

QUAD-PLUS Dialogue



Maritime Domain Awareness—Leaping Ahead

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Introduction

Maritime Domain Awareness (MDA) is a crucial component of modern national security. The members of the “Quad”—Australia, Japan, India, and the United States—all have vital maritime security interests across vast regions which are challenged by a range of traditional and non-traditional threats. Monitoring maritime activity—both legitimate and illegitimate—is a complex and demanding task due to the vast geographic scope, the huge numbers of maritime vessels and myriad of activities undertaken across the seas, and the potential sensitivities associated with sharing of information between states.

Information sharing between organizations lies at the heart of the MDA concept. The Australian Maritime Border Command Strategy for MDA states that “the effective understanding of any activity associated with the maritime environment that could impact security, safety, economy or environment.”¹ The Strategy goes on to note that achieving that overarching goal is the synthesis of “information from a diverse set of sources to support high-level operational and strategic decision-making aimed at mitigating civil maritime security threats across the border continuum.” David Brewster provides a bit more detail, noting that the maritime domain includes “all things relevant to the national interests on, under, associated with, or adjacent to Australia’s maritime zones.”² That is a challenging goal, and inevitably it extends beyond Australia’s maritime approaches, including its exclusive economic zone (EEZ).

The vast size of the region of interest for MDA and the nature of modern globalized maritime activity means that MDA is a task that will only achieve limited success if information sharing and joint operational practices are not established between international partners. There are technological measures that are exploited to maximize Australian MDA, which will

¹Maritime Border Command, “Maritime Domain Awareness – Strategy 2015-2020,” p .11.

²David Brewster, “Give Light, and the Darkness Will Disappear: Australia’s Quest for Maritime Domain Awareness in the Indian Ocean,” *Journal of the Indian Ocean Region*, Vol. 14, no. 3 (2018), pp. 296–314.

be focused on in this paper, but technology alone is not “the answer” to meeting MDA requirements. Equally important is building partnerships for states and agencies to work together towards common goals. The Quad represents an ideal foundation for building cooperative approaches towards information sharing that is the engine of MDA and the means towards achieving successful outcomes.

This paper examines the MDA challenge from two broad perspectives. The first is the view from Canberra, in which it considers new capability developments and new approaches to using intelligence, surveillance, and reconnaissance capabilities—both government (including military means) and commercial systems—for achieving MDA. The second is how best to develop new bilateral and multilateral partnerships with Quad nations to achieve common goals within MDA.

In particular, it examines the practical application of future MDA technologies and architectures to meet a range of threats. The Quad partners can and should leverage new technologies for wide area surveillance—UAVs and UUVs, as well as government and commercial space-based capability—to play a role going forward. The paper then considers the potential for Quad states to cooperate in leveraging these types of capabilities through building common capability to fuse data and deliver a “common operating picture” to all partners. This would be the ultimate indicator of a successful approach to MDA within the Quad.

The Quad has come back from a premature and untimely near-death experience in 2008, and now is making progress forward in a variety of areas of cooperation. The resuscitation of the Quad can in part be attributed to growing concerns about China’s much more assertive stance across the Indo–Pacific under President Xi Jinping. China’s militarization of the South China Sea, its rapid military modernisation, and its aggressive use of debt-trap diplomacy and sharp power via the Belt and Road Initiative has concentrated the attention of the foreign policy community in India, Australia, Japan, and the U.S.

In addition, the concept of an “Indo–Pacific Region” has taken center stage. The Indo–Pacific concept, as viewed from Australia, is much more than just a geographic idea. Ramesh Thakur describes it as integrating “geography, the free and open principle and democratic values into one strategic construct.”³ The idea of an Indo–Pacific region is not new, and first emerged in 2013, but it has since become the centerpiece of Australian defences and foreign policy, not to mention, a core concept promoted by the U.S. under its Free and Open Indo-Pacific (FOIP) strategy.

