



Testimony

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DOD ACQUISITION REFORM

Increased Focus on Knowledge Needed to Achieve Intended Performance and Innovation Outcomes

Statement of Shelby S. Oakley, Director,
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GAO@100 Highlights

Highlights of [GAO-21-511T](#), a testimony before the Subcommittee on Readiness and Management Support, Committee on Armed Services, U.S. Senate

Why GAO Did This Study

DOD spends billions of dollars annually to acquire new major weapon systems, such as aircraft, ships, and satellites, and deliver them to the warfighter. GAO has reviewed individual weapon programs for many years and conducted its annual assessment of selected major DOD weapon programs for 19 years. GAO added DOD's weapon system acquisition process to its High-Risk List in 1990.

This statement discusses: (1) the performance of selected DOD weapon programs and the role of a sound business case in that performance, (2) DOD's progress implementing recent acquisition reforms, (3) the status of DOD's actions to support innovation, and (4) DOD's efforts to improve data for acquisition oversight. This statement is drawn primarily from GAO's extensive body of work on DOD's acquisition of weapon systems, science and technology, and acquisition reforms conducted from 2004–2021, and observations from an ongoing annual review of selected DOD weapon programs.

To perform this work, GAO reviewed DOD documentation, program information, and relevant legislation. GAO also interviewed DOD officials.

What GAO Recommends

Since GAO added this area to its High-Risk List in 1990, it has made hundreds of related recommendations. As of December 2020, 114 recommendations remained open. DOD is currently reviewing an additional recommendation from GAO's draft report on its weapon systems acquisition process and weapon programs.

View [GAO-21-511T](#). For more information, contact Shelby S. Oakley at (202) 512-4841 or OakleyS@gao.gov.

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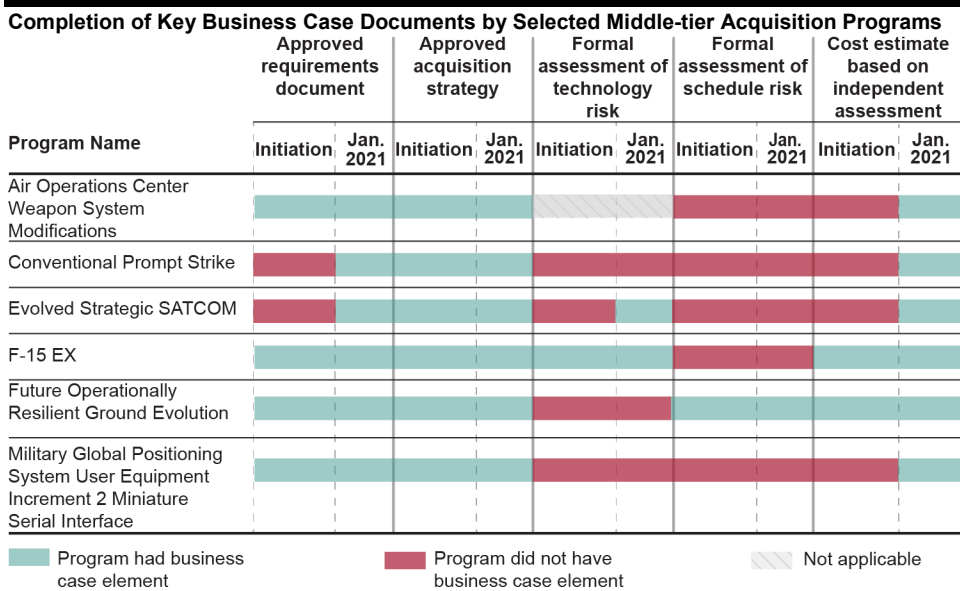
Increased Focus on Knowledge Needed to Achieve Intended Performance and Innovation Outcomes

What GAO Found

As the Department of Defense (DOD) drives to deliver innovative capabilities faster to keep pace with evolving threats and emerging adversaries, knowledge—about programs' cost, schedule, and technology—increases the likelihood that these capabilities will be achieved.

GAO annually assesses selected DOD weapon programs and their likely outcomes by analyzing: (1) the soundness of a program's business case—which provides evidence that the warfighter's needs are valid and the concept can be produced within existing resources—at program start, and (2) the knowledge a program attains at other key points in the acquisition process. For example, the Navy's Ford-class aircraft carrier program began with a weak business case, including an unrealistic cost estimate based on unproven technologies, resulting in over \$2 billion in cost growth and years of delays to date for the lead ship.

DOD's new acquisition framework uses six different acquisition pathways and offers programs a chance to tailor acquisition approaches, providing options to speed up the process. However, preliminary findings from GAO's 2021 annual assessment show that programs using the new middle-tier pathway face increasing risk that they will fall short of expected performance goals as a result of starting without sound business cases. While these programs are intended to be streamlined, business case information is critical for decision makers to know if a program is likely to meet its goals (see figure below).



Source: GAO analysis of programs' questionnaire responses. | GAO-21-511T

The framework also introduces new considerations for program oversight and reporting. DOD has made some progress in developing its approach to oversight for programs using the new pathways, but questions remain about what metrics DOD will use for internal oversight and report to Congress for external oversight.

Chairman Kaine, Ranking Member Sullivan, and Members of the Subcommittee:

Thank you for having me here today to discuss our ongoing work on the Department of Defense's (DOD) management of its weapon programs and its efforts to implement recent acquisition reforms. Our analysis of DOD's 2020 portfolio of its costliest weapon programs shows that DOD expects to invest more than \$1.79 trillion to acquire 107 new weapon systems. The acquisition of weapon systems has been on GAO's High-Risk List since 1990, and Congress and DOD have also long sought to improve how DOD acquires these systems.¹ Despite those efforts, many programs continue to fall short of cost, schedule, and performance goals. As a result, DOD faces challenges delivering innovative technologies to the warfighter to keep pace with evolving threats, including those posed by strategic competitors such as China and Russia. DOD has identified the timely modernization of weapon systems as a key part of its strategic approach for addressing the scope and pace of competitors' and adversaries' ambitions and capabilities.

DOD must address the critical challenge of delivering capability quickly while operating in an era of increasing complexities in the defense acquisition system. For example, weapon systems rely on sophisticated software more than ever before and face global cybersecurity threats. However, software development continues to be a stumbling block for programs, and DOD has made only limited progress in addressing cybersecurity vulnerabilities. A number of other issues could also affect DOD's ability to keep pace with evolving threats—issues such as the ability to develop innovative technologies and the capabilities and capacity of the defense industrial base. DOD is implementing significant changes to its acquisition system in an effort to improve weapon system outcomes. However, considerable work remains, and until it is completed, DOD's ability to quickly deliver capabilities to the warfighter is still in question.

