SECURING THE HIGHEST GROUND

INTEGRATING COMMERCIAL SPACE INNOVATION INTO NATIONAL SECURITY MISSIONS

The Hon. Mike Rogers &
The Hon. Glenn Nye
Project Co-Chairs

CSPC
MIKE ROGERS CENTER FOR MRC INTELLIGENCE & GLOBAL AFFAIRS

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Prepared in partnership with:

NSI | THE NATIONAL SECURITY INSTITUTE
At George Mason University's Antonin Scalia Law School

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EXECUTIVE SUMMARY

The most significant challenges currently facing the national security space enterprise are not engineering or technical in nature, but human. The processes by which the U.S. Air Force and the National Reconnaissance Office (NRO) acquire and field capabilities, the attitudes toward risk, and the speed at which the bureaucracy moves are stymying efficient and effective integration of emerging capabilities. In particular, they are failing to capitalize on the potential benefits of an emerging and rapidly expanding commercial space enterprise and significant technological innovation being created by new, agile startups across the country.

To be sure, these issues are not limited to the Air Force or NRO, but, rather, are endemic to significant parts of the defense and intelligence bureaucracy (with some key pockets being important exceptions to the rule). While the current leadership of the Air Force—civilian and military alike—appreciates the urgency of the issue and is acting to address it, the reality is that this challenge remains programmatic and systemic in nature.

The modern space enterprise itself is a product of the times in which it developed—largely a sanctuary environment, in which few countries could challenge American dominance in space, let alone field their own comparable space-enabled capabilities. The results of this enterprise are truly astonishing—from GPS-enabled munitions, directed by soldiers and Marines using satellite communications and targeted by exquisite imagery capabilities, to the ability to acquire hugely valuable intelligence collection from around the globe at speed and scale. Together, these capabilities create a global reconnaissance, precision-strike complex that empowers the modern American way of war, a capability the Chinese and Russians have yet to replicate.

SpaceX's First GPS III Mission
Credit: SpaceX

This relatively benign environment for U.S. space operations has, however, fundamentally changed. Russia and China, among others, are developing and fielding significant counter-space capabilities, and are also expanding the scale and capabilities of their own space assets to support terrestrial operations. This is occurring at a pace that is, in some cases, approaching parity with the United States.

At the same time, the commercial space industry is in the midst of a dramatic revolution that is fielding reusable rockets, smaller and more capable satellites, larger constellations, easily replaceable on-orbit vehicles allowing for more regular technology refresh, and more at a pace that is accelerating by the day.

To truly "go fast" in space, to take advantage of the revolution in commercial space, and to outpace America's adversaries, the United States needs to radically rethink the way it approaches national security space from acquisition through mission assurance and on-orbit operations. This likely requires a significant reconsideration of the nature of the enterprise itself.

- The U.S. Government should fundamentally change the way space acquisitions are made— changing from a product to a service by:
    - Committing to the expansion to a significantly larger and more diverse low-earth orbit (LEO) constellation that can service a broader range of intelligence, military, and other government needs.
    - Developing a faster and more robust launch cadence based on an indefinite delivery/indefinite quantity (ID/IQ) model to support a significantly larger LEO constellation, as well as a more robust maintenance and refresh rate for the constellation.

The *New Shepard* at Night
Credit: Blue Origin

- The expansion of the LEO architecture and the increased launch cadence will also result in, and necessitate, a larger and more robust satellite manufacturing industrial base.

- Under such an ID/IQ model for space, launch providers would be assessed against an agreed-upon set of criteria and awarded a base contract and subsequently compete for launch task orders based on price, unique differentiators, or capabilities.
  - This approach will provide better value for the government, increase competitiveness within the launch market, and deliver more flexible and agile capabilities for the U.S. Air Force and the Intelligence Community.
  - By changing the launch cadence and taking advantage of emerging small satellite capabilities, a transition away from large, expensive legacy satellites can occur.
    - This is not to say that there isn't a place for the exquisite capabilities that these vehicles can deliver—the limits of physics prevent some requirements from being met by smaller, less capable assets—however, given the development of significant counter-space capabilities by both peer and non-peer competitors, relying solely, or even primarily, on such assets creates significant exposure and challenges. What is needed is a smart balancing of existing and legacy systems, with new and emerging architectures.
- The U.S. Air Force should develop a robust rapid reconstitution capability, including through the use of commercially available capabilities and leading-edge technologies, to ensure that adversaries will not be able to degrade, disrupt, or destroy a significant portion of America's critical space-based national security capabilities.
  - This reconstitution capability will be enabled, in significant part, by the reorientation of America's space posture to include a broader, more robust constellation at LEO that incorporates emerging capabilities, a significantly expanded launch manifest, and a diversified portfolio of commercial partners.
  - Such reconstitution capability is one leg of the space domain mission assurance set of requirements that also includes resiliency and defensive operations.
- The U.S. Government should take a proactive posture towards and with commercial space, working to identify early opportunities for cooperation and integration to remain on the cutting edge of innovative capabilities.
  - Technological innovation in key areas related to space, including sensors, computing, and communications, is happening much too fast and too broadly for the government to be purely reactive; the government must work to identify these trends earlier, even helping shape them through seed- and early-stage investments and basic research by entities like DIU, In-Q-Tel, DARPA, IARPA, and the various national labs.

- The government must likewise engage with new providers who are developing novel and unique capabilities that can be shaped early to provide significant national security benefits and be more swiftly integrated into the existing architecture.
- This also means that commercial companies should be more broadly integrated into ongoing exercises and conflict scenarios.
- There are, naturally, some roles that should not be delivered solely by commercial companies.
  - Nuclear command and control, for example, ought never be outsourced to a commercial provider (and never would be).
- At the same time, however, key elements of communications, imagery, remote sensing, high speed satellite-based broadband, among others, could well be provided by the private sector at increasing levels.

- Finally, the acquisition and mission assurance calculus employed by the government needs to fundamentally shift from being purely focused on the specific launch vehicle and payload to a broader, more holistic consideration of the capability being delivered to warfighters and intelligence operators. Here again, the optimization and synchronization of launch, satellite manufacturing, and ground segment integration is critical.
  - Acquisition and mission assurance need to be more flexible, agile, and take into consideration the state of reusable and small launch capabilities.
  - For reusable rockets, a flight-hour model of maintenance and operation should be developed, akin to aviation operations.

SpaceX launches an Iridium Satellite.
Credit: SpaceX

A CHANGING SPACE PARADIGM

The Growing Threat Environment in Space

In the last two years, U.S. intelligence analysts noticed a significant trend: the number of worldwide satellite launches nearly quadrupled between 2016 and 2018 alone, from just over 100 to more than 400 satellites launched.[1] That rapid expansion of the global space industry is opening a space domain long dominated by the United States to an increasing number of actors, both state and non-state, benign and malign.

Space-based capabilities form the central nervous system of the U.S. military's globe-spanning operations and support key elements of the U.S. Intelligence Community's collection operations. These capabilities have long provided American policymakers and warfighters a decisive advantage against both peer-competitor nation-states as well as other nation-states and non-state actors.

However, in the modern era, these same capabilities (or at least similar capabilities) are proliferating at an unprecedented rate, from imagery and communications to global positioning and navigation. Indeed, it is a democratization of space capabilities.[2] No longer do the largest nation-states have a monopoly on access to space for military support and intelligence purposes. Indeed, the expansion of commercial capabilities are not only opening this domain to other nation-states, but increasingly also to universities, the private sector, and other non-state actors alike.

A *Falcon 9* before the launch of a classified NRO mission.
Credit: SpaceX

Even as the United States' once dominant position in space is being challenged by new players, potential "near-peer" adversaries such as Russia and China are developing new weapons to deny the U.S. military access to its space assets, as are key semi-peer states like India (as evidenced

1 Dan Coats, "Statement for the Record: Worldwide Threat Assessment of the US Intelligence Community". January 29, 2019. https://www.dni.gov/files/ODNI/documents/2019-ATA-SFR---SSCI.pdf, pg. 17
2 White House, "National Security Strategy of the United States". December 2017. https://www.whitehouse.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf, pg. 31

by a recent successful anti-satellite test)[3]. These capabilities exist on a continuum from those that create immediately reversible effects to permanent degradation or destruction.[4]

A similar Russian ground-based ASAT capable of targeting satellites in low-earth orbit is expected to become operational within the next few years, and Moscow has already fielded a ground-based laser weapon intended to dazzle or blind sensitive space-based optical sensors.