The opportunity for strengthening cooperation within the Quad on Maritime Domain Awareness across the Indo–Pacific is a natural step in the evolution of regional security from the perspective of Canberra as a participant in the Quad. India’s Prime Minister Modi stated in 2014 in an address to Parliament in Canberra that “we should work together on the seas

³Ramesh Thakur, “Australia and the Quad,” *The Strategist*, July 5, 2018, <https://www.aspistrategist.org.au/australia-and-the-quad/> (accessed October 7, 2019).

and collaborate in international forums...[noting that]...the oceans are our lifeline. But we worry about its access and security in our part of the world more than ever before.”⁴

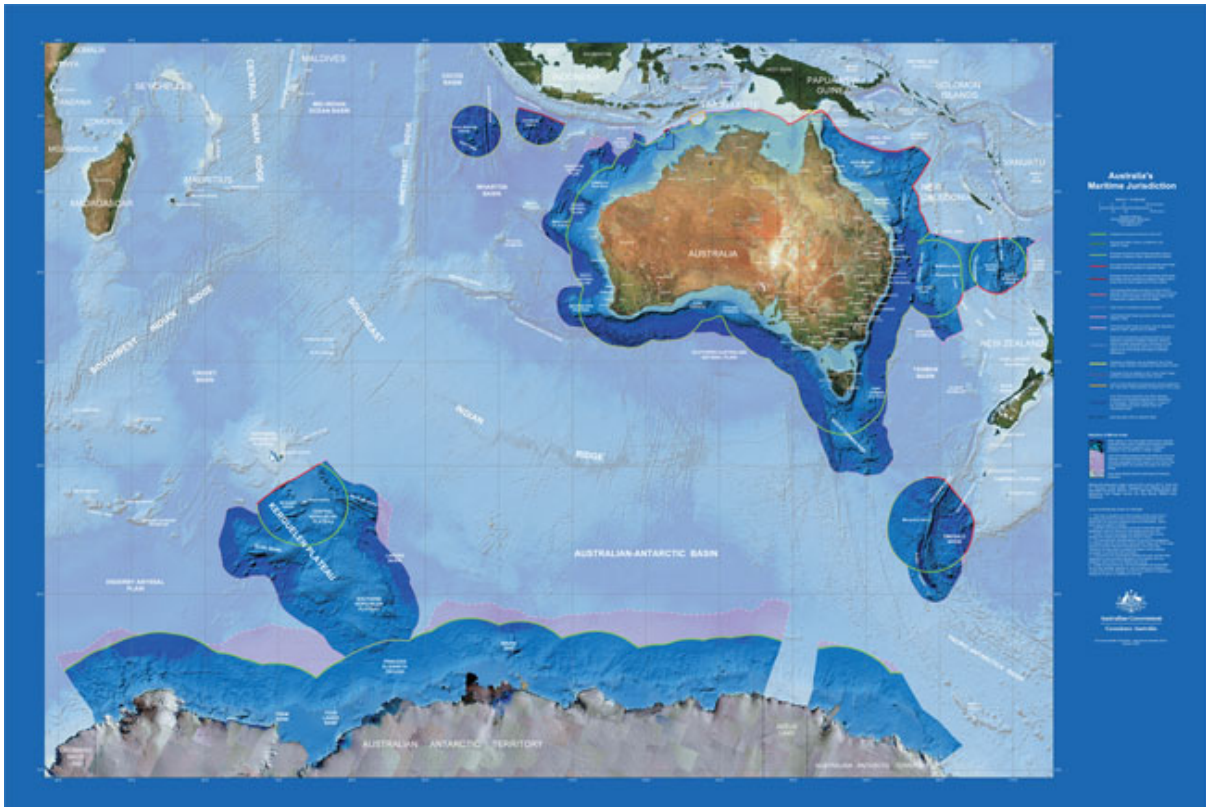
Looking at this challenge from Canberra, we face the complexity and scale of monitoring activities on the high seas over a vast area. Brewster notes that Australia has the largest Indian Ocean coastline, and the largest area of maritime jurisdiction of any Indian Ocean state, with about 5.9 million square kilometers (km) and an EEZ of 3.88 million square km. Our gaze covers not just monitoring shipping but being able and ready to undertake search and rescue, and policing over most of the eastern half of the Indian Ocean.