Yet even as the acquisition environment continues to evolve, the fundamental need for knowledge during the acquisition process remains unchanged. For years, we have reported on the importance of using a solid, executable business case—a justification for a proposed project or undertaking—before committing resources to a new product development

¹GAO, *High-Risk Series: Dedicated Leadership Needed to Address Limited Progress in Most High-Risk Areas*, [GAO-21-119SP](#) (Washington, D.C. Mar. 2, 2021).

effort. An executable business case uses realistic cost and schedule targets to meet the warfighter's performance and quality expectations by balancing inherent uncertainties in acquisition programs. In addition, our work has repeatedly demonstrated that knowledge attainment at key points throughout the life cycle underpins the sound business case, positioning programs to meet their cost and schedule goals.

Today, I will discuss (1) the role of knowledge attainment, including developing sound business cases, in the performance of selected weapon programs; (2) DOD's progress in implementing recent acquisition reforms; (3) the status of DOD's actions for adopting innovative technologies; and (4) DOD's efforts to improve data collection and reporting for acquisition oversight. This testimony draws from our extensive body of work on DOD's acquisition of weapon systems and the numerous recommendations we have made regarding individual weapon programs and systemic improvements to the acquisition process. It also draws on our ongoing work assessing the cost and schedule performance of DOD's most costly weapon programs.² For our work, we reviewed DOD policies, data, communications, briefings, knowledge-based practices based on prior work, and relevant legislation, and interviewed relevant officials.³ Additionally, as part of the ongoing work, we identified programs and analyzed information from multiple DOD sources, including selected acquisition reports and program status reports, as well as program office-provided data to assess cost and schedule performance. We also developed a questionnaire to obtain information on the extent to which programs were following knowledge-based acquisition practices. We expect to issue a report on the ongoing review later this spring. Finally, we met with DOD officials on April 19, 2021, to obtain agency views on the new observations discussed in this statement.

²[GAO-21-119SP](#); *Defense Acquisitions 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); *Navy Shipbuilding: Past Performance Provides Valuable Lessons for Future Investments*, [GAO-18-238SP](#) (Washington, D.C.: June 6, 2018); *Weapon System Requirements: Detailed Systems Engineering Prior to Product Development Positions Programs for Success*, [GAO-17-77](#) (Washington, D.C.: Nov. 17, 2016); *Defense Acquisitions: Joint Action Needed by DOD and Congress to Improve Outcomes*, [GAO-16-187T](#) (Washington, D.C.: Oct. 27, 2015); *Best Practices: Using a Knowledge-Based Approach to Improve Weapon Acquisition*, [GAO-04-386SP](#) (Washington, D.C.: January 2004).

³See [GAO-21-119SP](#), [GAO-20-439](#), [GAO-18-238SP](#), [GAO-17-77](#). More detailed information on our objectives, scope, and methodology for that work can be found in the issued reports.

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.

Attainment of Knowledge, Including Developing Sound Business Cases, during the Acquisition Life Cycle Positions DOD Weapon Programs to Achieve Better Outcomes

Multiple Factors Affect the Performance of Weapon Programs

For the last 19 years, we have reported on the cost, schedule, and performance of DOD's most expensive programs in our annual weapon systems assessments.⁴ Tracking the performance of these programs helps provide decision makers in the department and in Congress insight into the extent to which DOD is achieving its overall goals of delivering, among other things, timely, affordable capabilities to the warfighter.

For decades, these programs have had consistent outcomes: weapon systems that have historically had no rival in superiority, but which routinely take much longer to field, cost more to buy, and provide less capability than initially intended. In our upcoming 2021 annual weapon systems assessment, we expect to report that DOD's 84 major defense acquisition programs had accumulated over \$615.4 billion (or 52 percent) in total cost growth since program start, about 60 percent of which was unrelated to the increase in quantities purchased. Similarly, over the same period, the time required to deliver initial capabilities increased by about 35 percent, resulting in an average delay of more than 2 years.

⁴For our most recent annual assessment, see [GAO-20-439](#).

Cost and schedule increases in weapon programs are the outcome of a variety of factors. In some cases, cost increases reflect decisions to buy more of a system due to its effectiveness or changes in posture. However, in other cases, they reflect bad decisions stemming from unsound business cases. Similarly, we found a number of reasons that program schedules tend to get delayed over time, including hardware delivery delays from contractors, test delays, performance deficiencies, and schedule interdependencies.

One metric that helps identify program inefficiencies and underperformance is average procurement unit costs. In our upcoming 2021 annual weapon systems assessment, we expect to report that average procurement unit costs had increased for nearly half of the 84 major defense acquisition programs (MDAP) in DOD's 2020 MDAP portfolio. In some instances, program inefficiencies and underperformance stemming from unsound business cases can precede decisions to reduce quantities. For example, development cost growth stemming from an unrealistic business case led the Navy to reduce planned quantities of the DDG 1000 Zumwalt Class Destroyer from 32 ships to three ships. Consequently, the Navy is now only procuring three ships for what it originally planned to spend on 21 ships, and the DDG 1000 class ships will remain incomplete and incapable of performing their planned mission until at least 2025, nearly 20 years after development began. The persistence of such undesirable outcomes underscores the reverberating effects that can last for decades when decisions are made to move forward with programs before the knowledge needed to reduce risk and make those decisions is sufficient.

Table 1 identifies the five programs in DOD's 2020 MDAP portfolio with the highest average procurement unit cost increases—measured by percentage increase—since their first full estimates, as well as factors contributing to these increases, according to our analysis of program documentation.

Table 1: DOD Weapon Programs with the Highest Estimated Average Procurement Unit Cost Increases (Fiscal year 2021 dollars in millions)

Program name	Lead component	Unit cost at first full estimate	Unit cost in 2020	Percent change since first full estimate	Contributing factors for cost increase
DDG 1000 Zumwalt Class Destroyer	Navy	1193.3	4906.1	311	(1) Quantity decrease
Guided Multiple Launch Rocket System	Army	0.05	0.14	222	(1) Production inefficiencies
National Security Space Launch	Air Force	101.2	306.4	203	(1) Scope of work increase
H-1 Upgrades	Navy	12.3	34.5	181	(1) Overhead increase
MQ-8 Fire Scout Unmanned Aircraft System	Navy	11.8	31.2	172	(1) Quantity decrease (2) Additional engineering (3) Higher support needs

Source: GAO analysis of Department of Defense (DOD) data. | GAO-21-511T

However, while useful, the average procurement unit cost change metric provides only a single view of program performance at a point in time, after the cost and schedule growth has already occurred. Given the complexity of DOD’s largest acquisition programs, when trying to determine the highest and lowest performing programs, assessing each of the cost and schedule metrics we assess is likely to yield a different answer. For example, the F-35 Lightning II (F-35) program—DOD’s costliest weapon program—has had nearly \$120 billion in cost growth.⁵ But the program does not have one of the highest average procurement unit cost increases. Therefore, assessing program performance via a single metric does not provide the full picture. Cost, schedule, and performance are often interrelated as well, because addressing one of these factors frequently requires a trade-off among the other two factors to do so.

⁵The F-35 program also lacked a complete business case prior to system development start and began development with immature technologies and an incomplete understanding of its design. Further, the acquisition strategy called for high levels of concurrency between development and production. These issues caused significant cost and schedule growth, and other performance shortfalls.