"China and Russia are seeking to expand the full spectrum of their space capabilities," the Office of the Director of National Intelligence's 2019 Worldwide Threat Assessment concluded, even as both countries "are training and equipping their military space forces and fielding new antisatellite weapons to hold U.S. and allied space services at risk."[5]

In its report "Challenges to Security in Space," the Defense Intelligence Agency echoed those warnings. "Chinese and Russian military doctrines indicate that they view space as important to modern warfare and view counter-space capabilities as a means to reduce U.S. and allied military effectiveness,"[6] the report states. "The advantage the United States holds in space—and its perceived dependence on it—will drive actors to improve their abilities to access and operate in and through space."[7]

As noted in the 2018 National Defense Strategy, the United States is once again entering an era of great power competition and potential conflict, as well as increasing threats from other international and non-state actors. When combined with rapid technological advancement, the reduced cost of access to space, and profound bureaucratic inertia in the United States government, this reality is confronting the nation once again with a "Sputnik" moment.[8] Like it or not, the United States is in a space race that the country cannot afford to lose. On the current trajectory, the United States' space superiority will continue to erode, and the fighting edge the U.S. military currently enjoys over potential adversaries as a result of its space-based capabilities will dull significantly over time.

In the words of Dr. Will Roper, the Assistant Secretary of the Air Force for Acquisition, Technology, and Logistics, "We're not only in a competition with other nations, we're in a period where technology changes at a rate it never has before."[9]

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3 Loren Grush, "India shows it can destroy satellites in space, worrying experts about space debris". The Verge. March 27, 2019. https://www.theverge.com/2019/3/27/18283730/india-anti-satellite-demonstration-asat-test-microsat-r-space-debris

4 Defense Intelligence Agency, "Challenges to Security in Space". February 1, 2019. http://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf

5 Ibid, pg. 17

6 Ibid, pg. iii

7 Ibid.

8 Department of Defense, "Summary of the 2018 National Defense Strategy of the United States". January 19, 2018. https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf, pg. 2

9 U.S. Air Force Official Twitter. March 6, 2019. https://twitter.com/usairforce/status/1103414543659741189

The Burgeoning Commercial Market

Falcon Heavy launches from Pad 39A.
Credit: SpaceX

At the same time that the operational environment in space is becoming more congested, contested, and competitive, the commercial market for space-enabled capabilities has expanded dramatically. According to Morgan Stanley, "the global space industry could generate revenue of $1.1 trillion or more in 2040, up from $350 billion, currently."[10]

In 2017, over 160 investors entered into deals worth over $2.5 billion spread across 73 ventures, according to research by Bryce Tech.[11] The number of venture investments in the space industry in 2017 broke the previous record of 65 set just two years earlier. Three space companies alone secured over $1 billion in investment: SpaceX, Blue Origin, and OneWeb[12].

Today, the United States enjoys an impressive launch market. SpaceX now flies national security payloads alongside United Launch Alliance, and the former also boasts an impressive book of commercial business. Rocket Lab, Vector, and Virgin Orbit are pioneering small commercial and national security launch capabilities, and others are poised to enter the market. Blue Origin is regularly flying its New Shepard rocket and expects to field the New Glenn—a reusable rocket that it expects to be able to make upwards of 25 flights of each of its booster stage—by 2021. The space tourism market is also making headways with Virgin Galactic and Blue Origin planning to fly commercial customers to space.

These companies are also opening up space to new satellite and payload providers at greatly reduced costs. The once powerful nation-state monopoly on assured launch is now broken with a strong, competitive market available. Mega constellations of hundreds of small satellites are no longer restricted to the pages of science fiction. SpaceX (with its Starlink constellation), OneWeb, Telesat, LeoSat, and others are all seeking to put more satellites in low-earth orbit for uses ranging from imaging to communications and low-latency internet access in otherwise

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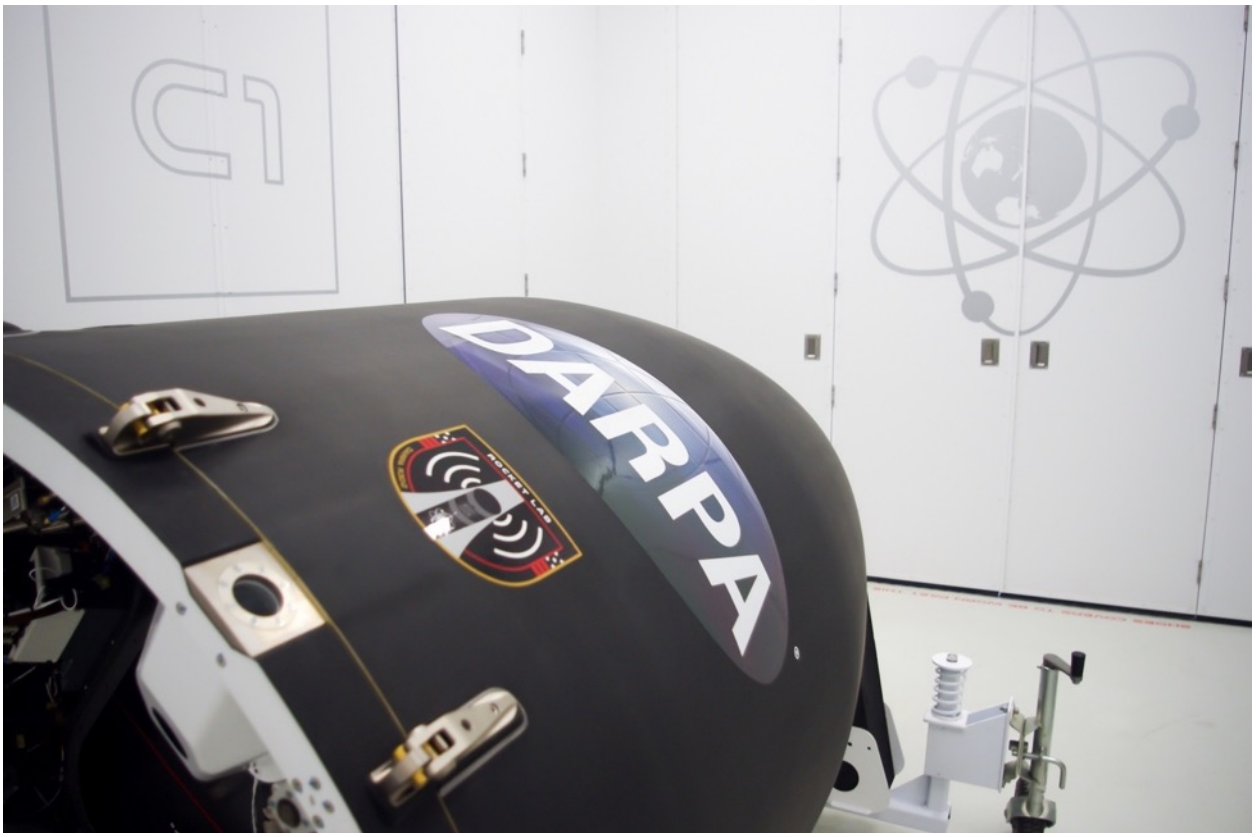
10 Morgan Stanley, "Space: Investing in the Final Frontier". November 7, 2018. https://www.morganstanley.com/ideas/investing-in-space

11 Bryce Space and Technology, "Start Up Space: Update on Investment in Commercial Space Ventures, 2018" https://www.brycetech.com/downloads/Bryce_Start_Up_Space_2018.pdf, pg. iii

12 It should be noted that OneWeb has relations with Russia, presenting potential security concerns for any involvement in U.S. national security space efforts. Maria Kolomychenko, "Exclusive: Russia opposes U.S. OneWeb satellite service, cites security concerns." Reuters. October 24, 2018. https://www.reuters.com/article/us-oneweb-russia-security-exclusive/exclusive-russia-opposes-u-s-oneweb-satellite-service-cites-security-concerns-idUSKCN1MY1P8

denied areas. Starlink has two satellites in orbit, and OneWeb recently launched six in February 2019.

