



Testimony  
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Forces, Committee on Armed Services,  
House of Representatives

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## SPACE ACQUISITIONS

# Changing Environment Presents Continuing Challenges and Opportunities for DOD

Statement of Jon Ludwigson, Director,  
Contracting and National Security Acquisitions

# GAO Highlights

Highlights of [GAO-22-105900](#), a testimony before the Subcommittee on Strategic Forces, Committee on Armed Services, House of Representatives

## Why GAO Did This Study

DOD space systems provide critical capabilities that support military and national security operations. Such systems are expensive to acquire and field, costing billions of dollars each year. The recently established U.S. Space Force will consolidate leadership, planning, and management for selected DOD space programs, as appropriate and authorized.

This statement (1) provides a description of key space system development efforts and summarizes the results of GAO's recent related reports, and (2) addresses challenges and opportunities facing acquisitions of new space systems. This statement is based on GAO reports issued since 2020 on DOD space programs. It also draws on work supporting GAO's annual reports on major defense acquisition programs and other reports on acquisition reforms.

## What GAO Recommends

Since 2020, GAO has made eight recommendations across five reports aimed at improving DOD's acquisition of space systems. DOD has partially or fully agreed to all of them. While DOD has plans to implement several of these recommendations, it has not yet fully implemented them. For example, DOD plans to implement recommendations to explore and implement an option to provide near-term narrowband satellite communications capabilities, reexamine future narrowband satellite needs, and make improvements to annual reports on the Space Command and Control program. These plans, if effectively implemented, would meet the intent of GAO's related recommendations.

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April 6, 2022

## SPACE ACQUISITIONS

### Changing Environment Presents Continuing Challenges and Opportunities for DOD

#### What GAO Found

Space-based capabilities—such as GPS—are fundamental to U.S. defense, national security, and civilian activities. GAO has reported that the Department of Defense (DOD) has faced long-standing challenges in acquiring the space systems that support these capabilities. This has led to significant cost increases and delays. In part to speed the acquisition process, DOD added more flexible acquisition pathways, including one known as the middle tier of acquisition. However, this pathway has trade-offs in reporting, monitoring, and oversight. For example, GAO found in 2021 that DOD had not developed an overarching data collection and reporting strategy for its middle tier of acquisition pathway, limiting DOD's visibility into programs and hindering the quality of its congressional reporting. DOD has undertaken several initiatives to update its processes and systems for reporting acquisition data to Congress and other stakeholders.

GAO has issued reports and made several recommendations on programs managed under this pathway, including the Next Generation Overhead Persistent Infrared satellite system. In September 2021, GAO reported that the program had taken steps aimed at accelerating development, but identified challenges for this system that made its aggressive schedule difficult to achieve. GAO also found that the program had not acknowledged these risks to the schedule in its reports to Congress. Accordingly, GAO recommended that DOD enhance schedule and cost transparency to facilitate congressional decision making.

The new acquisition process, the stand-up of the Space Force, the growth of the commercial space industry, and evolving threats in the space domain present challenges and opportunities for space acquisition efforts.

- DOD has reported making progress establishing the Space Force, but it remains to be seen if this organizational change can address GAO's 2016 concern that space acquisition leadership was fragmented.
- As DOD has reported, a new ecosystem of private companies offering capabilities such as space launch and satellite monitoring could create challenges in monitoring space objects, among other things, but could allow DOD to contract for data or services to meet some of its needs.
- For decades, space was largely a low-threat environment, but DOD has acknowledged that today, potential adversaries continue to develop offensive space capabilities, including weapons intended to target U.S. and allied capabilities.

GAO has reviews in progress that will cover several of the key topics noted above, such as DOD's efforts to tailor the acquisition process, leverage commercial capabilities, and address new threats.

