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Workshop Summary forSpace in 21st Century Conflict: Calibrating Risks, Tailoring Strategies

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Space in 21st Century Conflict: Calibrating Risks, Tailoring Strategies

Workshop Summary

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Summary of Workshop Discussion

Space in 21st Century Conflict: Calibrating Risks, Tailoring Strategies

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The views summarized here are those of the workshop participants and should not be attributed to CGSR, LLNL, LLNS or any other organization.

Executive Summary

U.S. strategic thinking on outer space security has been slow to evolve since the 1990s and the DoD finds itself struggling to develop an adaptive and cohesive strategy for the domain. Russia and China, however, have been thinking about space in a holistic and integrated way for some time. Both countries recognize that U.S. conventional strength relies heavily on technologies and systems enabled by space-based assets. Thus, holding those assets at risk represents an opportunity to asymmetrically counter America's ability to project power. China and Russia been developing a suite of anti-satellite (ASAT) capabilities to accomplish this, to include direct-ascent weapons, space-based weapons, jammers, and cyber capabilities; both countries have also incorporated these systems into their respective tactical and strategic planning. This represents a serious threat to U.S. power projection and assurance of our regional allies and partners. Assuring the U.S.'s ability to operate in space is paramount for supporting regional security missions in both Europe and East Asia.

Assuring DoD operations and capabilities in outer space, however, remains a challenge for the defense community. One solution offered by strategists is to enhance U.S. resiliency in space to turn the domain from offense dominant to defense dominant. This, they argue, can be achieved by improving space situational awareness (SSA), protecting space assets with active and passive countermeasures, disaggregating assets and leveraging new commercial space capabilities, and integrating allied space capabilities. However, many barriers remain to accomplishing these objectives. For example, some think that the classified nature of many U.S. space activities is an obstacle to deepening cooperation with commercial partners and allies. Others acknowledge the lack of a working model for incorporating cheaper, diverse, and scalable commercial space systems.

Identifying where space fits into broader U.S. deterrence strategies is a subject of contention. While discussions over the past few years have focused on the practicability of deterring attacks on space assets via cross-domain threats, this line of thinking has yielded few useful insights. Consequently, defense practitioners have more recently shifted to thinking of space as part of an integrated deterrence concept, one that envisions building resiliency and defenses into our space architecture while simultaneously holding an adversary's space-based assets at risk to enhance deterrence more broadly. However, both approaches illuminate a larger problem in the discussion of the relationship between space and deterrence: there is a lack of consensus

on what it is we are trying to deter, how space fits into broader deterrence and strategic constructs, and the role of space in extended deterrence and assurance of allies. For example, is the United States' priority to discourage attacks in space, to ensure regional power projection and alliance support capabilities, to deter broader global conflict or all of the above? Answering such questions will be an important step toward integrating space into a comprehensive defense strategy.

The key questions that the symposium identified for future research included:

- What is the role of space in broader defense strategy?
- What is the role of regional allies in supporting U.S. space and space-enabled capabilities?
- What are the key elements that could shift space from being an offense dominant to defense dominant domain?
- What is the most effective way to integrate commercial systems into U.S. defense capabilities?

Introduction and Context

Spurred on by the development of counterspace weapons by aspiring powers, policymakers have recently begun to question how the U.S. military can defend its space-enabled capabilities. Meanwhile, the gap between U.S. and near-peer competitor military space capabilities is closing fast, alarming defense officials, strategists, and members of Congress alike. While adversaries continue to develop space-based capabilities and integrate space operations into broader strategic doctrine, U.S. thinking has been stuck on how to shift military space operations and acquisition programs into a newly contested and competitive era. In an effort to address this issue, the Center for Global Security Research convened its second annual space symposium to explore the role outer space will play in future interstate conflict and identify how the domain may be integrated into broader defense and deterrence strategies. Put differently, the goal was to shift the conversation away from continued emphasis on how to fight a war in space and toward a discussion of the role of space in war.