Enabled by smaller cube and nano-satellites, the commercial sector is finding new and novel ways to exploit space for terrestrial benefit—and the government is getting in the small sat business as well. For example, two MarCO CubeSats relayed some of the first images of Mars on the recent InSight mission to the red planet.[13] The satellite constellation of Planet, an imaging company, has the ability to image any point on earth twice daily at a 72 cm resolution, a revisit rate that is expected to increase in the future. Other companies are exploring the use of synthetic aperture radar, signals geolocation, and other capabilities to identify trends and conditions for everything from agriculture to climate change.



Rocket Lab launched a DARPA payload in March 2019.
Credit: Rocket Lab

13 NASA, Mars Cube One (MarCO) https://www.jpl.nasa.gov/cubesat/missions/marco.php

Rising to the Challenge

In response to this transformation of space, the tremendous opportunities it brings for private enterprise and potential public benefits, as well as the significant threat that growing adversary counterspace capabilities pose to America's ability to take advantage of this innovation, the National Security Space Program (NSSP) was created in 2018. The NSSP grew out of a recognition that if the United States is to regain its leadership in space, it must leverage new commercial space technologies, integrate them into the national security space architecture, and prepare for a rapidly transforming space domain.

The NSSP is a joint program led by the Mike Rogers Center for Intelligence & Global Affairs (MRC) and the Center for the Study of the Presidency & Congress (CSPC). Congressman Mike Rogers, the former Chair of the House Permanent Select Committee on Intelligence (HPSCI), embedded his policy center in CSPC to take advantage of CSPC's non-partisan, results-driven, and policy-oriented approach.

Chairman Rogers also serves as CSPC's inaugural David M. Abshire Chair, where he leads the Center's foreign and national security policy initiatives. While in the House, Chairman Rogers had a key interest in national security space and oversaw the Intelligence Community's space programs as Chair of HPSCI. Upon leaving Congress, his interest in the subject continued and the NSSP became a natural outgrowth of that interest. Using personal relationships, his reputation for non-partisanship, and his unique insights into the challenges of national security space, Chairman Rogers led the program from its initial concept through to the successes achieved to date.

Chairman Rogers works hand-in-hand with CSPC President and CEO, former Congressman Glenn Nye, who served on the House Armed Services Committee. Together, Chairman Rogers and Congressman Nye bring a strong, bipartisan approach to this important issue.

Over the course of the past year, and in partnership with George Mason University's National Security Institute,[14] NSSP held five major off-the-record conversations in Washington D.C. and Los Angeles, as well as a table-top exercise in Washington to discuss the challenge and opportunities available in this critical area and to identify potential changes in regulation, culture, approach, and scope that could positively affect how the United States organizes, trains, and equips capabilities in the space domain. Each discussion, outlined in this report, was anchored by a key speaker who provided unique insight and perspective on the challenges and opportunities in "New Space."[15] Summaries of these discussions were circulated to program participants for comment, generating further discussion and dialogue.

14 National Security Institute, George Mason University, https://nationalsecurity.gmu.edu/

15 "New Space" typically refers to new emerging space companies, such as SpaceX, Blue Origin, and Rocket Lab, to distinguish it from legacy space companies such as Boeing and Lockheed Martin.

The program's director, Joshua C. Huminski, also conducted numerous off-the-record meetings with key leaders in the new space industry, the Department of Defense, and United States Air Force, developing a broad and deep network of thought leaders and innovators, all of whom are deeply committed to NSSP's success. Through this network, CSPC's leadership and policy team have had unparalleled access to private sector and government thinking on U.S. space policy, enabling the creation of a strategic vision and the development of potential new policies that could allow the government to take advantage of the major innovation taking place in the growing private-sector space industry.

NSSP's efforts also come at an opportune time, with the new Administration showing a strong interest in space given the White House's proposal for the creation of a new Space Force and the establishment of U.S. Space Command as the newest unified command in the American military. These White House efforts have focused the larger Executive Branch's attention on space, driving it to be a significant part of the broader national security discussion across the government.

Until 2017 and 2018, much of the debate on space issues within the government had been technical, focused on engineering challenges and improving core capabilities for intelligence collection, communications, and command and control, as opposed to policy, strategy, and doctrine in the space domain. Given this fact, much discussion was long dominated by military and intelligence views focused on technical means and outcomes, as well as traditional corporate voices seeking to build and expand on existing efforts. NSSP has offered new participants an opportunity to engage in a meaningful manner, enhancing and diversifying the dialogue on these important issues.

Diagnosing the Problem

In 2000, the Commission to Assess United States National Security Space Management and Organization—more commonly known as the Space Commission—met under the chairmanship of Donald Rumsfeld, who would go on to become President George W. Bush's Secretary of Defense. The Commission was directed "to assess the organization and management of space activities in support of U.S. national security."[16]

The "Rumsfeld Commission" highlighted many of the issues in national security space in 2000.
Credit: Department of Defense

A central goal of the Commission's work was to assess the costs and benefits of establishing an

16 "Report to the Commission to Assess United States National Security Space Management and Organization". January 11, 2001. https://apps.dtic.mil/dtic/tr/fulltext/u2/a404328.pdf, pg. vii

"independent military department and service dedicated to the national security space mission" and to holistically address the challenges of organizing, training, and equipping the U.S. military and Intelligence Community for space.

In September 2017, SpaceX flew the Orbital Test Vehicle on top of a *Falcon 9*.
Credit: U.S. Air Force

The Commission rightly noted that "the U.S. Government is increasingly dependent on the commercial space sector to provide essential services for national security operations." [17] And yet, it also found that the U.S. government had "*no comprehensive approach to incorporating commercial and civil capabilities and services into its national security space architecture.*" [18] [emphasis added]

That the government didn't have a coherent approach—let alone a full-scale strategy—for integrating commercial capabilities into the national security space architecture is perhaps unsurprising given that the Commission's core work was conducted nearly two decades ago. The commercial market at that time was a shadow of what it was to become. Indeed, the commercial space sector in the 1990s experienced a tumultuous period with few companies meeting expectations or promises.

At the time, few could imagine the rate at which commercial space would grow, fielding novel technologies and capabilities that would transform the space environment. In the nearly two decades since the Commission first met, the space commercial sector has grown exponentially. Many of the technologies fielded today were barely on the drawing board in 2000 even if they had been conceptualized by that point. Entrepreneurs like Elon Musk, Jeff Bezos, and Richard Branson were only notionally toying with the idea of reaching out into space, if at all, with each of them principally focused on creating their successful business endeavors far afield from the space industry.

17 Ibid, pg. viii
18 Ibid, pg. 72

The Future: Twenty Years Later

Yet, twenty years on, while the commercial space industry has grown by leaps and bounds, delivering massive innovation for both private and public applications, the U.S. government still does not have a coherent strategy for the integration of commercial companies into the national security space architecture. While existing providers are delivering new capabilities that can be used for these vital missions, there are few defined paths or avenues for the government to rapidly adopt and deploy new or emerging technologies. Indeed, even with the more flexible authorities increasingly being deployed by innovative departments and agencies to look at and buy new technology, it is notable that there are still precious few pathways pathfinder or prototype programs to transition into full-scale programs of record.

General John Hyten, the commander of U.S. Strategic Command, is a proponent of "going fast" in space.
Credit: U.S. Air Force

The existing structure and pathways for acquisition were created and defined by a period in which the United States enjoyed uncontested dominance in space. At the time, the Soviet Union was the only real peer competitor in space and, even so, Washington's capabilities greatly exceeded those of Moscow. Even with the so-called peace dividend following the end of the Cold War, the United States generally remained considerably ahead of its nearest competitors, Russia and China. Moscow and Beijing did not remain idle, however, and rapidly worked to develop their own space capabilities and systems designed to counter our strengths derived from and in space, as did other key nation-states.

Put simply, the national security space apparatus was built, designed, and operated for an environment of sanctuary that no longer exists—one in which the United States was largely unchallenged by key adversaries and where it largely retained a free hand for action. While the United States had initially innovated rapidly in the space arena, as it stared down the challenge posed by the Soviet Union. However, in the post-Cold War environment, the United States could then afford ten-year acquisition timelines, as there was no exigent pressure to move faster or innovate rapidly. Indeed, the relative battlefield dominance the United States enjoyed with respect to space-enabled capabilities in the post-Cold War era were created by the early innovative spirit that drove the development of exquisite imaging capabilities, precision navigation and timing, and high-speed communications.

