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# Working Smarter with America's Spacefaring Allies

Workshop Report

March 2020

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**AMERICAN BAR ASSOCIATION STANDING COMMITTEE ON  
LAW AND NATIONAL SECURITY**

**NONPROLIFERATION POLICY EDUCATION CENTER**

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# Working Smarter with America’s Spacefaring Allies

*Co-sponsored by the American Bar Association Standing Committee on Law and National Security and the Nonproliferation Policy Education Center*

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# Working Smarter with America's Spacefaring Allies

## ***Workshop Report***

### **Introduction:**

The workshop began with introductions of participants and affiliations. A host from the Nonproliferation Policy Education Center welcomed the group, explaining that this workshop is the fourth gathering with the goal of furthering meaningful discussion on public space policy. That goal is as crucial as ever, he contended. From the perspective of the United States and our partners, we sorely lack enough public space policy and, more importantly, public ventilation about the problems that drive changes to our policy. Unfortunately, sixty and seventy-year-old policies are beginning to become institutional. But there is also good news, he noted. The existing public discussion on space policy centers around good goals: that we must be more transparent and less classified; that we must streamline acquisition; that we must work closely with our allies; and that we must develop new rules of the road for space operations. Unless we can offer more than platitudes, though, the voices responsible for shaping concrete policy face a daunting challenge. Consequently, these workshops aim to fill that void and promote public policy through frank, candid discussion on policy ideas. These fundamentals led to the inclusion of a wide array of stakeholders as participants – the notion being that perhaps when U.S. government actors look outward for creative ideas, they can spur reform. Hosts from the ABA and NPEC agreed that, in short, we hear the refrain that space is the new frontier for military and commercial activity. If that is true, we must begin to do things differently than we did generations ago. Things are beginning to move more quickly in space, and we all feel a sense of urgency to resolve these developing issues. Workshops like these facilitate challenging assumptions, testing hypotheses, and creating ideas for mutual benefit.

## Workshop Participants

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Terri Black	Embassy of Australia
Brian Bolio	U.S. Space Force
Brooke Buskirk	Nonproliferation Policy Education Center
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Martin Faga	MITRE Corporation
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Michael "Mick" Gleason	Aerospace Corporation
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Marina Hague	Office of Space Commerce, U.S. Department of Commerce
Taro Hayashi	Hudson Institute
Danielle Hernandez	Office of General Counsel, U.S. Defense Intelligence Agency
Henry Hertzfeld	Space Policy Institute and The George Washington University
Rob Holman	Canadian Defense Forces
Martin Holmes	Office of the Deputy Assistant Secretary of Defense for Space Policy
Marc Jochemich	German Aerospace Center
Therese Jones	Satellite Industry Association
John "Patsy" Klein	Falcon Research
Mark Lekowski	JSAT International
John Lauder	Independent Consultant
Danielle Lewis	Joint Intelligence Operations Command, U.S. Indo-Pacific Command
Bailey Martin	Nonproliferation Policy Education Center
Holly McMahon	American Bar Association Standing Committee on Law & National Security
Genevieve Minzyk	Office of the Deputy Assistant Secretary of Defense for Space Policy
Victor Monnet	U.S. Defense Intelligence Agency Directorate for Analysis
Jamie Morin	Aerospace Corporation
Bryan Nowak	U.S. Defense Intelligence Agency Directorate for Analysis
Bryan Palmer	Nonproliferation Policy Education Center
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Taro Sato	The Stimson Center, East Asia Program, Air Staff, Japanese MOD
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Bryan Smith	Beacon Global Strategies
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Kaylee Walsh	Office of General Counsel, U.S. Defense Intelligence Agency
Brian Weeden	Secure World Foundation
Robert "Sam" Wilson	Aerospace Corporation
Simon "Pete" Worden	Breakthrough Initiatives

## **Panel I: Working Smarter Militarily with America’s Spacefaring Allies**

The panel began with a discussion on context led by the moderator, a former senior U.S. government official now in the technology field. The moderator emphasized that the challenges facing the United States in the space domain require working with allies on both military and non-military activities in space. He used Luxembourg as a case study: that country – a relatively small mining and steel economy during the 20<sup>th</sup> century – took the bold step of launching a satellite at great risk to the country’s GDP in the event of mission failure. The project succeeded, and Luxembourg became a leader in space and reached several bilateral agreements to safeguard their investment in space. Eventually, Luxembourg reached an agreement with the United States focused on space resources, and per U.S. insistence, included a few provisions on security in space. The ability for the U.S. to reach concrete international agreements containing military and security provisions is, often, an uphill battle. The takeaway from the Luxembourg example is the importance of recognizing internal sensitivities: that different governments have varying approaches to “security”. Economic security, environmental security, military security, and homeland security are all overlapping conceptions of security. Since security itself can mean something different to different governments, a good international partner must find congruencies wherever they exist. Governments reaching such agreements must move with clarity and be keen to public relations and sensitivities issues.

*The ability for the U.S. to reach concrete international agreements containing military and security provisions is, often, an uphill battle*

The moderator then applied this approach to one specific tool in space: lasers. The moderator explained that lasers present a particular opportunity and challenge. On one hand, the United States and other countries rely on optical sensors in space, and even relatively small lasers can disrupt and dazzle these sensors. But meanwhile, lasers have a huge potential for space applications. First, pieces of debris can be pushed by a laser using photon energy. The U.S. Air Force, for instance, already has a contract to track space debris using lasers. Second, lasers can assist in propulsion, pushing spacecraft to new velocities. And third, future lasers can

potentially be powerful enough to push an asteroid; this application, the moderator opined, might be “the ultimate definition of security.” Lasers, with all their potential good and evil, exemplify the nuances we must bring to any norm-building or agreements concerning space. The moderator noted that one party bringing good ideas to the table so far has been the United Nations Office for Outer Space Affairs, which has shown interest in facilitating dialogue to positively define protocols on the use of lasers to raise collective confidence that they won’t be used nefariously.