The workshop sought to stimulate strategic discussions on outer space by first reviewing past U.S. policies and postures, and outlining the Trump administration's approach to commercial and national security space. The proceedings then turned to examining adversary thinking on space as a strategic domain, to exploring the role space plays in U.S. views of future conflict, and to discussing space as it relates to integrated strategic deterrence. Finally, participants described the current and potential role of U.S. allies in defense and deterrence strategies in space and analyzed the implications and opportunities posed by the rise of the commercial space industry to these strategies. The key questions posed to the participants were:

1. What role will the space domain to play in the conflicts the United States and its allies are likely to face in the next decade or two?
2. How can we encourage a shift in focus from the elements of space military strategy to a focus on the role of space in broader defense and deterrence strategies?

3. In such a broader strategic approach, what roles can other stakeholders play?
4. What implications follow for the policies, strategies, and capabilities of the United States and its allies?

The workshop closed with lessons learned, focusing on how to bring forward an integrated view of what role space should play in future U.S. defense policy and posture. Presentations and discussions were on a not-for-attribution basis and made no use of classified information. This year's participants included members of the U.S. national security enterprise, the commercial space sector, and allied nations.

Panel 1: Reviewing the U.S. Policy Baseline up to 2017

- What were the main developments in U.S. military space strategy from 1990 to 2016?
- Was the "cross domain deterrence" excursion helpful for securing space?

After the Cold War, U.S. space posture entered a period of complacency. Space was widely considered to be a sanctuary where the U.S. had full freedom of operation that it could use to support conflict on land, sea, and in the air. At the time, many in the U.S. viewed space as a domain that should remain free of weapons given the critical support space systems provided U.S. conventional and strategic military forces. Many workshop participants hailed the 1991 U.S.-Iraq conflict as the first "space war."

The benefits space offered to conventional forces in 1991 were significant. However, the capabilities it provided during the Iraq campaign were limited to GPS navigation, intelligence, communications, weather assessments, and missile early warning. Over the coming years, the development of GPS guided munitions, aerial drones, and advanced ISR capabilities provided the U.S. with an ability to project conventional power in a way never before seen in history.

By the beginning of the 21st century, there was a concerted effort within the defense community to push space capabilities down to the tactical level – i.e., to warfighters on the ground – and policymakers in the George W. Bush administration briefly flirted with placing weapons in space to further leverage U.S. technical superiority. Around the same time that the U.S. expanded its use of space for tactical purposes, its rising near-peer competitors began their own efforts to consider how they might integrate space technology with ground operations, while concurrently exploring ways to deny the U.S. access to the domain. By the mid-to-late 2000s U.S. policymakers realized that they were facing a more contested space environment, with the renewed growth of Russian space capabilities, aggressive efforts in China to develop its own space capabilities, and both countries developing counterspace weapons.

The 2007 Chinese destructive hit-to-kill anti-satellite (ASAT) test was a wakeup call for the defense community. The incoming Obama administration recognized in 2009 that the nation needed a cohesive strategy aimed at exploiting space for strategic advantage. The result was the development of a strategy that outlined both the ends and ways to utilize space strategically. The 2011 National Security Space Strategy (NSSS) was an important achievement

in this regard. It spurred a series of space portfolio reviews to track progress in securing space systems, and established new organizations to cut across the U.S. government space stovepipes. But the scope of this policy review may have been too narrowly focused on national security, and its implementation was insufficient particularly on the side of the Defense Department as compared to the U.S. Intelligence Community (IC).

Some workshop participants believed this propagated a culture of inaction in DoD, where the U.S. continued to debate what to do in space while its adversaries moved forward with integrating space into their strategic thinking. Various approaches to address the "means" issue have since been suggested, but there remains little agreement on the best course of action—and what ends we seek to achieve via the use of space. This disparity, among other things, resulted in an asset-driven approach to space, where emphasis was placed on developing new technologies or tactics to counter adversarial aggression. As a result, while the U.S. military has broadly considered what war in space will look like, it has given insufficient thought to how space fits into war. Several workshop participants characterized the defense community's excursion into cross domain deterrence as unhelpful in this regard, in that it did not provide an adequate framework for developing integrated strategic concepts that incorporate space.

