Keynote Speech
Space Security Challenges for the U.S.-Japan Alliance

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1.0 Introduction

Japan is a space power. Japan's influence over and reliance upon the space domain will increase in the years ahead, with fundamental implications for all aspects of Japan's strategic interests, including national security, economic security and its geopolitical position and influence. During the Cold War, access to space capabilities was limited, space activities were led by the United States and the Soviet Union, and space power was defined primarily by capabilities in rockets and satellites. Commercial space developments have pushed the definition of leadership in space beyond just space hardware and into information and data services with potential for technological and economic benefit, but also with a larger and more challenging threat horizon.

Japan's space capabilities are foundational to its security, the Japan-U.S. security alliance, and security in the Indo-Pacific region. Japan relies on space for food security, navigation, ocean monitoring, missile defense, communications, economic security, weather, information collection, natural disaster response and recovery, technological innovation, science, and more. Space activities which threaten or block Japan's use of space, or which damage the long-term sustainability of space activity, will harm Japan's security. Similar to the oceans and air, activities in space connect Japan to the world. The ability to have unfettered access to and use of space is therefore vital to Japan's security, economy, and way of life.

This paper focuses on the space security challenges (and some opportunities) for the broader Japan-U.S. Alliance, not just the military activities by the United States and Japan. Security considerations include supporting civil, commercial, and diplomatic space activities that shape the conditions for Japanese national security (e.g., technologies, industrial capabilities, and international diplomacy). The next sections will address the context for U.S.-Japan space cooperation; the space security environment for Japan; key challenges for space security; strengthening the Japanese Self-Defense Forces (JSDF), and some policy recommendations.

2.0 U.S.-Japan Space Cooperation

Japan initially chose to develop independent space science capabilities with its "pencil rocket" in 1955 and launch of the first Japanese satellite, Ohsumi, in 1970 – the same year China launched its first satellite. International collaboration increased with the formation of the Institute of Space and Aeronautical Science (ISAS) in 1964 and the National Space Development Agency of Japan (NASDA) in 1969. Under license from the United States, Japan developed the N-1 and N-2s rocket, which were based on the U.S. Thor-Delta and Delta rocket designs. The United States placed tight restrictions on the transfer and use of ballistic missile technologies, however. Over time, with the H-series and other programs, Japan developed an autonomous launch capability for a wide range of payload weights, using liquid and solid propulsion motors.

The number and scope of space cooperation agreements between the United States and Japan began slowly, but have been increasing rapidly in recent years. See Table 1 below.

1969	Exchange of Notes concerning Space Exploration
1990	Exchange of Notes concerning the Policy and Procedure of R&D and Procurement of Artificial Satellites (Super 301 Trade)
1998	MoU concerning Cooperation on the Civil International Space Station
1998	U.S.-Japan Joint Statement on GPS Cooperation
2013	Japan-U.S. Agreement on SSA Services and Information
2013-Present	Comprehensive Dialogue on Space
2015	Extension of ISS Participation to 2024
2020	Artemis Accords founding member, Civil Lunar Gateway MOU
2023	US-Japan Space Framework Agreement

Table 1. Major Space Agreements between the United States and Japan

The 1969 exchange of notes dealt largely with how missile technologies from the United States would be protected and controlled. Twenty years later, the United States was concerned that Japanese launchers and communications satellites could use protected domestic markets to dominate global sales. Coming near the peak of trade frictions over automobiles, DRAM chips, and agriculture products, the United States and Japan created the 1990 Agreement on Satellite Procurement. This trade agreement barred Japan from

excluding foreign suppliers if satellites were to offer international commercial services. Japan could reserve satellites for domestic suppliers for non-commercial purposes such as scientific research or national security. It is still in effect and applies to Low-Earth Orbit (LEO) as well as Geostationary Earth Orbit (GEO) commercial satellites of all kinds.

During Diet debates on ratifying the 1967 Outer Space Treaty in 1969, Japan chose to interpret the term "exclusively for peaceful purposes" as meaning non-military. Thus Japan would not engage in military space activities. In contrast, the United States and other spacefaring countries interpreted "peaceful purposes" as allowing for non-aggressive military uses of space under the terms of the treaty. Japan's interpretation continued up until it was changed by the 2008 passage of the Basic Space Law, which opened the possibility of Japan using space for military purposes, consistent with Article 9 of the Japanese constitution.

Japan chose not to join the Space Shuttle program in the 1970s, while Europe and Canada did. Later, Japan did join the Space Station program, in part due to the common international views of President Reagan and Prime Minister Nakasone. The global growth of Global Positioning System (GPS) commercial applications, including for car navigation, led the United States and Japan to issue a joint statement on GPS cooperation in 1998, ahead of later satellite navigation agreements with Europe and other countries.

In the past decade, the United States and Japan have deepened their space cooperation across a wide range of civil, military, and commercial activities. Japan was one of the first countries to sign a space situational awareness data sharing agreement with the United States, the first country to have an annual comprehensive dialog on space (which has expanded to France), and was among the first eight countries to join the Artemis Accords. In response to current Russian efforts to station a nuclear weapon in orbit, Japan and the United States are working closely together in the UN Security Council and the UN General Assembly to organize international opposition to this potential violation of the 1967 Outer Space Treaty. Over time, Japan has become a crucial, if not leading, international space partner for the United States. In light of growing security challenges for both countries, this relationship is only likely to become more important for space security missions.

Under international law, space is the "province of all mankind" and is not subject to claims of sovereignty. This poses a dilemma for Japan and other spacefaring states in providing for their own security – they rely on the use of a domain that cannot be directly controlled. Thus, Japan must engage with other likeminded countries, especially

the United States, to secure support and understanding for Japan's interests. In particular, Japan needs to actively engage with other countries in shaping the conditions for space activities to ensure those conditions are conducive to Japan's interests.

Space activities today occur in a very different international environment than the Cold War or post-Cold War eras. The rapid globalization and democratization of space resulted in many more countries and private entities conducting space activities. Some companies are self-sustaining while others require government support. There has been a dramatic growth in the number of national agencies and there are now a hundred members of the United Nations Committee on the Peaceful Purposes of Outer Space (UNCOPUOS).[1] This trend reflects a broad alignment of interests between spacefaring countries and space-reliant developing countries; both are interested in the sustainable, peaceful uses of space to ensure the benefits from space-based infrastructures (e.g., satellite navigation, satellite communications, weather satellites, and remote sensing).