The conversation then turned to a perspective from a U.S. partner, a representative of the Japanese government. The discussant delivered a presentation exploring the Japanese perspective on the space security environment and a vision for future space security policy. He began with a short overview of the unique historical path of Japan’s current policy stemming from the country’s pacifist or anti-military post-war history. During the beginning of the space age in the 1960s and ‘70s, Japan retained a policy guaranteeing the non-military use of spacecraft. In this period, Japan’s military space capability was severely constrained, in contrast to the rapid development of civil space capabilities. That policy gave way in 1985 to the period of the “generalization theory,” which allowed the Japanese military to begin using satellites with capabilities used in the commercial sector, such as communication, meteorology, and GPS.

*The Basic Space Law changed the landscape of Japan’s activity in space from science and technology to three core pillars: science and technology, promotion of industry, and security.*

That period ended in 2008 when Japan enacted the Basic Space Law, and the country has since published updated iterations of the Basic Space Plan in 2009, 2013, 2015, and 2020 (upcoming). The Basic Space Law changed the landscape of Japan’s activity in space from science and technology to three core pillars: science and technology, promotion of industry, and security. The Japanese Ministry of Defense then identified space security as a top defense priority; in 2018, Japan published the National Defense Program Guidelines, establishing the need for offensive space capabilities.

The discussant explained that this history informs the Japanese perspective on the current space security environment. Today, Japan recognizes space as a new warfighting domain. The Chinese government has expanded its military capabilities in space rapidly; its arsenal includes direct ascent anti-satellite weapons, non-kinetic anti-satellite weapons, and co-orbital anti-satellite weapons. It has conducted at least ten anti-satellite tests, and is likely developing or already used lasers against others. China has also developed space-based C4ISR capabilities with the Yaogan remote sensing satellite and the Tian Lian data relay satellite, along with space-based anti-ship, ballistic, and cruise missile capabilities. In short, China has promoted the military use of space under the guise of scientific research.

*China has promoted the military use of space under the guise of scientific research*

The discussant's strategy began from the premise that China has been a destabilizing force in the East Asia region, and the Japanese Self-Defense Forces and US-Japan forces are not enough to stabilize the region; other U.S. forces such as INDOPACOM must be able to deploy and activate quickly to achieve regional deterrence based on three assumptions:

1. Ensuring Japanese capability and a U.S. forward presence.
2. Attaining the freedom of maneuver in the Pacific.
3. Securing long-distance C3 (command, control, and communication).

China's space-based C4ISR, missile capabilities, and counterspace capabilities work to deny all three of these assumptions, the discussant maintained. For example, Chinese ISR systems can interrupt the readiness of air bases and the Japan and U.S. air forces. China's ability to deny and degrade U.S. and Japanese communication lines means China could halt ISR or UAV or counter-UAV operations.

Given all this, the discussant argued, the U.S. and Japan should take realistic approaches toward China, while a liberal institutional approach is also needed to avoid a space arms race. Japan's future space security policy should have two overarching goals:

1. To ensure peace and stability in outer space through strength.
2. To strengthen international norms in outer space, maintain free access, and promote international cooperation on both the bilateral and multilateral scales.

The discussant introduced six policy proposals that might help realize the two goals:

1. Shaping international norms for military use of space. Here, Japan and the U.S. should collaborate with likeminded countries on the issues and norms. They might not reach consensus, but the dialogue provides a starting point for remedial action.
2. Promoting transparency and confidence building measures. Where it is often difficult or impossible to establish binding obligations, it might be more practical to promote transparency and confidence building measures (TCBM), even if they are nonbinding.
3. Strengthening cooperation with likeminded *space-developed* countries. For example, Japan's participation in the Combined Space Operations Center (CSpOC) furthers cooperation between the United Kingdom, Canada, Australia, and the United States.

4. Strengthening the cooperation with *space-developing* countries in the Indo-Pacific Region. In 2008, China established the Asia-Pacific Space Cooperation Organization (APSCO), a coalition to promote its relationships and interests in space with countries such as Thailand, Malaysia, and the Philippines. Cooperation with these countries is critical to counter Chinese influence.
5. Strengthening U.S.-Japan cooperation in fundamental military functions. Given the consequences of Chinese space capabilities, it is essential to promote cooperation in communications, early warning, navigation systems, and other essential warfighting capabilities. The U.S. established the overarching concept of the national defense space architecture and the two countries should seek opportunities to cooperate with those types of programs.
6. Establishing joint operating capabilities in space from peacetime to grey-zone to contingency operations. Both countries must deepen their ability to respond to malicious actors in the grey-zone and create deterrence.

The discussant explained that there is much to accomplish for Japan, and in this era of

*The U.S.-Japan alliance is not simply one of military or economic interests, but instead an alliance of values*

competition, the country prioritizes becoming a strong U.S. ally. While Japan has been dependent on American support, the country now plays a more active role both in the region and in space. The U.S.-Japan alliance is not simply one of military or economic interests, but instead an alliance of values, such as democracy, fairness, human rights, and a free and open society.

The conversation then turned to a dialogue with the participants. An attendee asked the discussant about whether there is concrete written space policy or goals promulgated by the

Japanese government. The discussant explained that Japan's space policy is covered by two documents, the Basic Space Law (2008) which is updated approximately every five years and the National Defense Program Guidelines (NDPG). While these are the two basic documents for Japan's space policies, they are not as specific as the recommendations given at this particular workshop. In 2020, the Japanese government plans to establish a newly updated space document which may detail some of these policies.

The participants expressed a consensus that this was an important and meaningful presentation that "quietly said a great deal." One attendee pressed the discussant on his vision of cooperating with likeminded countries still developing space programs, and inquired about who Japan is talking to and how the U.S. might approach such a discussion. The discussant highlighted that US-Japan cooperation, such as that used in space-based maritime domain awareness can serve as a model. In addition, both Japan and France are cooperating on space-based programs organized by the U.S. Where there are such profound issues in the South China Sea, for example, models like these in the region would be helpful for several Asian states.

