the Defense Advanced Research Projects Agency (DARPA) and the Small Business Innovation Research (SBIR) program. Similarly, Japan, India and Australia have their own programs to support the development of emerging technologies. Potential investors interested in supporting the development of emerging technologies in the Quad countries should research the available investment opportunities in each country.

- This could be a subset of the Quad Investment Fund. Quad governments would each contribute an agreed amount of capital to be matched by the private sector—a fund based on public–private partnership model to co-invest and co-create tech towards our collective security and prosperity.
4. A pilot Quad entrepreneur pitchfest program to encourage cooperation and collaboration between the Quad start-up industry and investor ecosystems
 - The *FOIP Pitchfest* would encourage collaboration and information sharing between the partners' respective start-up ecosystems. An entrepreneur pitchfest is an event where entrepreneurs have the opportunity to present their business ideas or ventures to a panel of judges or a live audience, usually with the goal of obtaining funding or support.
 - Entrepreneur pitchfests can be a valuable opportunity for entrepreneurs to showcase their ideas and get feedback from experienced professionals. They can also be a good way for investors to discover and evaluate new investment opportunities.
 - This should be developed and delivered by a leading private-sector start-up incubator (for example, in Australia, Stone and Chalk, Haymarket HQ or others), with seed/grant funding by all four governments, and involve key private-capital investors that can bring capital to the winning projects.
 5. A discussion paper with practical recommendations to facilitate greater people movement and skills development
 - All Quad members share challenges in talent development, talent attraction, digital upskilling and retention in both the public and the private sectors. An easier and faster border movement mechanism for emerging technology entrepreneurs and scale-ups would encourage collaboration between Quad start-up/scale-up ecosystems, facilitate cross-border research and development, expose alternative capital funds and build people-to-people networks.
 - The discussion paper will provide practical recommendations on options, attracting like-minded talent into the Quad, and tracking talent movement and trends.
 - It would also look to help identify training and education gaps and provide solutions to address them, particularly in Industry 4.0 digital skills, cybersecurity, artificial intelligence, fintech and blockchain.

Notes

- 1 'Quad Technology Business and Investment Forum', ASPI, Canberra, 2 December 2022, [online](#).
- 2 Edward Jones, 'Cloud market share: a look at the cloud ecosystem in 2023', *Kinsta*, 6 December 2022, [online](#).
- 3 Huon Curtis, Jamie Gaida, Jenny Wong-Leung, Stephan Robin, Urmika Deb, 'Embracing the vital human element in building critical technology futures', *The Strategist*, 28 September 2022, [online](#).

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