Yet as the world changed into a multi-polar environment and technological innovation began to enable our peer and near-peer competitors to gain ground, Washington largely acted as if the environment remained static. While events like China's 2007 successful anti-satellite test and

Iran's launch of satellites, even if only for a short period, should have been a wakeup call, yet they went largely ignored when it came to substantive changes in U.S. posture.

The Space Enterprise Vision & Space Warfighting Construct

Within the Air Force and Intelligence Community, there was clearly an appreciation of this growing threat and a desire to counter it. The institutional inertia, however, and a lack of political will and budgetary support stymied efforts to advance out of the sanctuary mindset.

There are signs that this approach is changing, however. The recognition of the threat and the need to counter it is clearly reflected in the Space Enterprise Vision (SEV), a recent joint U.S. Air Force and National Reconnaissance Office (NRO) product, which seeks to "chart a course to a resilient space enterprise by 2030 that is able to deter aggression within the space domain and, when necessary, prevail in a multi-domain conflict that extends to space."[19] The Space Warfighting Construct (SWC) builds off of that model and seeks to create more resiliency in the architecture and operationalize the broader SEV.

The *New Shepard* on the launch pad in West Texas
Credit: Blue Origin

19 United States Air Force, "Space Warfighting Construct". April 3, 2017. https://www.afspc.af.mil/Portals/3/documents/Space%20Warfighting%20Construct%20Handout%20-%203%20Apr%202017.pdf?ver=2017-04-05-191055-757

While much of both the SEV and SWC remain classified, the aim and intent are to reorient the entire space enterprise to a war footing is clear. While conceptually the efforts are sensible, the long-term implementation and efficacy—particularly following the establishment of U.S. Space Command and Space Development Agency as well as the currently uncertain future of the Space Force—remains to be seen.

The Need for Integration

During the post-Cold War lull, the national security space enterprise experienced a period of infrequent launches, a lack of political urgency, and the absence of a widely shared appreciation for the threat (outside of certain parts of the Air Force and Intelligence Community), and business as usual. The low launch rates meant that satellites needed to be large and built to last for a significant period of time. This also meant that mission assurance for these launches needed to be high—a $1+ billion payload had to make it to orbit, requiring a $500+ million launch and rocket. This increased the cost and value of each launch, making risk avoidance and aversion the defining characteristics of the national security space enterprise's culture, and perhaps understandably so.

As far back as 2000, however, the Space Commission recommended that the U.S. "develop a strategy for integrating and funding commercial services to meet, as practical, current and future national security space requirements."[20] The emergence today of new technologies, including dramatic improvements in optics, communications, and sensing, enabled in orbit by cheaper, reusable, and diversified launch vehicles, affords the national security enterprise a new set of diverse capabilities that can be rapidly refreshed, as needed. As previously noted, over the same timeframe, America's adversaries continue to develop counterspace capabilities designed to degrade our strengths in orbit.

The Rocket Lab *Electron* is prepared for its third launch
Credit: Rocket Lab, Kieran Fanning

When the Space Commission made its recommendation nearly two decades ago, they noted that "[t]he U.S Government, as a consumer, a regulator or investor, is not currently a good partner to the national security space

20 "Report to the Commission to Assess United States National Security Space Management and Organization". January 11, 2001. https://apps.dtic.mil/dtic/tr/fulltext/u2/a404328.pdf, pg. XXVII

industry,"[21] and while technology has certainly improved and the threat has increased, not much has changed at a strategic level when it comes to the government's relationship with the new private sector space industry in the intervening years.

It is thus critical that our approach to national security space fundamentally change. For example, while there are pockets of growth and positive trends in parts of the government, as a whole, the U.S. Government fundamentally lacks a coherent strategy for investment in, acquisition from, or partnership with the commercial sector. The Defense Advanced Research Projects Agency (DARPA), the Intelligence Advanced Research Projects Agency (IARPA), and Defense Innovation Unit (DIU), along with other offices, are leading the way in partnering and working with the space sector, but these organizations represent the exception, not the rule. As a whole, large agencies in this space, like USAF and NRO, lack a core approach to effectively acquiring and implementing national security space programs. As such, from the way the U.S. government invests in space ventures to the way it acquires capabilities, the national security space enterprise needs strategic coherence and greater focus and consistency if it is going to be able to take full advantage of the unique potential that the commercial space industry can offer to enhance deterrence, increase resiliency, and deliver better effects for the military and Intelligence Community, at a better value to the taxpayer.

The *New Glenn* will reportedly be capable of 25 flights.
Credit: Blue Origin

21 Ibid, pg. 72

The simple reality is that the United States cannot afford to continue operating as though space were a benign sanctuary. That paradigm has broken. China and Russia, as aforementioned, know and understand intimately America's reliance on space, and they are working to not only develop their own capabilities but also to counter America's existing strengths.

The United States space enterprise must change its approach to commercial space and its integration into the national security space architecture. Failure to deliver such strategic coherence, focus, and consistency has the serious potential to cede space dominance to Beijing, Moscow, and others. This is a result our nation can hardly afford in the current global strategic environment. Getting it right, however, will secure American leadership for the next generation and open up untold opportunities in outer space.

A recovered *Falcon 9* on a SpaceX drone ship.
Credit: SpaceX

RECOMMENDATIONS & AREAS OF REFORM

Breaking the National Security Space Architecture Mold

Today, the national security space architecture is largely, though not exclusively, reliant on bespoke satellites in small constellations that provide exquisite capabilities. While these assets achieve their mission, their utility is undermined by their limited numbers, slow rate of refresh, existing vulnerabilities, and a relative lack of countermeasures.

A new approach would fundamentally change the way space is acquired—from a product to a service—and would take the current approach of purchasing space capabilities and assets in five- or ten-year blocks from a limited pool of providers and broaden it to acquire significantly more satellite vehicles, focusing them each on a core set of advanced sensors, utilizing commercial launch at a more rapid rate to enable regular technology refresh at a much lower price point, with a range of competition amongst sensor, bus, and launch vendors to generate innovation and speed at a lower cost.

To that end, the authors recommend:

1.) The 116th Congress should hold hearings on fundamentally reimagining the national security space enterprise with a view to strengthening deterrence, enhancing resiliency, and delivering better effects for our warfighters. The authors suggest:
   - House Armed Services Committee—Strategic Forces Subcommittee
     - Next generation architectures for resiliency and deterrence.
   - Senate Armed Services Committee—Strategic Forces Subcommittee
     - Delivering space-enabled capabilities to the warfighter.

2.) The Government Accountability Office should be directed to conduct a study into the challenges, obstacles, and costs associated with the government adopting a broader range of satellite vehicles, sensors, and launch platforms, as well as the use of fractionated architectures and mega-constellations.

3.) The U.S. government should commit to a whole-of-government approach to national security space capability acquisition, under which a guaranteed (large) number of national security launches are pre-approved per year to support the broader set of low earth orbit (LEO) (discussed below) missions for the U.S military and Intelligence Community.
   - Providing the assurance of a significant number of guaranteed launches will permit the new commercial space marketplace to be prepared to support such requirements by creating a launch services portfolio including small, medium, and heavy-lift launch vehicles, essentially establishing a new core ecosystem for launch and developing a "highway to space."

- A higher launch cadence for national security payloads will also provide the opportunity for putting in place a rapid reconstitution capability as discussed below.

4.) Under this new launch-as-a-service program, companies will qualify and compete for launches on an ID/IQ[22] basis. The government will certify that vendors meet agreed-upon base standards for mission assurance, capability, and business capacity. Upon winning the base ID/IQ contract, companies will then compete for "task order" launches.