Then Australia must turn that gaze north into maritime Southeast Asia, south into the Southern Ocean towards Antarctica, and east out into the Southwest Pacific. The MDA Strategy document produced by Border Protection Command notes that:

Australia’s offshore maritime area consists of 15 million square kilometres.... [P]ossessing 36,000 kilometres of coastline, the Australian Exclusive Economic Zone is the third largest in the world covering 4% of the earth’s surface. Stretching from the tropics to the sub-Antarctica, Australia is responsible for managing security responses over an area that is 12 per cent of the earth’s surface [and has] distant maritime responsibilities including Christmas Island 1,500nm to the northwest through to Australia’s Antarctic territory (42 percent of the Antarctic mainland) to the south.⁵

⁴Prime Minister Narendra Modi, Address to the Joint Session of the Australian Parliament, November 18, 2014, <https://www.mea.gov.in/Speeches-Statements.htm?dtl/24269/Prime+Ministers+Address+to+the+Joint+Session+of+the+Australian+Parliament+18+November+2014> (accessed October 7, 2019).

⁵Maritime Border Protection Command, “Maritime Domain Awareness – Strategy 2015-2020,” p. 6.



Source: Geosciences Australia⁶

It is not just sheer size of our maritime environment, but the number of vessels operating in our waters. Mugg, Hawkins, and Coyne noted in 2016 that

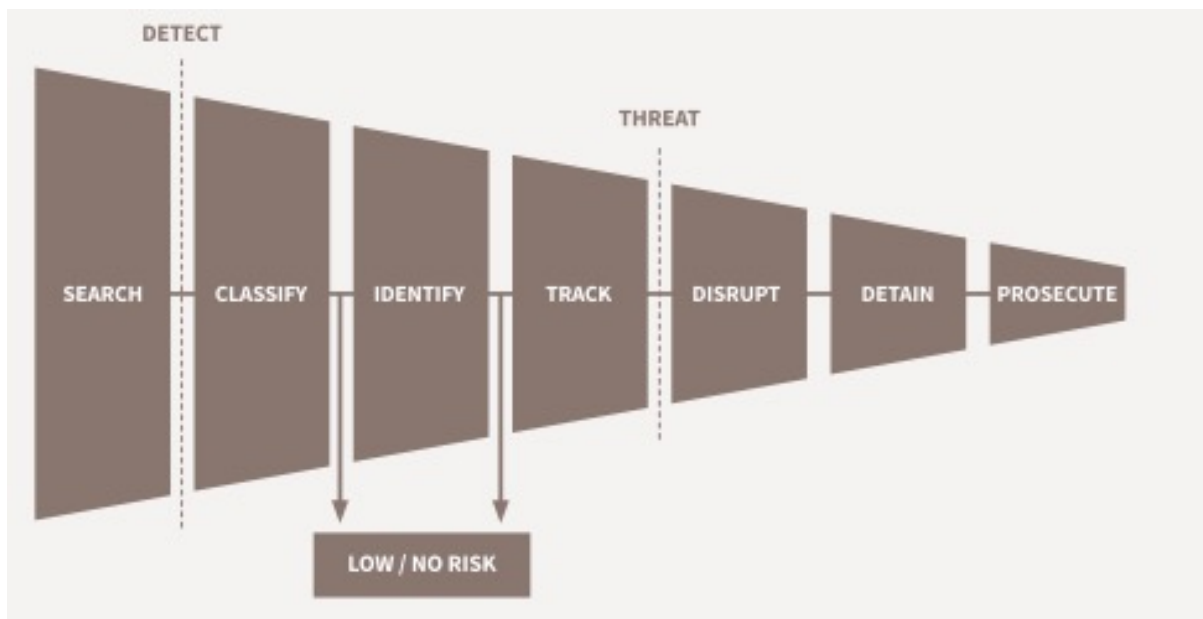
the number of vessels operating in Australian waters is growing, and as a result, border security assets are under ever-increasing strain. Each week in 2014, an average of 661 ships, 22,931 ship crew, 21,0000 sea passengers, 25 recreational craft and 55,000 sea cargo consignments arrived in Australia. Most of them transited through our northern approaches.⁷

Effective MDA at the national level over such a vast area depends on the Australian Maritime Identification System (AMIS), which was established in 2005. This is a networked system of sensors and platforms that gives the ability to detect, identify, and assess maritime security threats at long range.