Panel 2: The Trump Administration's Approach to Military Space Strategy

- On at least a preliminary basis, what insights do we have into the Trump administration's approach to conflict in space and space in conflict?
- What role does military space play (or will it play) in the Trump administration's National Security Strategy? In the National Defense Strategy? In the National Military Strategy?

Participants drew on the Trump Administration's National Security Strategy (NSS), public statements by senior administration officials, and their own personal experiences to provide insights on how the U.S. approach to space military strategy may be shifting in the new administration. At least one discussant described the current administration's policy as a realignment of previous objectives with implementation actions to achieve those objectives. The new NSS considers the "unfettered access to and freedom to operate in space to be a vital interest" and identifies space as a domain in which the United States must "maintain our leadership and freedom of action […]". As such, the NSS identifies space as part of the U.S. critical infrastructure. This allows the administration to respond to attacks made on space assets as it would to attacks targeting its critical, terrestrial based systems.

Discussants said the term "space preeminence" is the guidepost for the Trump Administration's space policy. The term is intended to convey a U.S. resolve to maintain leadership and freedom of action in outer space, and participants said it drives the development of capabilities such as enhanced SSA for attack attribution. It represents a shift from the Obama Administration's emphasis on collaboration with allies and the commercial sector. It also differs from the U.S. focus on "space dominance" throughout the Cold War and post-Cold War periods up to 2008,

with discussants noting that China, in particular, will no longer permit the United States to dominate in any individual warfighting domain.

Some debate emerged over whether a U.S. threat to respond to an attack in space in another domain would be perceived as hollow. One participant argued that the definition in the NSS of "unfettered access" to space as a vital U.S. interest and commitment to respond to any attack on U.S. space assets at a, "time, place, manner, and domain of our choosing," was meant to remove the "hollowness" of past deterrent statements. The Trump Administration accordingly highlighted in the NSS the importance and need for all-domain deterrence, which many observers believe is conceptually linked back to the flexible response strategy of the 1960s. Panelists highlighted that adversaries have been explicit about their intentions regarding national security space, while providing enough uncertainty about their capabilities to leave something to chance. In response, the U.S. has become increasingly frank about its intention to defend space, and after 2015 policymakers began talking about making investments in space control. One discussant called for greater attention in the national security community to the potential role of space in war, noting that war over orbital slots is unlikely but the United States has assets in those slots which enable and enhance terrestrial capabilities. Thus, a fight in space will more than likely be the result of nations addressing their political differences, rather than an abstract conflict over orbital territory.

As such, DoD is taking steps to assure space by assessing its current ability to protect its assets, along with identifying future strategies that support more resilient architectures. DoD also recognizes the importance of developing new space capabilities in tandem with other domains to ensure space forces are integrated, for example, with both cyber and special operations forces. Additionally, reform will be needed in DoD to support the acquisition of commercial capabilities moving forward. Also mentioned in the NSS, and worth noting, is that commercial assets integrated into the national security architecture are now considered protected infrastructure and will be defended as such during any conflict.

Panel 3: Understanding Adversary Approaches to Conflict in Space and Space in Conflict

- How does Russia differentiate the roles of space combat in local, regional, and strategic conflicts?
- Does China make similar distinctions, or does it take a different conceptual approach?
- How much progress do they expect to make in the next decade or two in shifting the strategic balance in space to their advantage?
- Looking ahead a decade or two, are there other potential actors in space of military consequence?

Russia and China are the nearest U.S. competitors in space and discussants focused almost exclusively on these two countries, conveying urgency in expressing their views that the United States needs to do more to address the increasingly sophisticated counterspace capabilities of both countries. By contrast, discussants largely argued that Iran and North Korea are nascent in

establishing their presence in space, and notwithstanding an interest finding and exploiting vulnerabilities in commercial space systems by the non-state hacker community, they present only a nascent threat thus far. Accordingly, the discussion during this panel session focused primarily on perceived threats posed by Russia and China.