Several participants wondered how successfully the Chinese government is working to craft agreements with countries developing their space programs for some of their advanced services, or if Japan is winning that rivalry. The discussant explained that there are many unknowns with regard to Chinese planned engagement with Asian space programs, but they have deployed their own GPS system and can provide highly accurate satellite Positioning, Navigation and Timing services (PNT) to Asian countries. The discussant highlighted the need for a strong U.S.-Japan partnership that can work to counter China, potentially by providing PNT via the Quasi-Zenith Satellite System (QZSS) in the Asian region.

*The discussant highlighted the need for a strong U.S.-Japan partnership that can work to counter China*

A participant noted the diverging problem sets and solutions that countries face in the commercial sector versus the military and security sector. Others, raising a common theme throughout the panel and day, raised questions as to the proper international approach for

preventing nefarious activity in space. On the security side of the military-commerce equation, one solution to the problem set of proximity operations (the subject of Panel II) is Space Situational Awareness (SSA). A participant asked about the extent to which Japan sees 24/7 real-time SSA as a priority. In response, the discussant explained that Japan's SSA program is advancing, and the program plans to be partially operational in 2022 and fully operational after 2023. The operation will be a dual ground and space-based effort with plans to cooperate with CSpOC to achieve real-time capability. The discussant reminded the group that with capabilities like that, it is crucial for the systems to gather more information than just SSA and share that information with likeminded states.

A participant sought a concrete application of the vision the discussant outlined, asking what he saw as the proper U.S. and Japan response to grey zone operations in space. The discussant, to some agreement in the room, explained that we need two parts: first, we must establish the architecture to analyze nefarious activity such as grey zone operations. And

*We have no agreement now on how to respond to problematic activity...building both architecture and consensus presents two paths forward*

second, the U.S. and Japan must establish consensus as to causes-of-action. In short, we have no agreement now on how to respond to problematic activity by, for example, China or Russia; building both architecture and consensus presents two paths forward. The discussant opined that any potential response is controversial because grey zone activity such as dazzling is reversible and doesn't necessarily destroy or permanently degrade. However, a clear stance on how we will respond will establish deterrence.

An important step forward is identifying which actions require deterrence. Specifically, participants noted that the current U.S. policy is focusing on promoting norms in space rather than assenting to agreements – as a consequence, the group wondered whether Japan has specific norms to promote. The discussant replied that those talks within the government are occurring now. Japan's era of building defense policy in space began about ten years ago, and now significant momentum is growing to tackle these problems. When Japan stands up an overarching SSA architecture, it will have the ability to fully evaluate the problem. The

discussant believed that that point, around 2022, will generate significant momentum to establish norms.

Dialogue among participants focused on building mutual understandings from government to government and mapping out what states should classify as grey zone activities. In addition, they discussed the equally important issue of available responses a government would use to respond to those activities. A key challenge here is determining exactly how much information to make public during these instances. Lots of work is being done outside of the public eye both within and between governments, such as in the Five Eyes' Combined Space Operations Initiative. The question is when and how to be public about the norms? A former high-ranking U.S. military officer reminded the group of the Cold War adage: "You reveal to deter, but you conceal to win." He agreed that transparency is important but highlighted that efforts to make information public can eventually go too far. In the midst of the secrecy-openness tension, he believed we should take meaningful steps with allies even in private, before catastrophe arrives.

Participants also identified the related issue of collective defense; in other words, do states share a responsibility to respond when another state is attacked in space? To this point, a participant voiced concern about potential overreactions in space resulting from this sort of Space-NATO Article 5 idea. Still, a recurring and unresolved question was whether states should take a more collective strategy, or a go-it-alone approach for responding to malicious activity in space.

*Do states share a responsibility to respond when another state is attacked in space?*

Participants also discussed capability development. Some suggested that it is important to cooperate early in a nation's space program in order for countries to work well together as those programs become operational. The discussant agreed that we should advance cooperation with likeminded countries, but qualified his response by speaking to the difficulty in determining which areas to cooperate in. He believed Japan should start by providing

assistance to countries developing their space capabilities, such as by building Maritime Domain Awareness capacity from space with southeast Asian countries.

At the conclusion of the panel, the discussion pivoted to approaches and strategies for implementing international space policy. Participants wondered what forms space policy might take, and what incentives had driven governments' inaction so far. One participant asked whether, while in talks with foreign governments, U.S. government actors fully appreciated competing forms of security (e.g., environmental security, military security, etc.). The moderator responded that it is something to work on, but that negotiators often know to achieve common definitions as a starting place. From that baseline, it is best to have discussions in private to be frank about a government's sensitivities or public relations requirements. Another participant asked about the proper approach to international attempts to regulate the use of some tools (e.g., lasers) in space when other actors (e.g., Russia) are adversarial and often act in bad faith. The moderator answered that this exact problem is the reasoning behind multinational consensus. The notion is that by having a party perceived as less threatening lead the discussion as to rules of the road, such as Luxembourg or the Czech Republic, we can begin coalescing around norms on the threatening versus non-threatening use of lasers. A participant highlighted that an additional useful diplomatic tool is the draft and comment process for language on norms. For instance, state consultations led by the Netherlands will begin in November 2020 for governmental comments on the draft of the Woomera Manual, a project to objectively articulate and clarify existing international law applicable to military space operations. It might be an interesting forum for governments to share their views on existing law.

## Panel II: Space Zones and Bodyguards for Proximity Operations: A

### Discussion

The panel began with an overview from the moderator, who teed up the two expert panelists having opposing views on the proper solutions to grey zone operations in space. He noted that there exists a general agreement as to the threat of grey operations – actions like jamming, dazzling, and proximity operations – but not as to the response. Finally, he highlighted the importance of strong alliances, particularly in a new domain where allies can nudge one another into better behavior.