If RAN and Border Protection Command ships and aircraft and commercial satellites are the eyes, then the AMIS is the brain that provides the means to detect, identify, and assess maritime security threats and illegal activities, as early and as far from our maritime borders and offshore infrastructure as possible. That provides decision makers with information and knowledge to make effective decisions on responding to threats. The process that supports MDA, from searching for and detecting maritime activity, identifying specific vessels of interest, and then deciding on how to respond is illustrated below.

⁶Geosciences Australia, "Australia's Maritime Jurisdiction Map Series," <http://www.ga.gov.au/scientific-topics/marine/jurisdiction/map-series> (accessed October 7, 2019).

⁷James Mugg, Zoe Hawkins, and John Coyne, "Australian Border Security and Unmanned Maritime Vehicles," ASPI Special Report, July 2016.



Source: Mugg, Hawkins, and Coyne, ASPI, 2016

AMIS provides “collation of data and intelligence from multiple government agencies, fused together in a single location” in a manner that “enhances shared awareness and understanding of threats and illegal activities in the Australian maritime environment,” and provides “enhanced information and system tools for collaborative decision-making to prioritise analysis in support of surveillance and response activities.”⁸

The key to successful MDA is a coherent common operating picture (COP) which brings together information from multiple agencies (and in an international context, foreign partners), as well as multiple technical means, to produce “a recognized maritime picture from which a recognized threat picture can be developed.”⁹ The goal is to allow decisions to be made on whether to act or not against a particular threat on the basis of shared, reliable and trustworthy information. Brewster goes on to note that one of the biggest challenges in creating a COP is dealing with differing organizational requirements. MDA is a task shared across both governmental and commercial, and civil and military entities, each with their own organizational interests and agendas and sensitivities. In particular, there might be challenges in sharing information if it emanates from highly classified sources, or if commercial confidence and sensitivity might be threatened. This challenge is accentuated if the MDA process is occurring between states—even notional partners and allies. For an emerging grouping like the Quad, it may be the issue of managing organizational risk which could slow progress. Yet such a challenge must be overcome because the clearly undeniable reality is that maritime traffic through the Indo-Pacific will continue and increase, with ongoing risks and threats posed across the spectrum of non-traditional to traditional maritime security challenges.

Seeing Deeper with Greater Clarity—Future MDA Capability

Australia’s approach to MDA is centered around the AMIS, but for AMIS to function, it must rely on a networked system of sensors and platforms to feed information. The current MDA

⁸Maritime Border Protection Command, “Maritime Domain Awareness – Strategy 2015-2020,” p. 13.

⁹Brewster, “Give Light, and the Darkness Will Disappear,” p. 300.

architecture includes use of commercial satellite imagery, the Jindalee over the Horizon Radar Network (JORN), as well as air and naval platforms.¹⁰ What might the future hold for these various capabilities and how might Australia exploit next-generation MDA capabilities?

Space. In their 2016 analysis, Mugg, Hawkins, and Coyne correctly argue that satellites currently only offer limited capability for supporting MDA.¹¹ This is due to the fact that satellites must follow orbital motion. That makes it difficult for them to manoeuvre around cloud cover that would defeat optical sensors for detecting small vessels without quickly using up onboard fuel. Given that Australia has relied on foreign commercial satellites, that does not give it the ability to quickly re-task satellites or alter a satellite's orbit and inclination. Getting optical detection is vital because it is needed to classify, identify, and track a vessel. A satellite can sometimes be equipped with synthetic aperture radar (SAR) which can pierce cloud cover, but small vessels are difficult to detect on SAR.

A solution to this problem might be emerging as a result of Space 2.0 technologies, including small satellite and "CubeSat" architectures that could be easily affordable for Australia to develop and fly as a *sovereign space layer* to support MDA.¹² Rather than exclusively rely on a few foreign-owned commercial satellites, Australia's growing space industry should be tasked with developing a plan for producing ocean surveillance satellites. The small size and low cost of CubeSat-based architecture would enable greater numbers of satellites to be deployed to support of Australia's MDA requirements, with these satellites built, owned, and operated by Australia as a sovereign capability. The greater number of satellites deployed, the greater the coverage of areas of interest, and the more flexibility in terms of satellite tasking, without having to rely on the consent of a foreign operator.