Russia

As keen observers of U.S. military campaigns, Russian analysts recognize that U.S. wars have been dominated by "non-contact warfare" —the ability to attack one's adversary from a great distance without sending troops into combat, such as with long-range and precision strike capabilities. Russian analysts also have concluded that such warfare is dependent on space-based assets. In short, they appear more concerned about the likelihood that space will be a key enabler of U.S. victory in a conflict than they are that a conflict will extend into space, given their fears of U.S. space-based capabilities that enable it to strike ground targets with precision guided munitions and minimal force at risk in a theater of operation.

As a result, Russia is developing capabilities and formulating strategies aimed at threatening U.S. space systems. Moscow possesses a robust set of counterspace programs, including a rapidly expanding set of cyber and electronic warfare capabilities. Space operations are also becoming integrated on a cultural level within the Russian armed forces, given their belief that wars are predicated on information superiority, which is in part enabled and achieved through the control of space. As a result, Russia has and will continue to build and secure its space architecture, but will first and foremost continue its pursuit of counterspace systems to deny an adversary freedom of operation in space and the benefit of space-enabled capabilities.

China

China's strategic counterspace posture shares some parallels with that of Russia. Recognizing that space plays an essential role in enabling the U.S. to project power well beyond its borders, and the force multiplier benefits of space, China, like Russia, sees an opportunity to asymmetrically counter U.S. preeminence by targeting its space infrastructure. To support this, China is developing new technological capacities and institutions to support strategies aimed at achieving space control, including denying adversaries the benefits of the space domain.

China differs from Russia in perceiving space as a critical but subordinate component of information dominance. Chinese defense planners calculate that China can achieve victory by gaining control of information in the early phases of a conflict, and see space, electronic warfare, and computer network capabilities as essential to achieving information advantage. Chinese defense planners recognize the United States as a superior military power and probably judge that the U.S. derives its power largely from its ability to leverage information systems, such as those in space, to provide decisive warfighting advantage. Undermining U.S. space capabilities is thus critical in Chinese eyes to neutralizing U.S. information dominance.

Several participants argued that U.S. planners focused on countering China's activities in space should keep the following points in mind:

1) Chinese efforts in space are still very much a work in progress. For example, we have not yet seen evidence that China has fully operational space warfighting capabilities. Moreover, China still lags far behind the U.S. in the development of command and control platforms.
2) There does not seem to be any significant Chinese literature arguing against initiating a war in space. This would seem to imply that Chinese strategists view the extension of war into space as inevitable.
3) China seems willing to be the first to use force, including in space.
4) Regime preservation will remain central in any Chinese decision to use force and in its determination about the type of force to be used.
5) China has been successful at framing the U.S. as the "bad guy" in space among the international community. The U.S. needs to place emphasis on diplomatically changing this narrative, as efforts to do so have been lacking.
6) China fears U.S. efforts aimed at increasing the resiliency of its space architecture. Thus, it can be expected that China will continue to seek ways to undermine U.S. confidence in U.S. space assets.

Panel 4: Exploring the Place of Space in U.S. Views of Future Conflict

- Does the U.S. differentiate the roles of space combat across different types of conflicts?
- How can space be utilized militarily to achieve specific objectives in peacetime, crisis, and war, both regional and strategic?
- What other interests should guide the development of U.S. military strategy in a way that integrates space?

The potential role of space in future conflicts is gaining renewed attention in the United States, which is reviewing its vulnerabilities and considering the development of systems and strategies to assure its continued preeminence. U.S. efforts to enhance the resiliency of space architectures are underway and will require cooperation with allies, partners, and the commercial sector. Working with allies and partners to integrate space capabilities will raise the political cost associated with an attack on U.S. space-based assets. Partnering with commercial enterprises to aggregate space systems will also make it difficult for adversaries to crumble entire architectures with a few kinetic strikes. Some discussants argued that beyond nuclear command and control, there is little that cannot be trusted to commercial entities and allies, and that they should be treated as full partners in U.S. national security strategies. To support commercial industry as an enabler of U.S. space preeminence, the room agreed that the U.S. government needs to find a better and quicker regulatory process to ensure American businesses remain the leading actors in commercial space development. However, some strategists worry about the risks associated with outsourcing critical space functions, given that purely commercial capabilities could be particularly vulnerable to low-end threats like jamming, dazzling or cyber capabilities.