Knowledge-Based Acquisition Practices, Including a Sound Business Case, Contribute to Better Outcomes

While cost and schedule metrics provide decision makers with performance information in hindsight, we have found that assessing a program's business case at the start of development and attainment of certain product knowledge at key points in the acquisition process can help predict a program's performance. For several years, we have reported in our annual weapon systems assessment on a statistically significant correlation between implementation of certain knowledge-based practices and improved cost and schedule performance.⁶

According to our body of work on knowledge-based acquisition practices, programs should take steps to acquire specific knowledge at key points in the acquisition life cycle.

- **Resources and requirements match.** Programs should confirm a match between requirements and available resources and have confidence that technologies will work as expected before starting development.
- **Product design is stable.** Programs should determine that the system's design is stable and will meet requirements within cost and schedule targets before beginning initial manufacturing. A leading practice is to achieve design stability by the critical design review, usually held midway through development.
- **Production processes are mature.** Programs should demonstrate that the system can be manufactured within cost, schedule, and quality targets prior to beginning production.

Incentives exist within the acquisition culture to overpromise a prospective weapon's performance while understating cost and schedule risks in order to get the program started. These conditions have historically resulted in the department's weapon programs framed around unworkable business cases. In other words, programs often proceed without a match between their requirements and resources (time, technology, and funding). Unworkable business cases lead to predictable outcomes. Once a program is off to a tenuous start, technical problems, accompanied by cost and schedule growth, are virtually inevitable. If a program falls short in one element, like technology maturity, at the start, it is harder to attain knowledge in subsequent elements, and these issues often cascade throughout a program's life cycle. In this environment, decision makers are confronted with the choice of increasing program investments, despite lacking insight into whether the program's cost and

⁶For example, see [GAO-20-439](#); GAO, *Weapon Systems Annual Assessment: Limited Use of Knowledge-Based Practices Continues to Undercut DOD's Investments*, [GAO-19-336SP](#) (Washington, D.C.: May 7, 2019); [GAO-18-360SP](#).

schedule estimates are achievable, or truncating the program and subsequently depriving warfighters of a promised capability.

We also found that as initial business cases begin to erode, programs face pressure to control growing costs and schedules, often by changing planned quality and performance goals and cutting test events. The result is a poor return on investment, with higher costs, late capability deliveries, and in some cases, reduced operational capabilities. For example:

- In 2007, we reported on weaknesses in the Navy's business case for the Ford-class aircraft carrier.⁷ Specifically, the program's business case was predicated on unrealistic cost and schedule estimates that did not sufficiently account for risks associated with the development of the Ford class's 13 critical technologies; the Navy used inaccurate labor hour estimates to build its schedule; and it proceeded with ship construction while continuing to develop critical technologies. To date, the lead ship, CVN 78, has experienced over \$2 billion in cost growth and was delivered over 2 years late with unproven systems and reduced capability at delivery. The lead ship has also struggled to demonstrate reliability of its key systems, which delayed operational testing by 18 months, and likely will not demonstrate reliability of two key systems until after it is deployed to the fleet. Additionally, CVN 78 will not be able to demonstrate it can rapidly deploy aircraft—a key requirement for these carriers—if its key systems cannot function safely by the time operational testing begins, 5 years later than initially planned.
- The Air Force's Next Generation Operational Control System—which is needed to enable the modernized features of the two latest generations of Global Positioning System satellites—had similar business case flaws at program start. It awarded a development contract before completing a formal development milestone decision review, a point when a program assess that the technology, design, time, and funding are properly matched to make sure the program can be executed as planned. The accelerated contract award resulted in unrealistic schedule and cost estimates, among other things. In addition, the program did not assess the maturity of the preliminary design and some system requirements were not well understood, which resulted in significant requirements revisions and additional

⁷GAO, *Defense Acquisitions: Realistic Business Cases Needed to Execute Navy Shipbuilding Programs*, [GAO-07-943T](#) (Washington, D.C.: July 24, 2007).

software development. The program has had over \$2.8 billion in cost growth and almost 5 years of schedule delays.

- In 2016, we reported that the Navy’s CH-53K Heavy Replacement Helicopter lacked a complete business case prior to development start—including undefined preliminary and system-level designs and that it began development with immature technologies.⁸ Nearly all systems engineering was done after development began, and the program experienced significant cost and schedule growth. Discoveries during ground testing drove additional unanticipated design changes, which has delayed initial capability. The program has had over \$12 billion in cost growth and 6 years in schedule delays since its initial estimates.⁹

In contrast, when programs entered development with a sound business case and plans to attain appropriate knowledge before significant investments are made, we observed better cost and schedule performance. For example:

- We reported in 2018 that the Navy’s Expeditionary Transfer Dock/Expeditionary Sea Base program attained design and construction knowledge prior to key milestones to better ensure the ships were built to agreed-upon cost, schedule, quality, and performance standards.¹⁰ The program avoided the concurrency between technology development, design, and construction phases often experienced by shipbuilding programs, and it achieved initial capability with \$697 million in cost savings and no schedule growth.
- The Navy’s VH-92A® Presidential Helicopter Replacement Program established a knowledge-based business case for entry into system development. We previously reported that the program has remained within its April 2014 cost baseline estimate, in part, by keeping program requirements stable and limiting design changes.¹¹ The program has relied on mature technologies and entered production in

⁸[GAO-17-77](#).

⁹The cost change reflects cost variation during system development and procurement and is in part due to DOD’s decision to procure more quantities than initially planned. However, other factors, such as development or production issues, also contributed to cost increases.

¹⁰[GAO-18-238SP](#).

¹¹GAO, *Presidential Helicopter: Program is Meeting Cost Goals but Some Technical and Schedule Risks Remain*, [GAO-20-356](#) (Washington, D.C.: Apr. 16, 2020).

June 2019 with a stable design. The program has so far had \$250 million in savings and is currently a year ahead of its initial estimates.

While these are just a few examples of business cases used by recent DOD acquisition programs and associated program outcomes, we have previous and ongoing work that highlights outcomes of many other acquisition programs.¹²

Sustained Leadership Attention Is Essential to Continue Progress on Acquisition Reforms

DOD Has Made Substantial Progress in Implementing Recent Acquisition Reforms

Amid concerns about the ability of DOD's acquisition process to keep pace with evolving threats, Congress included numerous acquisition reforms in recent National Defense Authorization Acts (NDAA) that could help to streamline acquisition oversight and field capabilities faster. In our initial assessments of DOD's implementation of these reforms over the past 2 years, we reported that DOD has made significant progress. For example, in June 2019, we reported that decision-making authority for major defense acquisition programs had been realigned between the Office of the Secretary of Defense and the military departments.¹³ At that time, we also found that the Office of the Secretary of Defense had put in place new processes to improve DOD's consideration of program cost, fielding, and performance goals and assessment of technical risk, although questions remained about how they would be implemented. The Office of the Secretary of Defense was also restructured in an effort to increase innovation in the earlier stages of the acquisition process and reduce cost, schedule, and performance risks in later stages. Appendix I provides a summary of selected acquisition reforms that affect program oversight.