A "high-low" mix of space capability, comprising small ocean surveillance satellites working with networked "fractionated constellations" of CubeSats could allow sharing of data from a range of sensors in the manner of hyperspectral imagery. The 2016 Defence White Paper announced greater emphasis on space-based intelligence, surveillance, and reconnaissance (ISR) under Project DEF-799 Phase 2, which aims to acquire sovereign ISR satellites by the late 2020s. The requirements for the MDA mission should be integrated within DEF-799 Phase 2 so that any capability—probably based around small satellites—would support MDA operations. Additional ocean surveillance could be provided by the Australian space industry via low-cost CubeSats on an as-needed basis.

With this thought in mind, Australia's space future will also likely include sovereign space launch capabilities, that would then allow operationally responsive space for the ADF, and thus by extension, Border Protection Command. If additional space assets were needed to support the MDA mission, the low cost of CubeSats combined with the quick launch offered by modern space launch technologies would give Australia the means to quickly deploy additional satellites without relying on foreign partners. In that sense, satellites should be seen as platforms in the same way as aircraft, ships, and UAVs that are deployable to support specific operational requirements and taskings as part of a joint operation—rather than merely distant enabling capability.

¹⁰Mugg, Hawkins, and Coyne, "Australian Border Security and Unmanned Maritime Vehicles," pp. 9–14.

¹¹Ibid.

¹²Malcolm Davis, Strategist References + Strategy paper

Finally, satellites can do more than observe. Satellite communications (SATCOM) is a key requirement for modern ISR networks such as AMIS to function effectively. Defence project JP-9201B is to provide next-generation SATCOM for the ADF and must also be required to support satellite communications for the MDA mission. Once again, commercial Space 2.0 solutions might potentially offer additional potential. A key development on the horizon for the 2020s is the creation of mega-constellations in low-earth orbit (LEO) comprising thousands of small satellites to provide global SATCOM and a “broadband in the sky” that would initially complement and then supplant terrestrial communications networks, and which would also ensure on-orbit data relay. There is no reason why small satellite architecture could not be applied in this manner by Australia through sovereign development of an Australian mega-constellation to be deployed on an Australian space launch capability. Such a sovereign mega-constellation, developed by Australian space industry, would ensure Australia no longer had to rely on foreign commercial partners for command and control of its satellites.

The problem we face in terms of space-based support for MDA now is too few satellites. The solution is to build and deploy additional space capability ourselves.

Air and Sea. Satellites are essential for providing a broad area surveillance and cueing capability to direct air and maritime assets that then enable classification and identification of all targets including small vessels, tracking of targets of interest, and if necessary, interception for disrupting and detaining those vessels engaged in illicit activity, or which are deemed to be threatening. The challenge that Australia faces is too few air and maritime platforms to manage responding to the large amount of shipping that traverses the vast regions of Australia’s maritime interest.

In terms of air capability, the RAAF is transitioning to a force of twelve P-8A Poseidon maritime patrol aircraft and six MQ-4C Triton UAV to replace the fleet of fifteen venerable AP-3C Orion, which will cease operations in 2023. E-7A Wedgetail airborne early warning and control aircraft can also contribute to the MDA mission.

Additionally, the RAAF operated aircraft, commercial contractors (Cobham Aviation) support the aerial surveillance mission with ten Dash-8 aircraft that have been modified with advanced sensors and satellite communications.¹³

Cobham is also the lead partner with General Atomics Aeronautical Systems Inc. (GA-ASI) to support the MQ-9 Reaper medium-altitude UAV (MALE-UAV) through Project AIR 7003, which will when necessary support the airborne leg of the maritime domain awareness mission.

