



NATIONAL INSTITUTE FOR PUBLIC POLICY

SPACE AS A WARFIGHTING DOMAIN:

RESHAPING POLICY TO EXECUTE
21st CENTURY SPACEPOWER

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**Space as a Warfighting Domain:
Reshaping Policy to Execute
21st Century Spacepower**

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May 2021

National Institute Press®

Published by
National Institute Press®
9302 Lee Highway, Suite 750
Fairfax, Virginia 22031

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The author would like to offer a special thanks to the senior reviewers of this monograph, whose inputs, criticisms, and commentary greatly improved its quality: Dr. Kathleen Bailey, Dr. Peter L. Hayes, Ambassador Robert Joseph, and Dr. Keith Payne. I would also like to thank Amy Joseph for her invaluable support throughout the development and production process. Finally, the author would like to express his appreciation to the Smith Richardson Foundation and the Sarah Scaife Foundation for their generous support that made this monograph possible.

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Executive Summary

There has been a shift in opinion in the nation's governing and defense-planning circles about the nature of inter-state relations in space and the duties incumbent on those in positions of leadership to adapt and respond to the reality that space is a warfighting domain. Over the past few decades, sanctuary-policy proponents recognized that space was increasingly likely to be a warfighting zone and worked hard to make the case that space should remain free of Earth's conflicts. Yet reality has dictated otherwise as other nations have acquired the abilities to use space for warfighting. There is today an overriding assumption that the country no longer has the luxury of believing it can operate in a benign space domain. The United States has responded with recognition of the changed dynamic in its security policies and strategies by promoting greater awareness of the threat and reorganizing the Joint Force and command structure to protect U.S. space assets and mature U.S. spacepower.

Pressure to bolster deterrence and prepare for the defense of U.S. interests in space is growing. Given that the United States has responded to the technological and policy developments of other nations in space by establishing the U.S. Space Force mission, what policies and steps will the nation take now to fulfill the mission to "defeat aggression and deliver space combat power"? Will it involve offensive and defensive terrestrial- or space-based capabilities (kinetic and non-kinetic) to protect U.S. satellites from direct attack from kinetic or directed energy weapons, or to permanently remove hostile satellites from orbit? Will it involve weapons deployed in space to defend the nation, for example, against ballistic or hypersonic missile attack? Even though reality dictates that space is now a warfighting arena, policy uncertainty about which U.S. activities in space are permissible remains.

Two major changes have occurred that make it impossible to regard space as a sanctuary and impel us to define it as a warfighting domain. The first is that space has become vital to our way of life; losing access to it and what it provides would be catastrophic. Second, others have deployed space assets as well as capabilities and weaponry to deprive the United States of its freedom to use space. Over the past two decades, multiple threats have emerged to U.S. space systems. China and Russia have made strategic choices to develop their spacepower capabilities, to include conducting live anti-satellite tests in space and building capabilities that can damage or destroy U.S. space assets. The U.S. dependence on space will only grow, which means the failure to respond smartly to a potential adversary's aggressive use of space could have deadly consequences. Possible answers to these threats, in the form of improved space control capabilities and the application of force in space, remain problematic because these missions have not been properly authorized and adequate money has not been appropriated to develop weapon systems. There is an inadequate "policy story" to fully support such a move.

National security space policy has been remarkably consistent since President Eisenhower declared it was in the interest of the United States to ensure freedom of space, which, from the earliest days, included the peaceful and scientific uses of space as well as military uses there. The right to self-defense is internationally recognized in Article 51 of the United Nations Charter, a right that all nations within the UN recognize, which also extends into the space domain. Policies since 1958 distinguished among military, civil, and commercial space activities, and they recognized an international dimension. There have been a few key strategic-level developments since 2000 affecting the evolution of spacepower in the United States and U.S. space policy discussions.

- With the nation's withdrawal from the ABM Treaty in 2002, the door was opened for the possible development, deployment, and operation of new missile defense architectures that involved space-based weapons.
- With the growth in transparency in the defense space world since 2013, there has been a greater willingness to talk about threats to space systems, the types of technologies in use, and the nations developing them.
- This recognition of the threat to U.S. space systems drove the United States to take steps to consolidate U.S. military space efforts in a U.S. Space Force and U.S. Space Command.

Early signals by the Biden Administration indicate that it will take a realistic view of the threats to and in space. The Biden policy will be constrained by an international and security environment much different than that which enabled the Obama policy of deemphasizing U.S. warfighting prowess in space. The significant military space developments by other nations will make it far harder to deny the fact that space has become central to warfighting scenarios envisioned by Russia, China, and perhaps others.

Developing military policies and programs with regard to space is complicated by a broad range of existing space laws and policies. There are various prohibitions and restrictions strewn among different treaties and conventions, and there are familiar domestic policy controversies (reflected in political arguments) about placing constraints on, and funding of, military space programs. In general, though, the decades-old political debates over military space issues, and secrecy surrounding national security space activities, have had a dampening effect on military space planning and programs in the United States.

This study examines critical military requirements and missions already identified by policy makers and defense planners, identifies how space capabilities might be able to improve the execution of those missions, and suggests capabilities (requirements) military commanders might want to have available to them, and why they might desire them. During peace and in war, the mission of the Joint Force is to deter nuclear and non-nuclear strategic attacks and defend the homeland. The United States is one of the few countries that can reach out to any corner of the world to pursue a military objective or defend its interests, and space is a critical enabler of this capability. Development of layered missile defenses is a requirement, and missile defenses must leverage the space domain for sensors, especially to address the more advanced missile threats. The Joint Force must also be ready to establish, maintain, and preserve freedom of operations in space and protect and defend U.S., allied, partner, and commercial space capabilities.

There are four military space missions that leverage or support the U.S. space system and, of those, two of the mission areas (space support and space force enhancement) are well established and amply supported by current policy structures, rhetoric, budgets, and actions. Space control, or ensuring freedom of action in space, and force application in space are two missions about current policies that are vague at best about *the use* of active (kinetic and non-kinetic) space denial capabilities. There are scenarios in which passive defenses will not be sufficient to protect satellite functions, and the employment of active defenses, or defensive force application, may be necessary. Today, the United States does not appear to be in a position to respond with agility to destructive space threats, at least within the space environment. There is no current policy support or public discussion in the Air Force or the U.S. Space Force for

the development and deployment of interceptors and strike weapons in space.

The current U.S. approach to deterrence of attacks in space is to deny the adversary victory by reducing the likelihood of success, that is, deterrence by denial. By merely threatening to attack U.S. space systems unprotected by a strong deterrent or defenses, a country might be able to deter, or significantly alter the manner or willingness of the United States' entry into a conflict. Deterrence of attacks on space systems presents special challenges, to include the defender being able to identify who did what to whom, and respond in a timely manner. Although deterrence by denial may deter aggressors from acting, it might not be sufficient against an optimistic, aggressive and determined adversary. A more comprehensive deterrence strategy—specifically the combination of denial and punitive approaches, coupled with the deployment of offensive retaliatory capabilities (potentially in space)—may be required to convince an adversary that the costs of initiating an attack would outweigh the benefits and that the likelihood of success would be low.

If the nation is to be in a position to defend itself and pursue its national interests in the age of satellites, the foundations of its national security space policy must be formed and solidified. That policy should express the power and the will to execute the underlying freedom of space vision. Unless power and will exist, the declarations made in a policy statement are ultimately meaningless and powerless. On the one hand, we speak in full recognition of space as a domain available for tactical military exploitation. Yet on the other, in what we do and what we *really* think, space is treated as a sort of haven from hostilities.

Clearly, the subject of spacepower maturation requires the Biden Administration to step up to ensure its relevance in policy discussions. If the subjects of space control and

space force application continue to be held in private, there is not much that can be done to advance the agenda and ensure the protection of U.S. interests through the exercise of spacepower. For space policy to be fully sanctioned by the nation and by the people, other supportive actions by the nation's leadership and across the government are required. An important part of this process is public education. There are at least three key points that must be conveyed to the U.S. public. (It should be noted that these same informational needs apply to our allies.) The first is the fact that space is vital to daily life as we know it. Second, the public must understand what the consequences would be of our failure to protect the nation's interests in space, defend its assets, or protect its territories from attacks that use space. And third, the public must understand what space control means. The meaning of "control" will come down to conveying to domestic and foreign audiences what is being controlled (an orbit or a spacecraft), how long it is being controlled, and the purpose of this control. The public needs information on the "who?" "what?" and "so what?" of space threats, and this will require reexamining the rules the country has in place to protect information. This information must be conveyed in a manner and language that increases public understanding of the issues.

The reality of possible conflict in space almost certainly will bring significant headaches in international diplomacy. Deterrence and warfighting practices and theories of stability will have to be reexamined. New and more vicious budget wars will arise. Political leaders may not want to confront the problems that necessarily result from the maturation of spacepower. A new vision for space, one that is bi-partisan in its fundamentals, would be critical to the formulation of enduring and clear policies and strategies. The bi-partisan policy should define U.S. national military posture in space, consider overall national foreign policy and military objectives, and make it possible to develop a

strategy for U.S. spacepower designed to achieve the high ends of policy. Clear and precise explanations of U.S. military space plans and actions to allies and international partners also will help U.S. leaders speak effectively to strategy, warfighting, and deterrence.

The key assertion of this study is that the national vision for space, and the country's national security space policy, should fold in the reality of possible combat engagements in space. If we are to ensure space dominance, the U.S. administration and the nation's lawmakers will have to take some policy risks in a time when near-peer competition in space is growing rapidly and significantly. The country may suffer great damage if leaders do not take steps to mature national spacepower. Policy that does not actually implement and evolve U.S. spacepower has the negative effects of inaction, inadequate action, or misguided action, and is potentially catastrophic with respect to the nation's ability to enforce its deterrence strategy or effectively fight a battle that may involve space warfare.

The Biden Administration should continue to support the establishment of the Space Force and the excellent work of the National Space Council, and undertake its own whole-of-government evaluation of existing National Security Space Policy and Defense Space Strategy to ensure they reflect 21st century space realities. It should then use the opportunity of a newly published directive to publicize broadly the U.S. vision for space, a vision that speaks clearly and unambiguously to the U.S. interest in maintaining freedom of space in times of peace and war.

Chapter 1

National Security Space Policy in Transition

The argument over whether space is a warfighting domain or a sanctuary is over. To be sure, there are people who disagree that a sanctuary is no longer possible and, given the opportunity, would work to reverse or slow the policy movement toward adopting a warfighting posture in space. Yet changes have occurred that are irrevocably transforming how we and others must view the space domain. Recent Chinese and Russian technological developments, and changes to their military doctrines, have created new threats to the much-increased reliance by the United States and others on space. This changed reality has caused a shift in opinion in the nation's governing and defense-planning circles about the nature of inter-state relations in space and the duties incumbent on those in positions of leadership to adapt and respond to the national security reality that space is indeed a warfighting domain.

Space was not a true sanctuary when Earth's orbits began to be a place of competition among the spacefaring powers in the 1950s. Over the past few decades, sanctuary-policy proponents recognized that space was increasingly likely to be a warfighting zone and worked hard to make the case that space should remain free of Earth's conflicts. Yet reality has dictated otherwise; other nations have acquired the abilities to use space for warfighting. In recognition of the reality that space is a place where other states may inflict violence against the United States, the United States established the geographic warfighting command, U.S. Space Command, and declared space to be a warfighting domain.¹

¹ White House, "Fact Sheet: President Donald Trump is Establishing America's Space Force," February 19, 2019, available at <https://www.whitehouse.gov/briefings-statements/president-trump->

In 2017, U.S. *National Security Strategy* (NSS) outlined a vision for space that acknowledged Earth's orbits comprise a warfighting arena. This view was also shared by the majority of the Legislative Branch, which supported the decision to establish a Title 10 entity, a sixth military service, the U.S. Space Force.² The vision reflects a decidedly realist understanding of the way states behave. The realist perspective holds that conflict and war are enduring possibilities in international relations and, correspondingly,

establishing-americas-space-force/; White House, "Fact Sheet: President J. Donald Trump is Unveiling an America First National Space Strategy," March 23, 2018, available at <https://www.whitehouse.gov/briefings-statements/president-donald-j-trump-unveiling-america-first-national-space-strategy/>; White House, "Remarks by Vice President Pence on the Future of the U.S. Military in Space," August 9, 2018, available at <https://www.whitehouse.gov/briefings-statements/remarks-vice-president-pence-future-u-s-military-space/>; 2018 *National Strategy for Space*, March 23, 2018; Jim Garamone, "Space Force Flag Unveiled at White House," *DoD News*, available at <https://www.defense.gov/Explore/News/Article/Article/2189023/space-force-flag-unveiled-at-white-house/>; Department of Defense, *Defense Space Strategy Summary*, June 2020, p. 1, available at https://media.defense.gov/2020/Jun/17/2002317391/-1/-1/1/2020_DEFENSE_SPACE_STRATEGY_SUMMARY.PDF; Stephen Kitay, DASD (Space), "Defense Official Briefs Defense Space Strategy to Reporters," June 17, 2020, "Now I wish I could say that space was a sea of tranquility and a sanctuary from attack. But the fact of the matter is, space is contested," transcript available at <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/2225281/defense-official-briefs-defense-space-strategy-to-reporters/>.

² Joe Gould, "Congress adopts defense bill that creates Space Force," *Defense News*, December 17, 2017, available at <https://www.defensenews.com/congress/2019/12/17/congress-adopts-defense-bill-that-creates-space-force/>; See also Kitay, "Defense Official Briefs Defense Space Strategy to Reporters"; Gen. John W. Raymond, "How We're Building a 21st-Century Space Force," *Atlantic Online*, December 20, 2020, available at <https://www.theatlantic.com/ideas/archive/2020/12/building-21st-century-space-force/617434/>. General Raymond is the nation's first Chief of Space Operations.

that international behavior will not become fundamentally cooperative just because the arena of dispute moves from Earth to space. Realists generally acknowledge that conflict in space may, in some instances, be modified or regulated intermittently by common acceptance of international norms and practices, as in the land, sea and air arenas. However, given the lack of reliably cooperative behavior and the ever-present possibility of conflict, this realism calls for a peace-through-strength approach to space policy.

Throughout the space age the United States has affirmed that “any harmful interference with or attack upon critical components of our space architecture that directly affects this vital interest will be met with a deliberate response at a time, place, manner, and domain of our choosing.”³ Access to and freedom to maneuver in space is a vital national interest of the United States, elevating defense of U.S. space assets to a high-priority mission. Past administrations held very similar views, especially as expressed in their national security space policy documents. Although these policy constructs and tenets existed for years, recent events spurred the United States to become better prepared to treat space as a place for combat. Indeed, initiatives are currently in place to accelerate efforts to meet the near-term imperatives of this new warfighting domain based on an overriding assumption – the country no longer

³ White House, *National Security Strategy of the United States of America*, December 2017, p. 8, available at <https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>. White House, “Remarks by President Trump and Vice President Pence Announcing the Missile Defense Review, January 17, 2019, available at <https://www.whitehouse.gov/briefings-statements/remarks-president-trump-vice-president-pence-announcing-missile-defense-review/>

has the luxury of believing it can operate in a benign space domain.⁴

It is entirely natural for any state, especially one with a strong national security and economic dependence on space, to develop the defensive and offensive spacepower capabilities required to protect its interests and, as needed, assert its will on the edge of Earth. Some space capabilities exist today, although they are mainly globally deployed satellite networks through which data may be passed, collected, processed, and exploited to improve terrestrial military operations. These vital space networks make it possible for communications, positioning, navigation and timing, and surveillance and reconnaissance satellites to provide critical force enhancement capabilities to U.S. and allied warfighters.

Space-reliant national security activities and functions include the execution of combat operations, command and control of forces and critical nuclear and missile defense systems, missile launch detection, kill assessment following missile defense engagements, targeting and offensive operations, and logistics and humanitarian support.⁵ Society at-large depends on space systems for trade and commerce, banking, other financial transactions, food production and distribution, communications,

⁴ Transcript, "Media Roundtable with U.S. Space Command Commander Gen. John Raymond," *Defense.gov*, August 29, 2019, available at <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/1949346/media-roundtable-with-us-space-command-commander-gen-john-raymond/>.

⁵ Joseph Nimmich, *Written testimony for a Joint House Armed Services, Subcommittee on Strategic Forces; and, House Homeland Security, Subcommittee on Emergency Preparedness, Response and Communications, hearing titled "Threats to Space Assets and Implications for Homeland Security,"* March 29, 2017, available at <https://armedservices.house.gov/legislation/hearings/threats-space-assets-and-implications-homeland-security>.

transportation, power and water infrastructure, and weather monitoring and assessment.⁶

While many methods for countering enemy satellites and protecting U.S. satellites, that is, space control, are classified, we can assume each of the military services uses other tactics to protect U.S. space systems from foreign interference (e.g., satellite avoidance operations and technical camouflage measures). We also know that the armed services have available active measures, such as radio-frequency jamming and cyber warfare, to disrupt threatening foreign satellite operations.⁷

Noticeably absent in the list of U.S. offensive and defensive capabilities (kinetic and non-kinetic), known at the unclassified level, are terrestrial- or space-based systems to actively protect U.S. satellites from direct attack by enemy kinetic or directed energy weapons, or to forcefully and permanently remove hostile satellites from orbit. Also absent are weapons that may be deployed in space to defend the nation, for example, against ballistic or hypersonic missile attack, or project force directly to a location on Earth. Official rhetoric to support the use of such weapons is practically non-existent. The main point is that today, aside from U.S. investments in terrestrial-based Intercontinental Ballistic Missiles (ICBMs) and terrestrial-based missile defense interceptors with exo-atmospheric kill vehicles (which are really space weapons that can only operate in the space environment to accomplish their mission), military activities in space are severely restricted to the use of space as a channel for passing or collecting

⁶ National Academies of Sciences, Engineering, and Medicine, *National Security Space Defense and Protection: Public Report* (Washington, DC: The National Academies Press, 2016), p. 2, available at <https://www.nap.edu/catalog/23594/national-security-space-defense-and-protection-public-report>.

⁷ Steve Lambakis, *Foreign Space Capabilities: Implications for National Security* (Fairfax, VA: National Institute Press, 2017), pp. 49-53.

data. This naturally begs the question: Given that the United States has responded to the technological and policy developments of other nations in space by establishing the U.S. Space Force mission, what policies and steps will the nation take now to fulfill the mission to “defeat aggression and deliver space combat power”?⁸

In many ways, space policy development seems to have been overtaken by events, which is another way of saying that, over the past decade at least, written policy and the record of public actions and words were not the best guide for anticipating needed U.S. national security space activities. Indeed, the absence of policy, supporting rhetoric, and authorized and budgeted programming have put the country behind the curve when it comes to fielding relevant military space capabilities and developing appropriate doctrines.

Although the United States, with bi-partisan support from Congress, adopted the view that space is a warfighting environment, much remains to be done. U.S. dependence on space continues to grow. Simultaneously, the capabilities of other nations to threaten U.S. space assets are increasing, as are their abilities to use space for warfighting. Meanwhile, as noted above, U.S. discussions for functioning in space are vague about or divorced from possibilities for using kinetic or non-kinetic force

⁸ According to the FY 2020 National Defense Authorization Act (NDAA) authorizing the Space Force, the Space Force shall be organized, trained and equipped to provide: 1) freedom of operation for the United States in, from, and to space; and 2) prompt and sustained space operations. Among the duties of the Space Force are: 1) protect the interests of the United States in space; 2) deter aggression in, from, and to space; and 3) conduct space operations. See Thompson Hine, “FY 2020 NDAA Signed into Law with U.S. Space Force, Cyber Operations & Acquisition, *thompsonhine.com*, December 26, 2019, available at <https://www.thompsonhine.com/publications/fy-2020-ndaa-signed-into-law-with-us-space-force-cyber-operations-acquisition-reforms>.

application in and from space (e.g., military activities that may be useful for space control or missile defense). This tentative approach, or even opposition to force application in space, within the U.S. government and Congress sets the space domain apart from other geographic warfighting domains in a meaningful way.

Thus, even though reality dictates that space is now a warfighting arena, policy uncertainty about which U.S. activities in space are permissible remains. Yet, pressure to bolster space deterrence and prepare for the defense of U.S. interests there is growing. This is due, in part, to the fact that other nations do not have the same policy uncertainties or self-restraint regarding technology initiatives. It is imperative that the country remedy the space policy deficit, clarify objectives, and identify technology choices. The purpose of this study is, therefore, to: a) identify issues and steps to help solidify a more coherent policy for national security space in light of changes in the strategic environment; b) highlight principles that recognize the country's long-term interest in preserving its position in space (vis-à-vis other powers); and, c) evolve concepts of U.S. spacepower essential to maintaining U.S. freedom of transit and action in space. This monograph is a follow-on to the author's 2001 book *On the Edge of Earth: The Future of American Space Power* by proposing a 21st century national security vision for space and policy guidance recommendations.⁹

As a backdrop to discussing these three topics, it is important to describe the recent developments that necessitate revising our approach to space warfighting. The U.S. reliance on space has become integral to its security, economy, and way of life. Concomitantly, there have been technological and doctrinal developments by other nations that directly threaten U.S. use of space. The ramifications of

⁹ Steven Lambakis, *On the Edge of Earth: The Future of American Space Power* (Lexington, KY: The University Press of Kentucky, 2001).

not ignoring these threats are enormous. Space protection and reliable access to space assets are likely to be a critical part of deterrence of war anywhere in the world, not just in space. If opponents think they can degrade U.S. ground and sea capabilities significantly through attacks in space, either combined with or independent of ground operations, they are very likely to believe they run much less risk in provoking the United States than otherwise would be the case.

Chapter 2

Key Changes Influencing Spacepower Requirements

Two major changes have occurred that make it impossible to regard space as a sanctuary and impel us to define it as a warfighting domain. The first is that space has become vital to our way of life; losing access to it and what it provides would be catastrophic. Second, others have developed capabilities and weaponry, the aims of which include depriving the nation of its freedom to use space.

Dependency on Space

The growth in space activities by the United States and other nations, spurred on by continual technological developments, has made everyday life inextricably dependent on space. In just a few decades, the nation's economy has become reliant on satellites and space-dependent computer networks. In addition to dependence on space for national prosperity, U.S. national security depends heavily on space assets for the operation of strategic and tactical weaponry. Almost every weapons delivery system depends in some manner on satellites for effective operation. For example, Major General John Shaw, Commander of the Combined Force Space Component, describes the very real consequences of the inability to prevent damage to satellites that support critical military operations: "If we don't supply satellite communications that enable a drone to see a potential threat that's coming toward land or maritime forces—if we don't deliver that capability and they aren't warned—lives are lost."¹⁰

¹⁰ Quoted in, Gina Harkins, "Space Wars: Why Top Military Leaders Say U.S. Must Prep for Battles Beyond Earth," *Military.com*, August 24,

For the future, this dependence on space will grow. The COVID-19 pandemic has changed the way people work, moving them from offices to home, pushing their communications online, and making cloud storage more widespread. This phenomenon is global, and these developments have spurred yet another phenomenon that was already underway – the increased use of space by more and more nations and companies.

Going to space is getting easier. The U.S. private sector has reduced launch costs and made space technologies more feasible and affordable, and this trend is likely to continue.¹¹ The costs and technological challenges associated with developing space capabilities have declined to such an extent that several nations are now striving aggressively to exploit the space environment to further their national interests. The availability of smaller satellites makes it less expensive to build orbiting platforms, lowers the cost of launch, and allows the inclusion of more satellites on a single launcher. A growing number of countries and international organizations have the ability to launch satellites into orbit, including the United States, Russia, China, the European Space Agency, France, United Kingdom, Ukraine, Israel, India, South Korea, North Korea, and Iran.