Some strategists believe the U.S. should work to establish international norms for space either by way of U.S. conduct or through informal confidence-building measures. There remains, however, little agreement on the right approach. Many planners argue against the effectiveness of international agreements related to space security, given the tendency of U.S. adversaries to agree to, then subsequently break, their commitments once agreements become incongruent with national interests. In response, some have proposed tapping the commercial sector to spearhead the establishment of norms. For example, norms against proximity operations could be driven by the commercial sector, as militaries continue to develop capabilities that could threaten commercial assets. By choosing not to lead the international community in norm building, these same analysts argue that the U.S. risks allowing other states to assume leadership roles in shaping the future of space.

One major hurdle to comprehensively integrating space into U.S. defense strategy, and a recurring theme during the workshop, are the classification barriers to sharing information on U.S. national security space technologies and operations. The highly classified nature of space activities makes it difficult to cooperate with allies and collaborate with private industry. It will remain difficult for the U.S. to build coalitions in space and integrate space-based systems with allies if planners are unable to share information. There are two mutually compatible avenues to reducing these barriers: reducing the classification of space systems and capabilities, and enhancing access to relevant information to allies and commercial partners. Over-classification also impacts the U.S.'s ability to deter its adversaries. If one goal of future space strategies is to deter adversaries from threatening the U.S., then making them aware of both offensive and defensive capabilities is essential. Some leaders in the U.S. space community have questioned the point of developing and deploying deterrent capabilities if no one knows what they are. By not signaling capabilities developed specifically to discourage unfavorable adversary action, the U.S. increases the potential for a deterrence failure.

Panel 5: Exploring Space in Integrated Strategic Deterrence

- What is integrated strategic deterrence? What are its potential values?
- What can military capabilities in space contribute to deterrence in different types of conflicts? What can space vulnerabilities detract?
- How do other countries answer these questions?

Integrated strategic deterrence grew out of the reaction to cross-domain deterrence. As one participant put it: cross domain was useful for thinking your way into the problem, but not out of it. In this context, space can be viewed on both operational and strategic levels. At the operational level, *there are at least three different scenarios worth considering.* The first is a high end destructive scenario, where kinetic attacks in space occur and cause a violent and long-lasting disturbance to the space domain. This could include, for example, the widespread use of destructive ASATs or nuclear weapons in space that could compromise humanity's future freedom to utilize the domain. Such a scenario may be best deterred by the establishment of restricted warfare doctrines that place limits on destructive attacks. The second can be classified as a high end disruptive scenario. This would entail the employment of techniques and capabilities that deny the U.S. the ability to project power through a set of tailored strikes,

perhaps using a mix of destructive and disruptive weapons. Enhancing resiliency is a proposed strategy to deter this type of attack, while the development of some offensive capabilities will further bolster deterrence through establishing escalation dominance. The third and final scenario is hallmarked by low end harassment and exploitation of U.S. space assets. Such activities are occurring today and have become accepted as the norm. As such, there is little possibility of deterring this behavior, unless the U.S. becomes an exceedingly belligerent space actor, which will then jeopardize its position as a steward of the global commons of space.