Mugg, Hawkins, and Coyne argue that the constraint on the number of air platforms dedicated to the MDA mission is cost. They highlight one of the most sophisticated capabilities—the MQ-4C Triton—which will provide satellite-like coverage over a vast area, but at relatively high cost of US\$14,876 per hour, including maintenance and fueling, and can only keep one area under surveillance at any one time.¹⁴

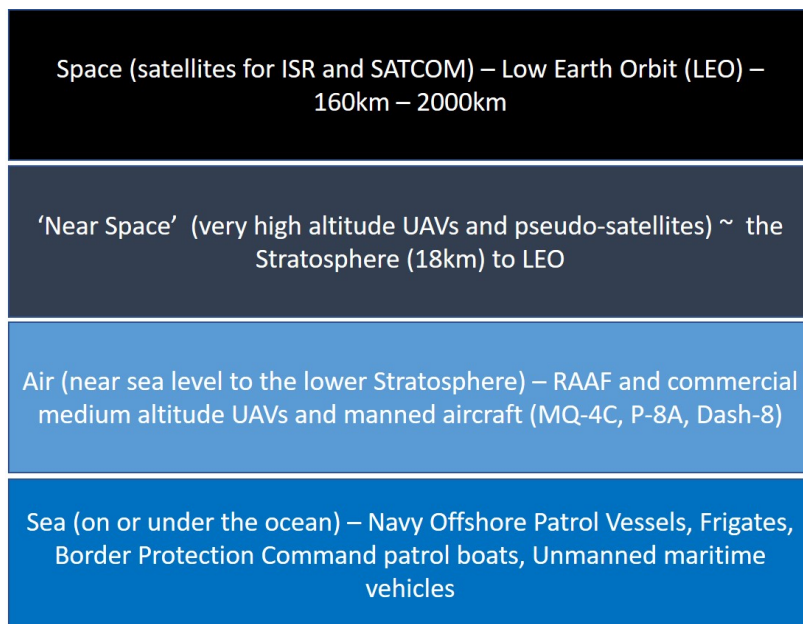
¹³Cobham Aviation Services, “Airborne Surveillance,” <https://www.cobhamaviationservices.com/what-we-do/surveillance> (accessed October 7, 2019).

¹⁴Mugg, Hawkins, and Coyne, “Australian Border Security and Unmanned Maritime Vehicles,” pp. 9–14.

UAV technology is moving forward, and a solution might be to acquire additional UAVs beyond that planned for in the 2016 Integrated Investment Program. In particular, the potential for UAVs operating at very high altitudes for prolonged periods, carrying an array of surveillance capabilities, should be at the forefront of future capability planning for maritime domain awareness.

One such capability would be solar-electric-powered and -propelled UAVs designed to operate in the upper atmosphere. Airbus has developed just such a platform with the Zephyr High Altitude Pseudo Satellite (HAPS) platform which can remain airborne for months at a time, whilst carrying a range of sensors.¹⁵ Airbus has established a flight base for Zephyr at Wyndham in Western Australia, which could support Zephyr operations over key areas of maritime interest off the northwest coast of Australia. Unlike Triton, a platform like Zephyr could stay airborne for months on station. The Zephyr UAV heralds a new type of capability designed for prolonged endurance on-station in “near space” that could expand the utility of air platforms for MDA.

If one considers the prospect for a multi-tier MDA architecture (as illustrated below) the opportunities for Australia to insert new technologies into this architecture should be closely examined.



If our use of space could be transformed by Space 2.0 technologies such as fractionated constellations of networked CubeSats and low-cost small satellites, whilst solar-electric UAVs such as Zephyr can remain aloft in “near space” for months on end, how might air and sea be exploited in new ways to further develop Australia’s MDA capability? The answer lies in integrating advanced unmanned maritime vehicles and solar-electric UAVs to ensure persistent ability to track maritime targets detected by HALE UAVs in near space and satellites in LEO.

¹⁵Airbus, “Zephyr – Pioneering the Stratosphere,” <https://www.airbus.com/defence/uav/zephyr.html> (accessed October 7, 2019).