2020, available at <https://www.military.com/daily-news/2020/08/24/space-wars-why-top-military-leaders-say-us-must-prepare-battles-beyond-earth.html>.

¹¹ Defense Intelligence Agency, *Challenges to Security in Space* (Washington, DC: Defense Intelligence Agency, January 2019), available at

http://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_0_20119_sm.pdf. See also Sandra Erwin, "Space Force technology roadmap to emphasize partnerships with private sector," *Space News Online*, August 19, 2020, available at <https://spacenews.com/space-force-technology-roadmap-to-emphasize-role-of-private-sector/>.

Significant advances in the private space sector in technology and services have created opportunities as well as challenges in protecting critical technology, ensuring operational security, and maintaining strategic advantages. Competitive launch markets and improvements in space technology miniaturization and computer processing power have assisted many nations with ambitions to leverage the benefits of space.¹² According to the 2020 *Defense Space Strategy*, “rapid increases in commercial and international space activities worldwide add to the complexity of the space environment.”¹³ Other nations are making technological strides to close the space gap with the United States, thereby creating positive opportunities. As DoD space strategy points out, U.S. allies and partners also recognize the benefits of space for military operations and are actively expanding their defense space programs, which present opportunities to enhance defense collaboration and cooperation.¹⁴

The proliferation of space technologies, of course, offers foreign governments and non-state entities unparalleled opportunities to enhance diplomatic influence (giving them “eyes” to see otherwise unknown events in a remote part of the world) and potential military effectiveness over the United States. “Our adversaries have reorganized for space. They are demonstrating their commitment to space

¹² Lambakis, *Foreign Space Capabilities*, pp. 7-15.

¹³ DoD, *Defense Space Strategy Summary*, p. 1

¹⁴ See Theresa Hitchens, “Space Force Will Boost Reliance On Commercial Sats: Gen. Raymond,” *BreakingDefense.com*, December 2, 2020. “Today we leverage commercial launch, we leverage commercial SATCOM, in a significant way for joint coalition forces,” [Gen. Jay] Raymond explained. “We also are now beginning to leverage commercial ... space domain awareness. And I will tell you, there's other missions that will materialize here in the future: commercial weather, commercial on-orbit servicing. So, we see a huge opportunity here to have a fused relationship with industry that will provide great advantage.”

operations [because] they recognize how the U.S. benefits from the use of space," according to a Space Command official. "It can be a little bit concerning that near-peer adversaries have that capability."¹⁵ Potential enemies of the United States today have improved vision over the U.S. homeland and battlefield activities, a better sense of direction and geographic position, greatly improved long-range precision strike weapons that utilize GPS-like guidance, and an improved ability to communicate, mobilize forces, and coordinate military activities. If an adversary were to interrupt or destroy our space assets, our economy could be destroyed, as well as our way of life and, perhaps, our existence as a nation.

Elevated Threat Risk to U.S. Space Systems

Over the past two decades, multiple threats have emerged to U.S. space systems. China and Russia have made strategic choices to develop their spacepower capabilities, to include conducting live anti-satellite tests in space and building capabilities that can damage or destroy U.S. space assets.

According to former Secretary of Defense, Mark Esper, "China and Russia are weaponizing space through the development of anti-satellite missiles, directed energy weapons and more, all designed to hold the United States and allied space systems at risk. They have turned a once peaceful arena into a warfighting domain."¹⁶ The Defense Department's 2020 *Defense Space Strategy* states that:

¹⁵ Harkins, "Space Wars."

¹⁶ Dr. Mark T. Esper, Remarks at USSPACECOM Change of Command, August 20, 2020. See also Bill Gertz, "Second defector's knowledge of Chinese bioweapons reaches U.S.: Esper on Space Threats," *Washington Times Online*, September 16, 2020, "Our near-peer rivals, China and Russia, seek to erode our long-standing dominance in air power through long-range fires, anti-access aerial denial systems and other asymmetric capabilities designed to counter our strengths." Available at

China and Russia present the greatest strategic threat due to their development, testing, and deployment of counterspace capabilities and their associated military doctrine for employment in conflict extending to space. China and Russia each have weaponized space as a means to reduce U.S. and allied military effectiveness and challenge our freedom of operation in space.¹⁷

Space access and space denial are critical components of Chinese and Russian national and military strategies. Beijing and Moscow view space as important to modern warfare, where counterspace capabilities may be used to reduce U.S., allied, and partner military effectiveness advantages and win wars.¹⁸ Both China and Russia perceive space systems as viable targets to nullify U.S. asymmetric advantages in other domains and gain a strategic foothold for future competition or counter a possible U.S. intervention during a regional military conflict.¹⁹ According to former Deputy Assistant Secretary

<https://www.washingtontimes.com/news/2020/sep/16/second-china-defector-gives-biological-weapons-inf/>.

¹⁷ DoD, *Defense Space Strategy Summary*, p. 1. See also Gen. John W. "Jay" Raymond, "Space dominance requires taking technology and policy risks," *Defense News Online*, September 14, 2020, available at <https://www.defensenews.com/opinion/commentary/2020/09/14/space-dominance-requires-taking-technology-and-policy-risks/>.

¹⁸ Gerald F. Seib, "Gen. Mark Milley: The Biggest Security Challenges for the U.S. The Chairman of the Joint Chiefs of Staff talks about the risks posed by China and Russia," *Wall Street Journal Online*, December 13, 2020.

¹⁹ DoD, *Defense Space Strategy Summary*, p. 3. Defense Intelligence Agency, *Challenges to Security in Space*, 2019, p. 14, available at http://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf. See also Patrick M. Shanahan and Joseph F. Dunford, "Statement of Acting Secretary of Defense Patrick M. Shanahan & Chairman of the Joint Chiefs General

of Defense for Space, Stephen Kitay, since 2019, China and Russia have been conducting highly sophisticated on-orbit activities that pose unprecedented new threats to U.S. and allied space systems.²⁰

China has a robust network of space surveillance sensors capable of searching, tracking, and characterizing satellites in all Earth orbits. It is also developing electronic warfare, cyberthreat capabilities, sophisticated on-orbit capabilities, kinetic energy weapons (such as ground-based anti-satellite weapons), and possibly directed energy weapons in addition to other counterspace technologies.²¹ China also has an unmanned, reusable space plane program.²²

China began its ASAT tests in 2005 and in 2007 destroyed a satellite in orbit that created significant space debris in low Earth orbit. Since then, it has conducted more than a dozen additional tests, including some in higher orbit, demonstrating the possibility of placing most U.S. satellites at risk. It has fired lasers at satellites and has five military bases capable of firing light to blind or destroy satellite optics. With these offensive capabilities, it has incorporated cyberattack plans. China is developing a multi-dimensional ASAT capability supporting its anti-access/area denial strategies, with its most recent ASAT activities apparently focused on the refinement of its kinetic space weapons.²³

Joseph F. Dunford before the Senate Armed Services Committee," April 11, 2019.

²⁰ Kitay, "Defense Official Briefs Defense Space Strategy."

²¹ Defense Intelligence Agency, *Challenges to Security in Space*, pp. 20, 21.

²² Trefor Moss, "Both the U.S. and China have secretive programs to develop unmanned, reusable spaceplanes," *Wall Street Journal Online*, September 4, 2020, available at <https://www.wsj.com/articles/china-launches-experimental-spaceplane-11599217896>.

²³ For a summary of the growing China space threat to U.S. systems, see Lambakis, *Foreign Space Capabilities*, p. 19-26, and; Lambakis, *A Guide to Thinking About Space Deterrence and China*, (Fairfax, VA: National

For the past three years, China has fired more rockets into space than any other country and has had the most aggressive programs for other military and scientific efforts in space.²⁴ As it develops the capability to destroy the U.S. Global Positioning System, it has constructed for itself a super-secure network of satellites and controllers for global communications, in addition to a 35-satellite highly precise navigation system. Despite the fact that China officially advocates for the peaceful use of space and pursues agreements on the non-weaponization of space, Beijing continues to improve its counterspace weapons capabilities and ability to fight wars in and through space.²⁵ The Commander of U.S Strategic Command said it best about the growing threat posed by China: "They always go faster than we think they will, and we must pay attention to what they do and not necessarily what they say."²⁶

Institute Press, 2019), pp. 11-22, and Sandra Erwin, "Raymond on China's space program: 'It's alive, well and concerning,'" *SpaceNews Online*, December 17, 2020, available at <https://spacenews.com/raymond-on-chinas-space-program-its-alive-well-and-concerning/>.

²⁴ William Broad, "How Space Became the Next 'Great Power' Contest Between the U.S. and China," *New York Times*, January 24, 2021, available at <https://www.nytimes.com/2021/01/24/us/politics/trump-biden-pentagon-space-missiles-satellite.html>.

²⁵ DIA, *Challenges*, p. 13. See also Office of the Secretary of Defense, *Military and Security Developments Involving the Peoples Republic of China 2020: Annual Report to Congress* (Washington, DC: Department of Defense, August 2020), pp. viii, 63-65. See also Brian G. Chow and Henry Sokolski, "U.S. satellites increasingly vulnerable to China's ground-based lasers," *SpaceNews Online*, July 10, 2020, available at <https://spacenews.com/op-ed-u-s-satellites-increasingly-vulnerable-to-chinas-ground-based-lasers/>.

²⁶ Quoted in, Amy McCullough, "Russia, China Push STRATCOM to Reconsider Strategic Deterrence," *Air Force Magazine Online*, October 21, 2020, available at <https://www.airforcemag.com/russia-china-push-stratcom-toreconsider-strategic-deterrence/#:~:text=Russia%2C%20China%20Push%20STRATCOM%2>

As part of its modernization efforts, Russia is expanding its space capability by investing significantly in a full range of capabilities, to include ASAT kinetic weapons, lasers, jammers, and cyber weapons.²⁷ Early in 2020, the commander of U.S. Space Command commander, General Jay Raymond, highlighted the concerning behavior of two new Russian satellites with distinct similarities to other Russian satellites that launched a high-speed projectile in 2017. "Out of that ... Russian satellite, a smaller satellite was birthed from that main satellite. From that smaller satellite, a projectile was launched from that Russian satellite."²⁸ Russia continued its ASAT development activities in 2019 and 2020.²⁹ It is also a leader in space

0to%20Reconsider%20Strategic%20Deterrence,Oct.&text=That%20shift%20in%20thinking%20is,into%20all%20Dout%20nuclear%20war.

²⁷ "Russian defense officials acknowledge that they have deployed radar-imagery jammers and are developing laser weapons designed to blind US intelligence and ballistic missile defense satellites." James Clapper, *Worldwide Threat Assessment of the US Intelligence Community* (Washington, D.C.: Director of National Intelligence, February 9, 2016), available at https://www.armed-services.senate.gov/imo/media/doc/Clapper_02-09-16.pdf. For a look at how Russia is demonstrating increasingly advanced orbital maneuvering capabilities, see Pavel Luzin, "Cosmos ASATs and Russia's Approach to Space Weapons," *Eurasia Daily Monitor* Vol. 17, Iss. 121, August 14, 2020. Russia has demonstrated two different types of space weapons. See Greg Norman, "Russia tests anti-satellite missile in pursuit to make space a 'warfighting domain,' US officials say," *Fox News*, December 16, 2020, available at <https://www.foxnews.com/world/us-space-command-russia-tests-anti-satellite-missile>.

²⁸ Kitay "Defense Official Briefs Defense Space Strategy," June 17, 2020.

²⁹ "Russia's persistent testing of these systems demonstrates threats to U.S. and allied space systems are rapidly advancing," General James Dickinson, commander of U.S. Space Command, quoted in Sandra Erwin, "Space Force official: Russian missile tests expose vulnerability of low-orbiting satellites," *SpaceNews Online*, December 16, 2020, available at <https://spacenews.com/space-force-official-russian-missile-tests-expose-vulnerability-of-low-orbiting-satellites/>.

launch, to include heavy lift capacity to geosynchronous orbit and human spaceflight; it has the facilities to control these launches within Russia.

Another aspect of the threat profile is the U.S. reliance on cyberspace and the electromagnetic spectrum. China, Russia, North Korea and Iran are honing their cyber assault skills and putting them into practice.³⁰ “Potential adversaries, such as China and Russia as well as individual hackers, have demonstrated the ability to interfere with satellites and the associated ground systems, including the hack of a NOAA weather satellite in 2014.”³¹ A cyberattack on space systems can result in data loss, widespread disruptions, and even permanent loss of a satellite and system shutdown. Denial of service or loss of system performance can mean denial or loss of capability, which means such attacks have the same impact as a kinetic assault on defense and economic assets that rely on digital systems.

Space systems, which are part of the information network that relies entirely on digital systems and data flow and on software and radio-frequency links, are especially vulnerable to electromagnetic pulse (EMP) attacks. An EMP might create havoc not only on Earth, but also within satellite systems. Given orbital mechanics, U.S. satellites have to circle the globe; thus, an EMP released anywhere in the world could affect U.S. military, civilian, or private space systems. The United States has a variety of systems, including Nuclear Command and Control and missile

³⁰ According to U.S. intelligence chiefs, more than 30 countries are developing offensive cyber attack capabilities. See Steve Ranger, “US intelligence: 30 countries building cyber attack capabilities,” *ZDNet*, January 5, 2017, available at <http://www.zdnet.com/article/us-intelligence-30-countries-building-cyber-attack-capabilities/>.

³¹ Christian Davenport, “Trump’s White House pushes measure to harden satellites against cyber threats,” *Washington Post Online*, September 4, 2020, available at <https://www.washingtonpost.com/technology/2020/09/04/satellites-hacking-trump-defense/>.

warning capabilities, whose survival, despite significant technical survivability enhancements, might be challenged by a nuclear detonation in space.³²

In the meantime, Russia and China are both actively developing doctrine, organizations, and capabilities to challenge America's diminishing advantage in that domain. Not only does the United States operate large "juicy targets" in space, as Air Force General John Hyten, Vice Chairman of the Joint Chiefs of Staff, called them, it has a space force structure that is not adequately protected from attack from kinetic and non-kinetic attack. The threat of a cyber-attack on U.S. space assets is being viewed as the likely form of attack, at least in the near term.³³

As noted, the United States also faces the possibility of other attack options, to include attacks by direct-ascent anti-satellite weapons, which are in fact currently undergoing development and testing by China and Russia. The vulnerability of U.S. space systems was the driving force behind the establishment of the Space Force and U.S. Space

³² See Kitay, "Defense Official Briefs Defense Space Strategy." High Altitude Nuclear Explosions in Low Earth Orbit (LEO) pump up the Van Allen radiation belts and cause failure of unhardened satellites, while an atmospheric EMP would affect activities on Earth and result in limited effects in space. For a good summary of the EMP threat, see Mitre, *Electromagnetic Pulse: The Dangerous but Overlooked Threat*, September 2020, available at <https://www.mitre.org/publications/project-stories/electromagnetic-pulse-the-dangerous-but-overlooked-threat>.

³³ See Theresa Hitchens, "Cyber Attack Most Likely Space Threat - Maj. Gen. Whiting," *BreakingDefense.com*, September 16, 2020, available at <https://breakingdefense.com/2020/09/cyber-attack-most-likely-space-threat-maj-gen-whiting/>. Defense planners should be wary of what we might call "Maginot Line thinking." While cyber assaults on space assets are most likely, focusing on that alone may leave the nation vulnerable to other lines of attack. Afterall, other kinetic ASAT weapons are under development.

Command.³⁴ However, space control and the application of force in space remain problems today in large part because these missions have not been properly authorized and adequate money has not been appropriated to develop the required weapon systems. There is an inadequate “policy story” to fully support such a move.

³⁴ Gen. David A. Deptula (Ret.), “A sitting target in space for Russia's anti-satellite weapons?” *The Hill Online*, August 4, 2020, available at <https://thehill.com/opinion/national-security/510337-a-sitting-target-in-space-for-russias-anti-satellite-weapons>.

Chapter 3

Current State of National Security Space Policy

This chapter offers a brief summary of current national security space policy and a look at the primary prescriptions and restrictions on military space activities. It also examines developments since 2000. Essentially, there has been a major shift in ideas about national security and space due to changes in the space threat and, to a lesser extent, the evolution of technology, which gives a growing number of actors greater access to space and space capabilities.

Policy Consistency from 1958 to Today

National security space policy has been remarkably consistent since President Eisenhower declared it was in the interest of the United States to ensure freedom of space, which, from the earliest days, included military uses of space and the goal of ensuring peaceful and scientific uses of space.³⁵ The Eisenhower National Security Council laid it out clearly when it adopted the view that one of “our objectives in the Earth satellite program was to establish the principle of the freedom of outer space.”³⁶

Every administration since Eisenhower’s has recognized the vital importance to U.S. national security of freedom of action in space and the right to defend national space assets. Just as the U.S. Navy was established to ensure

³⁵ A review of space policy history and the origins of the freedom of space principle can be found in Lambakis, *On the Edge of Earth*, pp. 211-235.

³⁶ White House Memorandum, “Discussion at the 339th Meeting of the National Security Council, Thursday, October 10, 1957,” available at <https://www.eisenhowerlibrary.gov/sites/default/files/research/online-documents/sputnik/10-11-57.pdf>.

free navigation on the seas, and the Air Force was established to ensure air supremacy, the United States is developing the policy, infrastructure, forces, and capabilities to protect and defend its space interests. U.S. space policy has always maintained that access to and use of space is central to the ability of the U.S. armed forces to maintain peace and protect the nation. Space underpins the U.S. way of life and the U.S. way of war.

The right to self-defense is internationally recognized in Article 51 of the United Nations Charter, a right that all nations within the UN recognize; this article also extends into the space domain. There are no geographic limitations to the right to self-defense. It generally has been recognized, in other words, that it would be irresponsible for the United States to allow an adversary to use assets in space against it in a conflict or to not use space to defend its interests.

From the earliest days of the space age, U.S. leaders recognized that space was freely available for exploration and use by all, but also that nations could do other nations harm from and in space. U.S. policy statements have consistently recognized this critical dichotomy, declaring space to be a free domain so long as activities of those who use space are peaceful and nonaggressive (although they may be military). That is, peaceful purposes allow defense and intelligence-related activities in pursuit of national security.³⁷

Presidents Gerald Ford and Jimmy Carter laid the foundation for the idea that space is more than a domain for enhancing land, sea, and air power, which set the stage for considering the development of anti-satellite weapons to counter threatening systems under development by the

³⁷ See White House, *National Space Policy of the United States of America*, December 9, 2020, p.1, available at *National-Space-Policy.pdf (whitehouse.gov).

Soviet Union.³⁸ In other words, the United States began viewing space as an active warfighting domain in the 1970s, a position expanded on by the Reagan Administration, which sought to eliminate the threat of nuclear ballistic missile attack against the United States through the deployment of defensive or counter-ballistic missile systems in space. The George H. W. Bush Administration sought to develop “Brilliant Pebbles,” a space-based interceptor system, as part of the Global Protection Against Limited Strikes architecture.

Policies since 1958 also distinguished among military, civil, and commercial space activities, and they recognized an international dimension. From the beginning, the United States encouraged international cooperation, underscoring that commercial and national involvement with other nations would benefit the United States. It has pursued international cooperative space-related activities to achieve scientific, foreign policy, economic, and national security benefits. The United States also has been cautiously open to undertaking measures with other nations to govern activities in space, as long as the international agreements reached are equitable, verifiable, and enhance the security of the nation and its allies.

³⁸ The 1976 NSDM-333 sought to enhance satellite survivability, available at <https://fas.org/irp/offdocs/nsdm-ford/nsdm-333.pdf>; and NSDM-345, issued in January 1977 toward the end of the Ford Administration, focused on development of the first non-nuclear ASAT, laying the groundwork for the first non-nuclear ASAT test using an F-15 in 1985, available at <https://fas.org/irp/offdocs/nsdm-ford/nsdm-345.pdf>. “1e. The United States will pursue Activities in space in support of its right of self-defense.” See Presidential Directive/NSC-37, “National Space Policy,” May 11, 1978, available at <https://www.hq.nasa.gov/office/pao/History/nsc-37.html>

Key Developments Since 2000

There have been a few key strategic-level developments since 2000 in addition to those discussed in Chapter 2, affecting the evolution of spacepower in the United States and U.S. space policy discussions.

Withdrawal from the ABM Treaty. Two years into the first round of the Strategic Arms Limitation Talks (SALT), the United States and the Soviet Union agreed to the Anti-Ballistic Missile (ABM) Treaty of 1972, which limited both countries to two missile defense sites, each one having no more than 100 interceptor launchers. The 1974 protocol reduced the number of sites for each treaty signatory to one. It also meant that neither side could develop and deploy sea-based, airborne (that is, mobile), or space-based (that is, persistent and global) missile defenses. Compared to other international agreements, this treaty placed the most significant restrictions on the development, deployment, and use of nuclear or non-nuclear space weapons.

The United States made its first significant policy change in missile defense when President George W. Bush became president in 2001.³⁹ Bush was strongly committed to fielding a homeland ballistic missile defense system against limited strategic ballistic missile threats, and the Defense Department undertook a thorough review (unconstrained by the ABM Treaty) of the missile defense program.⁴⁰ The president's guidance was to field an effective, evolutionary missile defense system in the shortest amount of time. Of course, critical to the success of the missile defense program was the President's decision to

³⁹ The Bush missile defense policy was built on the institutional and policy foundations laid by President Reagan in his March 23, 1983 address to the nation introducing his bold and revolutionary approach to missile defense development called the Strategic Defense Initiative.

⁴⁰ George W. Bush included homeland ballistic missile defense system development and deployment in his presidential campaign platform.

withdraw the United States from the ABM Treaty, which occurred in June 2002.

Since the ABM Treaty withdrawal, the United States has deployed weapon systems and sensors to improve its ability to operate effective missile defenses and, given the policy direction to do so, it could deploy active space defense systems. Bush directed the deployment of a Ground-based Midcourse Defense system, assisted by a network of sensors deployed in space and on U.S. and allied territories, ground-based interceptors in Alaska and California, and a command and control and battle management infrastructure ranging across the Pacific and the Atlantic, to defend the United States against anticipated rogue-state ballistic missile threats. The Bush program of record did not push for operationally relevant space sensors or space-based weapons for missile defense, although the United States did continue to launch payloads into orbit to demonstrate space sensor technologies and collect data that could be useful in the possible development of military space systems.

With the nation's withdrawal from the treaty, the door was opened for the possible development, deployment, and operation of new missile defense architectures. To defeat threatening co-orbital satellites in low Earth orbit and directed-ascent anti-satellite weapons today, the United States could leverage the progress it has made in missile defense assets for the satellite-defense mission. Interceptors could be deployed on the ground or at sea as well as in space to add layers to the missile defense architecture. These same systems, given policy support, might also be configured to perform the low-Earth orbit counterspace (offensive) or the counter-counterspace (defensive) missions.