Since our June 2019 report, DOD leadership has also continued to make progress in clearly defining roles and responsibilities for acquisition oversight. At that time, we found that DOD needed continued leadership attention to address challenges with implementing acquisition oversight

¹²For example, see [GAO-20-439](#), [GAO-18-238SP](#), and [GAO-17-77](#).

¹³GAO, *DOD Acquisition Reform: Leadership Attention Needed to Effectively Implement Changes to Acquisition Oversight*, [GAO-19-439](#) (Washington, D.C.: June 5, 2019).

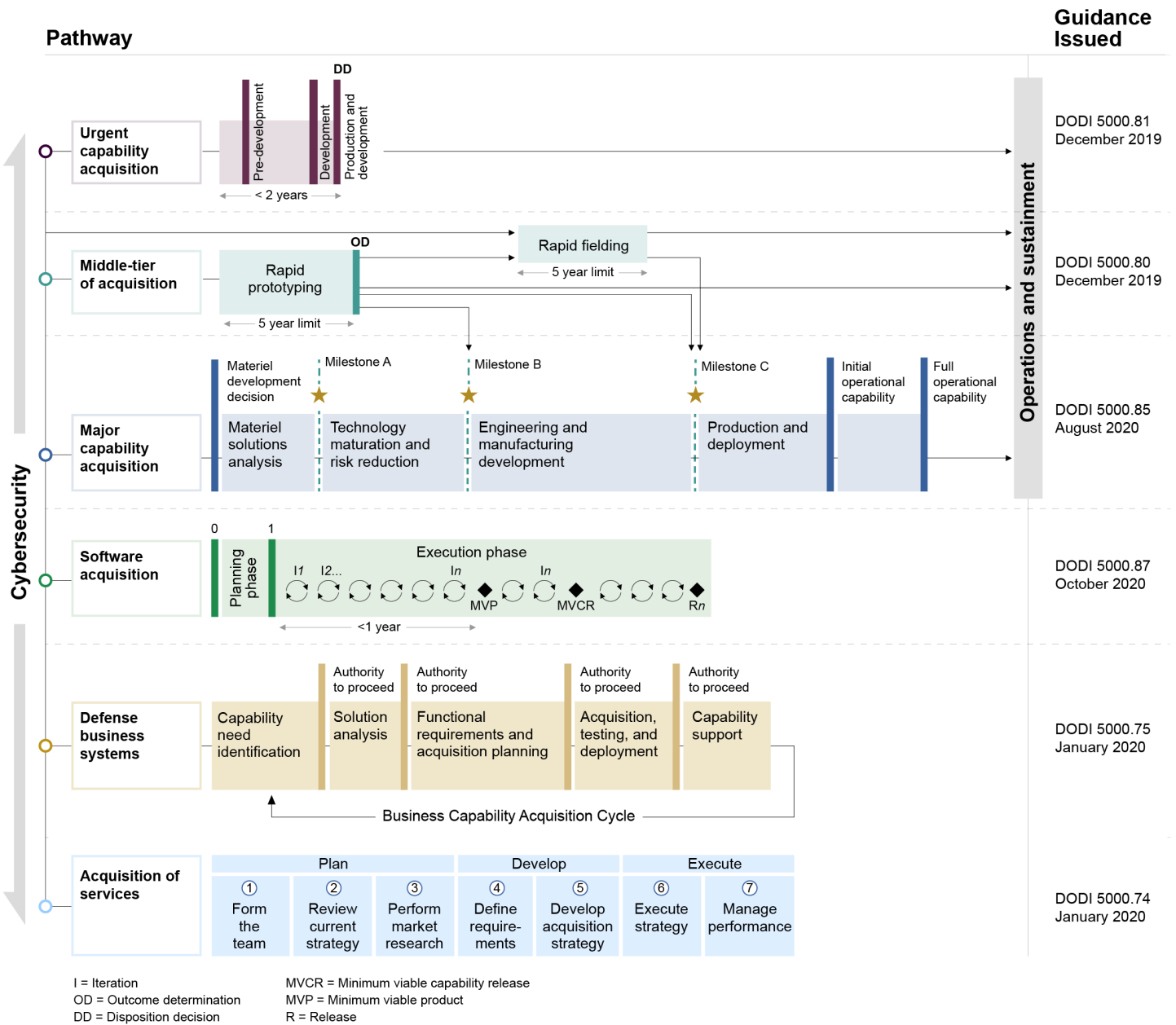
reforms, including disagreements between the Office of the Secretary of Defense and the military departments about acquisition oversight roles. Subsequently, the Deputy Secretary of Defense issued a memorandum in December 2019 to address issues related to acquisition roles and responsibilities, addressing a recommendation from our June 2019 report. In July 2020, the department issued charters for the Under Secretary of Defense for Research and Engineering, and for the Under Secretary of Defense for Acquisition and Sustainment. These two new offices responsible for acquisition oversight were established by a provision of the NDAA for fiscal year 2017. The charters should help to further clarify roles and responsibilities.

In January 2020, in part to address additional reforms directed by Congress over the past several years, DOD reissued and updated its foundational acquisition guidance, emphasizing speed and agility in the acquisition process.¹⁴ The new guidance established the Adaptive Acquisition Framework (AAF), which includes six acquisition pathways based on the characteristics and risk profile of the system being acquired. The creation of two of these pathways—middle-tier acquisition (MTA) and software acquisition—was directed by provisions in the NDAA for fiscal years 2016 and 2020, respectively.¹⁵ Throughout 2019 and 2020, DOD also issued supplemental guidance for these pathways and the functions that support them, such as cybersecurity and test and evaluation. DOD's new AAF has many potential benefits for weapon system acquisitions, including a more modern approach to software acquisition and a cybersecurity emphasis throughout the acquisition life cycle. Figure 1 shows the AAF and corresponding guidance specific to each pathway.

¹⁴Department of Defense Directive 5000.01, *The Defense Acquisition System* (Sept. 9, 2020); Department of Defense Instruction 5000.02, *Operation of the Adaptive Acquisition Framework* (Jan. 23, 2020).

¹⁵See National Defense Authorization Act for Fiscal Year 2016, Pub. L. No. 114-92, § 804 (2015); National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116-92, § 800 (2019).