The first panelist (Discussant I) opened with his support for workshops like these, where honest, real ideas and solutions can shine through during dialogue on space threats. He introduced the threat of rendezvous and proximity operations (RPO), in which one state’s spacecraft physically approaches another state’s satellite without the other state’s prior consent. Discussant I advocated the use of space zones as red lines to define and indicate whether one state’s satellite is too close to another state’s satellite. He also advocated for bodyguard spacecraft, which can be used to prevent an invading spacecraft from reaching and disabling our satellite. Discussant I introduced five imperative premises and measures for an effective solution: First, the RPO or proximity threat will soon be a real threat. In the last twenty-one months, we have seen a surge of publicity on the seriousness of the proximity threat, with at least eight American defense and intelligence officials and agencies at the highest level showing serious concerns. In August 2018, Vice President Pence didn’t mince words: “Both China and Russia have been conducting highly sophisticated on-orbit activities that could enable them to maneuver their satellites into close proximity of ours, posing unprecedented new dangers to our space systems.” In September 2019, his statement was quoted in full by Dr. Scott Pace, the Executive Secretary of the National Space Council. In February 2020, commenting on the incident of a Russian satellite operating within 100 miles of our 5-billion-dollar military satellite, General John Raymond, the

*The RPO or proximity threat will soon be a real threat*

first Chief of Space Operations, United States Space Force, said that “recent orbital maneuvers by a Russian ‘inspector’ satellite are concerning and threaten stability in space.” The other five people who sounded concerns about the proximity threat are also prominent. They are Lieutenant General Robert Ashley, the Director of the Defense Intelligence Agency; Dr. Yleem Poblete, former Assistant Secretary of State for Arms Control Verification and Compliance; the Air Force’s National Air and Space Intelligence Center; Defense Intelligence Agency; and General John Hyten, Commander of U.S. Strategic Command. Second, Discussant I was concerned that the U.S. will be unable to prevent robotic spacecraft from reaching and disabling an intolerable number of our critical satellite at the opening of a war. China, Russia, United States, European Union, and others will be doing robotic civilian operations in a few short years. These dual-use robotic spacecraft will be capable of grabbing and destroying our satellites. Third, space zones

*Space zones are needed for at least the next ten years to protect critical but vulnerable legacy satellites*

are needed for at least the next ten years to protect critical but vulnerable legacy satellites such as Space Based Infrared System satellites for early warning and Advanced Extremely High Frequency satellites for communications in a nuclear-disrupted environment. Unfortunately, our space defense proposals including resilience cannot be implemented in time to protect some critical satellite constellations in the 2020s; leaving us unprepared to address the threat we will face in this decade. Fourth, in addition to space self-defense zones, we need bodyguard spacecraft within those zones to protect our satellites. The bodyguard does not need to “grab” an invading spacecraft, or damage or destroy it, but instead merely blocks its path to reach our satellite.

Finally, Discussant I argued that China and Russia want to have an international Space Traffic Management system (STM) that does not have space zones and bodyguards so that they can participate in the lucrative Western space market and can threaten our critical and vulnerable satellites at times of their choosing. He outlined a potential solution moving forward: that the U.S. ought to pursue simultaneously an international STM with all spacefaring nations and a Western STM with the West and whoever wants to join. Both STMs will have space zones and bodyguards to remedy concerns of space zone infractions. If states like Russia

and China refuse to agree to the international STM, likeminded states can fall back onto the easier-to-create Western STM, which naturally requires any state to participate in the Western space market to observe the rules pertaining to space zones and bodyguards. As the zones and bodyguards will protect American satellites, China and Russia's proximity threat will become ineffective. They might as well follow rules of the road in the Western STM in order to participate in the lucrative Western space business; creating a sufficient incentive for Russia and China to come to the negotiation table for an eventual international STM that has both space zones and bodyguards.

The second panelist (Discussant II) disagreed with some of these arguments and offered three main counterpoints. First, that the threat of rendezvous and proximity operations is misunderstood and overblown. The discussant explained that performing RPO is substantially more difficult and riskier than is perceived by non-experts. Relatedly, there are easier and more efficient operations – such as kinetic hard kills, jamming, cyber threats – that could provide similar results. Second, bodyguard or “guardian” satellites are much less useful in practice than in theory, and are more limited in capability than as described in media today. With that said, they could be fruitful by leading to increased awareness in the direct area around the principal satellite, complicating an adversary's attempt at proximity operations, and potentially providing a platform for countermeasure technologies. And third, that the notion of space zones surrounding satellites may be effective in warning scenarios, but are unlikely to

*Performing RPO is substantially more difficult and riskier than is perceived by non-experts*

*Garnering political support for space zones will be prohibitively difficult*

provide the foundation for legal claims, such as claims of treaty violations. Perhaps most fatally, garnering political support for space zones will be prohibitively difficult. Discussant II stressed the difficulty of adversarial rendezvous or proximity operations. Just recently, he mentioned, two commercial satellites docked together for the first time. It was a huge achievement and took massive amounts of cooperation and planning. This feat exemplifies the difficulty of cooperative rendezvous to pull off, let alone unilateral, non-cooperative rendezvous.

The discussants agreed that space zones and bodyguard spacecrafts could at least provide some utility, but they disagreed as to the extent. Discussant II, for example, believed that space zones could institute the limited utility of supporting coherent rules of engagement;

*The development of zones and rules of engagement would serve to develop norms of behavior*

the rule of non-breach of a space zone would not be binding international law, but the development of zones and rules of engagement would serve to develop norms of behavior. Finally, the discussants diverged as to the scope of rules servicing different spacecrafts: Discussant I believed that rules and practices pertaining to space zones and bodyguards

should be enforced for all satellites, whether commercial or military, even during peacetime. Otherwise, an adversary could do all these dangerous moves during peacetime to get arbitrarily close to our critical satellites and ready for a proximity attack during crisis. Discussant II, by contrast, warned that commercial actors are wary of appearing to be affiliated with the military, even when discussing proximity operations, as that kind of affiliation might affect their insurance, investment aptitude, and place in the market. He argued that much like air traffic, the rules should be separate. The future of space, Discussant II mentioned, looks like the Strait of Hormuz: 98% of the transiting vessels are good-faith commercial actors; but from time to time there are malicious actors. We need strong rules in space to address that.