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Chairman Cooper, Ranking Member Lamborn, and Members of the Subcommittee:

Thank you for the opportunity to discuss our work on space system acquisitions efforts led by the Department of Defense (DOD). DOD's space systems provide critical capabilities that support U.S. military, civil, and commercial operations. These capabilities include communications; missile warning; intelligence, surveillance, and reconnaissance; weather monitoring; and positioning, navigation, and timing; among others. DOD's reliance on these capabilities has grown as the underlying technologies have improved. This has enabled precise munitions, high-resolution imagery, and other advancements.

At the same time, DOD is operating in a rapidly evolving threat environment. For example, publicly available information from the U.S. Intelligence Community states that Russia and China continue to develop and maintain their space capabilities, including weapons intended to target U.S. and allied satellites. Additionally, the number of space objects is rapidly increasing, raising the risk of catastrophic collisions.

DOD's space systems can be expensive, amounting to billions of dollars each year, and can take years to develop, produce, and launch. Given the time and resource demands of DOD's space systems and the need for funds to be used effectively, it is essential that DOD effectively manage space system acquisitions.

My statement will (1) describe key space system development efforts and summarize the results of GAO's recent related reports, and (2) address challenges and opportunities facing acquisitions of new space systems.

This statement is based on our reports on DOD space programs issued since 2020 and reports on acquisition reform since 2019 as well as work performed in support of our annual DOD weapon systems assessment. More information on our objectives, scope, and methodology is available in each of the reports cited in this statement.

We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## Key DOD Space Development Efforts and Related GAO Work

Many of DOD’s space acquisition programs began development a decade or more ago as major defense acquisition programs (MDAP) using the procedures and practices described in previous iterations of DOD Instruction 5000.02.<sup>1</sup> As we have previously reported, many of these programs experienced significant cost increases and schedule delays resulting from development challenges, such as using immature technologies and underestimating risks. For example, multi-year delays to the ground system intended to support GPS satellites caused the Air Force to create two additional programs in 2016 and 2017. These programs modified the current GPS ground system so that it can provide interim, limited capabilities while the replacement system is completed. Table 1 summarizes select MDAP space programs.

**Table 1: Select Department of Defense (DOD) Major Defense Acquisition Program (MDAP) Space Programs**

System name	System description
Enhanced Polar System Recapitalization (EPS-R)	This Space Force program—a continuation of the EPS program that provides protected communications over the North Polar Region—plans to develop an additional two satellite payloads and update the EPS ground segment to prevent a coverage gap in protected polar satellite communications. The Space Force is collaborating with Norway to host the two payloads on two Space Norway-procured satellites. The updates to the ground system are to provide command, control, and mission planning for the payloads.
Global Positioning System (GPS) III	This Space Force program is building and fielding a new generation of satellites to supplement and eventually replace GPS satellites currently in use. GPS III is to provide a stronger military navigation signal, referred to as military code (M-code), to improve jamming resistance, and a new civilian signal that will be interoperable with foreign satellite navigation systems. Other programs are developing the related ground system and user equipment.
GPS III F	This Space Force program is to build upon the efforts of the GPS III program to develop and field next generation GPS satellites to modernize and replenish the GPS satellite constellation. In addition to the capabilities built into the original GPS III design, GPS III F is expected to provide new capabilities. These include a steerable, high-power M-code signal—known as Regional Military Protection—to provide warfighters with greater jamming resistance in contested environments.

<sup>1</sup>See DOD Instruction 5000.02, *Operation of the Adaptive Acquisition Framework* (Jan 23, 2020) (establishes the groundwork for the operation of the adaptive acquisition framework). MDAPs are generally programs designated by the Secretary of Defense as such or that are currently estimated to require eventual total expenditure for research, development, test, and evaluation of more than \$525 million, or for procurement of more than \$3.065 billion, in fiscal year 2020 constant dollars. 10 U.S.C. § 4201(a); DOD Instruction 5000.85, *Major Capability Acquisition* (Aug. 6, 2020) (Change 1 Effective Nov. 4, 2021) (reflecting statutory MDAP cost thresholds in fiscal year 2020 constant dollars).