Figure 1: Adaptive Acquisition Framework Pathways and Related Department of Defense Instructions (DODI)



Source: GAO analysis of Department of Defense data. | GAO-21-511T

Over the past 3 years, DOD has made significant use of the middle-tier acquisition pathway to initiate development or fielding of some of the department's costliest and most critical weapon systems. This pathway is meant to provide a streamlined acquisition process for programs intended to be completed within 2 to 5 years. Programs using the MTA pathway (MTA programs) are generally exempt from DOD's traditional acquisition and requirements development processes. These programs can also be quite large. As of March 2020, the military departments had initiated at least 20 middle-tier acquisition programs that they identified as having costs exceeding the threshold for MDAP designation.¹⁶

Some of these programs are developing capabilities that are critical to meeting the department's mission. For example, the Army's Integrated Visual Augmentation System is expected to provide warfighters with augmented reality head gear that will provide continuous situational awareness during combat, among other capabilities. The program plans to deliver 121,500 systems at a cost of over \$3.4 billion. The MTA programs we reviewed are in various stages of prototyping and fielding and will reach significant milestones in the next few years. While it is too soon to tell how these efforts are progressing because none of the MTA programs we reviewed have completed their initial MTA effort, we will continue to follow these programs closely through our annual weapon systems assessment and other ongoing work.¹⁷

DOD also continues to work to implement reforms to other aspects of the acquisition system, including its requirements generation system. We will continue our oversight through ongoing or planned work looking in depth at additional aspects of DOD's efforts to implement reforms to the acquisition process, including DOD's efforts to reform its requirements generation process and the implementation of a wide range of recommendations and reforms related to the department's software acquisition process.

¹⁶MDAPs generally include those programs designated by DOD as such or that have a dollar value for all increments 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. Certain programs that exceed these thresholds, including MTA programs, are not considered MDAPs.

¹⁷For the purposes of this testimony, we use the word "effort" to refer specifically to the activities undertaken using a single 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 word "effort" excludes activities undertaken using other paths or pathways that a program may be using simultaneously, or may plan to use in the future, to field an eventual capability.

Continued Leadership Attention Is Needed to Ensure Reforms Achieve Intended Effects

DOD leadership demonstrated significant commitment in establishing the new acquisition framework discussed above and implementing reforms in order to improve the department's ability to quickly deliver needed capabilities to the warfighter. Change this fundamental, however, should receive continued attention from the Office of the Secretary of Defense and the military departments to ensure it is achieving intended objectives and helping the department make progress in addressing its long-standing acquisition management challenges. In our March 2021 update to GAO's High-Risk List, we identified a number of outstanding actions the department needs to complete related to acquisition reform implementation, including in the areas of leadership, developing capacity, and monitoring.¹⁸ For example:

- **Leadership:** Work still remains at both the Office of the Secretary of Defense and military department levels to complete the development and implementation of acquisition policies. According to officials from the Office of the Under Secretary of Defense for Acquisition and Sustainment, (1) the military departments will also need to update their policies to align with department-wide policies, and (2) the department will need to develop streamlined processes and tools to support the effective implementation of the newly issued policies. Additionally, in June 2019 we reiterated the importance of recommendations we originally made in 2015 to clarify and strengthen roles and responsibilities at the enterprise level for making portfolio management decisions. These recommendations aim to ensure that DOD's investments are strategy driven and affordable, and balance near- and long-term needs. We noted that these recommendations may take on more importance for DOD in light of the implementation of acquisition reforms that will further diffuse responsibility for initiating and overseeing acquisition programs. DOD has yet to implement them.
- **Capacity:** In our 2021 High-Risk Report, we highlighted capacity challenges related to weapon system acquisition that could affect the department's ability to successfully implement acquisition reforms. For example, DOD continues to face gaps in skill sets such as data analytics that are critical to acquisition oversight. Additionally, we found in our 2020 annual assessment of weapon systems that many major defense acquisition programs reported difficulty in hiring software development staff with the required expertise and in time to complete the required work, and our preliminary findings from our

¹⁸GAO, *High-Risk Series: Dedicated Leadership Needed to Address Limited Progress in Most High-Risk Areas*, [GAO-21-119SP](#) (Washington, D.C.: Mar. 2, 2021).

current assessment indicate the problem persists. DOD has taken initial steps to implement a statutory requirement to establish software development and software acquisition training and management programs, but implementation is still in progress.

- **Monitoring:** Although DOD's acquisition directive establishes that the defense acquisition system will employ a policy of conducting data driven analysis, DOD has yet to complete actions we have recommended in the past to improve the availability and quality of data needed for effective monitoring. For example, in June 2019, we recommended that DOD develop a plan to assess recent acquisition reforms and to identify the necessary data. However, DOD has yet to determine how it will monitor most of the reforms we reviewed. We recognized at that time that assessing the cumulative effect of recent acquisition reforms on the acquisition process and on the cost and schedule performance of the weapon system portfolio could take several years because a critical mass of programs will need to go through the new acquisition processes. However, developing an approach to assess the effects of recent acquisition reforms is critical so that DOD can monitor whether reforms are collectively speeding up the acquisition process without unintended negative consequences on cost and performance of acquisition programs.

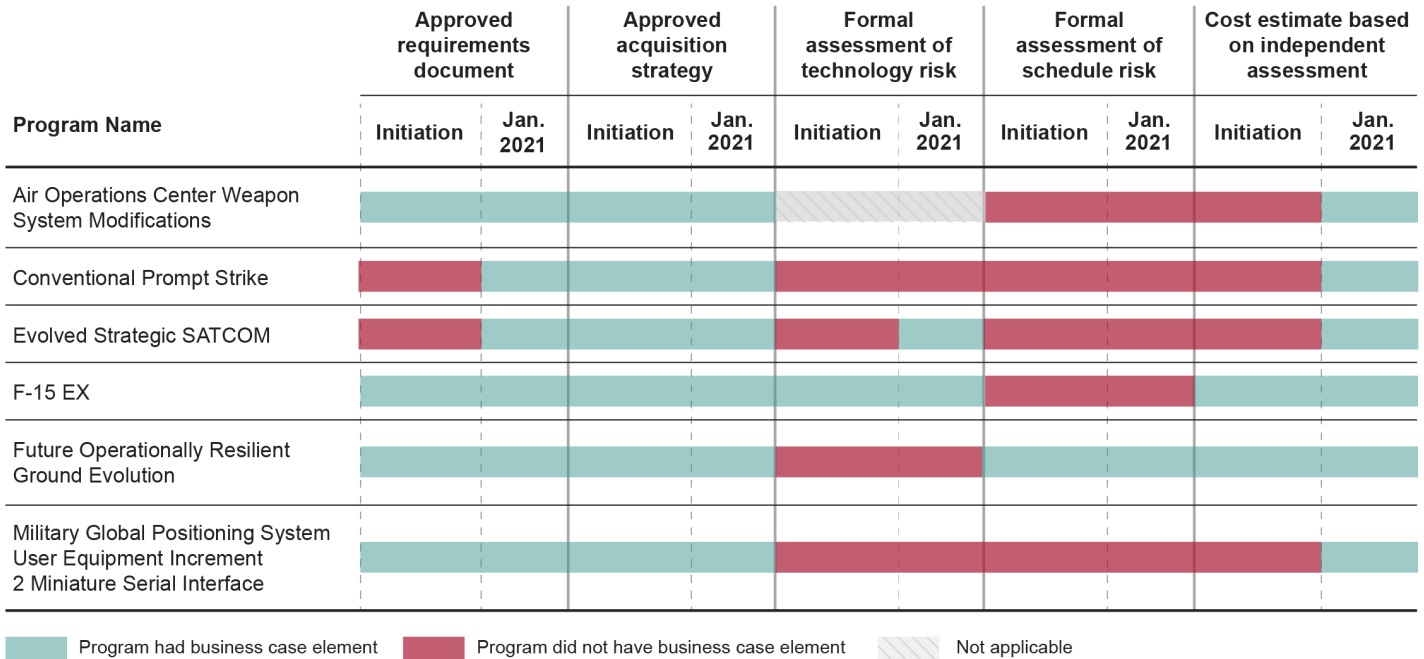
We have also identified the need for continued focus on MTA oversight, given the cost and complexity of many of these programs. DOD has made progress implementing and overseeing the MTA pathway since the first MTA efforts were initiated in 2018. For example, DOD issued guidance in December 2019 that increased oversight for its largest MTA programs, including requiring documentation to help assess whether programs are well positioned to field capabilities within 5 years, as we recommended in June 2019. DOD guidance also calls for programs to report certain cost, schedule, and performance information to the Office of the Secretary of Defense, among other things.