The two discussants agreed on all of the underlying facts, but reached several different conclusions on the proper way to deal with the proximity threat. Discussant II said Chinese robotic spacecraft had never actually grabbed a space object. Discussant I argued that this inability-to-grab statement is inconsistent with China's announcement that such spacecraft will be deployed to grab another satellite or space debris for servicing purposes in the next few years. If the robotic spacecraft could grab a space object for service, it could grab our satellites in just the same way. On the other hand, Discussant I agreed that there are different ways to degrade or destroy American satellites; however, he argued, that we cannot focus our efforts in defending against all ways except this proximity threat, which is highly effective and serious when it is made at the opening of a war. It does little good to be prepared for all threats except this one, because an adversary only needs to choose the one threat that we are not prepared

against to kill us. Under our current regime, an adversary’s spacecraft can legally get very close to our satellites during peacetime, and should hostilities break out, the attacking spacecraft could reach our satellites so quickly that we would not have enough warning time to save the threatened satellites. In a hypothetical brink-of-war scenario, for example, China only needs to

*China only needs to degrade three or four satellites in a ... network in order to expose serious holes in those networks*

degrade three or four satellites in a command, control, and communications or intelligence and early warning network in order to expose serious holes in those networks. He gave two examples in early warning and nuclear-disrupted communications in his opening statement. Therefore,

Discussant I concluded that while these measures might be moot once a war has begun, they serve as useful measures to mitigate this proximity threat at the outset of a war.

The value of zones limiting proximity drew differing views from the discussants and participants. Discussant II argued that limits on proximity don’t do much, since as a matter of orbital mechanics, distance can be overcome relatively easily. For that reason, the key barrier against malicious action would be ensuring different energy between two spacecrafts rather than ensuring a far enough distance. Instead, Discussant II reasoned, time and money would be better spent creating a satellite architecture of resilience – through backups, disaggregation, and other strategies. A more resilient architecture is the natural solution in an environment without meaningful protection. Creating an architecture of resilience, Discussant I argued, is a good strategy, but cannot protect all critical satellite constellations until at least 2030, so we must also have effective solutions such as space zones and bodyguards in the meantime to protect those vulnerable but critical satellites during this decade.

*Resilience...is a good strategy, but cannot protect all critical satellite constellations until at least 2030*

The participants and panelists discussed the value of safe zones despite the potential limitations identified by Discussant II. A former U.S. intelligence official suggested to the group that even if a space zone is a purely informal creation, it at least gives the threatened state a premise to complain. Discussant I continued the hypothetical, agreeing that safe zones would

be a critical element of the potential solution that should also include diplomatic and military options. A former high-ranking military participant noted that these self-defense zones would create a sense of uniformity similar to maritime vessels face threats and run up an escalatory

*Safe zones would be a critical element of the potential solution that should also include diplomatic and military options*

ladder of responses (e.g., hailing, firing flares, firing warning shots, etc.). A self-defense zone would institute a concrete standard from which procedures can flow.

Discussant II agreed and noted that this is useful for a state's own practice, but states must do more on publishing and promoting specific norms. As to

bodyguards, Discussant I responded that he has long agreed with what Discussant II said that if bodyguards were pursued, they could also lead "to increased awareness in the direct area around the principal satellite and provide "a platform for countermeasure technologies." With all these added benefits of deploying bodyguards, Discussant I wondered why Discussant II considered bodyguards to be "much less useful in practice than in theory."

Discussant II said that part of the problem with a keep out zone is "how do you set that distance in a way that is meaningful and is actually going to be a barrier. In the GEO belt, the distance of 50, 100, or 500 KM doesn't make that much of a difference if you are trying to forestall an attack. I don't think it is going to be helpful at all." Discussant I responded that Discussant II was probably thinking about a silver bullet that could take care of proximity threats within 50 km, as well as missile threats from 100 km, 500 km and even farther away. Everybody, including Discussant I, wants one defensive system to take care of all different threats, but Discussant I asserted that, "Ain't such a thing. We don't have it." In the meantime, Discussant I noted that we have many different threats, which call for different solutions. For the robotic threat, if an attacker from 50 km away gives us enough warning time to defend the attacker to grab our satellite, we can deal with robotic threat that originates from 51 km, 52 km and even far beyond.

*We have many different threats, which call for different solutions*

Finally, the two discussants were asked about their first priorities for policy in space. Discussant I reiterated that our top priority should be achieving real-time, 24/7 Space

Situational Awareness (SSA) in order to fully and in a timely manner evaluate and monitor the threats. Discussant II reasoned that if he had to institute a top-priority norm of behavior, it would be the use of flight plans for satellites the way we mandate for aircraft.

Throughout the discussion, participants expressed a common sense of urgency. A representative from a Five Eyes government argued that the suggestion of an international agreement for Space Traffic Management (STM) was striking. Given that it took seven years for the UN to develop extremely high-level guidelines on STM, that is just not feasible. The environment is changing rapidly; OneWeb [Postscript: filed for Chapter 11 bankruptcy on March 27, 2020] and SpaceX will combine to launch one thousand satellites this year. Instead of

*Instead of spending time figuring out what an international STM would look like... we need to spend resources being forward-leaning with our policy development*

spending time figuring out what an international STM would look like, the participant argued that we need to spend resources being forward-leaning with our policy development. Discussant I agreed that, while waiting for an eventual international STM, the United States should simultaneously pursue a Western STM, which is easier and quickly to attain. In other words, we cannot just look forward to the norms and response measures that we will not get until 2030 – instead,

we must also look to and take care of our current decade.

A common theme among the dialogue and questions from the participants was the unresolved issue of whether space policy can rely on analogies to the air and maritime domain, or alternatively if it requires a regime of its own. Participants raised this theme among concerns including the cessation of operations, state responsibility for their states' civil spacecraft after the Korean Air and September 11 attacks, whether states with smaller programs should prioritize collective bodyguard capabilities by working with the U.S. (or alternatively developing their own defense programs), and external signaling and required communications during self-defense.