Japan released its current Space Security Initiative (SSI) in June 2023 which outlines the nation's plans for its space security architectures.[2] It aims to ensure the safe and stable use of space systems with three interrelated approaches representing the military, diplomatic, and economic aspects of space power:

- Radically Expand the Use of Space Systems for National Security (security from space)
- Ensuring Safe and Stable Use of Outer Space (Security in Space)
- Realizing a Favorable Cycle of Security and Fostering Space Industrial Base[3]

Key components of the SSI include: space domain awareness (SDA) satellites; intelligence, surveillance, and reconnaissance (ISR) satellites; space-based communications satellites; positioning navigation satellites; and space surveillance sensors. The SSI also emphasizes the importance of a strong domestic space industrial base and vibrant innovation to support Japan's space security efforts. By leveraging private-sector technologies, Japan can build a space architecture for national security that is both innovative and cost-effective. This is similar to U.S. efforts to make greater

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1 United Nations. 2022. COPUOS Membership Evolution. https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html

2 Japan. 2023. *The Space Security Initiative*. Tokyo, Japan: The Space Development Strategy Headquarters, June 2023. English Translation.

3 Space Security Initiative, *Op. Cit.*

use of commercial technologies and systems to achieve agile capabilities at lower costs.[4] The U.S. situation is markedly different due to the size and scope of U.S. government demand. Nonetheless, U.S.-Japan security cooperation is likely to encourage approaches that leverage and promote commercial space capabilities by both countries.

3.0 The Space Security Environment

The space domain has unique physical properties, and like other shared domains, such as the high seas, the polar regions, and arguably cyberspace, space is a domain in which state and non-state actors interact beyond national borders. Given global dependence on space-derived information and an increase in potential adversary threats to space assets, states have taken a number of steps in recent years to protect their national interests in space.

China has been rapidly increasing the professionalism and capability of its armed forces, including the ability to exploit space for military and economic security purposes and strengthen the power of the Chinese Communist Party. During the George W. Bush and Obama Administrations, the pace of Russian and Chinese anti-satellite (ASAT) testing picked up, most notably with the Chinese ASAT test in 2007. Russia and China reorganized their own armed forces to focus more directly on space, with the Russian Aerospace Defense Forces being established in 2015 and the creation of the People's Liberation Army Strategic Support Forces (PLASSF) in 2016. In April 2024, China subsequently reorganized yet again with the Strategic Support Forces being split into three separate arms: the PLA Aerospace Force, the PLA Cyberspace Force and the PLA Information Support Force.

The Obama Administration opposed officially calling space a "warfighting domain" but proposed funding to improve the resilience of space systems to a range of attacks, including cyber. The first Trump Administration recognized space as a warfighting domain and quickly issued a space strategy that called for a "whole-of-government" approach to United States leadership in space, in close partnership with the private sector and allies. The strategy emphasized four pillars: "transform to more resilient space architectures"; "strengthen deterrence and warfighting options"; "improve foundational capabilities, structures, and processes"; and "foster conducive domestic and international

[4] Defense Science Board. 2024. "Commercial Space System Access and Integrity – Final Report." Washington, DC: U.S. Department of Defense, May 2024.

environments."[5]

The combination of Chinese and Russian actions to hold U.S. space assets at risk, the recognition of space as a warfighting domain, and dim prospects for arms control, all combined to increase U.S. administration and congressional interest in space security. There has been a return of "Great Power Rivalry" with Russian annexation of Crimea in 2014, the invasion of Ukraine in 2022, continuing Chinese challenges in the South China Sea, and cyberattacks from both, have all added to a sense of urgency for long-standing national security reforms. A United States Space Command (USSPACECOM) had been created in 1985, but was disestablished in 2002 after the events of September 11, 2001. Space responsibilities were transferred to the U.S. Strategic Command, which also had responsibilities for nuclear and cyber missions. In response to a new threat environment, the USSPACECOM was reestablished in August 2019, with a mission to "conduct operations in, from, and to space to deter conflict, and if necessary, defeat aggression, deliver space combat power for the Joint/Combined force, and defend U.S. vital interests with allies and partners."[6]

At a meeting of the National Space Council on June 18, 2018, President Trump directed the Department of Defense and the Joint Staff to create a United States Space Force (USSF) as a separate military service dedicated to space.[7] This would be an armed service within the existing Department of the Air Force, just as the Marine Corps is within the Department of the Navy. On December 19, 2019, President Trump signed the 2020 National Defense Authorization Act, which had passed Congress with bipartisan support, creating the Space Force. This was the first creation of a new U.S. armed service since the National Security Act of 1947 created the Department of the Air Force. The Biden Administration continued to support the USSF and the USSPACECOM. Major U.S. allies, such as France, the United Kingdom, and Japan have also created their own dedicated military space organizations.

On October 12, 2022, the Biden Administration released its National Security Strategy.[8] The Strategy states that America has a vital interest in an "open, interconnected,

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5 The White House, "President Donald J. Trump is Unveiling an America First National Space Strategy," Fact Sheet, Washington, DC, March 23, 2018.

6 Department of Defense, *U.S. Space Command*, https://www.spacecom.mil/Mission/

7 Loverro, Douglas. 2018. "Why the United States needs a Space Force," *Space News*, June 25, 2018.

8 The White House. 2022. "National Security Strategy." Washington, DC, October 12, 2022. https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf

prosperous, secure, and resilient" Indo-Pacific, and will support that end through investments in democratic institutions, free press, and civil society. The Strategy also calls for open access to the South China Sea, stating "No region will be of more significance to the world and to everyday Americans than the Indo-Pacific." With regard to shared domains, the Strategy highlights the world's dependence on sea, air, and space for security and prosperity.

The Biden Administration National Security Strategy largely continued the policies and priorities of the Trump Administration, albeit with greater emphasis on climate and environmental issues. The major strategic challenge facing the United States and its democratic allies comes from "powers that layer authoritarian governance with a revisionist foreign policy," creating threats to international peace. Russia and the People's Republic of China (PRC) pose distinct challenges. Russia is an immediate regional threat to a peaceful international system, while the PRC has both the intent to reshape the international order as well as the power to do so. The Strategy outlines how the United States and its allies can shape both Russia and the PRC's external environment to influence their behavior while competing with them to maintain international stability and security.

In recent years, there has been a marked decline in Russian civil space capabilities due to Western sanctions for past actions, such as the 2020 poisoning of Alexei Navalny, combined with those for the 2022 invasion of Ukraine. In addition, domestic opposition to Russian mobilization has led to the loss of younger technical personnel as they sought to flee Russia. Russia remains a space power, but a declining one. It faces increasing difficulty in maintaining its existing space capabilities and lacks the ability to innovate at scale. Conversely, Western commercial space capabilities such as imagery from Maxar, mobile communications from Starlink, and GPS receivers, are being exploited effectively by Ukrainian armed forces in a wide variety of creative ways.

The reelection of Xi Jinping as Chinese Communist Party (CCP) General Secretary for a third term at the 2022 Party Congress was a significant development for the international space security environment. China's space activities have the specific support of Xi Jinping, as the preamble to the 2022 Chinese space white paper states:

> "To explore the vast cosmos, develop the space industry and build China into a space power is our eternal dream," stated President Xi Jinping. The space industry is a critical element of the overall national strategy, and China upholds the principle of

exploration and utilization of outer space for peaceful purposes. [9]

China's space industry is considerably more robust and well-funded than Russia's, and catching up in operational experience. China's space capabilities have continued to grow; China has completed an independent space station and has successfully landed rovers on the Moon and Mars. Due to Western sanctions and export controls, China is not a major competitor in the international launch market today, but they are heavily engaged in marketing launch services, satellites, and other space capabilities to developing countries. In return, China gets access to raw materials, markets for its goods, and access to ports and bases for military use. Every indication exists that they intend to be competitive in all commercial space sectors.