The current role for airborne or naval surface platforms is for response and tracking of maritime targets of interest. Manned air platforms such as the P-8A are expensive to operate and have limited time on station. Naval vessels such as the *Arafura* class offshore patrol vessels (OPVs), being acquired under Project SEA 1180, will support ship-launched UAVs, but the RAN seems unwilling to make a strong commitment in this capability area, having chosen the much less capable Schiebel S-100 Camcopter for the Maritime Tactical UAS Interim Capability (MTUAS-IC) project whilst choosing a design for the OPV that lacks a proper hangar deck for larger aircraft.¹⁶

Developments are occurring in medium altitude maritime UAVs with a short and vertical takeoff and landing (STOVL) capability that could operate from land or sea would dramatically expand MDA coverage and ensure greater persistence over key areas of interest. For example, the U.S. Defense Advanced Research Projects Agency (DARPA) has tested the Silent Falcon UAV which is a solar-electric UAV that can fly for five hours at a range of 100 km and is also capable of being recharged by a laser as part of the Stand-off Ubiquitous Power/Energy Replenishment—Power Beaming Demo (SUPER PBD) project.¹⁷ Being cognizant of these technology developments should inform government thinking on future capability development for MDA.

Mugg, Hawkins, and Coyne emphasize the role of unmanned maritime vehicles (UMVs) such as the Liquid Robotics Wave Glider and the Ocius Bluebottle systems as a cost-effective way of providing maritime surveillance from the surface of the oceans.¹⁸ They note that acquisition costs for autonomous UMVs are far less than large UAVs such as Triton, with the US\$120 million for a single airframe being the same as 400 Wave Gliders, and operating cost for the Wave Glider being half the cost of Triton. This low cost would allow the creation of sensor nets across our maritime approaches, with the information cueing the deployment of aircraft and manned vessels to intercept and disrupt suspicious vessels.

The analysis suggested by Mugg, Hawkins, and Coyne is convincing, but the vision of networks of UMVs could be expanded upon. The U.S. Navy's Sea Hunter Anti-Submarine Warfare Continuous trail Unmanned Vessel (ACTUV) recently navigated autonomously from San Diego to Pearl Harbor and back, proving prolonged maritime endurance.¹⁹ At a cost of US\$20 million per vessel, and with operating costs of up to US\$20,000 per day, a fleet of Sea Hunters, perhaps equipped with STOVL solar-electric UAVs, could undertake MDA in concert with high-altitude pseudo-satellites like Zephyr and LEO-based ISR satellites, and support manned air and naval operations aimed at intercepting and disrupting illegal maritime activities.

¹⁶James Mugg and Andrew Davies, "Unmanned Naval Aviation—Bigger Is Better," *The Strategist*, February 14, 2017, <https://www.aspistrategist.org.au/unmanned-naval-aviation-bigger-better/> (accessed October 7, 2019).

¹⁷Ben Sampson, "DARPA Chooses Silent Falcon for Power Beaming Tests," in *Aerospace Testing International*, August 3, 2018, <https://www.aerospacetestinginternational.com/news/drones-air-taxis/darpa-chooses-silent-falcon-drone-for-power-beaming-tests.html> (accessed October 7, 2019).

¹⁸Mugg, Hawkins, and Coyne, "Australian Border Security and Unmanned Maritime Vehicles," pp. 16–21.

¹⁹Julian Turner, "Sea Hunter: Inside the US Navy's Autonomous Submarine Tracking Vessel," *Naval Technology*, May 3, 2018, <https://www.naval-technology.com/features/sea-hunter-inside-us-navys-autonomous-submarine-tracking-vessel/> (accessed October 7, 2019).

Building Partnerships—the Quad and Beyond

The architecture proposed above dramatically expands our use of space capabilities; exploits new advances in “near space” platforms such as solar-electric pseudo-satellite UAVs for MDA; and expands our use of UAVs and UMVs in a manner that would directly support manned air and naval platforms engaged in both traditional naval operations as well as MDA against non-traditional threats. It envisages incorporating networked long-endurance unmanned air and maritime platforms that would expand and sustain persistent surveillance of Australia’s maritime regions. Building such a capability should certainly be a priority for Australia but bringing in our partners in the Quad would further enhance our ability to exploit such technologies to strengthen MDA not only for Australia, but also for other Quad members.

Developing common capability between Quad members must start with cooperation in developing technologies, be it space capability, UAV and UMV systems, or enhancing maritime fusion centers that are being established around the AMIS. That will demand not just a focus on technology, but also strengthening maritime partnerships through enhanced defence diplomacy. The last section of this paper explores the opportunities and challenges in achieving this goal.