<b>System name</b>	<b>System description</b>
Military GPS User Equipment (MGUE) Increment 1	This Air Force program is developing GPS receivers compatible with the M-code signal. The receiver cards are to provide enhanced position, navigation, and timing capabilities and improved resistance to threats. Increment 1 is developing two types of receiver cards for testing—one for aviation and maritime applications, and one for ground applications. Once program integration and testing is complete, the military services will then determine whether to procure the M-code user equipment as tested, or to pursue additional development and testing before making a procurement decision for the weapon systems and equipment they operate.
Next Generation Operational Control System (OCX)	The Space Force is developing software to replace the existing GPS ground control system. The Space Force intends for OCX to help ensure reliable, secure delivery of position, navigation, and timing information to military and civilian users. The Space Force is developing OCX in blocks that provide upgrades as they become available.
National Security Space Launch (NSSL)	This Space Force program is to provide space lift support for national security and other government missions. Currently, NSSL procures launch services from two commercial companies, United Launch Alliance (ULA) and Space Exploration Technologies Corporation (SpaceX). The goal of the program is to help ensure the U.S. has the capabilities necessary to launch and insert national security payloads into space when needed.
Space Based Infrared System (SBIRS)	This Air Force satellite system was developed to replace the Defense Support Program and perform a range of missile warning, missile defense, technical intelligence, and battlespace awareness missions. SBIRS consists of five satellites in geosynchronous Earth orbit, two sensors on host satellites in highly elliptical orbit, two replenishment satellites and sensors, and fixed and mobile ground stations.
Wideband Global SATCOM (WGS)	This joint Space Force and Army program is intended to provide wideband satellite communications services to U.S. warfighters, allies, and coalition partners during all levels of conflict short of nuclear war. It is composed of the following principal segments: space (satellites), terminal (users), and control (operators).
Weather System Follow-On (WSF)	This Air Force program is intended to contribute to a family of space-based environmental monitoring systems by providing three of 11 mission critical capabilities in support of military operations. WSF is being developed to conduct remote sensing of weather conditions, such as wind speed and direction at the ocean's surface, and provide real-time data to be used in weapon system planning and weather forecasting models. The family of space-based environmental monitoring systems replaces the Defense Meteorological Satellite Program.

Source: GAO summary of DOD information. | GAO-22-105900

Some of DOD's newer space programs are following an acquisition pathway known as the middle tier of acquisition (MTA). DOD's MTA pathway includes paths for rapid prototyping and rapid fielding efforts. The MTA pathway is intended to rapidly develop fieldable prototypes within an acquisition program to demonstrate new capabilities, and rapidly field production quantities of systems with proven technologies that require minimal development. Program officials for DOD space programs estimate that using the pathway will allow them to cut, in some cases, years off the program schedule. These acquisitions generally may not exceed 5 years after program start without a waiver from the Defense

Acquisition Executive.<sup>2</sup> Additional funding and time may be planned through another acquisition pathway to complete the system.

Because programs using the MTA pathway are generally subject to different requirements than major defense acquisition programs, we included them in a separate table (see table 2).<sup>3</sup>

**Table 2: Select Department of Defense (DOD) Space Programs Acquired Using the Middle Tier of Acquisition (MTA) Pathway**