China is rapidly increasing the professionalism and capability of its armed forces, including their ability to exploit space to meet their national security objectives. As part of this effort, China's military possesses increasingly capable space counterforce weapons, as detailed in a 2022 U.S. Defense Intelligence Agency report.[10] These weapons include ground-based kinetic energy and directed energy systems as well as a wide variety of radio frequency jammers. Finally, China is also active diplomatically in a variety of fora. In its most recent space white paper, issued every five years, China addresses global space governance:

- Under the framework of the United Nations, China will actively participate in formulating international rules regarding outer space, and will work together with other countries to address the challenges in ensuring long-term sustainability of outer space activities.
- China will actively participate in discussions on international issues and the development of relevant mechanisms, such as those in the fields of space environment governance, near-earth objects monitoring and response, planet protection, space traffic management, and the development and utilization of space resources.
- China will cooperate in space environment governance, improve the efficiency of

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[9] The State Council, People's Republic of China. 2022. *China's Space Program: a 2021 Perspective*. January 28, 2022 (in English). http://english.www.gov.cn/archive/whitepaper/202201/28/content_WS61f35b3dc6d09c94e48a467a.html

[10] United States. 2019. *Challenges to Security in Space*. Washington D.C: Defense Intelligence Agency. https://purl.fdlp.gov/GPO/gpo116298

> space crisis management and comprehensive governance, conduct dialogue with Russia, the United States, and other countries as well as relevant international organizations on outer space governance, and actively support the construction of APSCO's (Asia-Pacific Space Cooperation Organization) space science observatory.[11]

In isolation, it should not be surprising that China, as a rising power, would seek to increase all aspects of its space power, whether military, economic, or diplomatic. What is of deeper concern is the Marxist-Leninist ideological conformity imposed by Xi Jinping in all areas. The strengths and weaknesses of a Marxist-Leninist approach to the Chinese economy, combined with a nationalist and confrontational approach to international relations are topics of ongoing debate by government and academic experts that need not be treated here. However, it is safe to say that China's approach to space-related security and economic activities are not, and will not be, separate from the rest of China's political priorities. Economic and military security in space are two sides of the same coin, both designed to strengthen the hegemony of the Chinese Communist Party.

The possible impacts of space activities on Japan's economic and military security over the next ten years depend on Japan's strategic vision for itself and the region. All vital national interests are still on Earth such that space activities are a means to strengthen and protect those interests, and that space activities are not ends in themselves. Space activities are more than just placing machines or even people in space, but also include the human values and goals guiding those space activities. First proposed by Prime Minister Abe in 2016, the goals of a free and open Indo-Pacific can be applied to space as well. As stated by the Japanese Ministry of Foreign Affairs (MOFA):

> "The Indo-Pacific region is facing various challenges such as piracy, terrorism, proliferation of WMD, natural disasters and attempts to change the status quo. Under such circumstances, Japan aims to promote peace, stability and prosperity across the region to make the Indo-Pacific free and open as "international public goods", through ensuring rules-based international order including the rule of law, freedom of navigation and overflight, peaceful settlement of disputes, and promotion of free trade."[12]

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[11] The State Council. *Op. cit.*

[12] Government of Japan. 2019. "Free and Open Indo-Pacific" Ministry of Foreign Affairs. https://www.mofa.go.jp/files/000430632.pdf

The United States endorses the concept of a free and open Indo-Pacific. In its 2017 National Security Strategy, the United States adopted the term "Indo-Pacific" in place of the term "Asia-Pacific" when describing U.S. interests in the region, to include the enhanced defense partnership with India. In 2021, Secretary of State Blinken emphasized that the concept applied to persons and not just governments, militaries, and businesses:

> "When we say that we want a free and open Indo-Pacific, we mean that on an individual level, that people will be free in their daily lives and live in open societies. We mean that on a state level, individual countries will be able to choose their own path and their own partners. And we mean that on a regional level, in this part of the world problems will be dealt with openly, rules will be reached transparently and applied fairly, goods and ideas and people will flow freely across land, cyberspace, and the open seas."[13]

Japan has close relations with many countries in the Indo-Pacific region. Those relations could be strengthened through the use of space capabilities for local development and the appropriate sharing of information for SDA and maritime domain awareness purposes. Building stronger, routine security ties among countries can enable them to better cooperate on common concerns (e.g., illegal fishing, piracy), or in the event of conflict, come to each other's aid more effectively. Expanding the use of space capabilities such as communications, navigation, and remote sensing give developing countries a stake in a peaceful, rules-based order in space. As with the free-and-open Indo-Pacific strategy generally, such cooperation need not be aimed at China, but it can make it easier for smaller countries to resist economic or military pressure from China.

Maritime law enforcement operations by the Japan Coast Guard (JCG) are a particularly promising area for greater diplomatic engagement between Japan and others in the Indo-Pacific region. This is already well-known in Japan, but it is also true that space-enabled maritime domain awareness can enable more effective and efficient use of limited numbers of ships and personnel while encouraging interoperability with likeminded countries. However, major barriers to closer maritime cooperation are a

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[13] Blinken, Antony J. 2021. "A Free and Open Indo-Pacific." Speech to the Universitas Indonesia, Jakarta, Indonesia. December 14, 2021. https://www.state.gov/a-free-and-open-indo-pacific/

lack of interoperable communications equipment and procedures among the JCG and local maritime law enforcement authorities. Equipment and legal interoperability are also challenges for closer cooperation between the JCG and the Maritime Self-Defense Force (MSDF). In the past, the JCG has resorted to communicating with the U.S. Coast Guard, who then communicates with the U.S. Navy, who then communicates with the MSDF.

4.0 Space Security and Key Military Challenges

The most significant threats to Japan, involving space systems, arise from China, particularly in the context of a conflict with the United States. North Korea poses a secondary, albeit serious, threat with its potential use of weapons of mass destruction and ballistic missiles against Japan. Japan's ability to deter these threats can be clarified by using the principles of deterrence laid out in the 2020 U.S. National Space Policy. As described in the U.S. Policy, the ability to deter an attack is based on five elements:

- Attribution – being able to identify who is to be deterred;
- Signaling – to communicate whether an action is unacceptable. This can include, but is not synonymous with norms of behavior;
- Credibility – having capabilities that are known, exercised, or demonstrated to support signaling to an adversary;
- Resilience ("denial of benefit") – a characteristic of a nation's capabilities in which they can function effectively across the spectrum of conflict and despite attacks from an adversary; and
- Cost Imposition – which may range from diplomatic protests and economic sanctions, to armed conflict.[14]

For the United States, space systems are needed to support or implement each of these deterrence elements. SDA is needed to attribute actions to adversaries in space. Diplomatic or political complaints about violating norms of behavior in space are one form of signaling, but other actions such as moving deployed forces can also send signals to an adversary. In order to be credible, the United States needs actual space

[14] The White House. 2020. "The National Space Policy." Washington, DC, December 9, 2020. Page 27. https://history.nasa.gov/NationalSpacePolicy12-9-20.pdf

capabilities, military or civil or commercial, that are proven to operate effectively. Those same capabilities are needed to support resilient functions. Communications and missile warning functions that cannot be easily denied or destroyed enable escalation control and greater crisis stability. The question for Japan is whether it requires space systems for all these elements of deterrence and why.