However, preliminary observations from our 2021 annual weapon system assessment suggest that work remains to ensure MTA programs are well positioned to rapidly deliver critical capabilities within budget. We expect to report in our upcoming 2021 assessment that MTA programs are being initiated without a sound business case, and they are not planning to

acquire sufficient knowledge before the end of the current MTA effort.¹⁹ While these programs are intended to have a streamlined oversight process, this type of information is critical to enable decision makers to better understand whether a program is likely to meet its goals. At the time we conducted our analysis for our 2021 annual weapon system assessment, 11 of the 17 programs we reviewed lacked at least one key business case document, and none of the six MTA programs we reviewed for the first time in our 2021 assessment had all of the key business case documents approved at program initiation. Figure 2 summarizes the status of key business case documents for the six new MTA programs reviewed in our draft 2021 annual weapon system assessment.

¹⁹We consider key business case documentation as the following: an approved acquisition strategy, approved requirements, formal assessments of technology and schedule risk, or a cost estimate based on an independent assessment. DOD Instruction 5000.80, issued in December 2019, requires MTA programs above certain cost thresholds to develop certain elements of a business case, including: approved requirements; a cost estimate; and an acquisition strategy that includes security, schedule, and technical or production risks, and also includes a test strategy or assessment of test results, and a transition plan. Moreover, DOD Instruction 5000.73, issued in March 2020, requires the Office of Cost Assessment and Program Evaluation to conduct an estimate of life-cycle costs for programs likely to exceed the acquisition category I threshold using the MTA rapid prototyping pathway, or the acquisition category I or II thresholds using the MTA rapid fielding pathway.

Figure 2: Completion of Key Business Case Documents for Six New Middle-Tier Acquisition Programs Reviewed in Our Draft 2021 Annual Weapon System Assessment



Source: GAO analysis of programs' questionnaire responses. | GAO-21-511T

Note: We did not assess Air Operations Center Weapon System Modifications' completion of a formal risk assessment since it is a software program that builds software applications using existing, commercially available mature technologies.

Additionally, while 11 of the 17 MTA programs we reviewed planned to transition to a follow-on development or production effort or MTA rapid fielding effort at the completion of the current MTA effort, these 11 programs generally reported limited plans to acquire key knowledge that is part of a sound business case before the completion of the current MTA effort. We also expect to report that, in some cases, MTA programs may report optimistic technology development plans during the MTA effort. For example, we identified three MTA programs that plan to significantly increase technology readiness levels for one or more of their

critical technologies during the current MTA effort.²⁰ Our prior work on MDAPs has shown that increasing technology readiness levels by even one level can take multiple years and becomes more challenging as the technology approaches maturity.²¹ These concerns are similar to those we have observed on MDAPs in the past. For MTA programs, a knowledge deficit at the end of the current MTA effort runs the risk of having implications after the program transitions to a follow-on acquisition pathway or effort.

DOD Can Improve Its Management Approach to Adopting Innovative Technologies

One of the key priorities of DOD's new acquisition framework is to improve DOD's ability to benefit from commercial innovation. DOD has long played a large role in influencing innovation in the United States through its research and development investments, but the department has been challenged in developing and integrating innovative technologies into its weapon systems. We have found for several years that as DOD increasingly relies on the commercial sector for fostering innovations that guide its technology investments, it needs to refresh its management approach to encourage technological innovation in its systems, and we have made related recommendations. Our findings include the importance of (1) establishing a balance between breakthrough, "disruptive" technologies—those considered to be innovative—and moderate, "incremental" technology enhancements; (2) generating opportunities for the acquisition community to become steadily involved in a technology's development; and (3) creating an environment that attracts companies that do not typically sell or develop products for DOD's use.

We previously reported that DOD's approach to managing its innovation investments differs considerably from the model used by leading innovators in private industry.²² Specifically, DOD too often focuses on

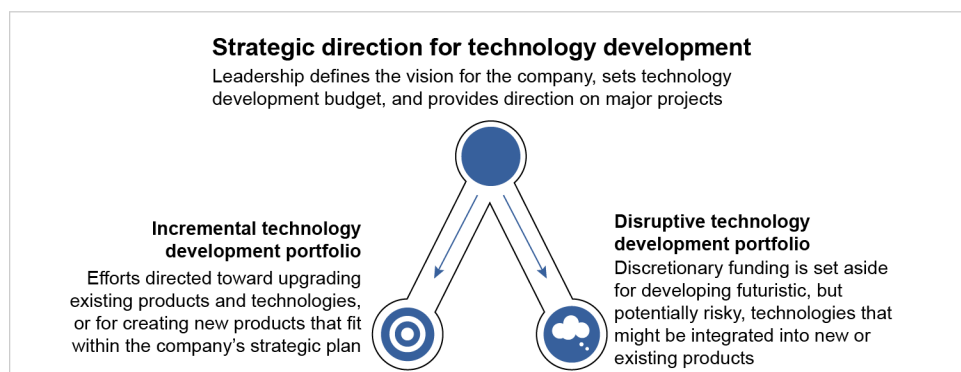
²⁰Technology readiness levels are a compendium of characteristics that describe increasing levels of technical maturity based on demonstrated (tested) capabilities, and are the most common measure for systematically communicating the readiness of new technologies or new applications of existing technologies to be incorporated into a system or program.

²¹GAO, *Defense Acquisitions: Decisions Needed to Shape Army's Combat Systems for the Future*, [GAO-09-288](#) (Washington, D.C.: Mar. 12, 2009); and *Ford-Class Carriers: Lead Ship Testing and Reliability Shortfalls Will Limit Initial Fleet Capabilities*, [GAO-13-396](#) (Washington, D.C.: Sept. 5, 2013).

²²GAO, *Defense Science and Technology: Adopting Best Practices Can Improve Innovation Investments and Management*, [GAO-17-499](#) (Washington, D.C.: June 29, 2017).

developing near-term, less risky, more incremental types of innovations at the expense of long-term, disruptive innovation. By separating these two portfolios, leading companies have reported that they could promote existing product lines in the short term while exploring opportunities to remain competitive in the long term and mitigate the financial risk associated with disruptive technology development. Figure 3 provides an overview of these two portfolios.