Two broad approaches should be pursued. The first is formulating information-sharing agreements between Quad states, and between the Quad members and other regional states, that ultimately lead to better understanding of realistic expectations regarding information sharing. Establishing common operating procedures and protocols for acting upon information received that relates to maritime activities is also important. By establishing a viable framework for multi-state MDA, and by getting partners to agreements acting in an aligned manner, it is easier to develop strategy for common capability development.

Christian Bueger and Anthony Bergin argue that a good model for establishing such a framework within the Quad, and between Quad states and other actors, is the Information Fusion Centre in Singapore.²⁰ The establishment of a Quad Fusion Centre for maritime domain awareness should be a priority and include personnel from all four Quad states. John Coyne and Isaac Kfir also argue that the model offered by the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against ships in Asia (ReCAAP) could be a basis for expanding MDA between Quad members.²¹ So, we already have two established organizational entities on which to develop MDA within the Quad.

Within the Indian Ocean region—probably the key focal area for Australia’s MDA efforts—dialogue at the Indian Ocean Naval Symposium (IONS) and future joint exercises could help grow cooperation and joint training between Delhi and Canberra. Diplomatic engagement within the Indian Ocean Rim Association (IORA) and the framework for security cooperation

²⁰Christian Bueger and Anthony Bergin, “Uniting Nations: Developing Maritime Domain Awareness for the ‘Blue Pacific,’” *The Strategist*, May 8, 2018, <https://www.aspistrategist.org.au/uniting-nations-developing-maritime-domain-awareness-for-the-blue-pacific/> (accessed October 7, 2019).

²¹John Coyne and Isaac Kfir, “Improving Maritime Security in the Asia-Pacific,” *The Strategist*, January 16, 2019, <https://www.aspistrategist.org.au/improving-maritime-security-in-the-asia-pacific/> (accessed October 7, 2019).

between Australia and India, announced during PM Modi's visit, would suggest further exercises, including one day, Australia's full participation in Ex Malabar.²²

These formal diplomatic channels can strengthen cooperation on maritime security issues, providing the stable foundation for the next step, which is building common capability. It makes eminent sense for the Quad participants to ensure that military and law enforcement capabilities can "plug and play" with each other, to make information sharing easier. Starting with space capability for ocean surveillance, the nature of modern Space 2.0 technologies makes it possible to develop multilateral constellations in orbit. So, rather than independent nation-state systems that sit within national silos, the Quad members could determine how best to exploit small satellites and CubeSats to provide pervasive ocean surveillance, and then each state contribute a number of satellites that work together as a common capability. The same approach could be done for advanced UAVs and pseudo-satellites, or UMVs. All four have high-technology sectors, space industry, aviation sectors, and are investing in R&D towards UAVs. There is broad commonality of equipment—for example India, Australia, and the United States all fly the P-8 Poseidon maritime patrol aircraft, whilst Japan, the U.S., and Australia fly either Global Hawk or Triton (or in the case of the U.S., both) UAVs.

Conclusion

The Quad is a good starting point for building stronger and more effective maritime domain awareness across the Indo-Pacific region. It represents four key actors—India, the U.S., Japan, and Australia—all with great interests in protecting vital maritime interests. The view from Canberra reinforces the significance of the maritime domain, for our national defense and security, our economy, and our society. But the scale of the challenge in maintaining maritime domain awareness over the vastness of the Indo-Pacific region means we cannot do it alone if we hope to have success.

Australia would welcome closer cooperation within the Quad members to boost MDA cooperation, make it easier to share information, and develop new MDA capabilities. The potential offered by new approaches to space systems, networked UAVs and UMVs, and a "system of systems" approach means that future MDA architecture can leap ahead beyond current levels of capability to offer greater persistence and detail of the complex and growing maritime traffic around Australia. An Australian effort to develop such a capability alone would be a significant boost to our ability to monitor maritime traffic in our approaches, but a true force multiplier will be common development of technology with key partners, including in the Quad.

²²Anthony Bergin, "Australia, India and Maritime Security," *The Strategist*, November 20, 2014, <https://www.aspistrategist.org.au/australia-india-and-maritime-security/> (accessed October 7, 2019).

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