System name	System description
Evolved Strategic SATCOM (ESS)	This Space Force program, using the MTA rapid prototyping path, is developing space-based capabilities to provide worldwide DOD users strategic and secure communications to support DOD's nuclear command, control, and communications mission. ESS expects to develop an advanced satellite communications (SATCOM) payload in the rapid prototyping effort. The Air Force aims to incorporate the payload onto an eventual ESS satellite in a future rapid fielding effort.
Future Operationally Resilient Ground Evolution (FORGE)	This Space Force program is using the MTA rapid prototyping path to develop a follow-on capability to the Space Based Infrared System (SBIRS) ground processing system. FORGE is designed to be a government-owned, open-architecture system to process data from both SBIRS and Next Generation Overhead Persistent Infrared (Next Gen OPIR) and is developing capabilities in three areas: satellite command and control, mission data processing, and communication relay stations.
Military Global Positioning System (GPS) User Equipment (MGUE) Increment 2	This Space Force program is developing GPS receivers compatible with the military code (M-code) signal. MGUE Increment 2 includes two separate MTA rapid prototyping efforts intended to (1) mature core GPS technology for a smaller receiver card for use in handheld devices and munitions, and (2) develop a handheld receiver end item employing the smaller receiver card for use across the military services.
Next Gen OPIR Block 0	This Space Force program, a follow-on to the Space Based Infrared System with a primary mission of missile warning, will consist of three geosynchronous Earth orbit satellites and two polar coverage highly elliptical orbit satellites. The Block 0 MTA rapid prototyping effort will deliver the main mission payload—an infrared sensor—for the geosynchronous satellite. A separate MTA effort, FORGE, will modernize the ground segment.

<sup>2</sup>There are two types of MTAs: (1) rapid prototyping and (2) rapid fielding. The objective of a program using the rapid prototyping path is to field a prototype meeting defined requirements that can be demonstrated in an operational environment and provide for residual operational capability within 5 years of the MTA program start date. The objective of a program using the rapid fielding path is to begin production within 6 months and complete fielding within 5 years of the MTA program start date.

<sup>3</sup>Throughout this testimony, we refer to programs currently using the MTA pathway as "MTA programs," although some of these programs may also currently use or plan to subsequently use one or more other pathways before fielding and eventual capability. For the purposes of this testimony, we use the word "effort" to refer specifically to the activities undertaken using a single adaptive acquisition framework (AAF) pathway or any of the paths provided by an AAF pathway (for example, the rapid prototyping path of the MTA pathway). Our use of the word "effort" excludes other paths or pathways that a program may be using simultaneously, or may plan to use in the future, to field an eventual capability.

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Protected Tactical Enterprise Service (PTES)	This Space Force MTA rapid prototyping effort plans to develop and field the ground system for enabling initial capabilities of adaptive anti-jam wideband satellite communications under the Air Force's broader Protected Anti-Jam Tactical SATCOM effort.
Protected Tactical SATCOM (PTS)	This Space Force MTA rapid prototyping effort is a space-based system that will transmit a protected, antijamming waveform to users in contested environments. The effort will prototype modular, scalable, hostable payloads. PTS is part of the Space Force's broader Protected Anti-Jam Tactical SATCOM mission area.

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Source: GAO summary of DOD information. | GAO-22-105900

Some of these MTA programs are follow-on programs to systems listed in table 1 or systems that DOD recently fielded. For example, Evolved Strategic SATCOM (satellite communications) (ESS) is a protected satellite communications program that is a follow-on to the fielded Advanced Extremely High Frequency satellite program. In addition, the Next Generation Overhead Persistent Infrared (Next Gen OPIR) program is a missile warning system that is a follow-on to the Space Based Infrared System (SBIRS) program.

The flexibility the MTA pathway provides acquisition programs also entails some challenges for reporting, monitoring, and oversight. In June 2021, we reported that DOD had trouble tracking cumulative cost, schedule, and performance data for programs transitioning between acquisition pathways or conducting multiple efforts using the same pathway and had yet to develop an overarching data collection and reporting strategy.<sup>4</sup> In that report, we found that the lack of such a strategy not only limits DOD's visibility into these programs but also hinders the quality of its congressional reporting and makes the full cost and schedule of the eventual weapon system more difficult to ascertain. DOD's ongoing efforts to improve its reporting on MTA programs will become increasingly important as these programs, some of which involve critical space-based capabilities, approach the end of their planned 5-year prototyping phase and transition to other pathways. We have conducted a recent review of efforts to implement acquisition reforms and found that DOD had yet to determine key aspects of its efforts such as what information to report. We made two recommendations including that DOD fully implement leading practices for managing reform efforts, such as by developing an implementation plan to track progress. DOD concurred with both

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<sup>4</sup>GAO, *Weapon Systems Annual Assessment: Updated Program Oversight Approach Needed*, [GAO-21-222](#) (Washington, D.C.: June 8, 2021).