## Keynotes: The U.S.'s Diplomatic and Military Future in Space

During the lunch hour, a top U.S. military officer and a senior State Department official addressed the group. The military officer noted his appreciation for the dialogue on space issues, and asserted that this is an exciting but critical time. For decades, he explained, the U.S. military has integrated space capabilities into everything it does. All military campaigns – humanitarian efforts, warfighting, etc. – have been enabled by space capabilities, and the U.S. is excellent at it. The challenge, however, is that our competitors and adversaries have been watching. They are developing their own capabilities and access to space, as well as developing capabilities to negate our space access. Just a few weeks ago, for instance, Russia launched a satellite, which maneuvered to the proximity of a U.S. satellite, opened it up and released another one from inside the first satellite. Years ago, Russia launched a similar satellite that launched a projectile appearing to be a weapon. This is not what responsible states do in space, the speaker argued. We have a few tasks ahead of us as a result; one of them is to outline what is safe versus unsafe behavior, professional versus unprofessional behavior in space. We have outlined these behaviors in the other domains of air and sea. The spectrum of potential behaviors is huge in space, ranging from low-end reversible jamming to directed energy targeting and up to, for example, the threat of direct-ascent anti-satellite missiles (i.e., ground-based missiles) from China.

*For decades...the U.S. military has integrated space capabilities into everything it does*

The United States' space activities, the speaker went on, today are in accordance with the National Defense Strategy's focus on peer global competition to address these most

*To compete, deter, and win against the threat, we have elevated space and must continue to elevate it*

pressing threats. To compete, deter and win against the threat, we have elevated space, and must continue to elevate it. From late 2019 to early 2020, the U.S. government has elevated both the warfighting function and the organize/train/equip functions in space. In the warfighting domain, for instance, the Pentagon stood up SPACECOM as its

eleventh combatant command in August 2019, removing space from STRATCOM. In the organize/train/equip domain (i.e. service branches), the U.S. has established the Space Force which has roughly 16,000 airmen assigned to the Space Force but not yet “on the books” as Space Force servicemembers. The Space Force will soon have its first senior enlisted advisor, and over the summer, the Air Force Academy will commission roughly sixty to sixty-five officers directly into the Space Force.

The speaker noted that we now say without pause that space is a warfighting domain just like air, sea, and land – and the implications are huge. That simple truth implicates all sorts of other questions: What tactics do we use? What relationships do we forge with allies? What intelligence activities do we conduct, and what authorities do we need? What is hostile intent in space? What are the rules of engagement in space? What are the norms of behavior in space? How close can a satellite get to me? What if it’s far away but on the same orbiting plane? And the answers to these questions have changed as a result of space’s prominence as a new domain. Historically, for example, the United States didn’t need allies in space. Today, the speaker continued, we are hard at work with the Five Eyes countries, plus France, Germany, Japan, and more. We have increased our joint training, shared strategies, and personnel exchanges. Our joint space operations with, for example, Japan and Norway, can even save the United States money.

*What is hostile intent in space? What are the rules of engagement in space?*

The speaker elaborated that the Pentagon and the rest of the U.S. government are working hard on these partnerships – and that one foundational piece of establishing SPACECOM was making it a combined force command; that is, a combined command with other nations. The DOD issued an order that was Five Eye releasable that outlined SPACECOM operations center activity with allied nations and governed the Command moving forward as an illustration of a commitment to cooperation. At their core these bureaucratic movements all prioritize acting responsibly in space. Through dialogue, the speaker hopes to develop norms in space that we abide by and to show what a responsible nation does, and he hopes others will join us.

The second keynote speaker emphasized that the State Department has a close relationship with the new Space Force. Diplomacy is a tool of statecraft to leverage and use aggressively to partner with others, so defense and diplomacy are complementary. He viewed

*The State Department is one part of a whole-of-government approach to protecting U.S. interests in space*

the State Department as one part of a whole-of-government approach to protecting U.S. interests in space. The State Department uses treaties, international agreements, transparency and confidence-building measures (TCBM), as well as norms and behaviors to guide other states. In short, he said, we are asking for allies to “do more” in the diplomatic sphere vis-à-vis space policy.

The State Department speaker noted the impetus for the Department’s efforts in space. When the Russian government launched a satellite to maneuver and conduct tests in a U.S. satellite area, the interagency immediately got to work to decide what to do about it. The White House, National Security Council, the Pentagon and others were all engaged. Eventually, the State Department sent out a diplomatic communication (demarche) expressing concerns to Russia in order to provide a deliberate and formal notification. These days, Russia and China have promulgated their own arms control proposals: Russia promotes a No First Placement resolution in the UN General Assembly, endorsing a “no first place” in space for a country to have weapons. The State Department’s view to Russia was that the resolution could be called No Third Placement, as Russia itself already had weapons in space. And despite Russia’s public posture, that government is actively pursuing counterspace capabilities. China engages in a similar pattern of behavior, the speaker argued, including “feel-good arms control treaties” to try to bind the U.S. – which will never happen, he noted in an aside – while they weaponize in space.

*Despite Russia’s public posture, that government is actively pursuing counterspace capabilities*

For any arms control treaty that the U.S. enters into, the speaker continued, we must first have clearly agreed-upon definitions and a description of behaviors that the agreement constrains. Today, we lack those requirements in any space-related agreements. For instance,

the Prevention of Placement of Weapons in Space (PPWT) defines a weapon as something that can disrupt an object in outer space, which is far too broad. To combat these campaigns for binding, yet too-imprecise arms control regimes by Russia and China, the State Department challenges their narratives both publicly and privately. As to verification, the State Department's stance is that the U.S. will only enter into an arms control treaty in space if it has verification provisions. By way of example, the New START Treaty contains a ninety-one-page appendix on conducting inspections. In space we are nowhere near that.