Attribution: Improving Japan's SDA would give it better knowledge of events in the space environment and allow for independent verification. This would improve and expand international confidence in correctly attributing hostile actions in space. By contributing to improved SDA, Japan can also promote international standards for information about space safety risks and better communicate that information to appropriate satellite owners and operators.

Signaling: Japan can support international discussions on transparent and responsible standards for active debris removal. Such standards can help reduce the risk of space debris and also help distinguish between friendly and hostile close approaches of satellites. Both would contribute to more confident signaling between actors and space and lower the risk of misunderstandings and potential miscommunication.

Credibility: Demonstrating the operational credibility and resilience of Japan's space capabilities is an important part of deterrence, just as it is in other operational domains such as the oceans and the air. This is particularly necessary where there may be intentional interference with those systems, such as jamming or ballistic missile attacks. Space-based communications, navigation, and ISR are especially important to the MSDF and Air Self-Defense Forces in maintaining operational access to the sea and air lines of communication connecting Japan to the rest of the world, and the United States in particular.

Resilience ("Denial of Benefit"): The JSDF should ensure that exercises include using space capabilities under both normal and challenging conditions when access to space-based information is degraded or denied. For example, JSDF ships and aircraft should be able to operate under conditions of GPS jamming. The JSDF and senior civilian Japanese leadership should have secure communications with each other and with U.S. armed forces, even when satellites are subject to interference. The JSDF should be able to maintain SDA and MDA of the areas surrounding Japan at high levels of conflict, when Japan is under attack. Doing so will require not only close cooperation with the United States, but with other Association of Southeast Asian Nations (ASEAN) countries.

Cost Imposition: Japan should consider what diplomatic, military, and/or economic

"weapons" it will deploy if/when Japan's space systems are attacked. Japan should develop response plans and determine approval authorities for responses at all levels of the conflict "escalation ladder." Some cost imposition options may be communicated publicly to partners and adversaries while others may be kept only for discussion within the Japan-U.S. alliance, or communicated directly to an adversary.

Space capabilities are part of overall national power. As a consequence, "space" should not be treated in isolation from other domains, such as land, sea, air, and cyber. In the case of a conflict over Taiwan, the U.S. strategy should be one which prevents China from immediately taking critical territory, even if not fully defeated, rather than ceding territory and having to wage a longer, costly counteroffensive after losing ground. The RAND Corporation has written on the specific military capabilities in which there is a

> "…need for a deterrent and defense posture that is based on rapidly blunting invading forces and holding decisive points—that is, *preventing an adversary from seizing the primary objectives of the invasion*, to wit, Taiwan or significant terrain within one or more NATO nations."[15]

Deterrence based on the denial of attack objectives tends to be more credible than threats of future cost imposition or escalation (whether vertical, such as nuclear weapons, or horizontal, such as out-of-area attacks). To blunt an invasion force, the United States, Japan, and their allies will need a strong forward defense to include rapid, precise, over-the-horizon strikes. Such a defense will require space-based communications, positioning, and ISR, as well as resilience to cyber and electronic warfare attacks. The decisive phase of a war could be in days, not weeks or months. Hence the importance of in-place, operational capabilities. RAND describes the information demands that will exist from the beginning of a conflict as follows:

> "Throughout the duration of the blunt phase, establish and sustain a sensing and targeting grid over the battlespace. The grid must be able to find, identify, and track ships, aircraft, and vehicles associated with enemy invasion in the face of *intensive air defenses, counter-space weapons, cyberattacks, and sensor and communications jamming*. The grid should be connected to air, land, and maritime operations centers via

[15] Ochmanek, David A., *Determining the Military Capabilities Most Needed to Counter China and Russia: A Strategy-Driven Approach*. Santa Monica, CA: RAND Corporation, 2022. Page 4. https://www.rand.org/pubs/perspectives/PEA1984-1.html.

> robust data links. The grid should also be capable of autonomously nominating and guiding weapons to targets in cases where those links are temporarily severed."[16]

Meeting these information demands is more than a space problem, but a complex management and technology problem that poses challenges to both military services and the supporting industrial base. That said, there are two space lines of effort that are mutually reinforcing and, when implemented together, will have greater effect. The first consists of space policies that improve the ability of Japan to defend itself, followed by policies which strengthen the Japan-U.S. alliance and foster a more favorable environment for Japan's space activities. The second line of effort are measures to strengthen Japan's space industrial base, raising Japan's ability to utilize space for economic growth, and fostering new innovations and scientific understanding. Clear policies on how and where Japan will utilize space to protect itself provide signals to Japan's industrial base on where to invest, innovate, and build space capabilities. These signals need to be clear and credible if they are to be trusted and acted upon by Japanese industry.

The most recent U.S.-Japan Summit Meeting in April 2024 between President Biden and Prime Minister Kishida resulted in a number of new initiatives in defense and security cooperation, including overlapping efforts in commercial and military space. For example:

> "The United States and Japan announced their intention to collaborate on a future Low-Earth Orbit (LEO) Hypersonic Glide Vehicle (HGV) detection and tracking constellation. This includes cooperation on demonstration, bilateral analysis, information sharing, and potential collaboration with the U.S. industrial base. The integration between U.S. and Japanese constellations of LEO satellites provides an opportunity to improve communications and increase the resilience of both nations' space capabilities."[17]

The focus on LEO satellite architectures addresses several interrelated interests. First, the need for detecting and tracking HGVs which are more difficult to defeat than ballistic missiles. Second, the exploitation of information from LEO constellations can also enable space-based tactical ISR which is a critical need in the Indo-Pacific. In

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16 *Ibid*

17 United States. 2024. "FACT SHEET: Japan Official Visit with State Dinner to the United States." Washington, DC: The White House. April 10, 2024. p. 7

particular, space-based solutions are important as traditional airborne ISR assets are not survivable in the expected threat environment. Finally, large scale production of LEO platforms offers potential economies of scale that would benefit commercial as well as military applications. There is a keen interest within Japanese industry to participate in mega-constellation programs but the current Japanese domestic market is small, making international cooperation a necessity. It is less clear, however, as to what such cooperation would look like, e.g., sales and subcontracting in the U.S. market, licensed production in Japan, or integration of separate, but compatible systems.