A number of key insights regarding integrated strategic deterrence were identified at the strategic level:

1. Both China and Russia incorporate integrated strategic deterrence in their respective theories of victory - which involve the use of all tools of national power to shape adversary choices. Accordingly, space plays a role in their broad strategic calculus.
2. Most in the U.S. defense community use the term "integrated" when they really mean "comprehensive." Integration implies the whole is more than the sum of the parts, yet there are no arguments describing how this will work for the U.S. military. Space plays an important role here, as it is a domain from which costs can be imposed and benefits denied, perhaps privately.
3. Many experts are overconfident in the U.S's ability to influence adversarial actions across all domains. In fact, space provides adversaries a good place to hide in the fog of war and the classified nature of U.S. space operations will continue to ensure that the domain is never fully integrated with others.
4. Integrated strategic deterrence is not only about war fighting or deterrence, it is also about long-term competition. Our adversaries are playing a long game, through which they intend to convince U.S. allies to drift away from western influence, eventually breaking U.S. partners off and forcing them—and ultimately the U.S.—to acquiesce to their wishes.
5. The final insight was that integrated strategic deterrence should encompass extended deterrence—the protection of allied capabilities through both assurance and defense posture—a topic which space strategists have spent precious little time thinking through.

Panel 6: Strengthening the Role of U.S. Allies in Space Defense, Deterrence, and Competition

- Which allies are engaged with the United States in space and which might become consequential in the decade or so ahead?
- What perspectives do they bring to the development of strategy, policy, and capabilities?
- How will their interests influence the development and implementation of U.S. policy?

There has been a great deal of conversation on how to increase cooperation in space between the U.S. and its allies and partners. Translating those conversations into concrete operations, however, is proving to be a challenge. Classification remains the biggest obstacle, making it

difficult to align and operationalize capabilities. Additional obstacles include lack of a common understanding among international partners of what is and is not a threat in space; risks inherently associated with bringing in international partners (such as whether the U.S. can rely on partners in situations where political interest and policies do not align); and frustration among allies who do not understand exactly what the U.S. wants them to bring to the table. On this latter point, rather than waiting for the U.S. to provide a list of desired capabilities, one panelist recommended that allies become "demanding partners" and identify services that would help drive future U.S. and allied requirements. Although cooperation is growing in both Asia and Europe, as one participant noted, operationalizing integrated capabilities with allies will continue to be a challenge for many years to come.

International partners at the discussion highlighted the enthusiasm in allied nations to have the U.S. take a leadership role in setting an agenda for allied space security. But for U.S. planners, identifying capabilities that allies can bring to outer space is a challenge. International partners generally recognize that an asymmetry exists between U.S. space capabilities and their own, but they are uncertain where their specific capabilities may be of use. Understanding that this technological gap is unlikely to close in the near to mid-future, some European partners believe they can best serve U.S. space interests via terrestrial-based capabilities. For example, the European practice of "shaming" those labeled as bad actors in the international community could help to bolster U.S. deterrence by raising the political cost of actions taken in space – the assumption being that no technical system could provide this type of political leverage. As the U.S. continues to leverage space for information collection, the need for data management and processing systems will be critical. Some U.S. thinkers believe there will be an opportunity in this area for cooperation with allies. The U.S. does not need more space assets, they argue, but rather individuals and systems that can digest the vast amounts of data being sent back to earth. Getting to space is no longer the hurdle; handling the data is.

NATO is currently exploring whether or not space should be more broadly integrated into its strategic doctrines. Strategists recognize that NATO forces have become increasingly reliant on space and at least one participant suggested the current threat environment has increased significantly since 2014, as Russia has become increasingly belligerent. Russia now chooses when and where to challenge the coalition, as highlighted by Russia's annexation of Crimea and subsequent involvement in Ukraine. As such, some strategists have called for discussions on the development of a cohesive NATO policy for space. Participants were generally pessimistic about the prospects for developing such a policy in the near term; however, they noted the large number of member states with disparate interests as problematic for reaching consensus on the issue in NATO.

Panel 7: Identifying the Interests of the Private Sector in Space Defense, Deterrence, and Competition

- How will the emerging role of the private sector in space influence strategies for space security?
- How should it?

