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AUKUS: STEPPING BOLDLY INTO SPACE

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Our information-based societies are inseparable from space technology, and space is an increasingly "contested, congested, and competitive" domain. With over 5,000 operational satellites in orbit and tens of thousands more to launch over the coming decades, reliance on space will only increase, as will its importance as a domain for strategic competition. Space-based assets provide services essential for telecommunications, weather and climate monitoring, agricultural management, the finance sector, natural disaster response and recovery, and more.

In recent years, governments and the commercial sector have awoken to the risk of space assets as a single point of failure, given that the degradation of access to space or the destruction of space-based assets would catastrophically affect civil, commercial, and national security sectors.

However, establishing a resilient and robust space industry ecosystem is an enormous, complex task requiring a significant degree of international collaboration on sensitive technologies—making AUKUS a prime medium for elevating such cooperation. The United States increasingly recognizes the need to support and scale international allies and their space capabilities as to deepen interoperable architectures and build resilient space systems.

Previously the sole preserve of a few governments, the space industry is now heavily dependent on commercial operators. SpaceX operates approximately one-half of all satellites in orbit, followed by OneWeb Satellites and Planet Labs. The proliferation of satellites and access to space is largely due to improvements led by the commercial launch sector over the past decade. In 2020, the global space industry's value reached an estimated $424 billion, expanding 70% since 2010.

With space increasingly recognized as a strategically pivotal domain of critical technology, its future will mirror that of cyber: trending towards bifurcation in trade and research as globalization retreats. This will spur intensification of space competition, presenting risks for civil, commercial, and national security uses.

Though the United States remains the pre-eminent global space power, Russia and China have been designated as the greatest threats to America and its allies in space, as outlined in a recent Defense Intelligence Agency report. Their significant investment and focus on space follows a common objective to out-perform the United States and its allies and to exploit reliance on space-based systems. Russia and China's combined operational space fleets have grown by approximately 70% between 2019 and 2021.

The Chinese government has a strategic approach that considers US dependence on space "its Achilles' heel," and is rapidly expanding its capabilities to exploit this. The Rosetta Stone for interpreting China's ambitions for space is its approach to Antarctica and the South China Sea, where it previously professed a commitment to non-escalatory behavior while continuing to incrementally expand its presence and assert its claims. Ye Peijian, the chief commander of the Chinese Lunar Exploration Program, compares the moon and Mars to the Senkaku and Spratly Islands, adding that China must protect its "space rights and interests."

Investment in new and emerging capabilities continues to grow in counterspace technologies.

The capabilities of Russia and China, in particular, are rapidly evolving. The most totemic counterspace weapon is a direct ascent anti-satellite weapon (ASAT), of which 16 tests have been conducted by four counties—the United States, China, Russia, and India. Yet it is investment in energy weapons beyond direct-ascent ASAT technologies by all major space players will define the future of counterspace technologies. These energy weapons include high-powered lasers and microwave weapons. Attacks from these weapons will be difficult to attribute as damage can be temporary or reversible. In the immediate term, however, use of cyber-attacks and radio frequency jammers targeting space infrastructure remains the most urgent military threat to space systems.

In-orbit collision is another risk that is difficult to mitigate. There is potential for a cascading series of orbital impacts—the Kessler effect—that could wreak havoc on all orbiting space assets and potentially render space inaccessible. Space weather can add to potential collision risks by rendering satellites uncontrollable. While the threat of radiation can be minimized, there is a limit to what can be done to protect from powerful geomagnetic storms that can either destroy or significantly harm the functionality of space-based assets.

Opportunity for AUKUS

The technology-centric trilateral AUKUS agreement could elevate space cooperation and build mutually beneficial space capabilities. One can already see space-related momentum in agreements on complementary technologies such as quantum computing, artificial intelligence, and hypersonics. For the United Kingdom, space cooperation and improving interoperability via AUKUS would support its recent designation of space as part of its Critical National Infrastructure. The 2022 UK Defense Space Strategy underscored Britain's desire to be "at the heart of Allied space efforts." The United States would profit from shared uplift in capabilities of the United Kingdom and Australia, which could for example become capable of reconstituting mutually beneficial space-based assets in the event of a crisis. This includes global navigation satellite systems that provide vital position, navigation, and timing services used for all forms of transportation, the finance industry, agriculture, emergency management and more. Additionally, via AUKUS, these partners can investigate opportunities to improve and streamline space "innovation cycles and co-development processes" for building mutually reinforcing capabilities in times of crises. These could include common satellite technologies.

Through AUKUS, they may take steps to boost space resilience against military or natural crises by ensuring that the countries maintain minimum viable capabilities across key elements of the space industry supply chain. This could include focusing on elements required to reconstitute vital space-based assets, as well as systems for disaggregating and complementing existing capabilities. This process should include AUKUS governments working together to incorporate new and emerging technology firms into the space industry supply chain.

The completion of the Australia-US Technology Safeguards Agreement (TSA) negotiations would help deepen cooperation. Using the recently completed UK-US TSA as a model, this agreement would enable US companies to operate from Australian spaceports and help pave the way to exporting space launch technology to Australia. It would ensure that US spaceflight technology is properly protected when operating in either the United Kingdom or Australia via a legally binding framework. The lack of a TSA between Australia and the United States is a significant barrier to further commercial activity across civil, commercial, and national security space sectors. Under the AUKUS banner, a TSA could be singled out for fast-tracking and would see both Australia and the United Kingdom able to more deeply engage world-leading US companies and their technologies.

Promoting the development of spaceports and mutual access via the AUKUS framework will improve both access to space and resilience building. Australia is well-positioned for launch activities by leveraging its

geographic advantages and regional accessibility. All three countries will need access to capable launch vehicles. The Australian Department of Defense's new Space Strategy notes that "Defence anticipates it will need access to a responsive and assured space launch capability in the future." The UK Defence Space Strategy, also released this year, underscores the importance of launch. Both Australia and the United Kingdom continue to support development and operation of a number of spaceports, as well as a number of companies seeking to develop launch vehicles.

The United States and United Kingdom maintain globally leading satellite manufacturing capabilities. However, all three countries should ensure the ability to support higher rates of commercialization in the burgeoning small satellite manufacturing industry, particularly as rapidly emerging capabilities and advanced technologies can quickly change the satellite-manufacturing ecosystem. For Australia, targeted investment in the ability to manufacture small satellite constellations would meet local demand while servicing an expanding segment of the global space industry. As noted earlier, commercial firms are the largest operators of satellites, but planned satellite constellations and fillings booming into the tens of thousands will increasingly strain launch infrastructure and supply chains. Recognizing this, the Australian government has moved to fund the creation of space-focused collaborative manufacturing hubs.

These recommendations, however, represent only some of the many potential areas for greater cooperation through AUKUS. For example, as we become further dependent on space technologies, significant investment in ground segment would be integral to bolstering resilience. Similarly, emerging capabilities in optical communications can change the space industry landscape.

The AUKUS partnership can minimize the impact of a crisis, from conflict to natural disaster, on space infrastructure. By expanding complementary low-earth orbit small satellite constellations; streamlining mutual access to launch facilities; and bolstering each other's domestic space manufacturing capabilities, the AUKUS partners could strengthen the resilience of their space-dependent societies. Better coordination of trilateral investment in new and emerging space-related technologies can support these initiatives.

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