The United States increasingly looks to hybrid architecture solutions in which government and commercial assets are used together, rather than relying on purely private or fully government systems for mission needs. This is particularly true in building interoperable and integrated ground systems for space services and Japan should follow this trend closely. Such an approach could provide faster, lower cost acquisitions as well as a means of ensuring interoperability. For example, Ukrainian armed forces have quickly adapted to using U.S. commercial space communications, commercial GPS, and commercial remote sensing data sources to wage highly sophisticated operations. Under the pressure of an existential threat, they are demonstrating the value of hybrid systems.

The most serious interoperability barrier is not likely to be technical or political, but data and information security. Sharing of space data for military or intelligence purposes remains exceedingly sensitive, despite ongoing efforts to lower classification restrictions for allies. For Japan to achieve its own security and enable full integration/interoperability with the United States, three foundational activities must be achieved: secure digital infrastructure, cybersecurity, and a government/industrial security apparatus. Each of these initiatives are foundational, interdependent, and a prerequisite to economic and security development.

Space activities are closely related to economic security as well as direct military security. This is particularly clear when looking at the space industrial base which provides the foundational capabilities for any space activity. As the experience in Ukraine has shown, logistics and the ability to sustain a protracted conflict are crucial to countering aggression. China may seek to prosecute a high-speed conflict, or escalate to multiple domains, such as space and cyber. The United States places its top priority on ensuring nuclear deterrence, to include extended deterrence of nuclear attacks on allies, to prevent nuclear escalation. Ensuring adequate munitions stockpiles and secure industrial supply chains are essential to deterring conflict from beginning by denying the attacker any realistic hope of victory. Resilient architectures that can withstand adversary

attacks, whether kinetic, electromagnetic, or cyber, are stabilizing as they enhance Japan's deterrence posture. Resilience can be demonstrated through use of hybrid architectures that draw on diverse commercial as well as government space systems. Like military weakness, perceived industrial weakness can be provocative to conflict rather than stabilizing.

U.S.-Japan commercial partnerships can encompass a wide range of activities such as sales of systems, subsystems, and components, licensed production, and co-development. The different sizes of the U.S. and Japanese space markets can make it difficult to find mutually advantageous projects. However, the United States is finding the Japanese manufacturing capabilities can fill in gaps on the U.S. side; for example in co-production deals for Advanced Medium-Range Air-to-Air Missiles (AMRAAMs) and Patriot missile defense batteries. There are situations in the U.S. space industrial base where there may be only one qualified supplier. Co-production partnerships with Japan could strengthen supply chain resilience and enable more economical, continuous manufacturing.

5.0 Space Security and Diplomatic Challenges

Global and regional geopolitical alignments will continue to be the underlying force behind high visibility human spaceflight cooperation. With an increasingly isolated Russia, international human spaceflight cooperation will likely separate into a new bipolar bloc centered on the United States and China respectively. The China bloc is likely to have limited appeal to developed countries but will be nominally international with Russia in the International Lunar Research Station (ILRS) project. Concern with China, and Russia's ties with China, will likely result in India increasing space cooperation with Quad nations, although remaining formally non-aligned. Japan thus has a potentially important role in encouraging space cooperation with India. Through the Asia-Pacific Regional Space Agency Forum (APRSAF) and other engagements with the ASEAN members, Japan is in a position to promote increased space cooperation across the region and provide an alternative to China.

After the International Space Station (ISS) program ends, either by 2030 or earlier, the ISS partners will shift to new programs. While Japan's space budget continues to emphasize civil space activities, increasing threats from Russia and China in space as well as cyberattacks, have made space cooperation an important part of Japan's security alliance with the United States. As more countries operate in space, for commercial and military purposes as well as traditional scientific purposes, Japan's involvement in human

space exploration is an opportunity to shape the governance of the space environment on which it relies. In doing so, a strategic partnership with the United States is one of its strongest assets.

Japan has ambitions to have one of its astronauts be the first non-American on the Moon. On December 28, 2021, Japanese Prime Minister Kishida released a statement on the latest version of Japan's Basic Space Plan which included this statement: "…in the latter half of the 2020s, we will aim to realize the landing of Japanese astronauts on the Moon…"[18] While very much a civilian program, the Artemis effort to return humans to the Moon is also a national security program. The necessary capabilities to operate in deep space and on the lunar surface – transportation, communications, guidance and navigation, power, etc. are all dual-use capabilities. Their development by civil, commercial, and international partners is less provocative than if led by national military forces, such as the U.S. Space Force. In addition, current U.S. military and civilian defense leaders do not see lunar activities as a security priority compared to supporting U.S. and allied forces on Earth.[19]

All countries, including the United States and China, operating in cislunar space need basic space situational awareness and other information for safety reasons. A civil multilateral forum could be created for the exchange of information on lunar operations. The UN Office of Outer Space Affairs (UNOOSA), with the endorsement of member states, supports the International Committee on Global Navigation Satellite Systems (ICG). The ICG provides an open, multilateral forum for technical information exchange among Global Navigation Satellite System (GNSS) providers such as the United States, Russia, China, Japan, Europe, and India. It can address technical matters and improve transparency but does not get into operational decisions, which are the preserve of member states. A Lunar Activities Committee (LAC) could play a similar role for states operating spacecraft, as well as infrastructure services in cislunar space.[20] Looking ahead to the return of humans to the Moon, such a forum could also discuss

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[18] Park Si-soo, 2021. "Japan wants a JAXA astronaut to be first 'non-American' to join a NASA lunar landing." *Space News*, December 29, 2021. https://spacenews.com/japan-wants-jaxa-astronaut-to-be-first-non-american-to-join-a-nasa-lunar-landing/

[19] Hitchens, Theresa. 2022. "Kendall's 'message' to Space Force: support missions are central role." *Breaking Defense.* April 6, 2022. https://breakingdefense.com/2022/04/kendalls-message-to-space-force-support-missions-are-central-role/

[20] United Nations Committee on the Peaceful Uses of Outer Space. 2024. "Draft mandate, terms of reference and methods of work for an Action Team on Lunar Activities Consultation (ATLAC) - Paper submitted by Republic of Korea, and Romania," United Nations, Vienna: June 25, 2024

potential means for the rescue and return of astronauts, or other forms of mutual aid, per international law.[21] While motivated by safety concerns, such a forum could also encourage the development of norms of behavior that would foster more transparent and sustainable lunar operations.

Multiple U.S. administrations have emphasized norms of behavior in space, in particular the voluntary halting of destructive direct-ascent kinetic energy anti-satellite tests. The natural question is what should come next? In deterrence terms, norms are part of signaling, and their significance lies in the extent to which they are broadly followed. In commercial, scientific, and exploration terms, norms of behavior can be important elements for creating or enhancing safe and responsible space operations. For example, in cooperation with likeminded countries, Japan can play a role in setting dual-use norms for rendezvous and proximity operations, satellite refueling, servicing, and active debris removal. Such capabilities are dual use and may be used to harm satellites as well as service them.