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recommendations and described planned or ongoing actions to address them.<sup>5</sup>

DOD's Space Development Agency also has efforts underway to more quickly develop and field capabilities. Specifically, the Space Development Agency is coordinating the rapid development and fielding of capabilities—such as low-latency tactical communications, beyond line-of-sight targeting, and advanced missile tracking—via a proliferated space architecture in low-Earth orbit.

Our recent work has highlighted some of the issues DOD has experienced developing and delivering space systems.

**Next Gen OPIR.** In September 2021, we found that the Space Force had taken steps to accelerate the development of its Next Gen OPIR program to meet a requirement to launch the first satellite in 2025.<sup>6</sup> Among other things, the program reported selecting contractors with experience and proven spacecraft designs, while also fully funding two competing subcontractors to design and build the first mission payload. However, we also identified significant management and technical challenges that will make it difficult for the program to deliver on its aggressive schedule. We reported that although officials we spoke to were aware of schedule risks, they continue to present on-track timelines and stable cost estimates in reports to congressional committees. We concluded more transparency in schedules and costs would contribute to better DOD and congressional oversight and decision-making.

We also found that DOD had initiated multi-agency efforts to determine how to meet future mission needs, but coordination mechanisms were not formalized. Consequently, we concluded that taking additional steps to integrate related capabilities across the military community and developing a plan that formalizes roles, responsibilities, and coordination mechanisms for agencies leveraging OPIR capabilities would help DOD to meet future needs. We recommended that DOD provide Congress with more transparent cost and schedule information for the Next Gen OPIR program and formalize coordination across agencies. DOD partially

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<sup>5</sup>GAO, *Defense Acquisitions: Additional Action Needed to Implement Proposed Improvements to Congressional Reporting*, [GAO-22-104687](#) (Washington, D.C.: Feb. 28, 2022).

<sup>6</sup>GAO, *Missile Warning Satellites: Comprehensive Cost and Schedule Information Would Enhance Congressional Oversight*, [GAO-21-105249](#) (Washington, D.C.: Sept. 22, 2021).



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concluded with both recommendations. We believe that their planned actions meet the intent of our first recommendation but that more work remains to formalize coordination mechanisms among agencies to ensure that warfighter needs are efficiently and effectively met.

**Mobile User Objective System (MUOS).** In September 2021, we found that DOD is not using the full capabilities of MUOS, its latest narrowband military satellite communications system.<sup>7</sup> Although the full constellation of MUOS satellites has been in orbit for over 5 years, DOD has not been able to use the system's advanced capabilities, such as its 10-fold increase in communications capacity—in part, because the military services have experienced delays delivering compatible radio terminals to users. These delays mean that users continue to rely on the communications systems that preceded MUOS, which is oversubscribed and will remain so while DOD works to field terminals and transition to MUOS. Because the MUOS satellites on orbit have limited design lives, DOD plans to buy and launch additional satellites to sustain the constellation's availability. However, these additional satellites will not have the capability to support users operating legacy terminals, which are in widespread use across DOD.

We also found that DOD had not determined its future narrowband satellite communication needs after MUOS, including updating its requirements to address changes in technology and threats to communications. We recommended that DOD explore and implement an option to provide near-term narrowband satellite communications capabilities and that it reexamine its future narrowband satellite needs. DOD concurred with both recommendations but has not yet taken actions to address them.