In February 2008, in a special one-off mission known as Burnt Frost, the Department of Defense leveraged Missile Defense Agency and U.S. Navy expertise to shoot down a

failing U.S. government satellite that carried toxic fuel and that posed a lethal danger to populations. The purpose of this successful mission was not to demonstrate an anti-satellite capability, although it accomplished that as well, but rather to protect lives on Earth. The Defense Department was able to modify the weapon system and the Standard Missile-3 ballistic missile defense interceptor and leverage remote sensors and a command and control and battle management system for this one-time intercept of a satellite in very low orbit.⁴¹

National Security Space Transparency. In *On the Edge of Earth*, this author argued that to develop and maintain U.S. space forces, the public must have an understanding of the importance of space operations to national security and a basic conceptual understanding of space missions. Policy makers need to examine the wisdom of keeping so many of the country's space activities in the highly-classified world, because funding may well depend on the quality of the public argument and justification.⁴² The Chinese space threat events of 2013 and 2014 shook the U.S. defense establishment to its core and caused it to reevaluate the secrecy surrounding the national security space program; it led officials to shed more light on the secret space world in terms of both threat and the adjustments being made to the U.S. space posture.⁴³ According to the DSS: "Public understanding of their reliance on space systems, the changing character of the space domain, and the significantly growing counterspace threats to the United States and its allies and partners remains cursory."⁴⁴

⁴¹ James Oberg, "U.S. Satellite Shootdown: The Inside Story," *IEEE Spectrum*, August 1, 2008, available at <https://spectrum.ieee.org/aerospace/satellites/us-satellite-shootdown-the-inside-story>.

⁴² Lambakis, *On the Edge of Earth*, pp. 292, 296, and pp. 283-285.

⁴³ Lambakis, *Foreign Space Capabilities*, pp. 80-81.

⁴⁴ DoD, *Defense Space Strategy Summary*, p. 4.

Today, Defense Department officials hold media roundtables to educate reporters and the public about the dangers of space threats and the actions taken by the United States in response. The U.S. intelligence community and defense officials are also publishing more details that help paint a picture rightly depicting space as a warfighting environment.⁴⁵ Secrecy is still required, however, as even the DSS does not go into detail about weapons and how the strategy will be implemented. That is understandable, as most defense strategies are classified and the most that can be released is an unclassified summary.

Nevertheless, the growth in transparency in the defense space world since 2013 has been unprecedented, from transparency on the new U.S. space organization to U.S. space activities and allied partnerships dedicated to deterring and defeating the threat. There has been a greater willingness to talk about threats to space systems, the types of technologies in use, and the nations developing them. General Raymond, for example, has been cautiously forthcoming about Russian on-orbit activities detected by the United States, shedding light on the Russian weaponization of space.⁴⁶ Yet there is still work to be done.⁴⁷

⁴⁵ See, for example, statement by Gen. John Raymond: "The scope, scale and complexity of the threat to our space capabilities is real and it's concerning. We no longer have the luxury of operating in a peaceful, benign domain, and we no longer have the luxury of treating space superiority as a given." In transcript, "Media Roundtable with U.S. Space Command Commander."

⁴⁶ Transcript, "Media Roundtable with U.S. Space Command Commander."

⁴⁷ "Gen. John 'Jay' Raymond and his staff are working a wide range of tasks to stand up the Space Force. They include important ongoing responsibilities such as space situational awareness and commercial satellite contracting, as well as planning for and exercising defensive and offensive missions in wartime. However, their efforts are made less efficient and effective by one huge impediment: the over-classification and compartmentation of both program and intelligence space

U.S. Organizational Changes. The changes in the security environment since 2013 and 2014 altered the calculus for the use of space. As noted above, this “counter-space awakening” led by military voices was a response to Chinese and Russian anti-satellite activities and a transformation taking place in the public eye, rather than behind the traditional closed doors of the defense space community. This was done in part, no doubt, to serve as a warning (or deterrent) to other countries that might seek to interfere with U.S. space systems. It is widely reported that China’s 2013 missile shot near geosynchronous orbit was the inciting incident because of the apparent ASAT linkage.⁴⁸ The Commander of U.S. Strategic Command had concerns about the ability of the country “to move fast enough to build those capabilities [to defeat adversaries who threaten the United States in space] that we need to respond to the specific threats.” He went on to report that “we’re moving much slower in certain areas than our adversaries. We need our industry and our acquisition process to move faster.”⁴⁹

information.” See, for example, Dennis Blair and Robert Work, “Stovepipes in space: How the U.S. can overcome bureaucracy to improve capabilities,” *Defense News Online*, July 13, 2020, available at <https://www.defensenews.com/opinion/commentary/2020/07/13/stovepipes-in-space-how-the-us-can-overcome-bureaucracy-to-improve-capabilities/>.

⁴⁸ Brian Weeden, *Through a Glass, Darkly: Chinese, American, and Russian Anti-satellite Testing in Space*, (Broomfield, CO: Secure World Foundation, March 17, 2014), pp. 1-19, available at https://swfound.org/media/167224/through_a_glass_darkly_march2014.pdf.

⁴⁹ Gen. John E. Hyten, *Hearing on the Nomination of General John Hyten to be Commander of U.S. Strategic Command*, 114th U.S. Congress, Senate Armed Services Committee, September 20, 2016, p. 20, available at https://www.armed-services.senate.gov/imo/media/doc/16-70_9-20-16.pdf.

The defense space enterprise was not built to thrive in a competitive and hostile space environment.⁵⁰ Space system acquisition prioritized performance in a presumably benign domain over the requirement of space system protection. As a top priority, the U.S. leadership issued a national space strategy to ensure that the United States would continue to lead in the creation and maintenance of the crucial space systems essential to national prosperity, security, and way of life.

In light of this, the United States took steps to consolidate U.S. space efforts in three parts: a U.S. Space Force, a U.S. Space Command, and the Space Development Agency (SDA).⁵¹ The Space Force, established in 2019, is now organizing, training and equipping the military force, and providing a dedicated military leadership to unify, focus, and accelerate the development of space doctrine, capabilities, and expertise. Space will become more than an add-on or supporting function of the other military services. Space will be the new military service's sole focus and it will be responsible for developing military units to protect and defend America's space interests. U.S. Space Command, a geographic command that has a joint operational area beginning at 100km altitude, will make space support to the warfighter the sole focus of the commander. Importantly, it will unify under a new field command the research, development and acquisition of major programs such as satellites, launch services and information systems.⁵² SDA and follow-on acquisition

⁵⁰ DoD, *Defense Space Strategy Summary*, p. 3.

⁵¹ Department of Defense, *Final Report on Organizational and Management Structure for the National Security Space Components of the Department of Defense* (Washington, DC: Department of Defense, August 9, 2018).

⁵² Sandra Erwin, "Raymond: Space Force has a plan to unify acquisition agencies," *SpaceNews Online*, October 22, 2020, available at <https://spacenews.com/raymond-space-force-has-a-plan-to-unify-acquisition-agencies/>.

organizations will help lead the development and deployment of a defense space architecture that is resilient and responsive to the threat and U.S. security needs in space.

Recent Changes in Visions

The 2006 National Space Policy of George W. Bush, the 2010 Barack Obama National Space Policy, and the Trump policy and strategy share much in common with previous space policies. Yet there were changes in priority and in tone, particularly between the 2006 and 2010 space policies.⁵³ At the highest level, the Obama Administration downplayed the relationship between warfighting and space. Whereas the relationship of national power to space were front and center in the Bush policy – as they are in the current space policy – the Obama policy did not highlight the importance of space to national security, shifting focus instead to the benefits of space to civilian uses and science.

This seemingly minor opposition in vision, tone, and emphasis can translate into very significant differences at the practical level, influencing what national security space programs are pursued and what defensive or offensive actions are taken. The Bush and Trump policies addressed the rights of the United States to defend itself against purposeful interference of its space systems; the Obama policy spoke in terms of a vision of “nations’ rights,” making it more of a globalist than a U.S.-centric

⁵³ White House, *National Space Policy of the United States of America*, June 28, 2010, available at

https://obamawhitehouse.archives.gov/sites/default/files/national_space_policy_6-28-10.pdf; and White House, *U.S. National Space Policy*,

August 31, 2006, available at

<https://web.archive.org/web/20101025140238/http://www.whitehouse.gov/sites/default/files/microsites/ostp/national-space-policy-2006.pdf>.

document. The Obama policy emphasized space-related arms control (“the United States will consider proposals and concepts for arm control...”), an apparent change from the Bush policy, which emphasized that the United States “would not accept any type of legal limitations on the US freedom of action in space.”

The Bush, Obama, and Trump policies all recognize the importance of international cooperation. Compared to the Bush and Trump visions, however, the dominant vision of the Obama policy was more of a rallying cry for “humanity’s reach in space.”⁵⁴ The Obama policy significantly de-emphasized, and even negated, the role of U.S. leadership in the space arena. Indeed, a reading of the “Introduction” of the Obama space policy, which offered perhaps the clearest statement of his administration’s vision, significantly downplayed the national security elements in the policy, saving until the very end a statement on the importance of maintaining freedom of space.

This particular reference to freedom of space in the Obama vision is laid out through a somewhat limited view of the history of U.S. activity in space, framing it in this way: from the outset of the space age, “this Nation declared its commitment to enhance the welfare of humanity by cooperating with others to maintain the freedom of space.” In reality, while the nation has always striven to work cooperatively with other nations to ensure stability and the peaceful uses of space, U.S. national security concerns have always figured most prominently, but this fact was pushed into the background by the Obama Administration.⁵⁵

⁵⁴ White House, *National Space Policy of the United States of America*, June 28, 2010,

⁵⁵ The 2010 *National Space Policy* did direct the Secretary of Defense to, “Develop capabilities, plans, and options to deter, defend against, and, if necessary, defeat efforts to interfere with or attack U.S. or allied space systems.” Nevertheless, funding priorities and public rhetoric did not

Intelligence officials recognized in the 2011 *National Security Space Strategy* that “space is becoming increasingly congested, contested, and competitive” and asymmetric space threats were growing. This report also stated clearly the need to counter those threats by developing capabilities, plans, and options to “prevent and deter aggression against space infrastructure that supports U.S. national security; and prepare to defeat attacks and to operate in a degraded environment.”⁵⁶

To prevent attacks, the 2011 space strategy proposed that the U.S. would: support diplomacy and pursue international partnerships “that encourage potential adversary restraint”; improve the ability to know who is attacking U.S. systems; strengthen the resilience of U.S. space architectures (passive defenses); and, “retain the right to respond, should deterrence fail.”⁵⁷ Quite the opposite of viewing space as a warfighting environment, the Obama strategies strove to counter the idea that the United States might have to be prepared to engage in space combat to protect its interests:

We believe it is in the interests of all space-faring nations to avoid hostilities in space. In spite of this, some actors may still believe counterspace actions could provide military advantage. Our military and

lend any seriousness to the Obama Administration’s support for measures to enable the U.S. military to fight through the “increasingly congested, contested, and competitive” space domain.

⁵⁶ Department of Defense and Director of National Intelligence, *National Security Space Strategy: Unclassified Summary* (January 2011), pp. 1, 4. The strategy also cites the 2010 *Quadrennial Defense Review*: “U.S. forces must be able to deter, defend against, and defeat aggression by potentially hostile nation-states. This capability is fundamental to the nation’s ability to protect its interests and to provide security in key regions.”

⁵⁷ DoD and Director of National Intelligence, 2011 *National Security Space Strategy*, p. 10.

intelligence capabilities must be prepared to 'fight through' a degraded environment and defeat attacks targeted at our space systems and supporting infrastructure. We must deny and defeat an adversary's ability to achieve its objectives.⁵⁸

Yet even the Obama Administration policy, which was a creation of civilian officials, acknowledged the harsh realities of the space age expressed by military and security experts. In the 2010 *National Security Strategy*, the authors wrote that the United States would continue to "pursue activities [in space] consistent with the inherent right of self-defense" and that it would continue to develop "next-generation space technologies and capabilities that benefit our commercial, civil, scientific exploration, and national security communities in order to maintain the viability of space for future generations."⁵⁹ Indeed, officials from the Obama Administration have increasingly acknowledged the threats. As Greg Grant, a Pentagon official in the Obama Administration, recently said, "There's been a dawning realization that our space systems are quite vulnerable. The

⁵⁸ Director of National Intelligence and Department of Defense, *National Space Security Strategy* (Washington, D.C.: Director of National Intelligence, January 2011), p. 11, available at https://www.dni.gov/files/documents/Newsroom/Reports%20and%20Pubs/2011_nationalsecurityspacestrategy.pdf. The ability to "fight through" the degradation of space systems was good, of course, but, when it came to protecting U.S. interests in space, the Obama Administration seemed to draw the line at passive defenses.

⁵⁹ The White House, *National Security Strategy* (Washington, D.C.: The White House, May 2010), p. 39, available at https://obamawhitehouse.archives.gov/sites/default/files/rss_viewer/national_security_strategy.pdf. Note the order of precedence, and how national security falls at the end of the list.

Biden Administration will see more funding—not less—going into space defense and dealing with these threats.”⁶⁰

By 2016, actions taken by China and Russia in developing weaponry and policies that envision use of space in warfighting were clear. This meant that the United States would be forced to change its policies or risk being incapable of effectively responding to challenges and attacks from other nations. Thus, the U.S. strategy was further refined to emphasize, “it is no longer a question of *whether* the character of warfare is changing, but rather *how* the United States should strategically re-orient itself to deter aggression and be prepared to fight and win future wars.”⁶¹ To that end, the Trump Administration prioritized the establishment of a U.S. Space Command and, later, a U.S. Space Force, which was designed to recognize “the centrality of space to America’s national security and defense.” That warfighting command will “ensure that America’s superiority in space is never questioned and never threatened.”⁶²

Early signals by the Biden Administration indicate that it will take a realistic view of threats to and in space.⁶³

⁶⁰ Broad, “How Space Became the Next ‘Great Power’ Contest Between the U.S. and China.”

⁶¹ DoD, *United States Space Force*, p.1

⁶² As reported in Robert Burns, “Trump declares new Space Command key to American defense,” *Associated Press*, August 29, 2019, available at <https://apnews.com/article/air-force-donald-trump-ap-top-news-politics-19f021f991844b348dc716f6f8851f7c>.

⁶³ According to Space Force Commander, General Raymond, “I have had an opportunity to talk with President Biden. The president and the vice president came over to the Pentagon and met with the Joint Chiefs, so I was there and I had an opportunity to talk about the strategic environment that we face. I was very pleased to hear that the administration came out in full support of the Space Force. It was really clear that everybody understands the importance of space to our nation and just how critical the standup of the Space Force is to stay ahead of a growing threat.” Jacqueline Feldscher and Lara Seligman, “Q&A: Chief of Space Operations Gen. Jay Raymond,” *Politico Online*, February 26,

Secretary of Defense Lloyd Austin, during his confirmation hearings, called for new U.S. efforts to build “space-based platforms” and referred to space as a warfighting domain and an arena for great power competition.⁶⁴ Austin elaborated: “Other nations are contesting the ability of the United States and its allies to operate in space. A balance of offensive and defensive capabilities, as well as resilient architectures, are essential to any credible strategy to deter hostile action and protect vital U.S. interests should conflict extend to space.”⁶⁵ Austin believes there have been “significant shifts” in space warfare that he will consider when developing the next National Defense Strategy.⁶⁶

The Biden Administration will need to make choices about whether to continue to emphasize U.S. space capabilities or to diverge from what is currently in place. The Biden policy will be constrained by an international and security environment much different than that which enabled the Obama policy of de-emphasizing U.S. warfighting prowess in space. The significant developments by other nations, noted above, will make it far harder to deny the fact that space has become central to warfighting scenarios envisioned by Russia, China, and

2021, available at

<https://www.politico.com/news/2021/02/26/politico-pro-q-a-chief-of-space-operations-gen-jay-raymond-471646>.

⁶⁴ See Sandra Erwin, “Biden’s Defense nominee embraces view of space as a domain of war,” *SpaceNews Online*, January 19, 2021, available at <https://spacenews.com/bidens-defense-nominee-embraces-view-of-space-as-a-domain-of-war/>.

⁶⁵ Advanced Policy Questions for Lloyd J. Austin, Nominee for Appointment to be Secretary of Defense, Senate Armed Services Committee, January 2021.

⁶⁶ Tony Bertuca, “Austin promises new defense strategy and extensive reviews for Biden’s DOD,” *InsideDefense.com*, January 19, 2021, available at <https://insidedefense.com/daily-news/austin-promises-new-defense-strategy-and-extensive-reviews-bidens-dod>.

perhaps others. The fact that space is increasingly a warfighting arena is a fact that cannot be walked back.

Military Space Activities: Legal and Political Considerations

Developing military policies and programs with regard to space is complicated by a broad range of existing space laws and policies. There are various prohibitions and restrictions strewn among different treaties and conventions (even futuristic prohibitions, such as the Outer Space Treaty provisions banning the establishment of military bases on the Moon), and there are familiar domestic policy controversies (reflected in political arguments) about placing constraints on and funding of military space programs. And there may be some policies or limitations that existed in the past, but which are no longer legally in effect. For example, some restrictions on space weapon development were in place when the ABM Treaty was in force, but are no longer. In general, though, the strong and decades-old political debates over many military space issues, and secrecy surrounding national security space activities, have had a dampening effect on military space planning and programs in the United States.

Space Law and Treaties. Since the early years of the space age, there has been a growing interest among some nations to keep space from becoming a battleground, even as (or, perhaps, because) a growing number of nations has sought to leverage the space environment to support military activities on Earth. International space law regulating military activities is made up of many different provisions, rules, and norms found in domestic laws, international treaties and conventions providing detailed regulations of space activities, including the Charter of the

United Nations (UN).⁶⁷ Most conventions and treaties addressing space activities do not specifically address space weapons (the exception being the ban on space-based nuclear weapons). The Charter, of course, lays the basis for addressing self-defense, international aggression, and the inherent rights of all nations that extend to the space domain.

There are weapons-related activities, national security operations and activities, and scientific experiments that may have applicability to national security that are permissible in space under the current legal regime. Some believe there is a significant gray area as to what constitutes an attack—satellites are jammed frequently, for example, but does it amount to an attack?⁶⁸ No doubt, the answer to that question will be found in the *consequences* of the active space countermeasure: did it happen during a critical space operation, and was the damage or interference permanent? The testing and deployment in space of conventional weapons (kinetic and non-kinetic), to include terrestrial-based anti-satellite and missile defense interceptors, are permitted under current international law. Nonetheless, there is significant international disapproval of any operations that cause the proliferation of space debris (and there is a significant gray area regarding the question of

⁶⁷ Key Treaties and conventions affecting military space activities are: Charter of the United Nations, Limited (or Partial) Test Ban Treaty, Outer Space Treaty, Liability Convention, and the Registration Convention. See also Louis de Gouyon Motignon, "The Legality of Military Activities in Outer Space," *Space Legal Issues*, January 24, 2019, available at <https://www.spacelegalissues.com/space-law-the-legality-of-military-activities-in-outer-space/>.

⁶⁸ Not attributed, "An arms race is brewing in orbit," *The Economist*, August 15, 2020, p. 53, available at <https://www-economist-com.libproxy.ncl.ac.uk/science-and-technology/2020/08/15/an-arms-race-is-brewing-in-orbit>.

whether a nation can be held legally responsible for causing debris that damages the spacecraft of another nation).⁶⁹

Following the U.S. withdrawal from the ABM treaty, it became possible for the country to develop, test, and deploy ballistic missile defense systems (sensors and weapon systems) in space without restriction. The ABM Treaty also restricted the development of ballistic missile defense systems based on other physical principles (e.g., directed energy). A follow-on agreement signed during the Clinton Administration (1997), also nullified by the 2002 U.S. treaty withdrawal, addressed space-based theater missile defense interceptors or space-based components based on other physical principles. The one activity that is clearly not permissible is the testing or deployment of weapons of mass destruction in space. Essentially, the current space legal regime permits a wide range of military space activities. Some of the more important restrictions, or non-restrictions, on military activities are highlighted below:

- Common interpretation of Article 51 of the UN Charter allows for any nation to claim the right of self-defense, which can be used to justify unilateral measures involving the use of force and actions that may be otherwise interpreted as illegal under Article 2(4), which states that no state shall threaten or use force in a manner that is inconsistent with the purposes of the UN. The articles protecting the right of self-defense are not limited by geography and are not restrictive of military activities, including the use

⁶⁹ Joanne Wheeler, "Space debris: The legal issues," *Royal Aeronautical Society* website, available at <https://www.aerosociety.com/news/space-debris-the-legal-issues/>. "Current space laws do not really address issues and liabilities relating to space debris." See, ad for Panish Shea & Boyle LLP, "Space Law: Liability for Space Debris," available at <https://www.aviationdisasterlaw.com/liability-for-space-debris/>.

of capabilities for space control and force application, in outer space. Although the idea is contentious, preemption is legitimate under customary international law, and anticipatory self-defense may also be considered a viable course of action in space if vital U.S. assets are under imminent threat of attack and the preemptive action is proportionate. There may be greater risk in inaction, with anticipatory action justified in the defense of U.S. interests, even when the timing of the attack is uncertain.⁷⁰

- The 1967 Outer Space Treaty states that activities on the Moon and other celestial bodies should be used for peaceful purposes. According to customary practice, the use of all domains for peaceful purposes does not prohibit military activities, if used for non-aggressive purposes (i.e., self-defense).
- Signatories may not test nuclear weapons in outer space or any other environment where radioactive debris is caused to be present outside the territorial jurisdiction of the testing state. Such activities are limited by the 1963 Limited Test Ban Treaty, to which the United States is a signatory. There is no restriction on nuclear-powered spacecraft or even, potentially, weapon designs. The Nuclear Ban Treaty has recently

⁷⁰ “America needs a better understanding of what is occurring in space, what constitutes a hostile action or intent, and a fully developed plan for discussing preemption with the international community to make preemption a viable strategic option.” “Preemption in space necessitates capabilities and processes for ‘observing’ what is occurring, ‘categorizing’ potential threats, and ‘communicating’ understandings with the international community.” In Edward G. Ferguson & John J. Klein, “It’s Time for the U.S. Air Force to Prepare for Preemption in Space,” *War is Boring*, April 22, 2017, available at <https://warisboring.com/its-time-for-the-air-force-to-prepare-for-preemption-in-space/#:~:text=Considering>.

been ratified by enough countries to come under the title of international law.⁷¹

- Signatories to the Outer Space Treaty may not deploy nuclear weapons or weapons of mass destruction (WMD) in orbit; the latter are typically understood to be nuclear, biological, chemical, and/or radiological weapons, and there is a restriction on installing WMD on celestial bodies. The use of lasers or other directed-energy weapons (which may be used in a highly discriminate fashion) is not prohibited. The Outer Space Treaty also does not ban the operational deployment of fractional orbital bombardment system (FOBS) weapons (which utilize a partial orbit to deliver a weapons payload, including a nuclear-armed payload) or nuclear-armed ballistic missiles. The START Treaty (which expired in 2009) did ban WMD-armed FOBS.
- Harmful or malicious interference with the proper functioning of space systems of other nations is prohibited in the Outer Space Treaty and other conventions and treaties (arms control treaties such as the 2010 New START Treaty identify these systems as “national technical means” of verification, such as monitoring performed by satellite imaging). Harmful interference, in general, is prohibited by the self-defense provisions of the UN Charter. At a minimum, one can presume that such interference refers to any

⁷¹Argun Makhijani, “On January 22, 2021, nuclear weapons will be illegal under international law,” *Institute for Energy and Environmental Research blog*, October 2020, available at <https://ieer.org/news/the-nuclear-weapons-ban-treaty-gets-set-to-enter-into-force/> “On January 22, 2021 – 90 days after the fiftieth ratification – the nuclear ban treaty will enter into force. From that day onwards, all aspects of nuclear weapons will be illegal under international law.”

activity causing damage or adverse effects on the *peaceful* activities of other states.⁷²

There are also domestic space laws that must be taken into account by policy makers, beginning with the 1958 National Aeronautics and Space Act. These laws mainly address commercial activities, such as the facilitation and regulation of commercialization of land remote-sensing satellites, and NASA civil space programs. Of course, the FY2020 National Defense Authorization Act created a sixth military service, the U.S. Space Force, within the Department of the Air Force.