Other dual-use space areas where Japan could lead would be in SDA beyond geosynchronous orbit and in cislunar space, defining lunar safety zones for human landings and resource utilization, and procedures for the rescue and return of astronauts. China is expected to eventually send humans to the Moon, including to the South Pole region where Japanese, European, and American astronauts will be. While such activity is not a military threat, discussion and coordination will need to take place with China to ensure safe and responsible operation on the Moon. Japan can play an important international role in establishing norms of behavior in and around the Moon.

The most serious challenge to the international legal regime for space is the potential placement of a Russian nuclear weapon in orbit.[22] In addition to the military and global economic threat posed by such an action, stationing a nuclear weapon in space would be a clear and direct violation of Article 4 of the 1967 Outer Space Treaty.[23] It is unclear how the United States and Japan, along with the rest of the international community, should react if the treaty is violated. Should signatories decide to withdraw from a

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[21] *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space*. Entered into force December 1968. United Nations, New York. https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introrescueagreement.html

[22] Duchaine, Daniel. 2024. "Russia's nuclear threat to space is worse than a 'Cuban Missile Crisis' in space." Commentary in *Space News*, July 9, 2024.

[23] Article 4 of the 1967 Outer Space Treaty states in part: "States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction…"

clearly ineffective agreement? Should the Russian violation be tolerated in the hopes of them coming back into compliance and preserving other parts of the treaty? Should international sanctions be imposed – in addition to those already imposed in response to Russia's invasion of Ukraine. As a last resort, should other spacefaring nations be prepared to remove the weapon by force?

If international law and space governance are to be effective, what, if anything, is the international community willing to do to uphold the Outer Space Treaty? Russia could cause global economic disaster by the collapse of space infrastructure. So, should a space-based nuclear weapon be considered an imminent threat? Would destruction of an orbiting nuclear weapon, to enforce the Article 4 prohibition, be legal under the UN Charter? More generally, does this situation suggest that the United States has an undefined military requirement to be able to destroy orbiting nuclear weapons, as well as ballistic transiting through space, and defend high value assets in space (such as missile warning and nuclear command and control systems)?

6.0 Strengthening the Japan Self-Defense Forces

Given historical circumstances and past Japanese government policies, the JSDF today has only limited abilities to utilize space for military benefit. Senior military and civilian leaders in the Ministry of Defense and the Self-Defense Forces (MOD/SDF) are aware of the importance of space to modern military operations, but this has not yet been translated into reality among deployed forces. The MSDF work closely with the U.S. Navy and can use satellite communications and satellite navigation systems. The ASDF are similar in their working relationship with the U.S. Air Force. The Ground Self-Defense Forces (GSDF) lag behind the most in that their vehicles are not routinely equipped with military-grade GPS, they lack robust satellite communications, and cannot easily use space and radar information for over the horizon strikes. JSDF commanders, even very senior ones, do not have access to satellite images, even commercial images, which are a routine part of U.S. military operations. Finally, the JCG is not able to operate as seamlessly with the MSDF as the U.S. Navy and the U.S. Coast Guard are able to do, for both legal and technical reasons. This is particularly worrisome as the JCG faces "gray zone" challenges from the PLA Navy, Chinese Coast Guard, or irregular forces.

The security environment around Japan has changed dramatically in the past decade and this has led to revisions to Japan's National Security Strategy and National

Defense Strategy.[24, 25] These revisions require a strengthening of the JSDF, to include the acquisition of its own counterstrike capabilities in addition to ballistic missile defenses and reliance on U.S. long-range strike capabilities. To defend Japan, the JSDF needs to be able to find, attribute, defend against, and kill targets "over the horizon" and not just on Japanese territory. These capabilities in turn require sophisticated information systems that utilize space-based services. In short, the JSDF cannot succeed without greater abilities to use space in their assigned missions.

Strengthening the JSDF requires more than just new equipment, important as that is. It requires transforming the JSDF into a more joint, flexible force that can adapt to the unexpected. From a U.S. perspective, the JSDF appears similar to U.S. military services prior to passage of the 1986 Goldwater-Nichols Act.[26] JSDF services operate within their own "silos" while competing for budget and attention with each other. They do not operate jointly nor is jointness stressed as a necessary value for military victory. While relations with individual U.S. Services are quite good, the JSDF prefers to work bilaterally with the United States and has difficulty in combined arms operations, such as working with Australia, the United Kingdom, and others in the kinds of coalitions that would arise in a realistic conflict.

The 2022 National Defense Strategy makes clear Japan's intention to "never accept unilateral changes to the status quo by force and such attempts at any time. These efforts cannot be achieved by Japan alone, and it will be necessary to cooperate and collaborate closely with our ally, like-minded countries and others."[27] In 2024, the Diet created a new joint JSDF headquarters and joint commander position to improve command and control coordination among the GSDF, MSDF, ASDF, and the U.S. forces.[28]

In some specialized areas, such as ballistic missile defense, joint operational coordination exists between the ASDF and MSDF, but this tends to be an exception. Some U.S.-JASDF bilateral exercises, such as Exercise Red Flag-Alaska, incorporate space

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[24] Government of Japan. 2022. *National Security Strategy.* Tokyo: National Security Secretariat. December 16, 2022. https://www.cas.go.jp/jp/siryou/221216anzenhoshou/nss-e.pdf

[25] Government of Japan. 2022. *National Defense Strategy*. Tokyo: Ministry of Defense. December 16, 2022. https://www.mod.go.jp/j/approach/agenda/guideline/strategy/pdf/strategy_en.pdf

[26] The Goldwater-Nichols Department of Defense Reorganization Act of October 4, 1986 (Public Law 99-433, signed by President Ronald Reagan) streamlined the military chain of command, increased the authorities of the Chairman, Joint Chiefs of Staff, and the commanders of the unified and specified combatant commands, and enhanced the effectiveness of joint military operations.

[27] National Defense Strategy. *Op. cit.*

[28] The Japan News. 2024. "Bills to Create Joint SDF Headquarters Pass Diet; New Joint Commander to Ease Burden on SDF Chief." *The Japan News*, May 11, 2024.

assets, but this is not common. The Amphibious Rapid Deployment Brigade (ARDB) conducts exercises (e.g., Iron Fist) with the U.S. Army and the U.S. Marines but space is not a significant aspect. Exercises with the GSDF such as Yama Sakura and Orient Shield typically have very limited cross-domain aspects and are not multi-domain. The GSDF has already established new electronic warfare units, but it is unclear how such units would support non-GSDF units or operate under joint command. In contrast, the U.S. Army, through the U.S. combatant commands, trains in multi-domain scenarios (air, land, sea, cyber, EW, space) as well as cross-domain operations.