- This approach permits the government to benefit from increased competition amongst launch providers, with prices driven down but quality remaining relatively high, as companies that fail to meet established standards are eliminated from future competition.
    - This mechanism allows for both incentives and punishments on the part of the government. Bonuses, for example, could be awarded for vendors that get to orbit faster, with higher assurance, or provide additional capabilities. Conversely, vendors that fail to meet the requirements are removed from the contract.[23]
    - This approach also allows launch providers to compete on cost and differentiating factors and could significantly speed up acquisition and time-to-orbit, versus the old acquisition model, which treated each new launch vehicle as an individual program to be evaluated and re-evaluated as major improvements are made.
- For commercial space, this would offer multiple benefits—a guaranteed customer in the government, a "seal of approval" for the commercial market, and also the same economies of scale noted above, allowing commercial service providers to take advantage of large LEO constellations and the attendant increase in capabilities.
- Such a model would support existing programs like DARPA's Blackjack effort which seeks to develop a large LEO constellation to demonstrate the ability to obtain the type of capabilities traditionally found in geostationary orbits in a more accessible orbital plane.
    - Companies could compete for Blackjack launches, enabling DARPA or successor organizations to ensure a faster and more consistent tempo of launches with ability to provide for rapid refresh and reconstitution.

22 Indefinite Delivery/Indefinite Quantity

23 NASA's Commercial Orbital Transportation Services (COTS) model is an example of this approach. https://www.nasa.gov/content/cots-final-report

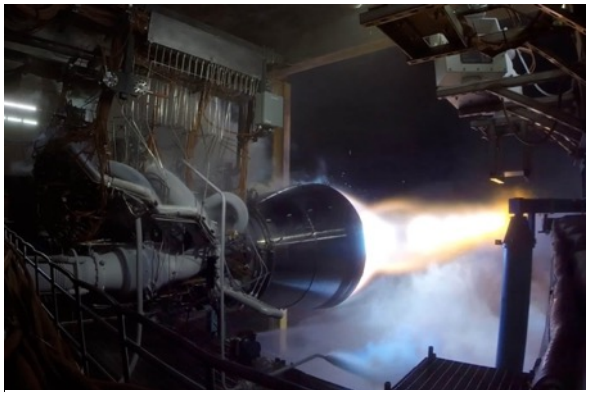
5.) The U.S. government should, concomitantly, commit to the proliferation of national security capabilities in LEO and agree to acquire a LEO constellation or services provided by a LEO-based constellation.

- Demonstrating a strong commitment to creating a large, updateable, and resilient national security constellation in LEO could fundamentally change the way the United States operates in space and take advantage of the growing industry already providing similar services to other sectors of the economy, while allowing that same industry to develop more robust and (eventually) exquisite capabilities.
- This acquisition program could operate under the new Space Development Agency (SDA) which could be tasked by the Secretary of Defense with centralizing the requirements from across the various military services and defense intelligence agencies and coordinating with the private sector companies.

6.) As an interim measure, the Department of Defense should explore the acquisition of access to the capabilities of the commercial mega-constellations currently being developed and deployed.

- Companies are endeavoring to field and deploy mega-constellations in low-earth orbit with the objective of delivering low-latency, high bandwidth broadband communications.
- The Department of Defense should, if it is not already doing so, engage with these companies to:
  - Acquire or modify satellites on the assembly line and repurpose them for USG usage;
  - Consider partnering with these companies to build out a parallel national security infrastructure; and/or
  - Obtain services from these constellations to augment existing communications, broadband, and surveillance requirements.

Taken together, the approach and initiatives recommended above allow for a more responsive and agile space architecture with an accelerated refresh rate for technology insertion. Whereas today, the time horizons for satellite acquisition are often a decade or more in length, more frequent launches of smaller payloads (with concomitant shorter lifespans) allows this type of constellation to take advantage of new and emerging technologies at a faster rate.



The hot fire test of Blue Origin's BE-4 engine.
Credit: Blue Origin

Likewise, when it comes to strategic and tactical deterrence, having a diversified and more robust

architecture creates a disincentive for adversaries like China to attack. For example, in a conflict scenario in which the United States operates a mega-constellation of hundreds of satellites, and the Chinese or Russian military is able to successfully target a number of them, if built correctly, the remaining network could potentially adapt to the loss. Similarly, in the event the United States is taking advantage of a commercial mega-constellation, adversaries will have to guess as to which satellites to focus on, increasing the likely overall resilience of the network.

Such an approach would also provide the United States with time to respond—introducing another deterrence element in a potential adversary's calculus. Combined with the rapid reconstitution model outlined below, this approach could help significantly decrease the relative benefits of a space-focused first strike.

Two first stages of the *Falcon Heavy* landing at Cape Canaveral.
Credit: Space X

Rapid Reconstitution of National Security Space Assets

Rapid reconstitution of space assets is a capability the United States does not presently field, but is also a critical need given the current state of adversary counterspace capabilities. This is, however, a capability that would go some way to enhance deterrence and increase the likelihood of mission success for the national security space enterprise. Reconstitution sits alongside (but each pillar is insufficient alone) defensive operations and resiliency as the key principles of space domain mission assurance.[24]

Additionally, the pursuit of a true rapid reconstitution capability will, in the view of the authors, drive the identification and integration of new commercial capabilities and diversify the suite of tools available to the Department of Defense and Intelligence Community.

Not all missions will be replaceable—exquisite small constellation satellites may simply not be replaceable in a timely fashion and core government missions like hardened nuclear communications, space-based early warning, and the like may not be appropriate for rapid commercial reconstitution.

That said, where appropriate, certain capabilities such as core imagery collection, communications, and remote sensing may be replaced or augmented with commercial off-the-shelf capabilities, particularly when there is a critical reconstitution need. Moreover, having an assured, broad set of commercial satellite, sensor, and launch capabilities and integrating national security payloads with this new set of capabilities increases the government's ability to be able to deliver enhanced capabilities on orbit sooner, including exquisite sensors, as appropriate.

Achieving rapid reconstitution will necessitate the acquisition of a broad base of launch capabilities and diverse new payloads to meet existing and future missions, and, subsequently, will drive the need for integration both into the existing architecture and into future force structures. In the words of one discussant, "change what you buy and you will change the culture."

Rapid reconstitution in this capacity is as much a capability as it is a driver for organizational, institutional, and cultural changes. As aforementioned, resiliency and defensive operations are critical components of the triad of space domain mission assurance, but reconstitution offers a capability that will have secondary and tertiary benefits to include (potentially): higher operational launch tempo, diversified architectures, reformed mission assurance, and a fundamental shift in the strategic thinking of space acquisition.

24 Office of the Assistant Secretary of Defense for Homeland Defense & Global Security, "Space Domain Mission Assurance: A Resilience Taxonomy". September 2015. https://fas.org/man/eprint/resilience.pdf

To that end the authors recommend:

7.) The 116th Congress should hold hearings on rapid reconstitution including through the use of commercial capabilities. Separately, and in support of this effort, all members of the 116th Congress would benefit from a uniform threat briefing. The authors suggest:

- House Armed Services Committee—Strategic Forces Subcommittee
  - Rapid reconstitution of space assets: public-private solutions to current and future space threats.
- Senate Armed Services Committee—Strategic Forces Subcommittee
  - Achieving survivability in a contested space environment.
- House Permanent Select Committee on Intelligence
  - CLOSED: Intelligence Community perspectives on threats to space assets.
- Senate Select Committee on Intelligence
  - CLOSED: Achieving resiliency in the face of emerging space threats through 2025 and Intelligence Community responses.

8.) Congress should amend Section 10 U.S.C. 2273[25] to include a requirement for the rapid reconstitution of critical national security space assets.

- The determination of critical national security space assets should be made jointly by the Secretary of Defense and the Director of National Intelligence and should be reviewed and recertified at least every four years if not at two-year intervals.
- This determination should also include the identification of critical commercial assets or elements of existing constellations that are or could be used in the event of a national emergency.