Figure 3: Commercial Model Ensures Investments in Incremental and Disruptive Innovation



Source: GAO analysis of leading company research and development practices. | GAO-21-511T

Based on this commercial leading practice, in 2017 we recommended that the Under Secretary of Defense for Research and Engineering (1) define the desired mix of incremental and disruptive innovation investments within military departments; and (2) annually assess whether that mix is achieved.²³ To date, DOD has yet to implement either of these two recommendations. We continue to maintain that these priority recommendations would ensure DOD is positioned to counter both near and far term threats.

Similarly, we reported in 2020 that the majority (67 percent) of research conducted by the defense industry's independent research and development projects (IR&D) completed between 2014 and 2018 focused

²³GAO, *Defense Science and Technology: Adopting Best Practices Can Improve Innovation Investments and Management*, [GAO-17-499](#) (Washington, D.C.: June 29, 2017).

on incremental, rather than disruptive, innovation.²⁴ However, we found that DOD was not tracking this kind of information in its database on IR&D projects. DOD largely lacked insight into these projects, including key information on linkages to modernization priorities and whether the project was pursuing incremental or disruptive innovation. We found that requiring defense contractors to identify whether an IR&D project is intended to provide incremental or disruptive innovation would give DOD leadership more information regarding the extent to which industry investments are focused more on improving existing technologies or on developing the next generation of technology. DOD concurred with our recommendation that DOD take steps to assess and determine whether the DOD IR&D database should require contractors to include additional information on IR&D projects, including the nature of the project as either potentially disruptive or potentially incremental.

Another challenge to DOD's adoption of technological innovation has been its divided responsibility for technology versus product development. We previously reported that this divide has contributed to a culture that does not encourage collaboration between DOD's science and technology (S&T) and acquisition communities, which is needed for the acquisition community to gain the confidence needed to introduce a game-changing technology into a weapon system, and it limits the S&T community's ability to conduct prototyping.²⁵ DOD is taking some steps to address this divide. For example, DOD implemented our recommendation to define an S&T management framework that includes incorporating acquisition stakeholders into technology development programs to ensure they are relevant to customers. DOD also implemented our recommendation to include promoting advanced prototyping of disruptive technologies within S&T labs so the S&T community can provide these technologies work to generate demand from future acquisition programs.

²⁴GAO, *Defense Science and Technology: Opportunities to Better Integrate Industry Independent Research and Development into DOD Planning*, [GAO-20-578](#) (Washington, D.C.: Sept. 3, 2020). The Federal Acquisition Regulation (FAR) generally allows contractors to recover the cost of IR&D efforts as indirect costs allocated to their government contracts. DOD does not specify the research to be conducted or directly fund the IR&D projects. As such, contractors have wide latitude in determining which projects to pursue under IR&D and submit their IR&D expenses to DOD for reimbursement of allowable costs on defense contracts.

²⁵[GAO-17-499](#).

In addition to basic research and development, DOD has also faced challenges in attracting new technology from innovative companies. We previously reported on several challenges that innovative companies said were reasons they do not typically do business with DOD.²⁶ These challenges are grouped into the six areas shown in table 2.

Table 2: Key Challenges That Deter Companies from Developing Products for Department of Defense (DOD) Use According to Selected Non-Traditional Companies

Complexity of DOD's process	Intellectual property rights concerns
Unstable budget environment	Government-specific contract terms and conditions
Long contracting timelines	Inexperienced DOD contracting workforce

Source: GAO analysis of company observations. | GAO-21-511T

DOD has taken some action to address these concerns, including each of the military services taking steps to shorten their contracting processes, and DOD establishing an innovation unit to reach out to companies that do not typically do business with the department. Perhaps most notably, DOD has also taken steps to streamline its acquisition process, although it is too soon to tell how these changes will play out. Specifically, the new AAF is designed, in part, to increase the speed of adopting technical innovation, including rapid prototyping and integrating information technology.

According to DOD policy, the implementation of the AAF and its acquisition pathways are to support the speed of technological innovation. For example, DOD guidance states that the MTA pathway is designed to fill a gap in the acquisition system for capabilities that have a level of maturity to allow them to be rapidly prototyped within an acquisition program or fielded within 5 years of MTA program start. Similarly, the software acquisition pathway is for the timely acquisition of custom software capabilities developed for DOD, and the urgent capability acquisition pathway is for programs to provide capabilities to fulfill urgent operational needs and other quick reaction capabilities that can be fielded in less than 2 years. We will continue to monitor DOD's efforts to use these pathways to increasingly leverage innovative technologies.

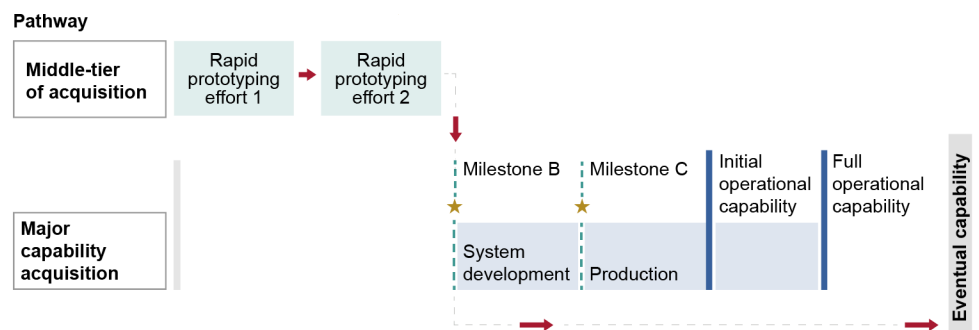
²⁶GAO, *Military Acquisitions: DOD Is Taking Steps to Address Challenges Faced by Certain Companies*, [GAO-17-644](#) (Washington, D.C.: July 20, 2017).

DOD Has Yet to Develop an Updated Approach to Program Data Collection and Reporting

While recent acquisition reforms are aimed in part at improving the speed of delivery capability, including by streamlining oversight processes, the ability of senior DOD and congressional leadership to conduct timely oversight remains fundamental to ensuring the acquisition system is responsive to warfighter needs. As part of the implementation of the AAF, the former Under Secretary of Defense for Acquisition and Sustainment, in December 2019, stated her commitment to conduct data-driven oversight of acquisition programs, nearly all of which are now managed at the military department level instead of the Office of the Secretary of Defense level. DOD has made some progress in developing its approach to this type of oversight. But today, many questions remain about DOD's planned approach to providing data for internal and external oversight of acquisition programs.

The AAF introduces new considerations for program oversight. Rather than requiring acquisition programs to use only one particular acquisition process, the framework allows program managers to use one or more of six acquisition pathways. Each pathway is governed by separate policies for milestones, cost and schedule goals, and reporting. Program managers can tailor, combine, and transition between pathways based on program goals and risk associated with the weapon system being acquired (see figure 4).