In addition to joint and combined arms operations, the JSDF needs to become better at cross-domain and multi-domain operations. Cross-domain operations are those in which information is passed between different secure systems, e.g., from a national intelligence source to a GSDF user. Multi-domain operations are those in which operations are planned and executed across traditional environmental domains, such as the land, sea, and air, and non-traditional domains, such as the electromagnetic spectrum, cyber and space. Promoting JSDF uses of space could be a useful catalyst to improving a "whole of force" approach for the JSDF as space capabilities inherently have joint, cross-domain, and multi-domain applications. What should be avoided, however, is the assignment of "space" or "electronic warfare" tasks to one service without attention to how those tasks contribute to overall joint operations.

The National Defense Strategy does address both cross-domain and space domain activities: "In the space domain, by proactively introducing new form of space use including satellite constellation and by receiving functions such as information gathering, communication, and positioning from space, Japan will reinforce its operational capabilities in the land, sea, and air domains. At the same time, in order to respond to threats to the stable use of outer space, Japan will develop ground-based and satellite-based surveillance capabilities, establish an SDA system, and reinforce the resiliency of space assets to enable the continuation of missions in response to various situations."[29] The Defense Build-up Plan goes on to be more specific when stating that "Japan will strengthen cooperation with the United States and build a satellite constellation to acquire target detection and tracking capabilities, supplemented by various initiatives, including utilizing commercial satellites. In addition, necessary technological demonstrations will be conducted to improve satellite-based countermeasures capabilities, such as detection and tracking of hypersonic glide weapons (HGVs), while taking into account the

[29] National Defense Strategy. *Op. cit.*

possibility of cooperation with the United States."[30]

The National Defense Strategy is clear and constructive in its recognition of cybersecurity, electronic warfare, cross-domain operations, and space. In the cyber domain, the MOD/SDF are directed to: "promote its efforts that contribute to reinforcing cooperation with the relevant ministries and agencies, critical infrastructure operators, and the defense industry, while improving its cybersecurity capabilities."[31] This does not directly mention, however, the need for cybersecurity in order to improve cooperation with the United States and other foreign militaries.

Lastly, the National Defense Strategy directs the ASDF to "develop a system which can reinforce quality and quantity of air defense capability, maintain effective stand-off defense capabilities, ensure effective missile and air-defense posture, and introduce various unmanned assets. Also, the ASDF will be renamed the Air and Space Self-Defense Force by reinforcing space operation capability and developing systems to ensure superiority in use of space."[32] Having units focused on space, along with cyber and electronic warfare tasks is a step forward, but the effectiveness of these units will be undercut without JSDF-wide attention to jointness across the services and interagency cooperation (e.g., working with JAXA and civilian ministries such as the Ministry of Land, Infrastructure, Transport and Tourism). The successful integration of space capabilities into the JSDF will require improvements at all levels, from policy and planning, to command post and field exercises, and the training of professional non-commissioned officers.

7.0 Integrating Diplomatic, Economic, and Military Power

Japan takes a "whole of government" approach to the space domain and seeks to integrate its economic, security, scientific and diplomatic efforts. In the 2022 edition of the *Defense of Japan*, this approach is described as: "The National Space Policy Secretariat … engages in the planning, drafting, coordinating, and other policy matters relating to the Government's development and use of space."[33] A comprehensive approach to space security requires integrating diplomatic, economic, and military power. This approach can be seen as a "grand strategy" toward outer space, even if not officially identified as

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30 Defense Build-up Plan. *Op. cit.*

31 *Ibid.*

32 National Defense Strategy. *Op. cit.*

33 Government of Japan. 2022. *Defense of Japan 2022*. Tokyo: Ministry of Defense. https://www.mod.go.jp/en/publ/w_paper/wp2022/DOJ2022_Digest_EN.pdf

such.[34]

Japan has a strong strategic alliance with the United States, but the combined security threats facing Japan are arguably greater than the military and industrial capabilities of the United States and Japan alone. In particular, an extended conflict with China would strain the industrial bases of both countries. During the Cold War, U.S. defense planners would speak of sizing forces to conduct "2 ½ wars" – one in Europe, one in Asia, and one smaller contingency elsewhere. Today, between ongoing conflicts in Europe, the Middle East, and potentially in Asia, the United States is hard pressed to supply, not just fight, multiple conflicts. The United States has lost manufacturing capacities since the end of the Cold War, and while still a global technology leader, has difficulty surging production for war time needs.[35]

An attempt by China to take Taiwan by force would be among the most serious threats, short of a direct attack on Japan itself. As former Prime Minister Abe said in 2021, "A Taiwan emergency is a Japanese emergency, and therefore an emergency for the Japan-U.S. alliance."[36] Helping Taiwan defend itself and be more resilient to Chinese coercion improves deterrence efforts. Stronger deterrence lowers the risk of being forced to defend Taiwan and deterrence is vastly less costly than war.

A quick strength-weakness-opportunity-threat (SWOT) assessment of the U.S.-Japan space security environment shows a mixed picture of the risks facing both countries.

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[34] Pekkanen, Saadia. 2024. "Japan's Grand Strategy in Outer Space" chapter in the *Oxford Handbook of Space Security*, Pekkanen, Saadia M., and P. J. Blount, eds. 2024. pp. 334-362. New York, NY: Oxford University Press.

[35] Jones, Seth G., and Alexander Palmer. 2024. *Rebuilding the Arsenal of Democracy : The U.S. And Chinese Defense Industrial Bases in an Era of Great Power Competition*. Washington, DC: Center for Strategic & International Studies.

[36] Blanchard, Ben. 2021. "Former PM Abe says Japan, U.S. could not stand by if China attacked Taiwan." *Reuters*. November 30, 2021

Strengths	Weaknesses
• Strong alliance for many decades • Economic power • World-leading technologies • Aligned international values • Stable democratic governments	• Limited industrial surge capacity, e.g., anti-ship munitions • Slow and costly military acquisition systems; uncertain space requirements for Japan • Risk-averse defense industries • Lack of JSDF space experience
Opportunities	**Threats**
• Indo-Pacific alliances, Quad partners • Leveraging commercial technology for military space • Shaping international law and rules for the space domain • Resilient industrial base supporting multiple allies	• Growing Chinese military power, especially in naval, space, and cyber domains • Unpredictable DPRK with missiles and nuclear weapons • Opportunistic Russian alignments with China and the DPRK

Table 2. Space Security SWOT Analysis for the United States and Japan

There are numerous books and reports on the challenge of deterring a Chinese attack on Taiwan which are beyond the scope of this paper.[37] Suffice to say that space capabilities are routinely recognized as necessary, but not sufficient, to win a conflict, and Chinese counterspace capabilities will attempt to degrade or eliminate U.S. and allied space systems used for Taiwan's defense. It is also recognized that munitions, such as anti-ship and anti-air missiles will be expended at extremely high rates. Assuming a quick loss is avoided, sustaining an extended conflict with China will require large stockpiles and industrial surge capabilities.