U.S. Space Policy. As of this writing, the most current National Space Policy was issued on December 9, 2020. The March 23, 2018 *National Space Strategy* covers national security activities, and its provisions updated and replaced the 2011 Obama *National Security Space Strategy*. The Defense Department issued additional guidance to defense planners when it released in June 2020 the *Defense Space Strategy*. The National Space Council, disbanded in 1993 and reestablished in 2017, also issued directives that impact military space activities, mainly a March 23, 2018 directive on the *National Space Strategy*, as noted above, and the February 19, 2019 directive calling for the establishment of

⁷² Launching objects into orbit is, of course, permitted, and state signatories are liable, if found to be at fault, to pay compensation for damage caused by its space objects on Earth (1972 Convention on International Liability for Damage Caused by Space Objects). Numerous questions and gray areas abound, however, including the definition of space debris, how it may be caused, or whether even a liability claim can result from a collision with debris resulting from ASAT testing. It does not appear to be a good instrument for governing disputes resulting from acts of war. The 1978 Environmental Modification Convention bans signatories from engaging in the hostile use of environmental modification techniques. For a good summary of the on-orbit liability issue, see James A. Vedda and Peter L. Hays, *Major Policy Issues in Evolving Global Space Operations* (Arlington, VA: The Mitchell Institute for Aerospace Studies, February 2018).

a Space Force. Aside from obvious questions about the continuation of current policy and strategy under the Biden Administration, there is also the question of whether the National Space Council should be continued.

Politics and Political Restrictions. Space weapons programs have been politically controversial throughout the space age. Administrations have advocated either for or against ballistic missile defenses or anti-satellite capabilities with space- or ground-based components at different points in history. President Reagan's Strategic Defense Initiative, in particular, brought many of the arguments against "weaponizing space" to the forefront of public discussions.

Debates over space weapons have traditionally revolved around the sanctity of the space environment and the dangerous instabilities that may arise with the introduction of weapons in space.⁷³ Critics of the Trump Administration argued that its efforts to give the country a more advanced and robust military space capability would threaten to carry conflicts into space and put all space activities, peaceful and military alike, at risk. This in turn could ratchet up an arms race and even spark a conflict in space.⁷⁴

In the past, debates in the United States over space weaponization took place with the comfortable knowledge that the United States was in a leadership role and other nations played second fiddle technologically. That is no longer true. U.S. abstinence did not effectively encourage other nations to follow its lead. Nevertheless, loosening the

⁷³ Walter McDougall wrote back in 1983 that the national discussion of space weapons has been "sullied by calculated hysteria meant less to reveal real demerits of the new technologies than to prevent publicity of their potential merits." Walter A. McDougall, "How Not to Think about Space Lasers," *National Review*, May 13, 1983, p. 552.

⁷⁴ Ramin Skibba, "The Ripple Effects of a Space Skirmish," *The Atlantic Online*, July 12, 2020, available at <https://www.theatlantic.com/technology/archive/2020/07/space-warfare-unregulated/614059/>.

political constraints on the development and deployment of systems for space control or force application will be controversial. One would expect the following key arguments to be raised should the United States initiate a space weapons program:

- *The Weaponization of Space.* In many ways, space continues to be viewed as a place to be kept free of earthly quarrels and competitions. To those who view space as an environment that must remain unsullied by conflict, activities that are of a military nature, especially if they involve weaponry, are among the most offensive. It was easy in the past to call space a sanctuary. It was logistically difficult to get there. Yet, as access to space has become more routine and threats to the United States from space have matured, policy makers and defense planners have come to view the environment as one that might be used for warfare.⁷⁵

Most people concede that space has been somewhat militarized already. It has been used for decades to enhance and facilitate military operations on Earth. Indeed, even from a force application standpoint, ballistic missiles have delivered weapons payloads through space. The questions seem to center around: 1) deployment of terrestrial- or space-based kinetic or non-kinetic weapons to terminate or destroy a satellite, or, 2) deployment of weapons in orbit for missile defense, space control, or striking targets on Earth.

While many of the political criticisms of space-based interceptor deployment have not been heard for the

⁷⁵ See Michael P. Gleason and Peter L. Hays, "A Roadmap for Assessing Space Weapons," *Aerospace.org*, October 2020, available at https://aerospace.org/sites/default/files/2020-10/Gleason-Hays_SpaceWeapons_20201006_0.pdf.

past 15 years or so (since the Defense Department considered the development of a Space-Based Interceptor Test Bed during the first term of President George W. Bush), there are arguments that have been used by missile defense critics that would certainly be dusted off and used again should the United States ever decide to use space platforms to intercept ballistic missiles.⁷⁶ The arguments of critics, to include Chinese and Russian critics, include: such deployments would further weaponize space, be ineffective and costly, and would be destabilizing. Moreover, they would likely renew calls for arms control and diplomatic solutions.⁷⁷

- *International Instability.* Opponents of weapons for or in space argue that their deployment would lead to international strategic and crisis instability.⁷⁸

⁷⁶ See for example Laura Grego, David Wright, and Stephen Young, "The Missile Defense Space Test Bed," Union of Concerned Scientists, May 2008, available at http://www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/policy_issues/the-missile-defense-space.html; for another rundown of the standard arguments, see Theresa Hitchens and Victoria Samson, "Space-Based Interceptors: Still Not a Good Idea," *Georgetown Journal of International Affairs*, Summer/Fall 2004, pp. 21-29.

⁷⁷ James N. Miller and Frank A. Rose hit all of these arguments in "Order from chaos: How space-based missile defenses could make us less safe, not more," December 14, 2018, available at <https://www.brookings.edu/blog/order-from-chaos/2018/12/14/how-space-based-missile-defenses-could-make-us-less-safe-not-more/>.

⁷⁸ "As the United States, China, and others increasingly benefit from the information that military and intelligence satellites provide, the temptation to attack these satellites provides troubling potential for instability and conflict in space that could dramatically affect U.S. military capabilities on earth." See, for example, Bruce W. Macdonald, *China, Space Weapons, and U.S. Security*, CRS No. 38 (New York: Council

Satellites are a stabilizing element in the strategic nuclear balance. They see and hear what is going on in other countries, are used for arms treaty verification, and help monitor the military and weapons development activities of other nations. Their destruction could lead to instability among the great nuclear powers. Also, it is argued that failure to exercise restraint in space might upset U.S. foreign policy and destabilize international relationships.⁷⁹ Arms in space, in other words, would earn Washington the enmity of capitals around the world and have far-reaching consequences for U.S. foreign policy and its ability to form military coalitions.⁸⁰ Should the United States ever decide to deploy weapons in space, critics argue, U.S. intentions would be placed in doubt. Many nations would worry about the U.S. “dominating the ultimate high ground,” something that would indicate an aggressive, unilateral posture by the United States. The consequence of space-based interceptor deployment, for example, is that many nations would view the United States as “not

on Foreign Relations, September 2008), p. v, available at <https://www.cfr.org/report/china-space-weapons-and-us-security>.

⁷⁹ “Space security depends at least as much on international cooperation as it does on national dominance.” Patrick Stewart and Kyle L. Evanoff, “The Right Way to Achieve Security in Space: The U.S. Needs to Champion International Cooperation,” *Foreign Affairs*, September 17, 2018, available at <https://www.foreignaffairs.com/articles/space/2018-09-17/right-way-achieve-security-space>

⁸⁰ I address these arguments in Steven Lambakis, “Space Weapons: Refuting the Critics,” *Policy Review*, February and March 2001, pp. 41-51.

being a supportive player in the international system.”⁸¹

As noted above, technological advances by others, particularly Russia and China, are already threatening satellites and the peaceful nature of space. Thus, the question is less one of whether the United States will upset the balance if it chooses space-weapons capabilities, but rather one of whether the United States will constrain itself from responding to the changed political-military environment of space.⁸² The all-important question now is which nation owns the space arms; the military-technical balance or imbalance is a subsidiary question.⁸³

- *Arms Race in Space.* The most frequently heard case against taking weapons into space is that such actions would fuel an arms race and lead the country into a chain of mechanical action-reaction responses.⁸⁴ Such arguments are made whenever an

⁸¹ Hitchens and Samson, “Space-Based Interceptors: Still Not a Good Idea,” p. 27.

⁸² For an excellent examination and discussion of (nuclear) deterrence strategy, especially as it relates to missile defense, see Keith B. Payne, *Redefining “Stability” for the New Post-Cold War Era* (Fairfax, VA: National Institute Press, 2021).

⁸³ Colin S. Gray, *Strategy and History: Essay's on Theory and Practice* (London: Routledge, 2006), p. 132; For a critique of stability theory, see Colin S. Gray “Strategic Stability Reconsidered,” *Daedalus*, Vol. 109, No. 4 (Fall 1980), pp. 135-154.

⁸⁴ Hitchens and Samson, “Space-Based Interceptors,” p. 25. See also Michael Krepon, “Weapons in the Heavens: A Radical and Reckless Option,” *Arms Control Association*, November 2004, available at <https://www.armscontrol.org/act/2004-11/features/weapons-space>. See, for example, Aaron Bateman, “America Can Protect Its Satellites Without Kinetic Space Weapons,” *WarOnTheRocks.com*, July 30, 2020, available at <https://warontherocks.com/2020/07/america-can-protect-its-satellites-without-kinetic-space-weapons/>.

administration proposes exploring military options that leverage the space environment, such as space-based interceptors.⁸⁵ The president who drew the greatest ire in this regard was Ronald Reagan was his proposals to develop technologies for space-based ballistic missile defenses, to include an array of directed energy and kinetic weapons capable of destroying missiles in their boost or midcourse phase of flight. Significant political opposition arose to stymie Reagan's "Star Wars" program, with opponents arguing that such systems would inspire the Soviet Union to double its efforts to remain ahead of the United States in order to meet head-on this "existential threat."⁸⁶

There are many problems associated with space arms control, especially when it comes to imposing binding limits on weapons and activities in space. Defining a space weapon is difficult and is just one of many problems negotiators will face. Terrestrial-based interceptors may be used to destroy another nation's satellites, as can lasers and cyber weapons. The United States relies on missile defense interceptors to protect its homeland, forces, and allies against missile attack and would never consider banning these land and sea weapons, which might also be used in a space-control role. Nations are also developing capabilities to service and refuel satellites, but these capabilities may also be used to maneuver near and interfere with an adversary's satellite. There are in fact a variety of

⁸⁵ See, for example, Jon Harper, "Would Space-Based Interceptors Spark a New Arms Race?" *National Defense Magazine*, April 24, 2019, available at <https://www.nationaldefensemagazine.org/articles/2019/4/24/special-report-would-space-based-interceptors-spark-a-new-arms-race>.

⁸⁶ Harper, "Would Space-Based Interceptors Spark a New Arms Race?."

possible threats to space systems, some of which may affect the ground segment. Verification of compliance and enforcement poses even more daunting challenges, especially when dealing with an opponent with a demonstrated propensity to cheat.⁸⁷ In addition, arms control has an uneven track record, and China has typically decided not to engage in arms control.

- *Space Debris.* It is sometimes argued that increased orbital debris would result from a greater military presence and combat engagements in space. Critics have pointed out the pressing dangers posed by satellite debris to other space systems.⁸⁸ Even small pieces of debris can damage or destroy multi-million-dollar satellites and spacecraft.⁸⁹ Much of the world was forced to fret about the dangers posed by low Earth orbit debris following China's deliberate satellite destruction demonstration in May 2007. Metal fragments travelling at 18,000 m.p.h. can be very destructive. The greatest threat from debris is in low Earth orbit, where half of the world's active satellites circle the Earth. Space debris does not discriminate. If a nation creates

⁸⁷ John Lauder, Frank Klotz and William Courtney, "How to avoid a space arms race," *The Hill Online*, October 24, 2020, available at <https://thehill.com/opinion/national-security/522512-space-arms-control-small-steps-can-begin-to-overcome-the-obstacles>. See also Nayef Al-Rodhan, "Weaponization and Outer Space Security," *GlobalPolicyJournal.com*, March 12, 2018, available at <https://www.globalpolicyjournal.com/blog/12/03/2018/weaponizati-on-and-outer-space-security>.

⁸⁸ See write-up and video in Anthony Bouchard, "The Dangers of Space Debris Explained," *labroots*, December 29, 2019, available at <https://www.labroots.com/trending/space/16475/dangers-space-debris-explained>.

⁸⁹ Micah Zenko, "Waste of Space," *Foreign Policy*, April 21, 2014, available at <https://foreignpolicy.com/2014/04/21/waste-of-space/>.

debris, that debris might end up hitting one of its own satellites. Alternatively, the long-term consequences of widespread kinetic intercepts in low Earth orbit might increase the risks to operational satellites posed by the resulting debris only marginally and might not be viewed as a major impediment by nations striving for strategic advantage in a conflict.

This is not the place to fully characterize the political debate over the strengths and weaknesses of pursuing more robust space control and space force application capabilities. What is important is to recognize that, in the context of the current strategic environment, where space is increasingly seen as a warfighting environment, continued U.S. wavering in defense space policy will hinder the ability of the United States to defend itself and its allies.

Chapter 4

Executing DoD Missions and the Use of Space

This section examines U.S. policy shortcomings by working the problem backwards to reveal how the exploitation of Earth's orbits might be of even greater assistance for U.S. security. It examines critical military missions already identified by policy makers and defense planners, identifies how space capabilities might be able to improve the execution of those missions, and suggests capabilities military commanders might want to have available to them (requirements), and why they might desire them.

This chapter does not advocate for particular military space programs. Nor does it examine all national security space missions, two of which have been firmly established for decades (e.g., the space support mission area, which includes the launching of satellites and day-to-day management of on-orbit assets that underpin military space operations, and the space force enhancement mission, which includes the use of space assets that increase the effectiveness of terrestrial military operations). Rather, this section is illustrative and focused on the politically controversial mission areas of space control and space force application.

Today's Military Challenges

The unclassified summary of the 2018 *National Defense Strategy* (NDS) recognizes the reality that the United States currently faces great power competition from Russia and China and that, ultimately, the safety of the nation can be best secured through military strength and relative advantage. The Joint Staff published the unclassified 2018 *National Military Strategy* (NMS) to provide a Joint Force

framework for protecting and advancing U.S. national interests and implementing the NDS. The 2019 *Missile Defense Review* (MDR) outlines a concerted effort to improve existing capabilities for both homeland and regional missile defense and supports innovative concepts and advanced technology development to provide more cost-effective U.S. defenses against expanding missile threats. The 2020 *Defense Space Strategy* (DSS) identifies how the Department of Defense will advance spacepower to enhance the ability of the Joint Force to compete, deter, and win conflicts in an increasingly challenging international security environment. As implementing documents for the 2017 *National Security Strategy* (NSS), we can use these Defense Department publications to identify some of the key military requirements identified by American strategists and defense planners in the early 2020s.

A supreme requirement identified in the NSS is that the country be prepared to fight and win any plausible conflict that threatens U.S. vital interests.⁹⁰ That means, of course, having the operational capabilities, organization, and warfighter—and the resolve to use them. Military capabilities under development or planned for future integration into the force are inconsequential to fighting and winning now.

During peace and in war, the mission of the Joint Force is to deter nuclear and non-nuclear strategic attacks and defend the homeland.⁹¹ The Joint Force must be capable of defending the U.S. homeland from attack and projecting power globally for both offensive and defensive purposes.⁹² “In a security environment where the homeland is no longer a sanctuary and every operating domain is contested, competitors and adversaries will continue to operate across

⁹⁰ 2017 *National Security Strategy*, p. 28.

⁹¹ 2018 *National Defense Strategy*, p. 6.

⁹² 2018 *National Military Strategy*, p. 1.

geographic regions and span multiple domains to offset or erode Joint Force advantages.”⁹³

The nature of the global strategic environment requires increased strategic flexibility and freedom of action, as well as preparedness to respond to contingencies even while ensuring general warfighting readiness.⁹⁴ The United States is one of the few countries that can reach out to any corner of the world to pursue a military objective or defend its interests. Its power projection capabilities are what make it a dominant military power. Maintaining favorable regional balances of power in the Indo-Pacific region, Europe, the Middle East, and the Western Hemisphere, and collaborating with and defending allies and international military partners from military aggression, are critical pieces to the power projection formula and maintaining peace and stability both regionally and globally.

The NDS also asserts that the country cannot expect success in fighting tomorrow’s conflicts with yesterday’s weapons and equipment; force modernization is imperative. The Joint Force is being directed to anticipate the implications of new technologies on the battlefield and foster a culture of experimentation and calculated risk-taking in order to evolve innovative operational concepts. “We must anticipate how competitors and adversaries will employ new operational concepts and technologies to attempt to defeat us, while developing operational concepts to sharpen our competitive advantages and enhance our lethality.”⁹⁵

According to the NSS, U.S. military forces must be capable of deterring and defeating the full range of conventional and nuclear threats to the United States, as well as developing new operational concepts and

⁹³ 2018 *National Military Strategy*, p. 2.

⁹⁴ 2018 *National Defense Strategy*, p. 8.

⁹⁵ 2018 *National Defense Strategy*, p. 7.

capabilities to win without necessarily being the dominant force in the air, maritime, land, space, and cyberspace domains. “Deterrence must be extended across all of these domains and must address all possible strategic attacks.”⁹⁶ The reason for this is that state and non-state actors have access to accurate and relatively inexpensive weapons and cyber tools to threaten and attack the United States, harming its military forces, or disrupting its economy. To do this, the United States requires effective and advanced military forces and the political will to use them.⁹⁷

Strong alliances and partnerships are also critical to sustaining U.S. military advantages. The NDS notes that U.S. allies and partners have contributed to every major U.S.-led military engagement since the September 11, 2001 terrorist attacks. Interoperability with allied forces enables combined forces to act together coherently and effectively to achieve military objectives.⁹⁸

According to the NDS, preparedness to fight and win wars will rely heavily on the use of space and require:⁹⁹

- Investments in resilience, reconstitution, and operations to assure space capabilities and resilient cyber defenses to ensure “full spectrum” military operations.
- Resilient and survivable command, control, communications, computers and intelligence, surveillance, and reconnaissance (C4ISR) capabilities to gain and exploit information, deny

⁹⁶ 2017 *National Security Strategy*, p. 27.

⁹⁷ 2018 *National Defense Strategy*, pp. 5, 10. The NDS notes that, “our strength and integrated actions with allies will demonstrate our commitment to deterring aggression, but our dynamic force employment, military posture, and operations must introduce unpredictability to adversary decision-makers.”

⁹⁸ 2018 *National Defense Strategy*, pp. 4, 8, 9.

⁹⁹ 2018 *National Defense Strategy*, p. 6.

competitors the use of the same, and enable warfighters to know who is conducting a cyber-attack in order to hold them accountable.

- Development of layered missile defenses and disruptive capabilities for both theater missile threats and North Korean ballistic missile threats to the U.S. homeland.
- The capabilities to strike diverse targets inside adversary air and missile defense networks to destroy mobile power-projection platforms.
- Ground, air, sea, and space forces that can deploy, survive, operate, maneuver, and regenerate in all domains while under attack.

Development of layered missile defenses is a requirement stipulated in the NSS and NDS and it received further elaboration in the 2019 MDR.¹⁰⁰ The review identifies several requirements. The first is to field defenses to stay ahead of and protect the United States against rogue ICBM threats. Secondly, the DoD must develop and field defenses to defend U.S. forces deployed abroad and protect its foreign partners from missile threats from any source. And thirdly, it requires investment in the pursuit of new missile defense concepts and technologies to address future threats.

The MDR emphasizes that comprehensive missile defenses must include attack operations to defeat missile threats prior to launch. Among other things, U.S. missile defenses should be flexible and adaptable. In addition to ballistic missiles, they should address emerging hypersonic and cruise missile threats (at least at the regional level). Also, missile defenses must leverage the space domain for

¹⁰⁰ “The United States is deploying a layered missile defense system focused on North Korea and Iran to defend our homeland against missile attacks.” 2017 *National Security Strategy*, p. 8.

sensors.¹⁰¹ Space sensors can offer persistent and global coverage and, because they eliminate the need for an extensive network of land and sea-based radars, ensure more cost-effective performance.

With respect to the orbital region around Earth, according to a Defense Department official who introduced the Department's 2020 *Defense Space Strategy*, "our desired conditions are a secure, stable, and accessible space domain."¹⁰² To achieve these conditions, the strategy underscores the need over the next 10 years to transform its approach to space from a support function to a warfighting domain, by leveraging the use of space to generate, project, and employ power across all domains.¹⁰³ Requirements identified in the strategy include the development and fielding of capabilities to counter hostile use of space, deter aggression and attacks in space and, if deterrence fails, be capable of "winning wars that extend into space."¹⁰⁴ The strategy also identifies the requirements to establish, maintain, and preserve freedom of operations in space, and to protect and defend U.S. and, as directed, allied, partner, and commercial space capabilities. Fundamentally, "outer space has emerged as a key arena of potential conflict in an era of great power competition. China and Russia have weaponized space and turned it into a war fighting domain."¹⁰⁵

¹⁰¹ Department of Defense, 2019 *Missile Defense Review* Fact Sheet, available at <file:///C:/Users/Steve/Documents/NIPP/Space%20Policy%20Project/MDR-Fact-Sheet-15-Jan-2019-UPDATED.pdf>.

¹⁰² Kitay, "Defense Official Briefs Defense Space Strategy."

¹⁰³ DoD, *Defense Space Strategy Summary*, pp. 2, 6.

¹⁰⁴ DoD, *Defense Space Strategy Summary*, pp. 7, 8.

¹⁰⁵ Kitay Briefing, June 17, 2020.

National Security Space Missions and Support for U.S. Military Requirements

Space offers significant advantages for a global military power. Expressed differently, the U.S. ability to project power in the 21st century is predicated on its access to space and freedom to use space. A global power requires a global perspective, and the space domain offers a persistent presence over every inch of the Earth's surface. It makes it possible to have a military presence, extend lines of communications into remote areas of the globe, and apply force at points very far removed from U.S. borders. Space allows unrestricted overflight over countries with very large interiors and over battlefields where it may not be possible for terrestrial-based sensors to see or fly into. This capability, and the general awareness of U.S. foes of U.S. global reach, can offer a powerful deterrent to potential adversaries and significantly reduce their ability to take offensive action against the United States using tactical, operational, or strategic surprise.¹⁰⁶

Space systems comprise ground-based and space-based assets and the data links that connect them and represent their lifeblood. While our focus tends to be on the orbital segment of the system, the most extensive and largest part of the system is on Earth. There are four military space missions that leverage or support this system and, of those, two of the mission areas (space support and space force

¹⁰⁶ "Preserving Freedom of Action describes a strategic condition where a nation or sovereign actor has the relative level of control or ability required to accomplish all four components – diplomatic, informational, military and economic – of their implicit or explicit space strategy." United States Space Force, *Spacepower: Doctrine for Space Forces*, August 2020, pp. 20, 22, 28, available at https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf.

enhancement) are well established and amply supported by current policy structures, rhetoric, budgets, and actions.