President Trump sometimes talks about burden sharing, he noted. The State Department is using diplomatic burden sharing. With partners and allies, the State Department constantly has great support privately. But we need this support publicly in the international arena. Our allies and others often challenge Chinese and Russian government narratives in private discussions with the U.S. government, but the State Department urges them to publicly denounce false narratives and cynical campaigns by those governments. For example, the Japan Ministry of Defense publicly called on China to enter into a trilateral arms control agreement, which is exactly what the State Department has been looking for. In addition, the State Department urges states to vote against these Russian and Chinese treaties, but the Department knows their messaging cannot just be about voting against measures - this is where norms come in. The State Department hopes to soon detail what responsible behavior in space looks like, and then continue to act in accordance with those norms. These can be outlined both diplomatically and by way of the Space Force. The speaker concluded that this will be a "busy year, diplomatically, on norms." The military speaker agreed, adding that from the military's perspective, ensuring access and freedom to maneuver in space are vital national security matters, and a military response will face anyone who threatens those priorities.

*Ensuring access and freedom to maneuver in space are vital national security matters*

As the dialogue turned to the participants, a few questions arose for the military speaker on the mechanics and future of the Space Force. Participants asked, for example, what groups of people are joining the Space Force, what roles and responsibilities the Space Force will have, and the effect that will have on the other service branches.

The speaker replied that anecdotally, the federal government had just advertised thirty civilian jobs for the Space Force and received overwhelming interest. As to personnel, it's easy to think in terms of three buckets. One bucket is full of space operators: nearly all of these personnel will come over from other military branches to the Space Force. Next is the support staff bucket: these personnel are not coming over from other branches, but will be hired, trained and recruited independently. And third is a bucket with acquisition personnel, engineers, scientists, and others: some, but not all, of these folks will come to the Space Force from other military branches. The speaker highlighted that he sees an opportunity for the Pentagon to rewrite the rules for human capital management. As to roles and responsibilities, the speaker explained that the Space Force is currently standing up by using assignees from the Air Force with minimal numbers from other branches. The law so far is clear that Space Force entrees (as opposed to mere assignees) will be from the Air Force, though that authority will likely broaden to the other branches in the future. Legally, the Space Force is empowered to define an acquisition strategy and a human capital strategy that works for it. The challenge

*The challenge ahead ... is to stand up the Space Force without "breaking" the other service branches*

ahead of the Pentagon is to stand up the Space Force without "breaking" the other service branches by siphoning off their personnel and talent. One key question that the military will face is where to house space capabilities when the support is enabling another domain, such as air or land forces. That issue is still undecided.

The discussion shifted to the value and the details of norms, as opposed to legally binding agreements. One speaker noted that large, multinational arms control agreements are likely a thing of the past. Today, the priority is on more focused tools such as bilateral agreements and political agreements. First, the discussion focused on whether the U.S. military is prepared to describe a set of detailed norms, given that the Pentagon has so far stayed silent. One speaker acknowledged the silence but assured participants that the military is hard at work articulating a set of norms, and above all, operating in accordance with them for others to follow. One participant asked whether

*The military is hard at work articulating a set of norms*

norms for civilian spacecraft and military spacecraft should be separated or unified. The military speaker replied that we all operate in the same domain, and the military shares information with companies that sometimes participate in the Pentagon's war exercises. Thus, he concluded, we cannot totally write off norms that would apply to both sectors.

Finally, the discussion focused on forms of cooperation with other states and militaries. The military speaker highlighted the problem of space debris, noting that roughly once every three days an object in space must maneuver to prevent a collision, and the problem is only getting worse. On the space debris problem, he explained, the government cooperates with everyone, even rival states and competitors. But the focus now is stopping the creation of debris. As to the proper approach to the international community, the State Department speaker articulated a dichotomy between pursuing normative behavior to deter conflict and pursuing arms control through legally binding agreements. The focus today is on the former. The State Department has heard through abstention votes that allies want a new approach. As part of that, the State Department implores them to speak out publicly on Russia and China; the speaker lamented that those countries refuse because of aggressive diplomatic retaliation from Russia and China. But many participants agreed that new approaches away from arms control might require new fora and venues to establish baseline norms, expectations, and political commitments.

*New approaches away from arms control might require new...venues to establish baseline norms, expectations and political commitments*

## **Panel III: Working Smarter Commercially with America’s Spacefaring**

### **Allies**

The panel began with recognition that space is not just about the Law of Armed Conflict, but also includes crucial commercial sector activity. The panel’s discussants included a representative of the government of Italy and a representative of the German Space Agency, who both focus on space policy and cooperation.

*Space is not just about the Law of Armed Conflict, but also includes crucial commercial sector activity*

The German discussant began with an overview of Germany’s commercial space environment. For the most part, Germany relies on small and medium-sized enterprises, which naturally have a harder time with international cooperation involving large multinational

*Germany relies on small and medium-sized enterprises, which naturally have a harder time with international cooperation*

companies. From the German perspective, there are barriers and challenges for the local, small and medium-sized enterprises: one challenge is the different business culture between U.S. companies and Europe. While they share the common goal of profit, the two cultures come at that goal with different approaches. For instance, German

companies sometimes get short and concise offers or proposals from U.S. companies totaling two pages, while the German companies are used to two-hundred-page proposals. European companies are used to an environment of transparency with each provision covered in an original proposal. As a result, they’re left unsure of how to proceed when they receive brief proposals.

An additional example of hardship on small and medium-sized enterprises is the lack of available information bridging the communication gap between market supply and demand. On one hand, U.S. companies do not know the German small and medium-sized business landscape and German capabilities that could supply needed systems or subsystems. To try and bridge the gap, Germany has established a website at Best-Of-Space.de with informational

resources on each company and their capabilities. On the other hand, German companies do not always know the U.S. market well, such as where the demand exists and the types of technology being sought.

Finally, the discussant explained, regulations on international trade harm business interests and make cooperation unnecessarily difficult. For example, the International Traffic in Arms Regulation (ITAR) places a significant administrative burden on both sides of a trade. As a consequence, there is a tendency in the U.S. to buy American in order to avoid the trouble and cost of going to Europe, even when a European company can better or more cheaply fill a commercial need.