The allied forces operating in coalition need not be an Asian form of NATO, but their weapons systems do need to be compatible and interoperable. Coalition forces operating in Asia can be expected to have individual material and non-material (e.g. political) constraints. In his book on *Space Warfare: Strategy, Principles, and Policy*, strategist John Klein observes that "Allies and coalitions do not need a common understanding, but instead should strive for a shared understanding of different viewpoints and concerns."[38] Achieving a shared understanding before and during conflict is perhaps one of the most useful tasks that space systems can provide to an allied coalition for military, economic,

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[37] Pottinger, Matt, ed. 2024. *The Boiling Moat : Urgent Steps to Defend Taiwan*. Stanford, California: Hoover Institution Press, Stanford University.

[38] Klein, John J. 2024. *Space Warfare : Strategy, Principles and Policy*. Second edition. Abingdon, Oxon: Routledge. p. 103

and diplomatic integration.

Space systems are increasingly important to tactical ISR functions. They have long been important to the United States at the strategic ISR level, with airborne systems providing the bulk of tactical support. However, this is changing in response to the changing threat environment for long-duration air assets. Tactical ISR is part of TCPED, an acronym for tasking, collection, processing, exploitation, and dissemination.

- Tasking: Identify threats and determine where to collect intelligence from
- Collection: Gather intelligence from sources like open-source, human, and technical intelligence
- Processing: Filter out irrelevant information, organize data, and create a report
- Exploitation: Use the intelligence to identify risks and vulnerabilities, and develop strategies to mitigate them
- Dissemination: Make the intelligence available in a format that decision-makers can quickly understand and act on

To employ counterstrike weapons and other military capabilities, Japan will need a TCPED process for its own systems. Developing and exercising its own TCPED process can help improve the ability of JSDF to conduct joint and combined arms operations. Engaging in more realistic exercises that utilize space systems will also help create shared understandings with allies and partners, and develop internal capacity for defining requirements for space systems and services that meet Japanese security needs.

An innovative and competitive domestic space industry is integral to success in achieving Japan's national security goals. Historically, the Japanese government gave direction to industry to develop specific space capabilities, such as launch vehicles and satellites. The situation today is different and the Japanese government is encouraging industry to innovate and create new space products and services, but without being clear on what it will buy and why. Thus, companies have trouble "hearing" and responding to demand signals. Lack of clarity on space security needs, based on realistic needs and priorities, is a "missing link" between good policy documents and actual operational capabilities for Japan.

8.0 Recommendations

Japan developed a strong National Security Strategy, National Defense Strategy, and a Defense Buildup program in 2022. These documents have been complemented by a forward-looking Space Security Initiative in June 2023. While these documents are excellent at the policy level, they do not by themselves provide the operational concepts and technical requirements for implementation by the Ministry of Defense and the Japan Self-Defense Forces. Japanese and U.S. industry can understand the policy and strategic direction but fail to know how they should respond. The government has proposed specific projects, but the requirements that led to those projects are often unclear so that it is difficult to assess alternative ideas. Ideally, the development of requirements, or the proposal of new capabilities that lack formal requirements, should be part of a transparent process from concept to implementation.

To achieve national goals through the use of space, Japan should 1) determine which national security missions require support from space capabilities; 2) develop national security space program plans and budgets that incorporate total mission operations (to include ground systems, data storage/handling, information dissemination, data exploitation, and user hardware/software); and 3) prioritize the development of national security space capabilities that are complementary and interoperable, but not duplicative, with allied space capabilities for the purposes of increasing resilience in space architectures. These capabilities need not be fully government-owned, but could consist of hybrid capabilities with commercial and international partners.

Top space-related priorities for strengthening the JSDF should be 1) the improvement of information security; 2) increasing joint service and interagency cooperation; and 3) more realistic training and exercises that reflect joint and combined arms scenarios that the JSDF (and the JCG) are likely to face. Attention to space applications for the JSDF can be a vital catalyst for advancing each of these priorities. Lack of attention or progress will make it difficult for Japan to secure necessary cooperation on emerging, multi-domain threats. Meeting such threats cannot be accomplished by an individual service alone but requires a joint response in concert with allies.

Just as Japan participates in the Schriever Wargames with the U.S. Space Force, so it should work to participate in the multinational Operation Olympic Defender effort with U.S. Space Command. NATO has declared space to be a distinct operational domain and Japan is an increasingly important partner with NATO. The NATO Cooperative Cyber Defense Centre of Excellence, in Tallinn, Estonia hosts Locked Shields and Crossed Swords exercises, for defense and offensive cyber operations. While not dedicated to space

operations, cyber is an integral part of the multi-domain operations that Japan needs to master. Interestingly, these exercises include companies as well as governments.[39] Most immediately, the JSDF should study and observe as closely as possible the practices of the Ukrainian Armed Forces in their use of commercial space communication, navigation, and remote sensing under actual combat conditions.

Japan should encourage the growth of commercial space industries as a foundation for Japan's economic security and self-defense capabilities. This should be done both independently and in cooperation with U.S. space industries. Japan should give precedence to the purchase of commercially available space capabilities that meet its security needs, where available.

One approach to stimulating private industry for military space needs would be to pick a small number of ISR constellation satellites that could be built in the United States with the participation of Japanese experts. Domestic Japanese small satellite production capacity could be expanded using private investment from larger firms or private equity. Some or all of a production could then be shifted back to Japan under a co-production licensing agreement.[40] If co-production is part of a U.S.-Japan security agreement, the United States could waive or subsidize the license fee to make the business case work. Under this arrangement, Japan would get domestic capability faster and the United States would be assured of interoperability. While the Japanese government would be the customer for some (or even most) of the satellite production capacity, if led by Japanese industry, there would be incentives to find other customers beyond the government. This gradual but deliberate arrangement would also allow more time for export control reforms and other policy changes (e.g., as achieved under the AUKUS arrangement for nuclear submarines). The challenge for the Japanese government will be in defining military performance requirements to be met and not just focusing on the production of satellites themselves.

Space security, and challenges to that security, are an increasingly important part of the Japan-U.S. Security Cooperation and Defense. As part of that alliance, Japan should develop space capabilities that meet national goals, increase the security of Japan, and contribute to a free and open Indo-Pacific region. In doing so, Japan should prioritize

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[39] NTT Group. 2024. "NTT Group participated in Locked Shields 2024, an international cyber defense exercise organized by NATO CCDCOE" NTT Group press release. July 23, 2024.

[40] Rubinstein, Gregg A. "Cooperative Defense Acquisitions Strengthen U.S.-Japan Alliance." Commentary in *Center for Strategic & International Studies*, January 30, 2025, https://www.csis.org/analysis/cooperative-defense-acquisitions-strengthen-us-japan-alliance.

the development and fielding of space security programs that are interoperable at the warfighter level and enable fully integrated and joint national security operations with the United States and likeminded partners. This will entail not only strong collaborative and cooperative programs, but also an independent and vibrant domestic space industrial base.

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