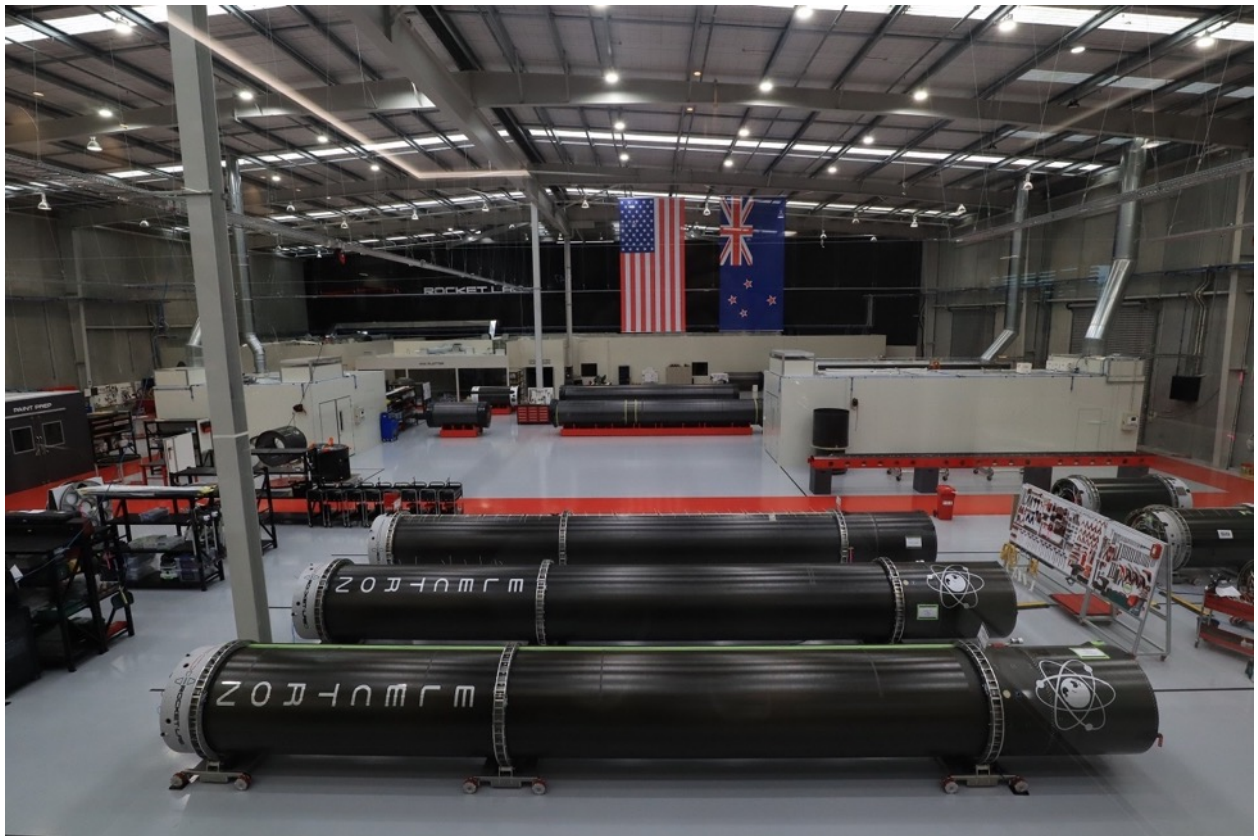
9.) Congress should mandate that the establishment of a rapid reconstitution capability be achieved and certified by the Secretary of Defense and the Director of National Intelligence not later than 2023.

- Thereafter, both the Secretary of Defense and the Director of National Intelligence are required to certify annually that the capability exists and is ready for fielding should the situation necessitate its use.
  - In both cases, the Secretary of the Air Force will be the Secretary of Defense's principal adviser on determination and subsequent certification of such a reconstitution capability, just as the Director of NRO would serve in a similar capacity to the DNI.

25 10 U.S. Code § 2273. "Policy regarding assured access to space: national security payloads". https://www.law.cornell.edu/uscode/text/10/2273

10.) Congress should require, as a matter of policy, that the rapid reconstitution capability include launch, payload, communications, and ground terminals and that, where appropriate, commercial companies should be relied upon to deliver these capabilities.

- Rapid reconstitution should likewise include the acquisition of commercial capabilities such as imagery, communications, and remote sensing services as a stop-gap measure pending full replacement.
- Further, reusability of both satellite vehicles and launch platforms must be a key component of any rapid reconstitution capability.
    - In the event that reusable components are not to be used, particularly with respect to launch, where a variety of reusable platforms are increasingly becoming available, the Secretary of Defense and Director of National Intelligence should be required to submit, in writing, a justification for such a decision. It should be noted that this language was passed in the most recent NDAA.



Rocket Lab manufactures and launches the *Electron* rocket.
Credit: Rocket Lab

The authors recognize that the capability does not yet exist, but certain efforts are actively underway. The Space Development Agency (SDA), could well become the organization outlined below. Congress should:

11.) Authorize the creation of a joint interagency Rapid Reconstitution Program (RRP). This program would coordinate U.S. Air Force, NRO, DARPA, IARPA, and DIU efforts while accounting for the unique and different requirements of military and intelligence customers.

- The U.S. Air Force and the NRO will serve as the primary customers of this capability and guide the requirements based on the determination of the Secretary of Defense and Director of National Intelligence mentioned above.
- Congress and the Office of Management & Budget (OMB) will maintain the traditional oversight and accountability roles and work to ensure that there is no unnecessary duplication of programmatic efforts.
- This should include Blackjack [26] —DARPA's program to develop a large constellation of low-earth orbit satellites as well as DARPA's Launch Challenge[27]. This program aims at fostering the small, heavy lift, and reusable commercial launch space. Both programs will remain under DARPA leadership but will be part of the broader RRP effort.
- DIU should lead on identifying and enabling non-traditional and emerging small commercial companies to help deliver and integrate their capabilities into the RRP effort.
    - To facilitate this Congress should undertake two DIU-focused reforms:
        - ⇒ First, authorize a dedicated funding stream specifically focused on rapidly deployable space capabilities and space reconstitution.
        - ⇒ Second, authorize the establishment of an indigenous contracting capability within DIU to eliminate the organization's reliance on other agencies for contracting services.
- Congress should encourage the RRP to consider: (1) the use of various types of launch vehicles, including disposable or reusable vehicles and both small and heavy lift vehicles; (2) both the delivery of on-orbit assets as well as the repurposing of existing assets; (3) the use of a common satellite bus, bus agnostic sensors and launch vehicles, and both modular payloads and hosted payloads; and (4) the purchase of commercial services, including imagery, communications, and remote sensing.

26 Sandra Erwin, "DARPA to begin new effort to build military constellations in low Earth orbit". Space News. May 31, 2018. https://spacenews.com/darpa-to-begin-new-effort-to-build-military-constellations-in-low-earth-orbit/

27 Jeff Foust, "DARPA planning responsive launch competition". Space News. February 12, 2018. https://spacenews.com/darpa-planning-responsive-launch-competition/

12.) Congress should ensure supply chain security in the national security space architecture by requiring a rapid phase-out of the use of key adversary parts, tools, services, and capabilities, including launch capabilities (e.g., the RD-180 Russian engine currently used for a number of national security launches).

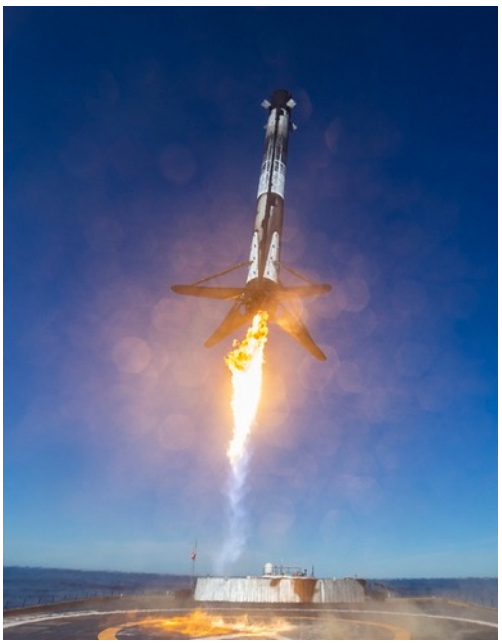
Exercise the Problem

Successfully integrating commercial and allied capabilities into the national security architecture requires advanced and detailed planning. Here, the Department of Defense, and, in particular, U.S. Strategic Command, the U.S. Air Force, and Air Force Space Command, excels. While exercises such as the Schriever War Game do take place and often include commercial partners, these often and understandably take place at the higher classification levels and while critical, it is just as important that the broader commercial space industry be brought into classified sessions, and that DOD and the IC begin to exercise potential reconstitution options in the unclassified space.

To that end, the authors recommend:

13.) The U.S. Air Force (forthcoming U.S. Space Command) should partner with the IC to hold additional exercises that integrate commercial partners in a meaningful way. This would have the benefit of exposing the Air Force to new capabilities that can drive future requirements while also allowing the commercial sector to better understand how the Air Force thinks about, plans for, and executes space-focused operations.