The commercial space industry will have a major impact on U.S. space activities for the foreseeable future. The space industry is currently a $350 billion economy, with the government driving 25% of the market and commercial interests driving the remaining 75%. The industry is evolving and seeing an increase in investment from an entirely new investment community – the venture capitalists. There are a few reasons this trend has developed. First is because of deep-pocketed dreamers, like Elon Musk and Jeff Bezos, who think space is cool for its own sake and want to push the limits of the industry. Second is the declining cost of hardware, more specifically, the low cost of the small satellite form factor and its ability to "hitch-a-ride" to space on cheaper launch vehicles. Third, investments made by institutional investors who are interested in a high return and who will hold, buy, and sell based on this objective. And finally, because of large aerospace companies hoping to find the next big revenue stream. The commercial future of this set of "New Space" industries is highly uncertain at this point, but the excitement it generates and the technologies it spawns will continue to pose both an opportunity and challenge for national security.

Some in the defense community believe the commercial space industry should be at the forefront of all national security discussions on space, especially when it comes to architecture planning and regulatory development. Currently, however, there is no roadmap for how the DoD and the IC can systematically integrate capabilities from the commercial sector. Rather than continue to plan its capabilities out twenty or thirty years down the road, DoD and the IC should seek to be a business partner in commercial technologies it sees as useful, rather than wait for them to appear in the marketplace.

Challenges associated with commercial capabilities do exist, and they need to be surmounted if commercial is to be a future key element of U.S. national security space. First, mechanisms to either task or directly operate commercial capabilities will be needed for the DoD and the IC to truly leverage commercial systems. The need to protect commercial assets from foreign threats is paramount, but processes to do so—either through information sharing mechanisms or levying government standards—have not yet been developed. The U.S. must also consider how its adversaries, especially China, will soon begin to benefit from similar commercial technologies being fielded by Chinese firms, while concurrently not allowing policymaker reactions to these developments reflexively stifle America's space industry. Finally, discussants argued that the U.S. must do more to prepare for China's inevitable full-fledged entry into the commercial space market. Strategists can start by streamlining licensing and regulatory frameworks, sharing threat information with commercial partners and allies, and assisting industry with processing and manufacturing.

Panel 8: Lessons Learned

- What implications follow for the policies, strategies, and capabilities of the United States and its allies?
- How far have we come in "solving" this problem? Is the problem changing more rapidly than our efforts can solve them?

The U.S. lacks a coherent strategy for space and has been slow to address rising threats. Although many senior leaders in the space community recognize that assured space is the best response to current threats, the Defense Department has yet to take such efforts seriously through reform. As a result, the DoD has made little progress in adapting to the newly-contested space domain, and the U.S. edge in national security space continues to slowly erode. China and Russia have both formally integrated space operations into broader strategic frameworks, with Russia integrating space into its new Aerospace Force incorporating air and missile defense, and China integrating space with cyber and electronic warfare forces under its new Strategic Support Force. The U.S. remains the preeminent actor in space, but its days of operating uncontested in the domain are over. If it fails to act soon, it risks being surpassed by its competitors.

A major theme in conversations surrounding U.S. space strategy is the concept of space as an "offense-dominant" domain. Current U.S. policy is guided by this principle, as space systems are few and vulnerable, and view this condition of affairs as being permanent. These experts think that if we are able to reform military space and invest in resilience, space could become a "defense-dominant" domain, where assets can be defended and enemies can be deterred. More specifically, an offense-dominated architecture has led the U.S. to hide behind a cloak of secrecy. This, as previously discussed, makes it difficult to build collaboration with allies, partners, and industry, and poses serious challenges to achieving effective deterrence. Similarly, the U.S. government's almost blanket unwillingness to reveal its capabilities severely hampers any ability to construct extended deterrence architectures with our allies. This can change, but we must reform how the U.S. organizes, trains and equips for space as well as how we think about the strategic role of the domain.

As the offense-dominant versus defense-dominant debate would suggest, there are varying opinions on how the U.S. can solve the problems it faces in space. Although most agree on core needs, there remains a lack of cohesion in ideas and efforts for developing a future strategy. One example of this is Congress's recently proposed establishment of an Air Force sub-service called a "Space Corps" to specialize on training and equipping for space within the current DoD services. Disliked by defense officials, and the Air Force in particular, congressional efforts to create a Space Corps underscore the increased frustration with DoD's lack of progress in responding to the growing threats posed by U.S. adversaries. Other constructs like a Special Operations Command model for space are also being considered, whereby Air Force Space Command (AFSPC) would obtain procurement authorities for space. In fact, the 2018 National Defense Authorization Act moved somewhat in this direction by disempowering the Secretary of the Air Force and Air Force Staff while granting AFSPC more control over the Space and Missile Systems Center (known as SMC), which procures DoD space systems. Regardless of

what package of reforms Congress selects, space needs to be recognized as a war fighting domain, enjoying the same attention, resources, and thought given to traditional domains.