**Space Command and Control (C2).** In December 2021, we found that the Air Force had complied with a statutory requirement for reporting annually to Congress on the status of its Space C2 program. However, we also found that the usefulness of these reports for oversight was limited because they lacked information needed to provide a more complete picture of the status of the program.<sup>8</sup> For example, some short-term priorities for delivering capabilities differed between the reports, and

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<sup>7</sup>GAO, *Satellite Communications: DOD Should Explore Options to Meet User Needs for Narrowband Capabilities*, [GAO-21-105283](#) (Washington, D.C.: Sept. 2, 2021).

<sup>8</sup>GAO, *Space Command and Control: Opportunities Exist to Enhance Annual Reporting*, [GAO-22-104685](#) (Washington, D.C.: Dec. 22, 2021).

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there was not enough information to determine the reasons for the changes. Given the cost, schedule, and performance challenges faced by previous space command and control efforts, we concluded that program oversight and knowledge-based decision-making would benefit from additional information, such as an explanation of significant changes from one report to the next.

We reported that information in the annual reports related to return on investment could be enhanced by documenting user perspectives on the operational benefits associated with program efforts. Including user perspectives would provide important information for understanding program value, enhancing program oversight, and informing future investment decisions. We made two recommendations to address these issues and improve the Air Force's reporting. DOD agreed with the substance of our recommendations and identified additional information it plans to include in future reports to address the recommendations.

**GPS Modernization.** In January 2021, we found that DOD is closer to being able to use the more secure signal—called military code or M-code—for the GPS satellites.<sup>9</sup> However, M-code remains years away from being widely fielded across DOD. One reason for this is that to utilize M-code, DOD will need to integrate multiple components—including special circuit chips, receiver cards, and receivers—into different types of weapon systems. Integration of these across DOD will be a considerable effort involving hundreds of different weapons systems.

M-code card development delays have had ripple effects on GPS receiver modernization efforts and the weapon systems that intend to use them. For example, the Air Force receiver modernization effort that depends on the new technology will likely exceed its current schedule and incur additional costs because of the delay. Additionally, other weapon systems that had planned to incorporate the new receiver will no longer do so because of the delay.

**Positioning, Navigation, and Timing Technologies to Complement GPS.** In May 2021, we issued a technology assessment on DOD's consideration of alternative positioning, navigation, and timing technologies (PNT) that are not dependent on continuous availability of

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<sup>9</sup>GAO, *GPS Modernization: DOD Continuing to Develop New Jam-Resistant Capability, But Widespread Use Remains Years Away*, [GAO-21-145](#) (Washington, D.C.: Jan. 19, 2021).

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GPS signals.<sup>10</sup> Although this work is not specifically tied to DOD's space portfolio, this effort exists in part because of the threats to the space-based GPS system. Such technologies have become more important given the potential for adversaries to disrupt or deny the capabilities provided by GPS to both military and civilian users. Our assessment noted a number of challenges DOD faces in developing and integrating alternative PNT technologies, including that there is no central program office within DOD responsible for developing those technologies across the department. We developed six policy options that may help address these challenges. For example, policymakers could consider having DOD conduct ongoing analysis of vulnerabilities of different PNT systems to help users better match solutions to the mission and threat.

On April 6, we plan to issue a report examining DOD's efforts aimed at developing alternative PNT systems. This report, which is for limited release but unclassified, identifies 11 efforts to provide an alternative to reliance on GPS systems and how DOD is overseeing those efforts.

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## Changing Environment Presents Challenges and Opportunities for Space Acquisition Efforts

For decades, space remained largely the purview of only a handful of countries, home to relatively few satellites, and largely free from threats. However, many countries now have space programs. Additionally, as DOD has reported, commercial space activities have expanded significantly. Private companies have emerged that provide a wide range of satellite-based services utilizing thousands of newly launched satellites with plans for launching tens of thousands more this decade. A new ecosystem of private companies also offer government and commercial services, including launch and satellite monitoring. It is also now clear that space is no longer free from threats, with some countries demonstrating the capability of targeting and destroying satellites.