The discussion then turned to the discussant from the government of Italy. He explained that the Italian space program started in the 1960s thanks to links between Italy and the U.S. Air Force. The discussant highlighted the importance of thinking through space policy as to all civilian space activity, meaning both commercial space activities and government civilian space programs. By way of example, the Italian Space Agency is the most important space actor in Italy. In addition, Italy established a National Space Committee, prioritizing space as a piece of economic development and cooperation with allies. In this important time, the discussant elaborated, the Italian government and industry are seeking new ways to strengthen ties with the U.S. But space capabilities also represent a sword that can be used or misused; it's important, then, to have the government ensure enterprises make their money safely and responsibly.

*The discussant highlighted the importance of thinking through space policy as to all civilian space activity*

Italy, the discussant highlighted, has been a reliable partner with NASA through direct exchange of personnel, and through Italian parts and systems used on the space shuttle and the International Space Station. In fact, half of the habitable volume of the ISS was made in Italy. It is an exciting time for Italy and the country hopes its bonds with the U.S. will continue to strengthen in the near term.

The discussant opined that good international cooperative policy can form a foundation for long-term commercial cooperation, and that much of the hard work will be developing the bilateral bond itself. Productive alliances, such as the U.S.-Italy relationship, were established in the past, but still need to be nurtured, ideally through face-to-face interaction. The new generations, the discussant urged, must have direct interaction with Americans in both government and the private sector. Personnel exchanges, for instance, facilitate these bonds. One hindrance on forging such bonds is the strict U.S. citizenship requirement before working for U.S. aerospace companies or NASA. In decades past, interns and junior workers could be foreign citizens and intern with NASA. A similar approach might help to solidify bonds today.

*Good international cooperative policy can form a foundation for long-term commercial cooperation*

As the discussion turned to the participants, one participant posed an analogy between space activity and the world aviation community, asking the discussants about the potential for mutual legal assistance treaties in order to facilitate license sharing and registration in the commercial space sector. The German discussant replied that in the Space Traffic Management sphere, he sees creative new approaches on shaping the idea of a management scheme, to which the German industry is interested in contributing. Today, he sees the lack of a meaningful forum being a hindrance on progress. Typically, these discussions might be held at the United Nations, but actions at the UN might be too slow, he offered.

Another participant asked the discussants what the U.S. could be doing better in this space. In Italy, the discussant responded, a previous generation developed deep bonds with the U.S., and those international programs have continued between the space agencies of those governments. But now that generation has retired. In the last ten years, both countries have unfortunately been unable to cooperate on some key issues. Thus, an increased focus on bilateral agreements rather than just multilateral agreements would be fruitful, he argued. The German discussant offered that large-scale cooperation between governments, such as cooperation between NASA and the European Space Agency, is very fruitful for both sides' business communities. Where there is NASA-ESA cooperation, cooperation between European and American companies becomes easier, enhancing the potential for future agreements. The

partners get to know one another, and the governments provide for a certain percentage of business to small and medium-sized enterprises. On the Orion spacecraft, for instance, this cooperation between NASA and ESA reached new heights.

One participant asked if the two moderators were venture capitalists, which one technology would they advise people to start thinking about now? The German discussant replied that the space debris problem will probably require significant investment. After all, he

*The space debris problem will probably require significant investment...if we don't invest in it, then all other technology in space is threatened*

argued, if we don't invest in it, then all other technology in space is threatened. Devising a solution to space debris will help the future of space activity, extend the life of spacecraft, and enable new technologies such as additional movement in space. The Italian discussant replied that throughout history, technology facilitating

transportation has been extremely fruitful, meaning in space anything that adds to space transportation would be high on the list.

Throughout the panel, a consensus formed among participants – those from the U.S. government, Five Eyes governments, and foreign businesses – that the International Traffic in Arms Regulation (ITAR) was an unfortunate Cold War relic that requires reform. Even so, a U.S. government participant emphasized to the group that ITAR's relevance to hundreds of components of the federal government means that there are many stakeholders in potential reform, and reaching consensus with all relevant groups would be a slow process. In addition, the federal government would need to weigh the effects of loosened ITAR restrictions on procurement. Specifically, U.S. firms might be dissatisfied that they are subject to stringent procurement regulations while the government is deregulating international firms.

The moderator posed a vision for discussion. In an environment where we have become focused on supply chain security, creating barriers to cooperation and partnership in the name of security, why not designate some activities as joint ventures with countries like Italy and Germany?

*Why not designate some activities as joint ventures with countries like Italy and Germany?*

Designations from the outset might lock down the technology process early on, enabling U.S. government confidence in security, allowing closer integration with partners. The discussants were on board. The United States, the German discussant reminded the group, is their most important ally. But regulations such as ITAR change the calculus for businesses by prohibiting them from using the technology that they helped to create for commercial applications. The Italian discussant agreed, highlighting that both countries on the ends of a deal stand to benefit from start-to-finish cooperation.

## **Concluding Remarks**

The workshop concluded with participants identifying several areas that require additional exploration, such as directed energy and lasers, space traffic management, norms and norm-building, and the upcoming National Defense Strategy.

One participant offered three concluding thoughts. First, we must triage which problems are coming the soonest. In his mind, directed energy and lasers present the most pressing technological challenge. We must find an approach, whether it be arms control-based or norms-based and apply it. Second, we must address the challenges posed by U.S. classification policies. For years, practitioners and policymakers have acknowledged that over classification is a problem, but now is the time for reform and ideas. And third, we cannot forget about cooperation even with our adversaries. One of the speakers, for example, spoke to cooperation with China with regards to space debris. As space activities grow, the government will need to address what cooperation with rival states will look like.

As to technology, the speaker concluded, the challenges are always ahead of us: whether it is getting to the moon, getting to Mars, or mining space. But with policy and law, often the challenges are behind us, such as reforming old practices or abolishing policy relics that have since become moot.