Conclusion

Participants found this year's event both engaging and fruitful. However, many gaps remain and future progress in addressing the following key issues will be paramount to ensuring U.S. preeminence in space:

Deterrence

What is the relationship between space and deterrence and how can space be leveraged to enhance broader U.S. defense strategy, including deterrence? There is little consistency on what is meant by the term "space deterrence." Some argue that space is a domain from which broader deterrence is bolstered, while others seek strategies that deter adversaries from attacking U.S. space assets. This discrepancy in focus increases the barriers to integrating space into broader U.S. defense strategy. Defense officials should identify specifically who, what, when, where and how we are seeking to deter, then hold separate conversations to determine if the space domain can be leveraged to achieve deterrence objectives.

Collaboration with Partners

Identifying the role allies and commercial actors should play in future U.S. space operations remains a challenge. How can we foster better cohesion and cooperation with partners and, more significantly, why have efforts to do so thus far been lacking? As many participants pointed out, over-classification of space activities stifles the United States' ability to cooperate meaningfully with allies. A shift in current U.S. thinking regarding classification is needed - one that enables defense officials to be more transparent with partners about U.S. space capabilities, operations, and intentions. For those who oppose this notion, such a shift represents a serious security concern. This concern is reasonable but also risks U.S. stagnation and isolation, and thus the long-term sustainability of its space architecture. Whether we like it or not, outer space is and will continue to be accessible to an increasing number of actors and it behooves the U.S. to begin establishing a track record of cooperation and multilateral leadership in the domain. As some analysts have highlighted, reducing classification hurdles will also allow the U.S. to integrate allies into its space architecture, creating collaborations that support U.S. objectives in space and more broadly, while also stimulating further cooperation between government and commercial industry - all of which will assure the sustainability of U.S. space operations. Any future discussions on outer space should include a robust debate on classification issues.

Data

There was limited discussion on *big data* during the workshop, but the few conversations that did take place made it obvious that this topic, perhaps more than any other, will have a significant impact on future U.S. space operations. This is unsurprising, as the mission of many space-based systems is to collect terrestrial information from the physical "high

ground," then transmit it back down to earth for analysis. One panelist highlighted that managing the vast amounts of data being sent back already represents a significant challenge and will remain so moving forward. The U.S. will be increasing challenged to exploit the information provided by its space systems, especially if these systems become proliferated or as data from commercial systems are added in. Advantages the U.S. enjoys from space-based ISR platforms will realize diminishing returns because of this problem, unless a new comprehensive enterprise to manage and interpret this data is developed, and soon. Aside from downlinking, storing, and triaging information, these systems must also allow analysts to disseminate information to warfighters in a timely, consistent, and organized manner. To address this problem, a robust conversation on data management specific to the space enterprise should begin and focus on the development systems, personnel, and strategies that enhance future operational effectiveness. The U.S. has been slow to identify rising threats in the space domain; we should not allow poor data management practices and inadequate systems to threaten the success of future space operations.

Although by no means exhaustive, these topics represent key issues that should drive future U.S. strategic thinking on outer space. Each pose a challenge to U.S. thinkers, but none should be ignored or sidelined in future discussions. As a starting point for success, strategists should view current vulnerabilities as an opportunity to re-focus strategic thinking, identify deterrence objectives and the role space can play in achieving them, put priority on policies that enable collaboration with allies and partners, and begin to develop and implement architectures that support enhanced data management. Accomplishing these objectives will help secure the United States' space architecture and ensure its continued preeminence in the domain.

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