Space Support. Perhaps the most visible and thrilling mission area is space support, which essentially deals with space launches, but also includes activities that sustain space operations. The first condition for the exploitation of space is the ability to have reliable access there. According to the August 2020 *Space Capstone Publication*, space mobility and logistics is one of the core competencies of the U.S. Space Force, and it “starts with the ability to launch military equipment into the proper orbit in a safe, secure, and reliable manner.” During a conflict, when there may be urgent requirements to either insert new space capabilities into orbit or replace assets that have been attritted, “space launch must be dynamic and responsive, providing the ability to augment or reconstitute capability gaps from multiple locations.”¹⁰⁷

Reconstitution of space assets may be required to overcome interference with satellites that have resulted in the loss of space systems, especially if the satellite assets are critical to the warfighting effort. U.S. spaceports lie on the coasts, making them vulnerable to enemy attack with little warning. Significant work remains, of course, to attain the desired level of responsiveness and survivability. Orbital sustainment (e.g., spacecraft inspection, maintenance, and upgrades) and recovery (personnel and equipment) are other activities that are already practiced by the United States to some degree, but also require further development.

Today, U.S. space support capabilities are largely uncontested, and the country is able to insert payloads into orbit at will, something it has been able to do since the earliest days of the space age.¹⁰⁸ To date, the United States

¹⁰⁷ United States Space Force, *Spacepower: Doctrine for Space Forces*, p. 37.

¹⁰⁸ One exception is the U.S. reliance on Russian space boosters to launch satellite payloads into geosynchronous orbit, for example. This

has deployed highly advanced systems intended to stay in orbit for a long time—an approach that is appropriate in a benign space environment. The United States, however, cannot assume that space will remain benign or that U.S. space support capabilities will remain uncontested.

Space Force Enhancement. By far the most extensive use of space for military purposes today involves leveraging satellites to improve the performance of operations. This mission area is likely to continue to expand and receive significant investment for modernization. Force enhancement via the use of space is essential to military effectiveness and success in achieving nearly every NSS, NDS, and NMS defense objective identified above. A significant policy framework exists to facilitate strategic planning, authorize and appropriate money each year to sustain and upgrade these critical systems.

Viable and effective space operations ensure the Joint Force will continue to have access to satellites that are rightly viewed essential to modern-day joint warfighting. This includes reliable and global communications, assured command and control (especially over nuclear forces),

dependence impacts the country's ability to place heavy payloads in orbit. The U.S. Atlas V heavy launch vehicle is powered by a Russian rocket engine, which is the only engine in the world right now to do that job. The United States does not have an American-made first-stage liquid rocket engine and has not had one since the decision to end development of rocket engines other than those required by the Space Shuttle. The DoD is currently funding the development of new heavy launch capabilities to provide an independent means to get its national security payloads to orbit. See Loren Grush, "The Defense Department picks three companies to develop rockets for national security launches," *theverge.com*, October 10, 2018, available at <https://www.theverge.com/2018/10/10/17961832/defense-department-launch-service-agreement-ula-blue-origin-northrop-grumman>. See also Wayne Eleazer, "The engine problem," *The Space Review*, August 3, 2015, available at <http://www.thespacereview.com/article/2799/1>.

interoperability with foreign forces, precise navigation and timing for synchronized operations, access to critical space-based guidance signals for its precision strike weapons, overhead infrared and visible light sensors to warn of attack and detect and track missiles. Space operations also enhance the ability to execute strike operations, conduct surveillance (including weather monitoring and forecasting), realize space domain awareness (identifying, characterizing, and understanding space objects and activities), and gather intelligence.¹⁰⁹

Space Control. Access to space is vital to national security, and is also critical to the nation's economic prosperity. The U.S. Space Force sees one of its key responsibilities to be the protection of space commerce and "freedom of action" for the United States and its allies. It is imperative that the Space Force have the budget to execute its core competencies, of which space control is just one.¹¹⁰

The NDS highlights that, "new threats to commercial and military uses of space are emerging, and that, during a conflict, attacks against our critical defense, government, and economic infrastructure must be anticipated."¹¹¹ U.S. space assets are, of course, part of that critical infrastructure. The imperative for space control was echoed by the then-

¹⁰⁹ See, for example, Nathan Strout, "Satellites played had a starring role at Project Convergence," *C4ISRNET.com*, October 12, 2020, available at <https://www.c4isrnet.com/digital-show-dailies/ausa/2020/10/12/us-army-uses-satellites-to-affect-the-state-of-the-battlefield/>.

¹¹⁰ Sandra Erwin, "Space Force outreach emphasizes role protecting global space economy – Lt. Gen. Liquori: Access to the space domain is vital to economic prosperity," *SpaceNews Online*, September 9, 2020, available at <https://spacenews.com/space-force-outreach-emphasizes-role-protecting-global-space-economy/#:~:text=Space%20Force%20outreach%20emphasizes%20role%20protecting%20global%20space%20economy,-by%20Sandra%20Erwin&text=Having%20free%20access%20to%20the,a%20the%20annual%20DefenseNews%20conference.>

¹¹¹ 2018 *National Defense Strategy*, p. 3.

Deputy Assistant Secretary of Defense for Space Policy, who noted that the United States was addressing its security needs consistent with international and national law at the same time that China and Russia were actively developing ASAT capabilities. The official concluded, “we are left with no choice but to ensure we are prepared with the necessary means to protect and defend ourselves from attacks to our systems whether they be in space, on the ground or any other domain.”¹¹²

This mission area starts with the ability to see objects and understand activities in space, that is, the achievement of space domain awareness (formerly referred to as space situational awareness). Persistent surveillance of the space environment using terrestrial and space-based sensors is required to detect, track, collect, disseminate, and characterize threat activity in all orbits; to undertake defensive and offensive counter-space operations; and, to execute an effective space deterrence strategy. Without “eyes” to see in space, it would be difficult to defend and fight in space and keep the peace.

The United States has a worldwide space surveillance network that tracks 24,000 to 100,000 objects in orbit—including operational satellites and debris—and the capabilities are getting better.¹¹³ The newest capabilities

¹¹² Kitay, “Defense Official Briefs Defense Space Strategy.” See also Sandra Erwin, “Top commander of U.S. space forces: Space should be peaceful, bad actors will be held accountable,” *Space News*, November 2, 2020, available at <https://spacenews.com/top-commander-of-u-s-space-forces-space-should-be-peaceful-bad-actors-will-be-held-accountable/#:~:text=Magazine%20Subscription%20Info,Top%20commander%20of%20U.S.%20space%20forces%3A%20Space%20should%20be%20peaceful,actors%20will%20be%20held%20accountable&text=Dickinson%3A%20%E2%80%9CWe%20have%20to%20ensure,domain%20in%20which%20to%20operate.%E2%80%9D>.

¹¹³ Stew Magnuson, “News from Space Symposium: Tracking Objects in Space Both Easier, More Complicated,” *National Defense*, April 11, 2019, available at <https://www.nationaldefensemagazine.org/articles/2019/4/11/tracki>

will give visibility to unforeseen events, to include satellite maneuvers, and enable warfighters to search space to determine what an object is. Some of the most advanced and recently deployed systems include Geosynchronous Space Situational Awareness Program satellites, which monitor activities in an orbital zone where the United States has critical communications and early warning satellites. These satellites will monitor Geosynchronous Earth Orbit (GEO) above and below this belt to capture close-up views of events, to include the deployment of space mines and other capabilities to destroy satellites.¹¹⁴ If known to opponents, space surveillance assets can act as a deterrent to bad behavior to maintain a safe, secure, and stable space environment and help prevent collisions between satellites. Indeed, the United States shares space domain awareness information with other nations and commercial firms to reduce the chances of collision and thereby prevent the proliferation of debris. An accurate intelligence picture of space activities is critical to space control, and the United States continues to build out its already impressive space surveillance network.¹¹⁵

ng-objects-in-space-both-easier-more-complicated. The newly operational Space Fence is said to be able to track objects as small as a marble. Available at <https://www.nationaldefensemagazine.org/articles/2019/4/11/track-objects-in-space-both-easier-more-complicated>

¹¹⁴ James Dean, "Delta IV blasts off with threat-detecting military satellites," *Florida Today*, August 19, 2016, available at <http://www.floridatoday.com/story/tech/science/space/2016/08/19/deltaiv-rocket-blasts-off-air-force-satellites-cape-canaveral-air-force-station-afspc6/88826330/>.

¹¹⁵ Sandra Erwin, "Space surveillance technologies a top need for U.S. military," *Space News Online*, November 22, 2020, available at <https://spacenews.com/space-surveillance-technologies-a-top-need-for-u-s-military/#:~:text=Gen.,-John%20Raymond%20said&text=WASHINGTON%20%E2%80%94%20Space%20tracking%20sensors%20and,U.S.%20Space%20Command%20%20officials%20said.>

Space control also requires capabilities as well as tactics, techniques and procedures for countering an adversary's space systems. Each Service is responsible for developing denial and deception countermeasures and operations security for dealing with threats posed by enemy satellites. Operators also may take advantage of weather conditions to disguise operations on the ground, avoiding detection by imagery satellites. Active measures might include radio-frequency telemetry jamming between satellites and ground stations. These capabilities have "reversible effects" and may temporarily impair a satellite. Cyber warfare may be used to disrupt a satellite's control signal encoding. Laser dazzling is a method for obscuring what an adversary can see from space. High-powered lasers, of course, also could be destructive to the optical sensors on a satellite (a non-reversible situation). Spacecraft or satellites designed to capture and fix or retrieve satellites might also be used in urgent scenarios to shut-down a hostile spacecraft.¹¹⁶ The Secretary of Defense acknowledged in 2020 for the first time that the reusable X-37 space plane is one of the systems that may be used to enhance high-technology military capabilities.¹¹⁷

If a more robust response to countering enemy satellites is required, it may be possible to use kinetic and directed energy weapons that have non-reversible effects to

¹¹⁶ Nathan Strout, "The Space Force doesn't want to send a human to do a robot's job," *C4ISRNET.com*, September 29, 2020, available at <https://www.c4isrnet.com/battlefield-tech/space/2020/09/29/no-the-space-force-wont-be-sending-humans-into-space-anytime-soon/>. The Air Force, Space Force, and the Defense Advanced Research Projects Agency have been investing in robotic capabilities to repair and fly spacecraft.

¹¹⁷ Bill Gertz, "Second defector's knowledge of Chinese bioweapons reaches U.S.: Esper on Space Threats," *Washington Times Online*, September 16, 2020, available at <https://www.washingtontimes.com/news/2020/sep/16/second-china-defector-gives-biological-weapons-inf/>.

terminate, destroy, or capture them. The United States does not have such weapons on hand, at least as far as the public record is concerned. Ground- or sea-based interceptors for missile defense could be modified in extreme situations to function as space control weapons, but they do not represent an enduring space control capability. Most of the capabilities designed to negate hostile space systems are classified, and there is little public acknowledgement that there are programs in place to develop and deploy kinetic-kill counter-space systems.¹¹⁸ In any case, regardless of what may be on hand in the secret world, the policies currently in place are vague at best about *the use* of active and kinetic space denial capabilities. These policies also may not be in place to support even non-kinetic uses, such as extensive or prolonged jamming or the use of cyberwarfare tactics.

A far greater concern for the U.S. military is the threat posed by adversarial counter-space assets.¹¹⁹ Concerns about the range of destructive and reversible threats to the security of U.S. communications satellites and tactical networks continue to grow.¹²⁰ Threats to U.S. space systems, for example, might involve attacks on space ground control systems that talk to military communications satellites, thereby disrupting their ability to send data to U.S. and allied forces around the world. “Our mutual ... objectives would be to locate and destroy

¹¹⁸ Eric Heginbotham, et al., *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power, 1996-2017* (Santa Monica, CA: RAND Corporation, 2015), pp. 238-41.

¹¹⁹ Author interview with Maj Gen Nina Armagno, Air Force Space Command, February 27, 2017.

¹²⁰ Defense Science Board, *Task Force on Military Satellite Communication and Tactical Networking: Executive Summary*, March 2017, available at http://www.acq.osd.mil/dsb/reports/2010s/DSB-MilSatCom-FINALExecutiveSummary_UNCLASSIFIED.pdf. Not to go unnoticed in the report is the vulnerability of the current ground network architecture to jamming.

adversary forces attacking our ground segment,” said U.S. Space Command commander, General Dickinson. “The result would be our continued ability to provide space warfighting capabilities in all domains.”¹²¹

The United States relies on satellites that offer a range of protection against reversible interference tactics, such as highly secure, jam-free, and hardened communications satellites. System configuration and employment of some satellites, such as U.S. SIGINT (signals intelligence) and ocean surveillance satellites, also help mitigate the risk of radio frequency jamming.¹²² Missile launch warning satellites, such as the U.S. Space Based Infrared High Earth Orbit (HEO) and GEO satellites, also have received improved protection against lasing to blind or dazzle. Operations conducted in GEO and HEO, given their distance from Earth, also complicate such counter-space aggression. GPS III next generation satellites are introducing new capabilities to meet higher military demands and reduce the chance of counter-space attacks.

There are scenarios in which passive defenses will not be sufficient to protect satellite functions, and the employment of active defenses, or defensive force application, may be necessary. There are no dedicated, publicly acknowledged, active defenses against enemy terrestrial-launched or orbital anti-satellite weapons, although there are systems in the force that could engage them, especially before launch. Ground- or sea-based U.S. missile defense assets might be used to defend a satellite against a ground-launched anti-satellite weapon given sufficient warning and provided the missile defense

¹²¹ Rachel S. Cohen, “SPACECOM Boss Talks Wielding, Defending Satellites in Combat,” *Air Force Magazine Online*, November 6, 2020, available at <https://www.airforcemag.com/spacecom-boss-talks-wielding-defending-satellites-in-combat/>.

¹²² Heginbotham, et al., *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power, 1996-2017*, pp. 252, 53.

interceptors were in the right position to reach the threat, both of which would involve a large measure of serendipity. Today, the United States does not appear to be in a position to respond with agility to destructive space threats, at least within the space environment.¹²³ To develop such responsive capabilities would require a shift in policy to support development of a dedicated defensive ASAT capability.

Today, the most important statement made on this subject of space control has been made by the political leadership. The 2017 *National Security Strategy*, recognizing the pursuit of ASAT weapons by other nations, unequivocally concludes that space is a warfighting domain. "The United States considers unfettered access to and freedom to operate in space to be a vital interest. Any harmful interference with or an attack upon critical components of our space architecture that directly affects this vital U.S. interest will be met with a deliberate response at a time, place, manner, and domain of our choosing."¹²⁴ This statement, buttressed by the establishment of organizations necessary to carry out the space warfighting mission, is driving the nation's efforts to make the United States the world's premier spacepower. The most significant mission to ensure that preeminence is space control.

Of course, "unfettered access to and freedom to operate in space" is the quintessential goal of the space control mission. Freedom of space requires capabilities to deny an adversary the ability to damage national interests in or from space and ensure U.S. access to the space domain. The Space Capstone publication issued by the U.S. Space Force,

¹²³ Cited in Jim Sciutto, "US military prepares for the next frontier: Space war," *CNN*, November 29, 2016, available at <http://www.cnn.com/2016/11/28/politics/space-war-us-military-preparations/>.

¹²⁴ 2017 *National Security Strategy*, p. 31.

the basis for the development of space warfighting doctrine, reminds us that “any loss of space domain freedom of action compromises the other two responsibilities [to make the Joint Force an effective force and providing the national leadership options in a crisis or conflict]. *Thus, preserving freedom of action in space is the essence of military spacepower and must be the first priority of military space forces.*”¹²⁵ This is a military requirement clearly stated.

Space Control Corollary: Requirement for Space Deterrence. Since the primary objective of space deterrence is to prevent attacks on U.S. space systems, space deterrence may be viewed as a corollary of the space control mission. “Any discussion of a future conflict must begin with a conversation of deterrence and what can be done, as a joint force, to prevent our adversaries from open conflict,” stated General Mark Milley, Chairman of the Joint Chiefs of Staff.¹²⁶ Exploitable vulnerabilities invite attack, and there is no way to protect a single satellite against a determined attack.¹²⁷ General Raymond explained that “[o]ur goal is

¹²⁵ *Spacepower: Doctrine for Space Forces*, p. 44. Italics in original. The report continues, “The ability to control and exploit the space domain is an essential component of modern warfare. Military spacepower allows for the rapid dissemination of information on a global scale. Information can be collected and delivered to austere environments without terrestrial infrastructure. Capabilities such as precision attack, maneuver warfare, strategic warning, and global power projection are fundamental to modern warfare. These capabilities must be protected, and military space forces must rely on military operations in the other domains to do so.” While these are cogent statements, this publication does not provide clear guidance on the most effective ways to achieve space control.

¹²⁶ Katrina Manson and Christian Shepherd, “US military officials eye new generation of space weapons: Pentagon planners worry about China’s extraterrestrial advances – including its version of GPS,” *Financial Times*, September 2, 2020, available at <https://www.ft.com/content/d44aa332-f564-4b4a-89b7-1685e4579e72>.

¹²⁷ Doug Loverro, Former Deputy Assistant Secretary of Defense for Space Policy, “Space Warfighting Readiness: Policies, Authorities, and

not to get into a conflict, we want to deter it.”¹²⁸ Former Secretary of the Air Force, Barbara Barrett, argued that, “we have got to be able to deter derogatory action in space, and if deterrence doesn’t work, we need to be prepared to be something other than a victim with our space assets.”¹²⁹ So space deterrence is critical, as is the need to avoid proliferating orbital debris, and this, of course, creates its own special challenges.

U.S. leaders and planners understand the need to deter a space conflict and have been taking steps to use passive defenses to make U.S. satellites, “hard to find, hard to catch, hard to hit, hard to kill.”¹³⁰ The current U.S. approach to deterrence of attacks in space is to deny the adversary victory by reducing the likelihood of success, that is, deterrence by denial. This might be achieved by a disaggregated or proliferated satellite system, where it is

Capabilities,” *Statement before the House Armed Services Committee*, March 14, 2018.

¹²⁸ Sandra Erwin, “U.S. Space Force unveils doctrine explaining its role in national security,” *Space News*, August 10, 2020, available at <https://spacenews.com/u-s-space-force-unveils-doctrine-explaining-its-role-in-national-security/>. See also Gen. John Raymond, “Media Roundtable with U.S. Space Command Commander Gen. John Raymond,” *U.S. Department of Defense*, August 29, 2019, <https://www.defense.gov/Newsroom/Transcripts/Transcript/Article/1949346/media-roundtable-with-us-space-command-commander-gen-john-raymond/>

¹²⁹ C. Todd Lopez, “Time to Move Forward with Space Force, Air Force Secretary Says,” *U.S. Department of Defense News*, December 8, 2019, available at <https://www.defense.gov/Explore/News/Article/Article/2034790/time-to-move-forward-with-space-force-air-force-secretary-says/>.

¹³⁰ Bob Work, *Remarks at the Space Symposium*, *Defense.gov*, April 12, 2016, available at <https://www.defense.gov/News/Speeches/Speech-View/Article/723498/remarks-at-the-space-symposium>; see also Sandra Erwin, “In the Trump Administration, deep mistrust of Chinese, Russian motives in space,” *Space News*, April 12, 2018, available at <https://spacenews.com/in-the-trump-administration-deep-mistrust-of-chinese-russian-motives-in-space/>.

assumed that this would lead the adversary to decide not to attack at all.¹³¹ Different orbits, mobility, hardening, deception, satellite backups, decentralizing functions critical to national security, and distributed architectures can be used to make U.S. space architectures resilient or less attractive targets.

By merely threatening to attack U.S. space systems unprotected by a strong deterrent or defenses, a country might be able to deter, or significantly alter the manner or willingness of the United States' entry into a conflict. Although deterrence by denial may deter aggressors from acting, it might not be sufficient against an optimistic, aggressive and determined adversary. A more comprehensive deterrence strategy—specifically the combination of denial and punitive approaches, coupled with the deployment of offensive retaliatory capabilities—may be required to convince an adversary that both the costs of initiating an attack would outweigh the benefits and that the likelihood of success would be low.

For deterrence to work, U.S. retaliation capabilities must be known to adversaries and they must believe that the United States has the will to use those capabilities. In other words, maintaining secrecy around a space weapon would deprive the nation of critical deterrent leverage. Former Secretary of the Air Force Heather Wilson has stated that, “there may come a point where we demonstrate some capabilities so that our adversaries understand that they will not be able to deny us the use of space without consequences.”¹³² She did not state what those capabilities might be, though one might presume that the United States currently has very few options when it comes to conducting

¹³¹ See Lambakis, *Foreign Space Capabilities*, pp. 64-71.

¹³² Aaron Bateman, “America Can Protect Its Satellites Without Kinetic Space Weapons,” *WarOnTheRocks.com*, July 30, 2020, available at <https://warontherocks.com/2020/07/america-can-protect-its-satellites-without-kinetic-space-weapons/>.

a punishing attack in space. While in some situations it might be desirable to avoid being explicit about the gravity and timing of a U.S. response, an opponents' anticipation of the consequences of its prospective aggression is necessary for deterrence to work.

Deterrence of attacks on space systems presents special challenges: the defender must be able to identify who did what to whom and respond in a timely manner. This is known as the forensics helpful for credible deterrence. It is helpful for the deterrer to see or know about the threat before he can deter it. General John Hyten explained why space is such a critical domain for viewing threat activity, including space as well as missile threats:

When you move to space you have the ability to see the entire globe. And if you can see the entire globe you can understand the threat, which means you can deter the threat, that's the most important thing.... You can't shoot something unless you can see it. And if you have blind spots it's not hard for an adversary to figure out where your blind spots are and go there, so you want to eliminate your blind spots. That's the other reason you want to go to space.¹³³

Also, there is the consideration of the appropriate response, keeping in mind that a response may be issued in a domain other than space. For example, threatening to destroy a nation's spaceport or critical communications node on Earth in response to aggressive action in space may be more effective than threatening the aggressor nation's

¹³³ General John E. Hyten, USAF, *Hudson Institute Holds Webinar on National Defense Strategy (August 12, 2020)*, available at <https://www.hudson.org/events/1853-video-event-general-john-e-hyten-on-progress-and-challenges-implementing-the-national-defense-strategy82020>.

satellites. Not all countries have the same respect for the space domain or are as active in the space domain as countries that rely heavily on space systems for their economy and security. Another consideration is whether the satellite under attack is a critical national security asset, belongs to an ally or partner, or is a commercial platform. Punitive responses in the case of interference with allied space systems open up the possibility of follow-on attacks against U.S. space systems. The conditions under which the United States might execute a deterrent threat—in crisis or war—add yet additional layers of complexity. Punitive actions in times of war would likely be less problematic than retaliatory actions taken during peacetime.

There are other special challenges to space deterrence. The kinetic destruction of space systems might be part of an offensive package, but only when the stakes at hand are greater than any concern over the proliferation of space debris. When it comes to deterrence in peacetime, such a threat may be considered highly suspect. In-kind threats against a state that does not depend on space may provide little deterrent effect. When considering space systems and deterrence in crises, it is also important to take into account the type of weapon used (e.g., does it produce reversible or irreversible effects?), the type of target (e.g., commercial satellite or nuclear command and control satellite?), and the situation on Earth at the time. What is happening on Earth is a key determining factor in a response to such a disruption.

Another special challenge is deterring non-destructive, reversible interference, which can be done through jamming or dazzling, for example. Cyber-attacks would also fall into this temporary interference category. Nonetheless, temporary interference might have a profound strategic cost. For instance, GPS satellites may be jammed or interfered with over a particular region and only over a short time span, but that short period of interference

may result in sporadic disruption in the use of GPS-guided weapons against time-sensitive targets (GPS-guided cruise missiles, perhaps) that fail to accomplish their mission. Temporary should not be equated with benign.