14.) These exercises should be held at the unclassified level where possible to allow broader participation and input.



The *Falcon 9* first stage drone ship landing and recovery.
Credit: SpaceX

Reforming the Launch Enterprise

Both the proliferation of low-earth orbit and the development of a rapid reconstitution capability necessitate the reform of the U.S. military's launch enterprise. While reforms are underway—most notably the transition to the National Security Space Launch Program and a similar program for small launch—additional efforts are warranted if both aforementioned goals are to be met.

To that end, the authors recommend:

15.) Since space launch is fundamental to U.S. leadership, access to, and use of space for national security, civil, and commercial purposes, the National Space Council should conduct a review of National Space Transportation Policy, including the National Security Space Launch program and its impact on development of domestic space transportation capabilities.

16.) The 116th Congress should hold hearings on achieving competition in the national security launch market and ways of "going faster" in launch. The authors suggest:

- House Armed Services Committee—Strategic Forces Subcommittee
  - Future reforms to the National Security Space Launch Program to achieve proliferation and rapid reconstitution.
  - The strategic vision for the National Security Space Launch Program.
- Senate Armed Services Committee—Strategic Forces Subcommittee
  - Achieving true and real competition in the national security launch market.

17.) The Government Accountability Office (GAO) should be directed to conduct a study into the recent history of the Evolved Expendable Launch Vehicle (EELV) and National Security Space Launch (NSSL) program efforts, to include assessing and evaluating the underlying philosophy, strategic vision, competition process, and value to the government, particularly in light of the current national security space threat environment.

18.) See "*Breaking the National Security Space Architecture Mold*," for additional launch reforms.

From left to right, the Secretary of the Air Force, Dr. Heather Wilson; the Air Force Chief of Staff, General David Goldfein; and the Commander of U.S. Space Command, General John Raymond.
Credit: U.S. Air Force

Space Domain Mission Assurance

Traditionally, mission assurance in the national security space enterprise has been evaluated in the context of rockets and payloads and whether they get safely to space and are able to operate on orbit for the lifecycle of the mission. This concept should, however, be reframed around the actual mission of a given bus, payload, and launch vehicle combination, rather than the specific systems themselves.

That is, if the same outcome can be achieved or the same basic mission can be met through an alternative approach, whether through commercial capabilities or through the delivery of a particular bus or set of sensors on orbit on an alternate vehicle, those approaches ought to be considered up front. After all, from the point of view of the warfighter or intelligence customer, it is not the rocket or the payload that is of primary concern, but rather the delivery of the concrete capability needed, whether that is communications, imagery, remote sensing, position and timing information, or something else.

To that end, it is critical that the U.S. government take a holistic view of mission assurance to focus principally on the delivery of key capabilities in the strategic context rather than on individual vehicles or payloads.

The second launch of the *Electron*, aptly named "Still Testing."
Credit: Rocket Lab, Kieran Fanning & Simon Moffatt

Launch & Payload Mission Assurance

A key thematic element that emerged during NSSP discussions on launch was the onerous nature of mission assurance requirements imposed by the United States Air Force for national security payloads. These requirements, while understandable, were—in the views of most participants—based on outmoded models for launch and space operations.

In essence, the pursuit of a "five nines"[28] solution of near perfection was driving up launch costs and failing to take advantage of emerging launch capabilities. Further, in the view of participants, the certification requirements for new launchers were unnecessarily complex, failed to seize upon new technologies, and served as a barrier to entry for emerging companies.

The costs of mission assurance also undercut the benefits derived from commercial markets and often bleed over into the commercial side of the house for private sector launch companies, thereby eroding the competitiveness of American providers.

To that end, the authors recommend:

19.) The U.S. Air Force should streamline the approval and vetting process for new capabilities and the certification of reusable rockets and small-scale launch vehicles.

20.) Once certified, the contracting process should not—as it anecdotally appears often happens—treat each rocket as the acquisition of a wholly new asset.

21.) The U.S. Air Force and the National Reconnaissance Office should agree upon a single set of core mission assurance standards that are graded upon a consistently applied cost and risk analysis, accounting for the increasing availability of commercial assets and capabilities for refresh and reconstitution.

- This model should also take advantage of decreasing launch costs and the other reforms recommended in this report that can reduce the impact of failures.

22.) The U.S. Air Force should amend its contracts with key Federally Funded Research and Development Centers (FFRDCs), such as the Aerospace Corporation, to require timely audits and assessments of new capabilities, including commercially-developed capabilities.

- In this context, the Air Force should focus its work with FFRDCs on substantially improving mission outcomes and developing improved, more responsive space capabilities, as opposed to primarily being focused on current contractual or single-platform technical priorities.

23.) The U.S. Air Force and FFRDCs like the Aerospace Corporation should agree to a standard set of time horizons to ensure the swift approval of changes, schedules, or

28 "Five nines" is an engineering term and refers to 99.999% reliability.

other mission assurance-related tasks and activities. Further, these schedules should have automatic triggers after which a decision or change is accepted or rejected.

Mission Assurance & Reusability

In the latest NDAA, significant steps toward integrating reusability into the national security launch portfolio were made. Under this legislation, the EELV program becomes the National Security Space Launch Program, and the Secretary of Defense is directed to pursue a strategy that includes reusability—partial or fully reusable rockets—in national security launches. The NDAA also mandates the continuation of certification processes to validate the use of reusable components and requires justification if national security launch contract awards exclude reusable rockets.

The *New Shepard* landing after completing its seventh mission.
Credit: Blue Origin

While these reforms are very helpful and indeed implement, in part, a core recommendation developed by the NSSP, additional steps are needed.

To that end, the authors recommend:

24.) Partnerships between launch providers and the Air Force should adopt a left-seat, right-seat mentality, sitting side-by-side, as appropriate, to review performance data and address issues on a rolling basis, rather than on a one-off or ad hoc basis.

25.) In cooperation with reusable launch providers, the U.S. Air Force should develop a flight hour-like maintenance and inspection schedule for reusable rockets. This schedule will detail appropriate checks and assessment of reusable rockets to ensure air (space)-worthiness prior to flight. This will become of increasing importance as rockets are planned to be reused upwards of 25 times or more in some cases.

Existing Alternative Acquisition Vehicles

Under the leadership of Secretary of the Air Force, Dr. Heather Wilson, significant steps are already being taken towards accelerating acquisition efforts and diversifying the companies that supply space assets to the national security space enterprise.

For example, the Space Enterprise Consortium (SpEC[29]), launched in 2016 and strongly supported by the new Secretary, aims to broaden the national security space architecture to include startups and small businesses. This model is proving successful in bringing small companies and startups into the national security space sector.

Since inception, SpEC concluded contracts with over 175 companies and today has a budget ceiling of $500 million—this is up from the initial $100 million. The SpEC uses OTAs for information dissemination and contracting and is working with DIU and other organizations to accelerate systems acquisitions. Indeed, the Department of Defense awarded the consortium's operator—Advanced Technology International (ATI)—a contract modification that extends the work through 2023.[30]

Efforts like those championed by Secretary Wilson, including SpEC, should be expanded and enhanced.

To that end, the authors recommend:

26.) The continuation and expansion of the SpEC program to include an increased funding ceiling of $750 million, expansion of the program's reach to a broader range of

29 Space Enterprise Consortium, "Doing Business with SpEC", January 17, 2018. https://www.space-enterprise-consortium.org/wp-content/uploads/2018/01/Doing-Business-with-SpEC_17JAN-V3.pdf
30 Monica Jackson, Air Force Increases ATI Space Enterprise Consortium OTA Ceiling to $400M". GovConWire. September 12, 2018. https://www.govconwire.com/2018/09/air-force-increases-ati-space-enterprise-consortium-ota-ceiling-to-400m/

companies and to influence programs of record, and expansion of partnerships with DIU and other organizations across the military and intelligence enterprises.

The U.S. Air Force is also using the so-called Section 804 authorities for middle tier of acquisition for prototyping and rapid fielding. In at least one instance, this authority resulted in the delivery of a program to the U.S. Navy 18 months earlier than planned and yielded two contract awards for another program in under six months. As with the SpEC program, the use of authorities like Section 804 ought to be broadened and institutionalized.