It is in this new context that DOD aims to modernize its space systems to deliver necessary warfighting capabilities. Key challenges and opportunities include completing the standup of the Space Force, undertaking new acquisition approaches, leveraging commercial capabilities, updating existing systems, and responding to new and emerging threats.

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<sup>10</sup>GAO, *Defense Navigation Capabilities: DOD is Developing Positioning, Navigation, and Timing Technologies to Complement GPS*, [GAO-21-320SP](#) (Washington, D.C.: May 10, 2021).

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**Completing the Standup of the Space Force.** As I testified last year,<sup>11</sup> and as is still true, DOD remains in the midst of the historic transition to create the Space Force.<sup>12</sup> DOD has made much progress in standing up the first new service in decades, but much remains to be done. For example, DOD plans to complete the realignment of the Space Development Agency under the Space Force later this year. Only time will tell if Space Force and its newly installed Guardians (Space Force personnel) will be able to address the long-standing concerns raised by us and others including historical fragmentation in space acquisition leadership.<sup>13</sup> As we noted in our testimony last year, organizational change, the movement of personnel, and the establishment of a new culture can bring both challenges and opportunities.

**Undertaking New Acquisition Approaches.** DOD and Space Force have sought to improve acquisition outcomes. Over the past several years, as we have reported, DOD has taken steps to update its acquisition processes to provide flexibilities for efforts across the department.<sup>14</sup> These steps have included, among other changes, introducing the adaptive acquisition framework (AAF). The AAF is comprised of six acquisition pathways, each with processes, reviews, documentation requirements, and metrics that program managers can match to the characteristics and risk profile of the capability being acquired. Programs, with approval from the decision authority or the milestone decision authority, may leverage a combination of acquisition pathways to provide value not otherwise available through use of a single pathway. Space Force has also sought its own acquisition flexibilities to address concerns that developing systems for space is unique. The goal

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<sup>11</sup>GAO, *Space Acquisitions: DOD Faces Challenges and Opportunities with Acquiring Space Systems in a Changing Environment*, [GAO-21-520T](#) (Washington, D.C.: May 24, 2021).

<sup>12</sup>On December 20, 2019, the National Defense Authorization Act for Fiscal Year 2020 established the United States Space Force as a new branch of the Armed Forces within the Department of the Air Force. Pub. L. No. 116-92, Sec. 952 (2019).

<sup>13</sup>GAO, *Defense Space Acquisitions: Too Early to Determine If Recent Changes Will Resolve Persistent Fragmentation in Management and Oversight*, [GAO-16-592R](#) (Washington, D.C.: July 26, 2016).

<sup>14</sup>GAO, *DOD Acquisition Reform: Leadership Attention Needed to Effectively Implement Changes to Acquisition Oversight*, [GAO-19-439](#) (Washington, D.C.: June 5, 2019); GAO-GAO, *DOD Acquisition Reform: Increased Focus on Knowledge Needed to Achieve Intended Performance and Innovation Outcomes*, [GAO-21-511T](#) (Washington, D.C.: Apr. 28, 2021); [GAO-22-104687](#).

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of these efforts has been to help the Space Force deliver new systems and capabilities more quickly. In September 2021, we provided briefings to this committee and your staff on these efforts.

Our work on leading practices has identified useful tools for acquisition programs and oversight including: building opportunities for oversight into programs, using data and knowledge to anchor decisions, empowering managers to make decisions and holding them accountable for their decisions, and canceling unsuccessful programs. We have also developed reports examining acquisition reform, including examinations of MTA efforts.<sup>15</sup> As previously mentioned, our prior reports have provided recommendations, which were agreed to by DOD and are either implemented or in the process of being implemented.

We also have an ongoing review of DOD's efforts to further tailor acquisition requirements for space programs. Specifically:

- We are waiting to complete our review of the DOD's final report on the space acquisition framework until DOD submits it to the congressional defense committees and we can review it.