Space Force Application. Current military requirements favor long-range strike options, stand-off attack for improved force protection, rapid execution of the strike mission, and precision targeting. Today, the United States has platforms and capabilities for executing a strike from land, sea, and air domains. There are no space-based strike weapons in the U.S. Joint Force to project power or defend against ballistic or hypersonic missiles. Although technically not space weapons, the U.S. ballistic missile force can deliver its payload against a target on Earth through space. Also, the U.S. missile defense program has investigated the possibility of developing and deploying space-based interceptors or lasers over the years, but such efforts never entered the development phase. In the early 1990s, the United States considered developing a space-based interceptor called Brilliant Pebbles (part of the Global Protection Against Limited Strikes program), a program that was not politically supported in its time and was quickly killed by the incoming Administration of Bill Clinton.¹³⁴ A space-based missile defense layer would

¹³⁴ A few days after his retirement, General James Abrahamson, first SDIO Director, submitted an end of tour report that strongly endorsed Brilliant Pebbles. He was convinced that BP was the key to an effective, affordable space-based architecture and believed that BP could be operational in five years at a cost of less than \$25 billion. Therefore, he recommended pushing Brilliant Pebbles aggressively. "This concept," General Abrahamson wrote, "should be tested within the next two years and, if aggressively pursued, could be ready for initial deployment within 5 years." Moreover, "once deployment has begun and a competitive industrial base is established, the system could be scaled to higher levels of effectiveness forever decreasing incremental costs." Quoted in Donald R. Baucom, "The Rise and Fall of Brilliant Pebbles," Paper presented at "They Taught the World to Fly: The Wright Brothers and the Age of Flight," an International Flight

provide an on-call global presence, an attractive capability in a world where missiles can be launched with little or no notice from different regions around the world. Presently, there is no apparent policy support for the development and deployment of such interceptors.

Force application in and from space might also involve the use of weaponry based in space to strike terrestrial targets. The United States currently has terrestrial-based weapons that fly at hypersonic and supersonic speeds, making it possible to strike any point on the globe within a short period of time. It is possible to leverage suborbital or even orbital capabilities to accomplish the same military objective of destroying targets on Earth in an even shorter period of time.

Currently, there is no military requirement for a capability to strike targets on Earth from space. The U.S. Air Force operates and continues to develop strategic bombers and conventional and nuclear ballistic missiles to undertake the long-range strike mission. Air Force Global Strike Command is focusing on a new concept to have its bombers operate without a predictable schedule in order to be “strategically predictable, but operationally unpredictable.”¹³⁵ It should be noted that a space strike capability would be one other way to be operationally unpredictable and to respond on a more rapid timeline. The Air Force is pursuing four major nuclear weapons upgrade programs, the B-21, the Ground Based Strategic Deterrent, the Long-Range Standoff Weapon, and the B61-12 bomb,

Symposium Sponsored by the North Carolina First Flight Centennial Commission, October 23, 2001. Baucom cites Former SDIO Director Gen. James A. Abrahamson, Memorandum for Deputy Secretary of Defense, Subject: “‘End of Tour Report,’ – Information Memorandum,” February 9, 1989, Attachment 1, “Lt General Abrahamson’s Recommendations: *SDI Breakthrough Architectures*,” pp. 1-1-1-3.

¹³⁵ John A. Tirpak, “A New Bomber Vision,” *Air Force Magazine*, June 1, 2020, available at <https://www.airforcemag.com/article/strategy-policy-9/>.

and is no doubt looking at longer term long-range conventional strike capabilities. There has been no public discussion in the Air Force or the U.S. Space Force on moving platforms into space so as to strike targets on Earth.

The United States explored the possibilities of offensive space strike weapons early in the space age,¹³⁶ and the Soviet Union at one time developed what it called a fractional orbital bombardment system to leverage the suborbital region to carry a payload farther than a ballistic missile. Such weapons use gravitationally curved trajectories to travel into space and deliberately reenter the atmosphere before a complete circumnavigation of Earth. It is not clear whether the United States ever fully explored the tactical and strategic utility of such weapons.

Space or suborbital strike weapons might be able to improve U.S. non-nuclear deterrence, accomplish a rapid strike against mobile ballistic missile launchers, or destroy hard and deeply buried targets, for example. However, the country never ventured down this path, not for technical reasons,¹³⁷ but for the absence of persuasive advocacy and a fully developed strategic and operational rationale. The strategic utility of such weapons would need to be explored before committing the country to their development. This also is political territory that has never been fully explored; it would likely require a significant effort to develop a

¹³⁶ See, for example, Jonathan Shainin, "Rods from God," *The New York Times*, December 10, 2006, available at <https://www.nytimes.com/2006/12/10/magazine/10section3a.t-9.html>, and Larry G. Sills, *Space-based Global Strike: Understanding Strategic and Military Implications*, August 2001 available at <https://apps.dtic.mil/dtic/tr/fulltext/u2/a407068.pdf>.

¹³⁷ Technology is emerging such that, "at some point in the future, a laser and missile-armed autonomous drone could launch attacks in space." Kris Osborn, "Could the Air Force X-37B become a laser and missile-firing space drone?" *FoxNews.com*, November 12, 2020, available at <https://www.foxnews.com/tech/could-the-air-force-x-37b-become-a-laser-and-missile-firing-space-drone>.

national consensus and allied understanding around an offensive space strike capability.

Cislunar Space - New Mission? While this study will not give the mission to operate in cislunar space much attention, it is worth noting that there is emerging a longer-term requirement for the U.S. military to operate beyond the geosynchronous belt in cislunar space. The Space Force and NASA signed a Memorandum of Understanding in September 2020 that furthers cooperation between the civilian and military space forces in areas such as situational awareness, communications, and precision navigation, and includes the establishment of norms of behavior for operating around the Moon or on other celestial bodies.¹³⁸ Motivating the desire for such an agreement is concern about the challenges that exist in space, to include the need for security.

Private sector investments and the development of new technologies may expand the reach of vital national space interests, and the Joint Force may be called upon to maintain U.S. advantages. After all, defense will follow commerce.¹³⁹ The expansion of this requirement could involve the possibility of human activity, or Space Force “boots on the moon.”¹⁴⁰ To be sure, this is a mission area to watch, but

¹³⁸ Theresa Hitchens, “Space Force-NASA Accord Highlights Cooperation Beyond Earth Orbit,” *BreakingDefense.com*, September 22, 2020, available at <https://breakingdefense.com/2020/09/space-force-nasa-accord-highlights-cooperation-beyond-earth-orbit/>.

¹³⁹ Theresa Hitchens, “SDA’s Kennedy: Cislunar Space The Next Military Frontier,” *BreakingDefense.com*, April 17, 2019, available at <https://breakingdefense.com/2019/04/sdas-kennedy-cislunar-space-the-next-military-frontier/>.

¹⁴⁰ Sandra Erwin, “Space Force members can go to the moon, if they’re picked by NASA: Gen. DT Thompson: There are no plans today to send Space Force units into space,” *SpaceNews Online*, October 1, 2020, available at <https://spacenews.com/space-force-members-can-go-to-the-moon-if-theyre-picked-by-nasa/#:~:text=Magazine%20Subscription%20Info-,Space%20Force%20members%20can%20go%20to%20the%20moon,they>

there may be a push toward expanding the active Space Command area of responsibility which would most certainly involve diverting funds from ostensibly more pressing near-term requirements, and the need to execute effectively the current four basic national security space missions.

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E2%80%94%20Since%20the%20U.S.%20Space,deploy%20troops%20to%
20the%20moon.

Chapter 5

Refining National Security Space Vision and Policy for 21st Century Warfighting

Former Secretary of Defense, Dr. Mark Esper, summed up the future of warfighting: “In the years ahead, wars will be fought not just on land and sea as they have for thousands of years, or in the air as they have for the past century, but also in outer space and cyberspace in unprecedented ways.”¹⁴¹ China and Russia, he warned, have turned space into a warfighting domain and are modernizing military forces for high intensity conflict. Esper conveyed that, due to the changed technological and military threat environment, the United States can no longer afford to back away from the idea of defending U.S. interests in space and, if necessary, fighting in space.

U.S. published strategies and space doctrine, as well as Defense Department organizational decisions, have moved the nation toward a better understanding of why and how the United States must defend its interests in space. Yet the reasoning behind the former Secretary’s statement appears to be not fully understood throughout the U.S. policy-making community. As a result, support for U.S. defensive and deterrent capabilities are inconsistently expressed in the words and actions of the nation’s leadership. Rather

¹⁴¹ Bill Gertz, “Second defector’s knowledge of Chinese bioweapons reaches U.S.: Esper on Space Threats,” *Washington Times Online*, September 16, 2020. Esper continues: “Our near-peer rivals, China and Russia, seek to erode our long-standing dominance in air power through long-range fires, anti-access aerial denial systems and other asymmetric capabilities designed to counter our strengths.” Available at <https://www.washingtontimes.com/news/2020/sep/16/second-china-defector-gives-biological-weapons-inf/>.

than acknowledging the momentous changes brought about by Russian, Chinese, and other countries' space-related developments, some U. S. officials, including within the Defense Department and U.S. Congress, remain convinced that it is still feasible to preserve space as an environment free of any kinetic or disruptive military disagreements.

However, the events that inspired the former Secretary's declaration have transpired and the genie truly is out of the bottle. Thus, the Joint Force must be ready to engage with hostile actors in the space environment as needed, using appropriate weapons, possibly *in unprecedented ways*, and in a manner that is fully authorized, funded and supported by the American political leadership and public. The alternative is to allow adversaries the option of crippling the United States militarily and economically via attacks on U.S. space assets.

Despite this acknowledgement that space is a warfighting environment, understanding of why and how is not sufficiently widespread among U.S. officials and leaders. If the nation is to be in a position to defend itself and pursue its national interests in the age of satellites, the foundations of its national security space policy must be formed and solidified.

Furthermore, a nation's policy on any particular matter is more than the paper upon which it is written. Policy should express the power and the will to execute the underlying vision and, unless the power and will exist, the declarations made in a policy statement are ultimately meaningless and powerless. The latest U.S. space policy reflects many of the familiar statements made by Administration and Defense Department officials, including this statement made in the 2017 *National Security Strategy*: "The United States considers unfettered access to and freedom to operate in space to be a vital interest. Any harmful interference with or an attack upon critical

components of our space architecture that directly affects this vital U.S. interest will be met with a deliberate response at a time, place, manner, and domain of our choosing.”¹⁴² This is an interesting statement, one of many similar statements made by former administration officials since 2017, yet it also captures the inconsistent nature of current space policy framework. On the one hand, we speak in full recognition of space as a domain available for tactical military exploitation. Yet, on the other, in what we do and what we *really* think, space is treated as a sort of haven from hostilities.

The real controversy with the statement is not centered on the means—the resources, weapons, organizations, or strategies—but on the ends expressed by the vision and purpose. The NSS statement is a good statement on paper, to be sure. It seems to offer the policy basis for establishing space control. However, it is also sufficiently vague, so as to leave in doubt whether the United States is actually committed to developing and deploying defensive or offensive space control capabilities. For example, retaliation for interference with U.S. satellite operations could be made entirely against targets in the land or sea domains (which may be appropriate, given the situation). Yet, the statement fails to specify whether a possible requirement to deploy active satellite defenses, such as space-based interceptors or defensive ASATs—could be employed to prevent the interference with, or destruction of, a friendly satellite. It does not explicitly support the deployment of non-kinetic weapons (e.g., cyber) on Earth or in space for retaliation in response to disruption of a satellite’s operation, its permanent disabling or severance of its connection to Earth stations. The uses of counterspace weapons are not yet fully sanctioned in the U.S. policy

¹⁴² 2017 *National Security Strategy*, p. 31. This statement would be strengthened by including “purposeful and” before “harmful.” See also *National Space Policy*, December 9, 2020, pp. 3, 4, and 9.

community. In the current political-military environment, when space combat issues have not been settled, statements such as the one made in the NSS are nebulous and elusive in nature.

Fully sanctioned space combat activity means that, in the aftermath of the space-domain retaliatory action, there would be no accusations that the action taken was a provocation and unprecedented incitement to initiate a space war. It means military leaders would not have to tiptoe around public space weapon discussions for fear of crossing a line of political correctness.¹⁴³

To be fully sanctioned means the nation's allies would generally understand the course of action that had been taken and, although there might not be full agreement with U.S. decisions and actions, they would have little difficulty aligning themselves with their international partner in the court of world opinion. U.S. diplomats and international partners would not be on the defensive about Washington's statements about the need for "space superiority"¹⁴⁴ or

¹⁴³ "When asked when the Space Force might field offensive weapons, Raymond demurred but insisted the United States considers space a vital national security interest." See Abraham Mahshie, "Gen. Jay Raymond previews Space Operations Command stand up," *Washington Examiner Online*, October 21, 2020, available at <https://www.washingtonexaminer.com/policy/defense-national-security/exclusive-gen-jay-raymond-previews-space-operations-command-stand-up>.

¹⁴⁴ Frank Rose, who served as Assistant Secretary of State for Arms Control, Verification, and Compliance from 2014-17, has stated that, "the biggest challenges the [defense space] strategy faces are fundamentally political. Terms like 'space superiority' are politically problematic. Russia and China will use them to falsely claim that the United States is responsible for 'weaponizing' outer space, even though it is those countries that are aggressively developing and deploying anti-satellite weapons." Frank A. Rose, "The U.S. Defense Space Strategy works on paper, but will it be implemented?" *Brookings.edu*, July 6, 2020, available at <https://www.brookings.edu/blog/order-from-chaos/2020/07/06/the-u-s-defense-space-strategy-works-on-paper-but-will-it-be-implemented/>.

dominance and would be fully armed to resist calls by America's hostile detractors and strategic competitors to force the United States to answer or pay for its "outlandish behavior."

To be fully sanctioned means that the administration would have its defenders in the domestic and foreign press, the think tanks, and the universities. It means that a sufficiently educated American public would show a fair amount of support in the latest polls conducted to measure reaction to the most recent space combat engagement. If administration officials do not have to dive into a bunker or constantly dodge verbal projectiles thrown at them in the wake of a defensive action to protect U.S. space assets, then a fully sanctioned policy exists.

Clearly, the subject of spacepower maturation requires the Biden Administration to step up to ensure its relevance in policy discussions. If the subjects of space control and space force application continue to be held out of the public limelight, there is not much that can be done to advance the agenda and ensure the protection of U.S. interests through the exercise of spacepower. General Hyten made the point with respect to the acquisition authorities of the Space Force: if Space Force leaders do not step up to deliver concrete plans, then Congress will step in and write the plans for them. "Congress," he said, "is an impatient body."¹⁴⁵ The same could be said for space policy development. If there is a gap in development, if those who advocate for a spacepower strategy and the acquisition of capabilities refuse to define what they mean and the purpose for which those capabilities are intended, then

¹⁴⁵ Sandra Erwin, "Hyten: Space Force has a limited time window to define its future," *Space News*, September 21, 2020, available at <https://spacenews.com/hyten-space-force-has-a-limited-time-window-to-define-its-future/#:~:text=If%20those%20questions%20aren't,Congress%20to%20set%20the%20direction.>

lawmakers, who also have a hand in making defense policy, will do so. However, they may not share the administration's vision and focused strategic mind-set, and what results might be inadequate.

For space policy to be fully sanctioned, other supportive actions by the nation's leadership and across the government are required. The policy-making process starts with a vision that clearly expresses the nation's will to protect and extend the freedom of American public and private interests to function safely and securely in space. That vision also should highlight the idea that U.S. interests are best served when the United States is viewed by other nations to be the preeminent military power in space, not so that it can act in a dominant, controlling or imperialistic fashion toward other states, but so that it can be free to act as needed to protect its interests and deter aggressive behavior against itself and its allies.

The most recent national security space documents have fairly captured this vision. It is one that has been shared, in some manner, by every administration since Eisenhower. This vision has been expressed in every published national security space policy for the past 60 years. However, policy obviously is much more than this; it is evident that fairly significant differences are apparent among past administrations with regard to national security and space.

The Importance of U.S. Public Opinion

Abraham Lincoln observed that, in the United States, a regime that is perhaps best characterized as a constitutional or democratic-republic, "public sentiment is everything." With it, the chances of success are good; without it, expect failure. So, Lincoln wrote, "he who molds public sentiment goes deeper than he who enacts statutes or pronounces decisions. He makes statutes and decisions possible or

impossible to be executed.”¹⁴⁶ A subset of this argument is that, in the United States, public support for military action or war is critical. Thus, if the United States is to effectively develop its Space Force, and if the Joint Force is to function in space as described in the Space Force doctrine (i.e., utilizing it fully to be in a position to fight wars in all domains), it is vital to gain the support of the American people.

There are at least three key points that must be conveyed to the U.S. public. (It should be noted that these same informational needs apply to our allies.) The first is the fact that space is vital to daily life as we know it. “The importance that space plays in our daily lives and in the defense of our nation is often overlooked or understated,” writes General John Raymond.¹⁴⁷ The American public does not fully understand why and how space marshals all the instruments of national power to strengthen the country economically and militarily. It is critical, therefore, as an element of policy making, that the American public be made aware of key issues: the current and near-term threats by potential adversaries that use or affect space; U.S. space capabilities (or lack thereof) and vulnerabilities; U.S. dependence on space; and, predictions for long-term threats in space. Until the public understands why the United States needs revision and upgrading of its space policies and strategies, support is likely to be elusive.

The second key point concerns consequences a U.S. failure to protect the nation’s interests in space, defend its assets, or protect its territories from attacks that use space. Space is of value beyond its venue for space-based sensors and communications networks. It is also a domain wherein

¹⁴⁶ First Lincoln-Douglas debate, Ottawa, Illinois, August 21, 1858, in Roy P. Basler, ed., *The Collected Works of Abraham Lincoln* (New Brunswick, NJ: Rutgers University Press, 1953), pp. 12-30.

¹⁴⁷ Raymond, “Space dominance requires taking technology and policy risks.”

the United States might find it advantageous to deploy missile defense or satellite-defense interceptors, for example. It could be the place where the Space Force must undertake military action to defend its satellites, terminate another nation's satellite or disrupt its satellite network, either to ensure the success of a Joint Force mission or defend national assets in space. The American public will understand that technologically these things are not necessarily hard to do. Rather, the truly difficult task is overcoming political obstacles and ensuring that average Americans understand that one day the Joint Force might have to fight a war as it needs to be fought (including in space) so as to preserve the maximum number of American lives and pursue its military objectives most effectively.

The third key point is that it will be important for the public to understand what U.S. leaders mean when talking about space control. Specifically, it does not mean overbearing dominance in space, which is impossible and, in any case, not desirable. The meaning of "control" will come down to conveying to domestic and foreign audiences what is being controlled (an orbit or a spacecraft), for how long it is being controlled, and the purposes for which it is being controlled.

To accomplish the goal of informing public opinion, it is important to not confuse the national dialogue on this subject by continuing to use language that is counterintuitive. For example, after decades of calling missile defenses "destabilizing," because they might compromise the mutual vulnerability that produces a "stable balance of terror" (balance-of-terror theory underpins the logic behind the 1972 ABM Treaty), the United States finally began deployment of a missile defense system in the early 2000s. The Missile Defense System on alert today is still not capable of countering a large-scale missile attack from Russia or China (the nation still relies on nuclear deterrence to prevent such an attack). Yet,

fortunately, it is today providing protection against missile raids from lesser powers such as North Korea. The predictions by missile defense opponents that ABM Treaty withdrawal, accomplished by the United States in 2002, would bring about a highly dangerous world were totally inaccurate. Current protections against a North Korean nuclear missile attack is a requirement well-recognized on a bipartisan basis. The larger point here is that words and arguments we choose can work to seriously undermine for decades the messaging logic related to national security.

A key to properly informing public opinion is dealing head on with some maxims that undoubtedly will be raised by opponents. For example, an argument likely to be put forth is: if the nation takes steps to shore up its space defenses, this will create instabilities in the international arena and provoke other nations to follow suit. This argument has repeatedly been proven shallow in similar debates over military policies. The fact is that nations do not invest in expensive, difficult military development because they want to mimic the United States, but rather because they perceive it to be in their own strategic interests to do so. Also, it should not be forgotten that, in the case of space, other nations have already undertaken steps to develop space offense and defense. U.S. restraint has not been reciprocated. In future debates on U.S. space policy, policy makers should not pretend that vulnerability in space is an advantage or a strength for the United States. It is not.

The reality of possible conflict in space almost certainly will bring significant headaches in international diplomacy. Deterrence and warfighting practices and theories of stability will have to be reexamined. New and more vicious budget wars will arise. Political leaders may not want to confront the problems that necessarily result from the maturation of spacepower. Yet, despite all of the difficulties one may anticipate in shoring up the nation's ability to defend and promote its space interests, it is nevertheless

something that must be considered and ultimately worked through.

U.S. public opinion generally recognizes national strength as the source of true stability. Officials responsible for spacepower policy must confront how to couch public messaging to convey exactly how U.S. space capabilities fit into the fabric of national strength, and how it will contribute to, rather than, undermine stability. Officials must first identify debating points against the deployment of systems to control portions of space, ensure access, or utilize the space environment. Secondly, they must provide clear, thoughtful reasons for the public to understand how U.S. spacepower would protect U.S. space assets and U.S. and allied populations, as well as help ensure the continued use of space for the benefit of all nations and economies. Effective messaging and solid arguments used in debates in Congress or on stages around the country will inform political leaders to enable better decision-making, further develop public understanding of the objectives of U.S. space policy, and promote the deterrent values of U.S. spacepower. To improve understanding of how this would work and what steps need to be taken, leaders should revisit the successful public messaging campaign undertaken by the Bush Administration following the U.S. withdrawal from the ABM Treaty.

U.S. public opinion will be shaped initially and most importantly by increasing understanding of the developments in the capabilities of China, Russia, and to some extent others, to use space to threaten the United States and its allies, or to threaten to constrict the U.S. use of space for commerce or military purposes. That understanding today is inadequate, which leads to the question of how we must work to unwind the often-unnecessary classification of space-related information.

Security Classification Involving Space Systems

For more than 60 years, the United States has gone to great lengths to protect space technology and information. As a result, compartmentalizing and classifying space programs, especially national security programs, at the highest levels became the norm. Old rules established to protect sensitive information largely remain in place today and exceed even the norms and rules in programs involving the land, sea, air and cyber domains. At the domestic level, these practices have led to duplication of space acquisition programs, inadequate integration of space capabilities into plans and exercises, and ignorance of space threats.¹⁴⁸ The establishment of the Space Force, Space Development Agency, and space-centric acquisition centers will help resolve some of these issues within the United States and at the international level.¹⁴⁹ Yet the problems will remain significant without a policy that recognizes the shortcomings of current information-sharing practices.

Today, U.S. information-sharing policy starts by asking the question, “what must be classified?” Space policy, however, should empower policymakers and program managers to ask, “why are we classifying this information?” Stove-piping, the refusal to share information among key government stakeholders, remains a highly frustrating problem in the national security space community.

¹⁴⁸ Blair and Work, “Stovepipes in space: How the U.S. can overcome bureaucracy to improve capabilities.”

¹⁴⁹ Aaron Mehta, “Increasing allied role in space a ‘priority’ for Space Command head,” *DefenseNews.com*, September 3, 2019, available at <https://www.defensenews.com/space/2019/09/03/increasing-allied-role-in-space-a-priority-for-space-command-head/>.