To that end, the authors recommend:

27.) The expansion of Section 804 authorities to a broader range of areas, as appropriate, and particularly for the delivery of new and novel capabilities in national security space enterprise.

Cultural Reforms

As noted above, as an organizational matter, the national security space enterprise, and, in particular, the Department of Defense and the U.S. Air Force, have historically been institutionally and culturally risk-averse. At the same time, there are increasing signs of change. For example, the senior Pentagon leadership, including Secretary Wilson, Chief of Staff General David Goldfein, and senior commanders, including General John Hyten of Strategic Command and General John Raymond of Air Force Space Command, are all vocal advocates of a "go fast" approach and creating a new culture that accepts more risk. These changes and advocacy at the leadership level are critical, and ought to be further reflected in organizational and programmatic changes in order to reform a long-entrenched culture of risk aversion deep into the bureaucracy.

Successfully changing cultures, of course, is not something that can be legislated by Congress or implemented directly by the White House. First and foremost, it requires forward thinking and forward-leaning individuals empowered by their leadership to take smart risks, and giving them appropriate leadership cover should efforts fail to succeed on the first, second, or tenth tries.

Second, changing the culture of risk aversion requires delegating decision making down the chain and empowering executing commanders or program officers to make decisions themselves, knowing that those decisions will be backed by leadership and responsibility will be shared.

Finally, at a time when there is a growing gap between government and private sector innovators, the U.S. government should embrace the opportunity presented by a cutting-edge industry where many in this field are eager to do business with the government and build a cooperative relationship. Personnel exchanges and streamlined procurement culture can work to strengthen

government and military understanding of private sector innovation, while private sector leaders can likewise better understand the culture and needs of the military and Intelligence Community.

Congress and the Administration can also have a positive effect by creating programs and organizations where risk taking is encouraged. This is the model behind the successes of DARPA, IARPA, In-Q-Tel, the famous private sector-run, government-funded "Skunk Works," and other similar organizations, many in the military's Special Forces community and in certain Intelligence Community agencies. Indeed, the creation (or revitalization) of the Space Rapid Capabilities Office presents an opportunity for just such an effort.

To that end, the authors recommend:

28.) The existing program of personnel exchanges between the private sector and the U.S. Air Force be expanded both internally, with increased numbers of government personnel and participant companies in the new space community, and externally, to include participation from Intelligence Community agencies and contractors.

Devolution of Decision Making

The acceleration of national security space acquisition envisioned in NSSP's recommendations will require a fundamental change in the way decisions are made and, in particular, the speed with which a decision is reached when it comes to buying, building, and deploying capabilities. The Department of Defense and the U.S. Air Force are already working to devolve decision making to a lower level, as described above. This effort to empower leaders below the Secretary and Deputy Secretary levels to make decisions is a strong step in the right direction, as removing rungs on the decision ladder can greatly accelerate the acquisition process.

Specifically, of 19 Major Defense Acquisition Programs (MDAPs), decision authority for 14 are now delegated to the U.S. Air Force, reducing decision making time by an estimated four to six months. Additional delegation of Acquisition Category Three (ACAT III) programs is also underway within the U.S. Air Force, providing a further acceleration in decision making time of one to three months. In some cases, these changes represent a 50-60% time savings when compared to prior rapid acquisition efforts.

Such reforms ought to be expanded and enhanced to achieve even greater devolution of decision-making authority and to create a more rapid, effective acquisition process.

To that end the authors recommend:

29.) The Department of Defense in general, but the U.S. Air Force in particular, should delegate decision making to an appropriate level while maintaining necessary

oversight and accountability over an established, forward-leaning holistic national security space strategy.

- This trend should be maintained even if a program suffers a setback or delay, with managers expected to back their subordinates while still being held accountable for inappropriate delays or failures.

30.) Devolution of decision-making should also be structured in a way that empowers program managers to work side-by-side with contracting officers and the operators themselves for "mission-oriented procurement" and accept risk smartly that is aligned with an established and focused strategy. Such a cultural shift will ensure that as responsibility is devolved, these leaders have the necessary authority to make their program a success.

LETTER FROM THE CO-CHAIRS

Securing our National and Economic Security Future in Space

The Hon. Mike Rogers (left) is the former Chairman of the House Intelligence Committee and current David M. Abshire Chair at CSPC. The Hon. Glenn Nye, a former Representative from Virginia, is the CSPC President & CEO.

Our country's economic well-being and national security is predicated on a strong position in space. Nearly every aspect of our daily lives, including many we don't often consider, is directly connected to, or enabled by, space-based capabilities. It is a reality that is and will only grow in the near future.

Our adversaries recognize this and are seeking to develop their own capabilities and counter our own strengths. If we are to continue to enjoy the advantages of space, we need to ensure our leadership in space continues. To do so means seizing upon the incredible advancements being made in the private sector.

It is with this core goal in mind that we launched the National Security Space Program at the Center for the Study of the Presidency & Congress.

The partnership between CSPC and the Mike Rogers Center for Intelligence and Global Affairs blossomed into an example of what can happen in today's political climate if you bring together leaders from different parties who remain focused on making a change for the common good. From our tenures in Congress, we understand the importance of bipartisan, strategic cooperation on national security issues, and the need to incorporate far-sighted, innovative thinking to keep our country safe.

Over the last 12 months, with the generous support of the Sarah Scaife Foundation and our corporate partners, we built an impressive program that resulted in the document you're currently reading.

We brought together over 125 leading innovators from the commercial space sector, senior government representatives, military leaders, and members of academia to develop recommendations to strengthen America's national security space architecture. More than simply that, we sought to find ways to increase our capabilities, their resilience, and enhance our deterrence capabilities for our allies.

Our work is by no means finished and this document represents just the beginning of our ongoing efforts to reform the national security space enterprise.

Acknowledgments

On behalf of the Center for the Study of the Presidency & Congress, we want to thank the following for their contributions to CSPC's work on the National Security Space Program.

The Sarah Scaife Foundation, Blue Origin, Leidos, Rocket Lab, and other corporate partners for their generosity in time, financial support, and knowledge, and interest in the subject. Without the support of these groups for this initiative, addressing this forward-looking and increasingly important topic would not be possible.

From Blue Origin, Brett Alexander, Jacki Cortese, Adam Goodwin, Scott Jacobs, and Megan Mitchell.

From Leidos, Lt Gen William Bender (USAF, ret.), BG Tim Coffin (USA, ret.), Nan Hardin, Art Ibers, and Barbara Slayton.

From Rocket Lab, Kennon Kincaid, Col Lars Hoffman (USAF, ret.), and Indra Hornsby.

The Secretary of the Air Force, Dr. Heather Wilson, and her exceptional staff who provided invaluable perspectives and insights into Air Force space activities, active reforms, and long-term strategic planning.

Members of U.S. Strategic Command, whose thought leadership, knowledge, and expertise, helped shape and drive the National Security Space Program's objectives, outcomes, and inform the program's discussions.

The Trustees and Counselors of CSPC, for their advice, counsel, and support—for not only the Center's overall mission but also the encouragement to continue to take a strategic approach to the national security policy challenges of today and tomorrow.

Jamil Jaffer and Bryan Smith of George Mason University's National Security Institute for partnering on this program and providing insight into Congress' perspective on national security space.

Joshua Huminski, the Director of the Mike Rogers Center for Intelligence & Global Affairs, for his dedicated research, outreach to project participants, and program leadership. By building a strong network of policymakers and space innovators, he has continued to ensure that CSPC is a resource for leaders in this and other important national security fields.

Dan Mahaffee, the Senior Vice President and Director of Policy at CSPC, for his efforts in shaping the program and providing insightful perspectives on acquisition reform, and for cross-pollinating the National Security Space Program with other CSPC programs.

Our Senior Fellows and Advisors who contributed to this project—Andy Keiser, James Kitfield, and Michael Stecher—who applied their expertise from a range of fields to analyze the impact of these technologies and the challenges they pose for policymakers.

Our entire team at the Center that made this report possible: Emma Alperin, Chris Condon, Michelle Miller, Erica Ngoenha, Jordana Schmierer, Sara Spancake, and Hurst Renner.

Brian Weeden and Victoria Samson at the Secure World Foundation for their support and for advancing the dialogue on counterspace capabilities and the importance of space sustainability.

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Mike Rogers
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