**Leveraging Commercial Space Capabilities.** The growth of the commercial space industry could provide opportunities for DOD to contract for commercially available data or services to meet some of its needs in lieu of developing its own systems. In particular, the increasing numbers of commercial satellites providing services such as communication and Earth observation, as well as services to track and control those satellites may offer unique opportunities for DOD. To assess some of these efforts, we have ongoing or planned work examining ways commercial space capabilities may support DOD. Specifically:

- DOD's plans for contracting for commercial space situational awareness data.
- Status of Space Force's Satellite Control Network, including its capacity for conducting satellite operations for current and future satellites, and the extent to which DOD acquisitions, agreements with federal partners, or contracting for satellite control services from commercial providers can address some of DOD's needs.

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<sup>15</sup>GAO-19-439; GAO, *Defense Acquisition Annual Assessment: Drive to Deliver Capabilities Faster Increases Importance of Program Knowledge and Consistent Data for Oversight*, GAO-20-439 (Washington, D.C.: June 3, 2020).

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- National Reconnaissance Office's Commercial System Program Office and efforts by the DOD and Intelligence Community elements to license and use commercial imagery and analytics.

**Updating Existing Systems and Capabilities.** Space-based systems require periodic renewal and updates to address attrition of satellites and other elements as well as to ensure that the systems continue to meet the capabilities required in the face of evolving threats. We have work ongoing related to DOD national security space programs currently in development. Specifically, we are reviewing:

- DOD's OPIR programs—including but not limited to the Next Gen OPIR program—to determine the extent to which they are on track to deliver needed capabilities and meet cost and schedule goals, and how DOD is addressing any challenges.
- DOD's GPS programs, including the status of the space, ground, and user terminal segments, and how DOD is addressing any risks to delivering critical mission capabilities.
- The Air Force's annual reports on the Space C2 program, including an assessment of the program's objectives for each upcoming fiscal year, challenges encountered, and lessons learned.

**Responding to new and existing threats.** DOD has acknowledged that our potential adversaries intend to target our space-based capabilities. This recognition has given rise to the need to identify and address threats to these important assets and ensure that DOD has tools to operate under these new circumstances. In November, we issued a classified report examining the space control readiness and force structure challenges facing DOD.<sup>16</sup> We also have work underway that directly examines efforts related to addressing threats to space capabilities. Specifically:

- A review of the National Space Defense Center, an organization created to facilitate information sharing between DOD and the Intelligence Community in light of increasing threats to space capabilities. We are assessing the center's efforts to integrate space domain awareness information, among other things.

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<sup>16</sup>GAO, *Space Operations: DOD Efforts to Improve Space Control Shortfalls Underway but Longstanding Challenges Persist*, GAO 22-530C (Washington, D.C.: Nov. 8, 2021). DOD defines space control as operations that ensure freedom of action in space for the United States and its allies and deny threats to freedom of action in space.

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- A review of DOD’s space protection acquisition programs, including the extent to which these efforts and plans are coordinated across the department and among other government, commercial, and international entities.
  - A review of challenges facing DOD’s air- and space-based intelligence, surveillance, and reconnaissance collection and processing capabilities for operations involving Russia or China.

In conclusion, space has been and will continue to be vitally important for DOD operations. Many of DOD’s programs are making progress and other efforts are planned. Clearly, the days of uncontested access to and use of space are behind us, the need for space systems is ever increasing, and the challenges are formidable. However, there is a new urgency to address the rising challenges and consider how to leverage the opportunities available to DOD. This will require careful attention by the department and oversight by Congress.

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Chairman Cooper, Ranking Member Lamborn, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

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## GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this testimony, please contact Jon Ludwigson, Director, Contracting and National Security Acquisitions, at 202-512-4841 or [ludwigsonj@gao.gov](mailto:ludwigsonj@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Rich Horiuchi (Assistant Director), Andrew Berglund (Analyst-in-Charge), Peter W. Anderson, Claire Buck, Laura Hook, and Christine Pecora. Key contributors for the previous work on which this statement is based are listed in products cited.

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