There must be greater public awareness of space as it relates to U.S. national security.¹⁵⁰ Specifically, the public needs information on the “who?”, “what?”, and “so what?” of space threats. This information must be conveyed in a manner and language that increases public understanding of the issues. The Defense Department and U.S. intelligence agencies have done a better job over the past few years of making materials accessible to the public. How or even whether the United States should pursue robust space defense technologies are questions that have yet to be answered adequately. Increasing awareness of the space threat among senior policymakers and government institutes, the American public, and allied audiences must be a primary consideration. General James Dickinson, then-deputy commander, USSPACECOM, believes that, “the lack of a visible threat makes some believe [a threat] doesn’t exist.”¹⁵¹ He is right, and significant effort should be put

¹⁵⁰ Hyten said: “I have pretty strong partners – from the chairman of the joint chiefs of staff, the deputy secretary of defense, the chief of space operations and the commander of space command – who all see it the same way. We’re pushing hard.” General Raymond echoed the concern: “Our desire is to deter conflict from either beginning or extending into space. To do that deterrence, you have to change the calculus of your opponent. And to do that, you have to be able to talk and you have to be able to message.” Courtney Albion, “Hyten: ‘I’m going to be unbelievably loud’ about space overclassification,” *InsideDefense.com*, November 20, 2020, available at <https://insidedefense.com/daily-news/hyten-im-going-be-unbelievably-loud-about-space-overclassification>.

¹⁵¹ Thomas Brading, “Top SMDC officer uses drone-zapping lasers, says missile defense remains top focus,” *Army News Service*, March 6, 2020, available at https://www.army.mil/article/233514/top_smdc_officer_uses_drone_zapping_lasers_says_missile_defense_remains_top_focus#:~:text=FAQs
 -,Top%20SMDC%20officer%20uses%20drone%2Dzapping%20lasers%2C%20says,missile%20defense%20remains%20top%20focus&text=ARLINGTON%2C%20VA%20%2D%2D%20A%20wrecked,Alabama%2C%20a%20few%20weeks%20ago.

forth to overcome this difficulty. Enhancing understanding of the risks through improved declassification procedures, to include the capabilities of American adversaries and the response capabilities available to the Joint Force, must be undertaken if the nation is to coherently and effectively deal with the threat from enemy systems.¹⁵²

A Unified Pursuit of Strategy

As is the case with any policy formulation, political unity is best. Bi-partisanship in a country such as the United States is empowering. The United States fought and won the decades-long Cold War with the Soviet Union primarily because the effort was supported by both political parties. This, of course, meant that there were no significant changes to the fundamental vision of Cold War victory, which led to consistent budgets and a true alignment of objectives within all branches of government. Clearly, there were differences in the levels of support for these efforts, and even in terms of tactics, but the high ends of Cold War policy were made rock solid by the bi-partisan agreement on national security fundamentals.

A new vision for space, one that is bi-partisan in its fundamentals, would help ensure enduring, clear policy- and strategy-making. The bi-partisan policy should define U.S. national military posture in space, consider overall national foreign policy and military objectives, and make it possible to develop a strategy for U.S. spacepower designed to achieve the high ends of policy. Clear strategy, of course, will enable the development of appropriate concepts to deter aggression and attacks in space, and win wars that

¹⁵² See also Nonproliferation Policy Education Center and American Bar Association, *Three Neglected Space Issues: Laser ASATs, Cooperation with Russia and China, and Space Secrecy – Workshop Report*, July 2020, pp. 16-24, available at npolicy.org/article_file/July_2020_Space_Policy_Workshop.pdf.

extend into space should deterrence fail. These strategic concepts are required to write doctrine, design operational architectures, and adopt a targeted acquisition strategy. Appropriately designed policy also will provide the framework for U.S. diplomats to formulate international norms of behavior and help shape the views of allies, partners, and potential adversaries about space as a warfighting domain.

A policy that upholds a requirement to control space as necessary, for example, would lead to a more focused strategy for military operations in space, to include possible engagements there. It would also sharpen bilateral and multilateral diplomacy and strategic communications to support that end. Similarly, a policy that provides explicit guidance to deploy missile defense interceptors in the domain in which they will be most effective, or accomplish early intercept, would facilitate strategy, doctrine and diplomacy.

As noted, space is an environment ever-increasingly characterized by great power competition. By exploiting space for military purposes, the United States would further underscore for U.S. and foreign audiences the importance of military preeminence as a means to preserve U.S., allied, and international freedom to use space. By demonstrating the will and capability to fight and win in space, the nation would achieve its bi-partisan strategic goals of strengthening deterrence, protecting the homeland, U.S. forces, allies and partners, and ensuring vibrant free markets.

Improved space deterrence required by strategy will demand increased capabilities for defense leaders and warfighters to know what is happening in space in a timely manner in order to issue an appropriate and timely response. A policy that projects interest in the active use of space for national security would make it possible, for example, for the space deterrence strategy to undertake

retaliation in space, if deemed necessary, using non-kinetic means. The new strategy might also support prominently key operational objectives such as enhanced “forward presence” – the ability to provide the first line of defense (in the case of a ballistic missile attack) – primary over a target, in space or on land, with sensors and interceptors. An active-space-oriented strategy, in other words, would enable application of many novel concepts for operating a Joint Force; this prospect underscores the importance of being militarily dominant in all operational domains.

A clear bi-partisan policy reflected in the nation’s strategy will enable it to make the investments and take actions necessary to prevent the dominance of space by foreign powers. This would be essential to ensure continued access to space by U.S. and allied commercial interests and the Joint Force. The United States could execute strategy unilaterally and in concert with its allies as required. Strategic deterrence—defense of the homeland from nuclear or conventional attack—and space deterrence—prevention of aggressive acts in space—no doubt would be central to any 21st century U.S. strategy and bi-partisan authorization and funding.

The Centrality of Cooperation with the Allies

Clear language explaining to allies and international partners U.S. military space plans and actions will help U.S. leaders speak effectively to strategy, warfighting, and deterrence. In 2001 and 2002, the George W. Bush Administration consulted very closely and very effectively with U.S. allies and with Russia on its plans to withdraw the nation from the ABM Treaty and deploy homeland missile defenses. Similar steps should be undertaken to prepare for major changes in the U.S. space defense posture. As acknowledged in the 2020 *Defense Space Strategy*, the United

States will need the political support of its allies and partners, as well as military collaboration and cooperative involvement in the space domain, to maintain a high level of security and economic prosperity.

Washington's early consultation and collaboration on military space activities with its closest allies, such as the "Five Eyes" partners—a cooperative intelligence alliance among Australia, Canada, New Zealand, and the United Kingdom—France, Germany, and Japan, would go a long way toward solidifying its space age diplomacy, which includes communicating and enforcing its defense space policy. U.S. allies are increasingly cognizant that space is an operational domain, and that Russia and China pose significant challenges in that arena.¹⁵³ Indeed, U.S. leadership in this area since 2019 has induced several U.S. partners and allies to sign partnering agreements to cooperate on security in the space domain.¹⁵⁴ These agreements are important not only for military and technological purposes, but for harmonizing policy and strategic vision.

¹⁵³ Andrew Foxall, "China and Russia are seeking to conquer space itself in their shadow war against the West," *The Telegraph Online (UK)*, November 21, 2019, available at <https://www.telegraph.co.uk/news/2019/11/21/china-russia-seeking-conquer-space-shadow-war-against-west/>; Theresa Hitchens, "Space Force Reaches Out To New Partners-Eye on China," *BreakingDefense.com*, January 13, 2021, available at <https://breakingdefense.com/2021/01/space-force-reaches-out-to-new-partners-eye-on-china/>.

¹⁵⁴ Abraham Mahshie, "Space Command's Gen. Raymond cites allies' space commands and partnerships," *Washington Examiner Online*, October 22, 2020, available at <https://www.washingtonexaminer.com/policy/defense-national-security/exclusive-space-commands-gen-raymond-cites-allies-space-commands-and-partnerships>. See also Theresa Hitchens, "Space Command Widens Embrace Of Allies," *BreakingDefense.com*, November 5, 2020, available at <https://breakingdefense.com/2020/11/space-command-widens-embrace-of-allies/>.

Insofar as U.S. policy incorporates novel or revolutionary non-kinetic and kinetic space weapon systems, Washington would require a vigorous strategic communications plan that includes, at some level, public discussion with allied countries of the new military direction. Success in this area will require significant effort to ensure that foreign perceptions of U.S. goals in space and the role of military technology in space are accurate.

It would be an exaggeration to say that today's U.S. national security space policy infrastructure reflects the Joint Force vision for military operations. That vision is to operate collaboratively in a multinational, all-domain warfighting environment. The NMS and NDS recognize the United States is unlikely to go it alone when defending its regional interests, making the sharing of information with allies and partners vital to success. With respect to information sharing and over-classification, the nation's guide in this area should be its strategy, and the centrality of bilateral and multilateral military interoperability and collaboration to successful warfighting.

While improvements to allow some allies to "peek under the tent" have been made, the Defense Department, in general, continues its propensity to over-classify information in order to protect sensitive technologies and secrets, as noted above. This includes the generous assignment of classification levels that specifically restrict foreign nationals from viewing sensitive information.¹⁵⁵ The nation has made some headway against this practice, however. The United States, for example, does have some critical

¹⁵⁵ For an excellent summary of these issues, see Mark Pomerleau, "Info-sharing hurdles hinder alliance partnerships," *C4ISRNET.com*, August 7, 2016, available at <https://www.c4isrnet.com/videos/2016/08/07/info-sharing-hurdles-hinder-alliance-partnerships/>.

intelligence-sharing arrangements within the Five Eyes alliance. Currently, it is working to facilitate information sharing with NATO allies to accompany the search within the alliance for more opportunities to develop mutually beneficial capabilities.¹⁵⁶ Yet, with an understanding of what a heavy lift it truly is, there is no doubt more work to be done to ensure that top-level space policy and national security space strategy comprehensively and adequately support the sharing of space-related information and technology with America's closest allies.

Policy should facilitate technology-sharing. The space capabilities and expertise of the United States are not easily matched by other nations, which means there is a natural technology and capability gap between the United States and its foreign military partners. U.S. capabilities can offer significant security benefit to allies and might be used to improve relationships. Interoperability among allied forces also is a key requirement for the Joint Force, and, should this be the goal, it is imperative that U.S. policy continue to bring along allies in order to maintain the ability to fight side-by-side with friendly powers.

In this new security environment, there is a basic requirement for military forces to be linked using command and control, communications, computers, intelligence, surveillance, and reconnaissance systems. For example, the Joint All-Domain Command and Control system, also known as JADC2, is being developed to connect existing sensors and shooters of the services.¹⁵⁷ This is a more

¹⁵⁶ Theresa Hitchens, "Raymond Urges NATO Space Ops; Europeans Fear Offensive Missions," *BreakingDefense.com*, November 18, 2019, available at <https://breakingdefense.com/2019/11/raymond-urges-nato-space-ops-europeans-fear-offensive-missions/>. Today space cooperation now is led by SPACECOM-led Combined Force Space Component Command.

¹⁵⁷ Maj. Gen. Kim Crider, Space Force acting chief technology innovation officer stated: "Joint All-Domain Command and Control,

holistic, joint approach for a new way of war, which will present new vulnerabilities and require new ways of protecting JADC2 assets, including those assets on orbiting platforms.¹⁵⁸ “In competition, we’ve got to be able to move data. In some cases that’s being able to secure our networks,” stated Brigadier General Bradley Pyburn, the commander of the 16th Air Force, the service in charge of developing the JADC2 system.¹⁵⁹ JADC2 will distribute military and intelligence data to all domains (land, sea, air, space and cyber) and U.S. military forces so that every sensor and shooter from every service is connected in order to enable a more efficient military operation.

As the United States expands its ability to execute joint combat engagements, to include within the space domain, U.S. policy should evolve to ensure possible international military partner involvement in supportive or execution activities. Healthy international cooperation initiatives can enable the leveraging of emerging technological and

really, is grounded in space. Space is a joint all-domain fight. Space depends on information from other domains so that we can assure our space assets and we can understand where there might be threats that could impact space coming from other domains, to include the cyberspace domain. ... So, space is fully a partner in the Joint All-Domain Operations and significant contributor to Joint All-Domain C2.” Jay Koester, “JADC2 ‘Experiment 2’ provides looking glass into future experimentation,” *Army.mil*, April 23, 2020, available at https://www.army.mil/article/234900/jadc2_experiment_2_provides_looking_glass_into_future_experimentation.

¹⁵⁸ See, for example, Theresa Hitchens, “Space Is At Heart Of JADC2,” *BreakingDefense.com*, December 23, 2020, available at <https://breakingdefense.com/2020/12/exclusive-space-is-at-heart-of-jadc2-says-maj-gen-crider/>.

¹⁵⁹ Mark Pomerleau, “Air Force looking at how to defend JADC2 systems,” *C4ISRNET.com*, September 16, 2020, available at <https://www.c4isrnet.com/digital-show-dailies/air-force-association/2020/09/16/air-force-looking-at-how-to-defend-jadc2-systems/>.

commercial innovation in foreign industry to outpace the adversary threat. Today the United States has tight controls over its space technologies, and it no doubt will have to reconsider many of these restrictions as it attempts to include more allies in the strategy-making process and combined military operations.

According to the DSS, “space superiority will be achieved through on-orbit, multi-domain, and cross-component operations that are fully integrated with our allies and partners.”¹⁶⁰ Space policy must support this integration through the facilitation of exercises and wargames with allies to examine warfighting concepts that include extending the battle into space, training and educating commanders, exploring different scenarios, and evaluating force planning choices. Space warfighters will need to understand how to deal with hostile actions from adversaries who might employ electronic warfare attacks to jam signals, cyber assaults on space systems, and direct-ascent missile strikes to destroy high-value satellites. Operators within the United States and within allied nations will need to understand the capabilities and limitations of the systems they are using, to include Global Position System satellites, allied navigation systems such as European Galileo, satellite communications, imagery satellites, or other services provided by space-based assets. Current approaches to embed U.S. allies and military partners into U.S. wargames and exercises as operational partners will facilitate the education of friendly states on the realities of space warfighting.¹⁶¹

¹⁶⁰ 2020 *Defense Space Strategy*, p. 7.

¹⁶¹ According to the freshly appointed Space Operations Commander, Lt. Gen. Stephen Whiting, we are already seeing evidence of international partners’ acceptance of space as a warfighting domain: “Now, Canada has a SpOC. It’s called the CAN-SpOC,” Whiting said. “The U.K. has one, we call it the U.K.-SpOC. Australia has a space operations center. We call it the AUS-SpOC. Japan is developing one.”

In the same manner as sea control and air superiority, space control is an expression that must be fully understood by U.S. leadership so that it can be properly conveyed to allied audiences. This understanding should pervade all U.S. military activities, communications, and training exercises. Space force training must expand to include anticipated space events and threat training to understand how adversaries may attack any given space capability. Significant education is needed to explain military activities and engagements that may take place in space, such as space control.¹⁶² The growing use of space by many governmental and non-governmental actors is a firm reality.

At a minimum, the United States and its international partners must ensure a solid defense of friendly space systems in peacetime and be ready to pursue military actions in the space domain in wartime, which may demand active offensive space control. At present, U.S. policy does not support active space combat operations. Involvement of allies and partners in space control, the protection of space systems, and the prevention of hostile acts in space, are legitimate concerns. Satellites are only part of the space system. There are also ground stations for up-linking or receiving satellite data, and space domain awareness

Mahshie, "Space Command's Gen. Raymond cites allies' space commands and partnerships."

¹⁶² Theresa Hitchens, "US, Allies Agree On Threats In Space But Struggle With Messaging," *Breaking Defense*, September 11, 2020. According to Hitchens, "This [the idea of space war] is creating a bit of schizophrenia in public messaging by Pentagon space leaders. On the one hand, senior officials have been blasting a clarion call for building up space warfighting capabilities as they seek domestic (read congressional funding) support for the new Space Force and Space Command. On the other hand, they are trying to dampen concerns among allies - or at least their skittish publics - about what some perceive as aggressive US intentions."

sensors deployed around the globe: these are critical to the system and must be operated and protected.

Significant international cooperation is already taking place. The United States, for example, leads a coalition to bolster space defenses against key competitors in an exercise known as Operation Olympic Defender. According to the Chief of Space Operations, General Raymond, "Through Operation Olympic Defender, we are optimizing space operations, improving mission assurance, enhancing resilience and synchronizing U.S. efforts and capabilities with ... our closest allies so that we can deter hostile acts in space and protect vital national capabilities."¹⁶³ The U.S.-based Combined Space Operations Center is a venue where allies can execute operational command-and-control of space capabilities.

While such efforts are important, there is also a need, as recognized in the DSS, to make "cooperation and collaboration a matter of course in future capability development and operations."¹⁶⁴ The DSS also emphasizes that spacepower can only achieve its greatest potential when it is combined with all other forms of military power, to include the operational integration of military power possessed by allies. There is urgent need to work out with allies now, in advance of any potential conflict, the 'rules' for warfighting. This must start at the level of policy.

Budget

Part of the policy-making process must include resource considerations. Current space policy does not provide a sufficiently persuasive rationale of why investment is

¹⁶³ Yasmin Yadjdeh, "Space Force Tightening Ties with UK," *National Defense Magazine Online*, July 15, 2020, available at <https://www.nationaldefensemagazine.org/articles/2020/7/15/just-in-space-force-tightening-ties-with-uk>.

¹⁶⁴ 2020 *Defense Space Strategy*, p. 6.

required to promote and develop robust space warfighting capabilities. After all, where the nation spends its money reveals where its priorities lie. A revitalized space policy would provide the justification for spending money on what is bound to be a very expensive activity. Clearly, a nation that continues to spend money on status quo systems will not sufficiently invest in research, development, testing and evaluation, and it will not have vigorous science and technology programs to adequately prepare for the threats of tomorrow. Moreover, without a well-developed and clear policy stating Washington's vision and long-term plans for space and outlining its approach for meeting its plans, private industries will not be inspired to invest heavily in the development of capabilities. Without a clearly articulated policy that has congressional support, government and private interests will likely be reluctant to commit resources to fund new national security space initiatives.

Aligning Space Control Requirements and Policy

We have already shown that U.S. space support infrastructure and force enhancement satellites have received significant policy support and budgetary attention since the dawn of the space age. These space assets are critical to deterring nuclear and non-nuclear strategic attacks, defending the homeland, and projecting U.S. power globally. The current U.S. satellite fleet enables strategic flexibility and ensures freedom of action and a readiness to respond to crises urgently and effectively. These capabilities also make it possible for the United States to maintain its network of allies and international partners, guard its interests abroad, and maintain balances of power in the Indo-Pacific, Europe, the Middle East, and the Western Hemisphere regions. Any deficiencies we might

experience in the space support and space force enhancement areas are the result of budgetary constraints or defense planning choices, not an unsupportive policy structure.

This is not the case with the space control mission. U.S. policymakers have never thought of space as a domain of anarchy, even in the earliest days of the space age. The recognition of space as a domain that would be contested, an arena where a struggle may be required to maintain freedom of space, can be traced back to the administration of Dwight Eisenhower; including its political leadership as well as its military officials.¹⁶⁵ It was the case then, and is the case today, that U.S. military leaders have been the most vocal advocates for pushing the nation's acceptance of the idea of space as a contested domain, an arena of anarchy wherein struggle may be required.

Army General James Dickinson, Commander of U.S. Space Command, reminds us that "our economy, our way of life depends on space capabilities. We have adversaries and competitors now in the space domain that have demonstrated that they want to hold our assets at risk. We need to be able to defend those" and hold adversaries

¹⁶⁵ Lambakis, *On the Edge of Earth*, pp. 211-220. Although Eisenhower did flirt in public with the notion that space should remain a sanctuary for peaceful and scientific purposes (putting him at odds at times with his military advisors), U.S. policy even in these early days did recognize that nations could do other nations harm in space. Eisenhower was very committed to winning over the international community to the idea that space should remain a free arena for scientific exploration, and the sanctuary rhetoric may have helped him negotiate with other nations to achieve that end. Nevertheless, he believed it was critical that space not be used to endanger U.S. security and that the U.S. military had to be prepared to defend U.S. interests there. The military services contributed to the policy debate back then by convincing the leadership that the ability of other nations to collect information from space or project power could damage U.S. interests.

accountable for what they are doing in the space domain.¹⁶⁶ General Dickinson suggests the consequences of not having the defensive space control capability required to protect vital U.S. satellites.

Brigadier General Shawn Bratton, Deputy Director of Operations at U.S. Space Command, essentially acknowledged that, regardless of any of the ongoing special access programs in the space development world, the United States does not have space-based weapons and believes other nations, especially China, have been developing them. He explained that military planners are particularly concerned that China's navigation system, BeiDou, would give its military an opportunity to disable the US satellite Global Positioning System in a conflict, depriving the U.S. Joint Force of critical navigation, positioning and time data essential for operations. "I would like to have more capability than I do today," Brig. Gen. Bratton pointed out. "We have so much capability on orbit that we have to be able to defend it." Space weapons would supplement terrestrial weapons, including satellite jammers and missiles fired from Earth, and give the Commander in Chief and the Secretary of Defense more options.¹⁶⁷

¹⁶⁶ "Russia is making considerable gains, and our operational advantage is shrinking." "China continues to develop a variety of counterspace capabilities designed to limit or prevent an adversary's use of its space-based assets during a crisis or conflict." Gina Harkins, "Space Wars: Why Top Military Leaders Say U.S. Must Prep for Battles Beyond Earth," *Military.com*, August 24, 2020, available at <https://www.military.com/daily-news/2020/08/24/space-wars-why-top-military-leaders-say-us-must-prep-battles-beyond-earth.html>. Sandra Erwin, "U.S. SPACECOM nominee Dickinson says countries must be held accountable for actions in space," *SpaceNews Online*, July 28, 2020, available at <https://spacenews.com/u-s-spacecom-nominee-dickinson-says-countries-must-be-held-accountable-for-actions-in-space/>.

¹⁶⁷ Manson and Shepherd, "US military officials eye new generation of space weapons."

The reason there is such emphasis by strategic planners and military leaders on describing the need for a space control capability is because the country appears to lack reliable tools to conduct the mission today, despite the demonstrated need. This is not a failure of technology; it is a failure of policy. The remedy for this must begin with strong policy arguments. While the recognition of a space control requirement has been quite strong among the defense leadership and the Services, those voices in favor of a robust space control capability in the political arena have been more fleeting, vague, and disparate.¹⁶⁸ Advocacy for space control, what it is, and why we need it, is not currently being done.

Force Application in Space

Space force application can be used for offensive and defensive purposes, and may be used to affect the course of a conflict or engagement in space or on Earth. It may contribute to space control, the requirements for which are discussed above, by conducting defensive operations to protect space systems, or offensive operations to impede temporarily or permanently an adversary's use of satellites. It may also be used to strike targets on Earth from space, or in a defensive mode, to protect strikes against friendly terrestrial targets (e.g., missile defense).

¹⁶⁸ A senior Defense Department advocate for U.S. military space capabilities testified before Congress about the growing threats to the U.S. space system but did not specifically address the need for space control capabilities; but rather, he spoke vaguely about the need to "accelerate the development and fielding of military space capabilities necessary to ensure U.S. and allied and partner technological and military advantages." Kenneth Rapuano, ASD for Homeland Defense and Global Security, written testimony before the House Armed Services Committee, March 11, 2020, p. 6, available at <https://docs.house.gov/meetings/AS/AS00/20200311/110692/HHRG-116-AS00-Wstate-RapuanoK-20200311.pdf>.

A Space-Based Interceptor (SBI), or a space-based laser, potentially could be useful for defending friendly satellite constellations, and also could be used within the currently operational Missile Defense System to add an additional layer to homeland defenses against ballistic missiles. An SBI might also be useful against offensive hypersonic missiles that, once launched, initially fly a ballistic trajectory toward space before descending back to Earth to begin maneuvered flight.

The Missile Defense Agency currently does not have an SBI program and has focused its efforts and investments on the development of a Hypersonic and Ballistic Tracking Space Sensor.¹⁶⁹ It should be noted that the 2019 *Missile Defense Review* (MDR) does not identify a requirement for SBI, although it does recognize the need for a multi-layered missile defense system. According to the MDR, “the exploitation of space provides a missile defense posture that is more effective, resilient and adaptable to known and unanticipated threats.” The report, therefore, recognizes the possible emergence of a requirement for SBI.¹⁷⁰

¹⁶⁹ Admiral Hill notes that, “space is a critical environment for addressing rapidly advancing threats across multiple regions of interest,” and that the HBTSS capability represents the first installment in an all-domain sensor architecture that, once delivered, will contribute to the hypersonic defense fight by providing a persistent, layered capability to track dim boosting ballistic missiles and hypersonic glide vehicles. Vice Admiral Jon A. Hill, Director, Missile Defense Agency, *Written Testimony before the House Armed Services Committee Subcommittee on Strategic Forces*, March 12, 2020. See also Kris Osborn, “How Will the U.S. Military Stop Hypersonic Attacks? Space-Based Missile-Killer Systems,” *The National Interest*, August 8, 2020, available at <https://nationalinterest.org/blog/buzz/how-will-us-military-stop-hypersonic-attacks-space-based-missile-killer-systems-166494>.

¹⁷⁰ “As rogue state missile arsenals develop, the space-basing of interceptors may provide the opportunity to engage offensive missiles in their most vulnerable initial boost phase of flight, before they can deploy various countermeasures. Space-basing may increase the overall likelihood of successfully intercepting offensive missiles, reduce the number of U.S. defensive interceptors required to do so, and potentially

SBI is not now on the table for consideration, nor is it really in the public discussion of a layered homeland defense system 10 or 20 years from now.¹⁷¹ There are several obstacles that lead officials to continually conclude that this issue warrants further study. Perceptions of affordability tend to stall debates. There is concern that weapons in space will disrupt the existing “harmony” in orbits that currently traffic in military, civil, and commercial assets. The SBI debate also must consider any policy concerns about space control and space access denial. Space debris and possible debris chain reactions after a space strike are concerns also frequently raised.

Officials today are instead focused on meeting the demands of tomorrow by building out and upgrading existing ground-based defenses, sensors and interceptors, or adding new land-based capabilities that leverage sea-based missile defenses. However, yet cost and technology are not the hurdles for not pursuing a space-based system, as one Pentagon official maintained in 2019.¹⁷² One of the

destroy offensive missiles over the attacker’s territory rather than the targeted state. DoD will undertake a new and near-term examination of the concepts and technology for space-based defenses to assess the technological and operational potential of space-basing in the evolving security environment.” Department of Defense, 2019 *Missile Defense Review*, p. IX.

¹⁷¹ See, for example, Terri Moon Cronk, “Senior Defense Officials Discuss 2030 Missile Defense,” *DOD News*, September 11, 2020, available at <https://www.defense.gov/Explore/News/Article/Article/2345352/senior-defense-officials-discuss-2030-missile-defense/>; Sandra Erwin, “Defense policy chief: Weapons in space ‘bridges yet to be crossed,’” *Space News*, September 4, 2018, available at <https://spacenews.com/defense-policy-chief-weapons-in-space-are-bridges-yet-to-be-crossed/>.

¹⁷² Former Strategic Defense Initiative Organization Director Cooper cites then-Under Secretary of Defense for Research and Engineering, Michael Griffin, as saying: “I get tired of hearing how it could cost \$100-or-more billion to put up a space-based interceptor layer. The entire cost of a system with 1,000 SBIs could come in at about \$20 billion.”

reasons the United States is looking at sea-based options¹⁷³—Aegis Ashore Guam, for example—is that the SBI option has been taken off the table.¹⁷⁴ To date, it has not been considered a viable option despite many studies, as well as successful demonstrations conducted in the early 1990s (with Brilliant Pebbles); this is mainly for policy reasons. Discussion simply cannot move off of these ideas because current policy simply does not support plans to use space to improve the performance of the Missile Defense System and support the space defense mission.

As suggested above, an effective space-based missile defense layer would require a persistent, on-call global presence. While missile defense weapons are entirely based on Earth today—on land and at sea—most of the engagements actually take place in space. In other words, today's missile defenders using terrestrial interceptors are starting this combat engagement out of position. Defensive interceptors have to be exceptionally fast and highly advanced technologically to enter the engagement zone (space) quickly. In other words, the attacker will have the advantage in a battle, because the attacker launches before the missile defense system can be cued and activated. By pre-positioning defensive weapons in the environment where the missile engagement will take place, SBI could offer efficiencies for the entire Missile Defense System as

Henry F. Cooper, "Space-Based Interceptors: The Price Is Right!", *Newsmax*, April 23, 2019, available at <https://www.newsmax.com/henryfcooper/brilliant-pebbles-price-estimate-space-defense/2019/04/23/id/912964/>.

¹⁷³ Aegis Ashore facilities, which deploy on land the Aegis Weapon System and Standard Missile-3 missile defense interceptors, essentially bring sea-based defense capabilities to the shore. There is currently an operational Aegis Ashore site in Romania.

¹⁷⁴ Jason Sherman, "INDOPACOM chief: Aegis Ashore Guam could one day be armed for strike to counter China," *Inside Defense*, September 22, 2020, available at <https://insidedefense.com/daily-news/indopacom-chief-aegis-ashore-guam-could-one-day-be-armed-strike-counter-china>.

part of a layered defense system by improving overall operations and protecting more areas around the world. Space systems could provide on-demand, near global access to ballistic missile threats, minimizing the limitations imposed by geography, absence of strategic warning, and the politics of international basing rights.¹⁷⁵ A space layer would help thin out missile attacks, freeing up other elements of the system to engage from the land or sea. A space layer also would eliminate “free rides” into midcourse by introducing a capability to strike a ballistic missile in boost phase or as it is climbing in and through space.¹⁷⁶ On call around the clock, an SBI constellation would be available and in position to counter a surprise attack.¹⁷⁷ Space-based interceptors would be useful for engaging missiles launched from deep within the interior of a large country such as Russia, China, or Iran. Interceptors that can kill a threat early in the trajectory also would complicate things for the country launching the offensive missile, due debris or nuclear effects on its homeland. Depending on the type of SBI deployed and its orbit and altitude, it may even be possible for the space-based

¹⁷⁵ According to the National Research Council, “In principle a constellation of satellites equipped with boost-phase interceptors could be configured so as always to be geographically in range for an intercept. The number of satellites required depends, in part, on the burn time and altitude of the threat missiles. Shorter powered flights of solid-fueled threat missile require many more satellites for coverage.” *Making Sense of Ballistic Missile Defense*, p. 9. Retired Air Force Lt. Gen. Trey Obering also raised the possibility of mounting lasers on satellites because, “lasers operate in space with much lower risk of beam attenuation when compared with laser weapons fired within the earth’s atmosphere.” See Osborn, “How Will the U.S. Military Stop Hypersonic Attacks? Space-Based Missile-Killer Systems.”

¹⁷⁶ Henry A. Obering, III, *Missile Defense Program and Fiscal Year 2008 Budget*, Testimony before the Strategic Forces Subcommittee, Senate Armed Services Committee, April 11, 2007.

¹⁷⁷ Steven Lambakis, “Missile Defense from Space,” *Policy Review*, February-March 2007, No. 141, pp. 47-58.

element of the missile defense system to have shot opportunities in all phases of flight, boost, ascent, midcourse, and even high terminal.¹⁷⁸

The MDR prepared by the previous administration recognized this possible improvement in missile defense system efficiency:

This force-sizing measure for active U.S. missile defense will require the examination and possible fielding of advanced technologies to provide greater efficiencies for U.S. active missile defense capabilities, including space-based sensors and boost-phase defense capabilities. It calls for a missile defense architecture that can adapt to emerging and unanticipated threats, including by adding capacity and the capability to surge missile defense as necessary in times of crisis or conflict.¹⁷⁹

There is no reference to space-based interceptors; the document refers instead to the advantage of including boost-phase defenses. By doing so, it implicitly presents the strong rationale, in principle, for SBI. In any case, a well-designed missile defense system architecture requires

¹⁷⁸ Independent Working Group, *Missile Defense, the Space Relationship, and the Twenty-First Century: 2009 Report*, pp. 26, 27. "Space-based defenses could be deployed on top of an optimal combination of land- and sea-based defenses, as determined for different airbase locations. The space-based layer of, for example, 1,000 interceptors and a squadron of space planes, would enormously complement the Earth-based defenses, seriously complicate an attacker's planning, and greatly improve America's ability to deter or defeat missile and satellite attacks on global U.S. interests...." Norman M. Haller and Peter Pry, "Air Force Bases Need Space-Based Missile Defenses As Soon As Possible," *RealClearDefense*, July 7, 2020, available at https://www.realcleardefense.com/articles/2020/07/07/air_force_bases_need_space-based_missile_defenses_as_soon_as_possible_115446.html.

¹⁷⁹ 2019 *Missile Defense Review*, p. VII.

integration among elements in all domains and must be layered, meaning that a space-layer should be designed to complement land- and sea-based defenses and not operate as a stand-alone capability.

Space policy must also take into account and objectively study the use of force application in space to protect space systems. In scenarios when passive defenses would not be sufficient to protect satellite functions, and the employment of active defenses, or defensive force application, might be necessary, if only to prevent a satellite kill that causes the proliferation of space debris in a particular orbit. SBI or other kinetic defensive weapons may be used in a defensive role to protect U.S. and friendly satellites. Space-based interceptors have a wide area of coverage and would be, in effect, the first line of defense in a direct-ascent anti-satellite attack against U.S. space systems. If the conflict stakes are high, concerns about space debris and any domestic or international condemnation of the defensive action could pale in comparison. Space debris concerns, in fact, may be minimal if the interceptor is moving downward in order to meet the ascending anti-satellite missile somewhere below the orbital plane, as this would lead to debris that rapidly burns up as it reenters Earth's atmosphere.

The Joint Force does not appear to be in a position to respond with agility to destructive space threats posed by direct-ascent ASATs, at least not within the space environment. Deputy Secretary of Defense Robert Work in the Obama Administration noted that, "from the beginning, if someone starts going after our space constellation, we're going to go after the capabilities that would prevent them from doing that.... Let me just say that - having the capability to shoot the torpedo would be a good thing to have in our quiver."¹⁸⁰ The defensive capabilities referred

¹⁸⁰ Cited in Jim Sciutto, "US military prepares for the next frontier: Space war," *CNN*, November 29, 2016, available at

to by Mr. Work which, by implication we do not have, could be located in space or on Earth.

In scenarios where U.S. military success absolutely depends on the control of an orbit, even if only for a short period of time, active offensive space control tools might be the only instruments that work with immediacy and reliability. It would be advantageous for the Joint Force to at least have that option. Space policy must provide the policy and resource framework necessary to do more than just watch what happens in the space battle arena and prepare active defenses or offenses.

Chapter 6

Recommendations

The national vision for space, and its national security space policy, should address the reality of possible combat engagements in space. If the United States is to ensure space dominance, its administration and lawmakers must assume some policy risks at a time when near-peer competition in space continues to grow rapidly and significantly. The country may suffer great damage if its leaders do not take steps to mature national spacepower. The reasons for this urgency are clear, General Raymond has stated: “Through intense study of our potential enemies, validated during multiple war-gaming exercises, we know that space is critical should our nation be plunged into conflict.”¹⁸¹ Therefore, a comprehensive defensive approach, which may include active offensive and defensive combat operations, is required to ensure national safety.

General Mark Milley, Chairman of the Joint Chiefs of Staff, has resisted a call for weapons in space but has stated nonetheless that, “the first shots of a future war between great powers is likely to be in space and cyber.”¹⁸² This is a rather sobering thought. The former Air Force Secretary, Heather Wilson, also implicitly addressed this question when she stated that, without specifying what capabilities, “there may come a point where we demonstrate some capabilities so that our adversaries understand they will not be able to deny us the use of space without consequences.”¹⁸³

¹⁸¹ Raymond, “Space dominance requires taking technology and policy risks.”

¹⁸² Manson and Shepherd, “US military officials eye new generation of space weapons.”

¹⁸³ Aaron Bateman, “America Can Protect Its Satellites Without Kinetic Space Weapons,” *WarOnTheRocks.com*, July 30, 2020, available at

Defense space no longer simply involves the combat support function. All interested parties must assume, for defense planning purposes, that China and Russia, given the right opportunity and circumstances, could attack U.S. and allied spacecraft using kinetic or non-kinetic options. The nation may never experience such a combat situation but, in light developments over the past several years, that statement may rightly be characterized as overly optimistic. It is better to plan and consider future possibilities, based on observations of state behavior. Given the need for freedom of operations in space, not only is it advisable for the country to adopt passive defense measures—such as disaggregated constellations for survivability, to deter a “first-strike” against U.S. spacecraft—it is also highly prudent to evolve thinking and capabilities related to combat engagement involving space systems.¹⁸⁴

Policy that does not actually implement and evolve U.S. spacepower has the negative effects of inaction, inadequate action, or misguided action, and is potentially catastrophic with respect to the nation’s ability to enforce its deterrence strategy or effectively fight a battle that may involve space warfare. The consequence of not working toward a solid, fully sanctioned policy when it comes to space warfare is that trouble surrounding this issue will continue to haunt this administration and future administrations. The collective unwillingness to do so, if it endures, will thwart future defense planning and budgeting, the formulation of appropriate strategies, and the ability of Washington to

<https://warontherocks.com/2020/07/america-can-protect-its-satellites-without-kinetic-space-weapons/>.

¹⁸⁴ See for example, the remarks of Army National Guard Maj. Gen. Tim Lawson in Jon Harper, “Space Command Hints at New Capabilities to Counter China, Russia,” *National Defense Magazine Online*, August 21, 2020, available at

<https://www.nationaldefensemagazine.org/articles/2020/8/21/us-space-command-hints-at-new-capabilities-to-counter-china-russia>.

speak with a coherent voice to the American public and foreign governments.

This study makes the following basic observations:

1. Rhetoric, capabilities, deeds, and the content of presidential directives reflect real, or the sum of, national security space policy. It is important to look beyond official directives and documents to determine actual space policy. What the nation's leaders say, do, and build offer the best representation of policy, and it is the goal of the policy directive to best reflect and promote that understanding.
2. That policy directive, which recognizes specific ends, must be used as a basis for developing strategy, delivering a consistent message, and organizing and making budgets.
3. National security space policy should be forward-looking and reflect vision and guidance for near-term security challenges while anticipating and not unnecessarily hamstringing future leaders who must deal with far-term challenges.
4. U.S. national security space policy should remain vigilant to the reality and enduring nature of threats to U.S. space systems and the uncertainties they pose.
5. Policy should strive to stay ahead of threats posed by other states by encouraging and enabling the development of defenses (military capabilities and strategies), and rely, to the greatest extent possible, on deterrence to address near-term

threats as part of a larger and longer-term strategy of space defense.¹⁸⁵

Some special emphases are required in the areas of education, transparency, and foreign relations.

Education

General Raymond correctly identified the core problem facing this nation concerning greater security in space: "I think there's an awareness issue. The average person in the world doesn't understand how their way of life is linked to space. I don't think the average person understands the threat that exists today."¹⁸⁶ The problem is, "satellites don't have mothers," stated the general; how then does leadership convince people of the need to protect important national space assets?¹⁸⁷ One cannot address the more challenging policy issues of space control and force application in space until the public understands why space is important, and how and why other nations may want to jeopardize U.S. assets in space. The American people need to understand that space warfighters are essential to the "American way of life" and the "American way of war."¹⁸⁸

¹⁸⁵ Deterrence is deterrence, not limited to any place in its functioning. Just like land or sea, you can deter provocations in space, but that is not "space deterrence" – any more than there is "land deterrence." Deterrence is shaping behavior in different arenas.

¹⁸⁶ Cited in Hitchens, "Raymond Urges NATO Space Ops; Europeans Fear Offensive Missions."

¹⁸⁷ Sandra Erwin, "Space Force eyes closer ties with civil space: 'It's good for taxpayers,'" *SpaceNews Online*, February 3, 2021, available at <https://spacenews.com/space-force-eyes-closer-ties-with-civil-space-its-good-for-taxpayers/>.

¹⁸⁸ Abraham Mahshie, "Space warfighters essential to 'American way of life' and 'American way of war,' says Gen. Jay Raymond," *Washington Examiner*, October 27, 2020, available at <https://www.washingtonexaminer.com/policy/defense-national->

Prior to any deployment of space defense capabilities, U.S. defense planners and strategists must strive to understand how and why adversaries might employ space weapons. Strategic messaging on this issue that is properly coordinated within the government would include enhancing public awareness of deterrence approaches should tensions escalate. The message should emphasize that, as China and Russia continue to develop and field space weapons, the United States must also consider developing the kinetic and non-kinetic systems necessary to mitigate an attack and limit any potential damage. All of this, of course, will require adequate resourcing as well as comprehensive and all-of-government awareness initiatives.

It is difficult to overemphasize the importance of clarity and transparency when it comes to developing U.S. space policy to prepare the country for 21st century warfighting. Major General Tim Lawson, Army National Guard and top Space Command official, reflected this significant reality in his response to a question about desired capabilities:

I would love to sit behind some *closed doors* and have this discussion on some of the things we really think we need. A lot of times you listen to that threat picture and you kind of get a little dismayed at what you're seeing, but then you look at our side and - trust me - we've got some things coming. So, it's good news.¹⁸⁹

In fact, most information about the U.S. military's space programs is hidden from public viewing within a classified or "black" budget; this complicates efforts by the public and

security/space-warfighters-essential-to-american-way-of-life-and-american-way-of-war-says-gen-jay-raymond.

¹⁸⁹ Quoted in, Harper, "Space Command Hints at New Capabilities to Counter China, Russia." (Emphasis added).

congressional representatives to know what is being discussed and planned and whether to be concerned about significant capability shortcomings and national strategic needs.

The fact is, the public remains uninformed, in part because U.S. leaders apparently remain unimpressed by the space threat. Representative Kay Granger wrote an entire article, published in September 2020, devoted to characterizing and warning about the broad array of national security threats posed by China, threats that are being addressed by the Department of Defense at many levels. Yet, the article did not mention the importance of space to the nation, China's weapons developments to encroach on U.S. interests in this area, or the fact that space is shaping up to be a key battleground between the United States and China.¹⁹⁰ This is a critical failure of national security policy. The United States must maintain its leadership and freedom of action in space. The current state of play in the policy-making community of the United States is unsustainable.

Information Transparency

The lack of information transparency regarding national security space programs and activities has been a problem for many years. Overcoming the over-classification impediment is critical to public education and will require the energetic involvement of the entire Department of Defense and Department of State leadership, to include the Secretary and the national security space stakeholders and top intelligence officers, led by the director of national intelligence. While some progress has been made, the

¹⁹⁰ Rep. Kay Granger (R-TX), "Great power competition: Why we must confront China's military buildup," *The Hill Online*, September 4, 2020, available at <https://thehill.com/blogs/congress-blog/foreign-policy/515153-great-power-competition-why-we-must-confront-chinas>.

nation must continue to work the over-classification problem and open up to discourse the extremely limited discussion of a number of space programs. Congressman Mike Rogers has underscored that, under current conditions, it is difficult to build support for both the public and members of Congress. According to Air Force Secretary Barbara Barrett: “The lack of understanding really does hurt us in doing things that we need to do in space.”¹⁹¹

Rules and procedures for handling sensitive information about space systems were established early in the space race when the sensitive nature of the nation’s efforts against an existential foe created a “norm” of compartmentalized, classified programs at the highest levels. Whatever the validity of the reasons at the time, currently the partitioned nature of space program classification far exceeds that of other equally sensitive domains—air, land, sea, undersea and cyber. There are at least three major impacts of the current system: Duplication with space acquisition programs; non-existent or rudimentary integration of space capabilities into the plans and exercises of combatant commanders; and, ignorance of specific space threats.¹⁹²

Information transparency must also be reviewed in U.S. international relationships. Despite the importance placed by the United States on supporting and interoperating with allies and military partners, a factor hindering joint and combined operations is restriction of information-sharing. There will be a need to protect some secrets while sharing others with

¹⁹¹ Cited in Nathan Strout, “Barrett, Rogers plan to declassify black space programs,” *Defense News Online*, December 7, 2019, available at <https://www.defensenews.com/smr/reagan-defense-forum/2019/12/08/barrett-rogers-plan-to-declassify-black-space-programs/>.

¹⁹² Blair and Work, “Stovepipes in space: How the U.S. can overcome bureaucracy to improve capabilities.”

coalition partners, and the right balance must be sought.

Work Closely with Allies

The United States will need to develop and execute a coordinated plan for educating its international partners on its space vision and policy, and work to involve its allies in providing interoperable capabilities for combined space operations. To do so would be a significant step beyond simple traditional information-sharing although, as explained above, this too can be expanded. The goal, according to the U.S. Space Command, is to facilitate movement toward mission sharing. “We have other satellites that feed information into our situational awareness catalogue. ...We have partnerships in communications systems. So, I think there’s great opportunity here to develop capabilities that will be mutually beneficial for all of our countries.”¹⁹³ Once the United States and its partners are properly aligned on policy, the mutual objective can be freedom of action in space, the establishment of norms for space behavior,¹⁹⁴ and, when necessary, the achievement of space superiority.

A Final Word

The Biden Administration will likely continue the excellent work of the National Space Commission and undertake its own evaluation of existing National Security Space Policy and Defense Space Strategy to ensure they reflect 21st century space realities. It should then use the opportunity

¹⁹³ Hitchens, “Raymond Urges NATO Space Ops; Europeans Fear Offensive Missions.”

¹⁹⁴ International understanding and agreement of what constitutes unsafe, irresponsible, or threatening behavior in space is nascent. See *Defense Space Strategy*, p. 4.

of a newly published directive to publicize broadly the U.S. vision for space, a vision that speaks clearly and unambiguously to the U.S. interest in maintaining freedom of space in times of peace and war.

The Biden Administration also should make a concerted effort to persuade leaders throughout government, especially in Congress, of the merits of its vision and new policy. It must work to make that vision a reality by preparing the public mind (domestic and foreign) for the possible introduction of new Defense Department programs to compete in a space combat environment to address 21st century national security and military requirements.

All federal departments and agencies, and Congress need to be educated and enabled to carry out a new policy direction. The leadership may wish to establish a bipartisan task force on a path forward and to examine and make actionable recommendations to mature U.S. space policy and space activities. Whatever approach is taken, the adoption of a vision and a national security policy will invariably require a whole-of-government approach, and the National Space Council can help ensure that its success.

If the nation is to be ready to defend U.S. interests in space and use it effectively in the prosecution of a future war, there is a dire need to “streamline” or corral the execution of space policy, the development and execution of which currently falls within the purview of many offices within the U.S. Government. As General Raymond writes, “Our charge in the months and years ahead is to act boldly. In fact, one of the risks I see for the new Space Force is us not acting boldly enough.”¹⁹⁵ Indeed, the entire U.S. national security space enterprise will be at risk in the absence of a decision to proceed boldly.

¹⁹⁵ Raymond, “Space dominance requires taking technology and policy risks.”