Figure 4: Notional Use of Multiple Efforts and Multiple Pathways



Source: GAO analysis of Department of Defense data. | GAO-21-511T

Previously, DOD's reporting on its costliest weapon programs typically encompassed the total estimated cost and schedule associated with delivery of the eventual capability once a program reached the system development milestone. Annual selected acquisition reports, which

facilitated oversight of individual MDAPs, would typically have only one “effort” using the single acquisition pathway.

The current statutory requirement for selected acquisition reports is scheduled to terminate with the final report for fiscal year 2021. For over 40 years, these reports have provided summary level cost, schedule, and performance data on MDAPs, and more recently other program types, to enable Congress to conduct oversight. The NDAA for Fiscal Year 2020 required DOD to submit to the congressional defense committees a proposal for an alternative methodology for reporting on all acquisition programs. DOD’s proposal, submitted in November 2020, states that DOD plans to transition from the current selected acquisition report format to instead provide Congress with direct access to program data in the department’s Advanced Analytics (Advana) database. The proposal notes that each pathway will have unique data strategies for reporting to Congress, but does not address fundamental questions such as how performance will be measured for each pathway or how reporting will be handled for programs that use more than one effort or pathway.

DOD’s plan to transition program reporting to its Advana system has the potential to improve the timeliness of data available for oversight and offer opportunities for more complex data analytics than previous reporting approaches. However, defining the underlying approach to program oversight, including what data will be needed to monitor program performance, is also an important part of achieving these benefits. DOD officials, realizing the need to collect new types of data for oversight, developed a plan to identify performance metrics and data requirements for AAF pathways and have made progress on executing the plan for some pathways. DOD officials told us in December 2020 that they finalized data strategies for programs in the major capability acquisition and MTA pathways. They stated they are continuing to work with stakeholders and program managers to identify metrics for other pathways. However, we expect to report in our 2021 annual assessment that officials have yet to establish consistent practices for monitoring efforts to acquire weapon capabilities under the AAF, including finalizing metrics for all acquisition pathways, and determining how to track cumulative cost, schedule, and performance data for the delivery of capabilities that leverage multiple efforts or pathways.

DOD’s lack of information on the performance of programs across pathways and efforts creates challenges for DOD with regard to assessing whether it is meeting its acquisition reform goals of building a more lethal force and speeding delivery of capability to the warfighter. In

addition, the lack of information hinders DOD's ability to conduct effective internal oversight of the development of critical weapon capabilities and management of the weapon system portfolio as a whole. DOD's ability to provide quality external reporting is also constrained, which may limit information for congressional oversight of some weapon programs.

We have ongoing work addressing DOD's proposed changes to its congressional reporting requirements, including proposed metrics for program performance. However, given that program execution is well underway for several programs planning to use multiple pathways or efforts within a pathway, addressing the gap with regard to reporting on eventual capabilities quickly is essential while DOD works on a longer term effort to finalize metrics and define programs under the new AAF. In our draft 2021 annual assessment of DOD's weapon systems, we made a recommendation to improve internal and external oversight of capabilities developed using multiple efforts or pathways. DOD is currently reviewing the draft report and is scheduled to provide any comments later this month.

As the department continues to develop its approach to program data collection and reporting, the willingness of the military departments to transparently share data about their acquisition programs is critical to understanding the effectiveness of new acquisition approaches. In June 2019, we reported on disagreements between the Office of the Secretary of Defense and military departments about the amount of program information that military departments should be required to provide to the Office of the Secretary of Defense for certain programs.²⁷ DOD emphasized the importance of resolving these disagreements in a November 2020 report to Congress in which it noted that ensuring data transparency across the DOD components was a challenge to improving acquisition data. The Office of the Under Secretary of Defense for Acquisition and Sustainment announced plans in July 2020 to adopt a data and analytics strategy to facilitate data-driven oversight, which the Under Secretary's office and the military departments are developing together. This effort could be an important step in addressing disagreements and realizing the department's policy of data transparency identified in DOD's foundational acquisition guidance.²⁸

²⁷GAO-19-439.

²⁸Department of Defense Directive 5000.01, *The Defense Acquisition System* (Sept. 9, 2020).

In conclusion, DOD leadership has demonstrated significant commitment to implementing reforms to improve the ability of the defense acquisition system to quickly deliver innovative capabilities to the warfighter. However, in order to ensure that the intended effects of these reforms are achieved, it is imperative that DOD's leaders demonstrate the same level of commitment to setting up proper oversight of the acquisition process and acquisition programs as programs begin using the new pathways and flexibilities of the AAF. DOD's challenge is to find the right balance between having an effective oversight process and managing the competing demands such a process places on program management. While our work supports the benefits of streamlining the oversight process, change does not mean weakening oversight. Rather, the goal of change is to perform effective oversight more efficiently and to recognize problems or incentives that require remedies—not just more information requirements. Not making meaningful changes to focus oversight on the most important aspects of program performance could have reverberating effects for decades to come if critical programs continue to deliver disappointing results.

Chairman Kaine, Ranking Member Sullivan, 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.

GAO Contact and Staff Acknowledgments

If you or your staff have any questions about this testimony, please contact Shelby S. Oakley at (202) 512-4841 or OakleyS@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 Anne McDonough, Assistant Director; Erin Carson, Analyst-in-Charge; and Nathan Foster. Also contributing were Vinayak Balasubramanian, Rose Brister, and Robin Wilson.

Appendix I: Summary of Selected Acquisition Reforms

Table 3: Summary of Selected Reforms that Affect Acquisition Program Oversight from the National Defense Authorization Acts for Fiscal Years 2016 and 2017

Action related to reform	National Defense Authorization Act year and section	Description
Changes to oversight processes for major defense acquisition programs (MDAP)		
Designating military departments to be milestone decision authority	Section 825 of the National Defense Authorization Act for Fiscal Year 2016	Required that the service acquisition executive of the military department concerned be designated as the milestone decision authority for MDAPs that reach milestone A after October 1, 2016 unless the Secretary of Defense designates an alternate milestone decision authority under certain circumstances outlined in statute, such as the program being critical to a major interagency effort.
Performing independent technical risk assessments	Section 807(a) of the National Defense Authorization Act for Fiscal Year 2017	Required independent technical risk assessments be conducted for MDAPs that reach milestone A after October 1, 2017. The assessments are to be conducted before any decision to grant milestone A and must identify critical technologies and manufacturing processes that need to be matured. The assessments are also to be conducted before any decision to grant milestone B approval, before any decision to enter into low rate initial production or full rate production, or at any other time considered appropriate by the Secretary of Defense; these assessments must identify critical technologies or manufacturing processes that have not been successfully demonstrated in a relevant environment.
Establishing cost, fielding, and performance goals	Section 807(a) and section 925(b) of the National Defense Authorization Act for Fiscal Year 2017	Required cost, fielding, and performance goals be set for MDAPs that reach milestone A after October 1, 2017. The goals must be established before funds are obligated for technology development, systems development, or production. The goals are to ensure that the milestone decision authority approves a program that will: be affordable; anticipate the evolution of capabilities to meet changing threats, technology insertion, and interoperability; and be fielded when needed.
Reorganizing acquisition oversight functions in the Office of the Secretary of Defense		
Reorganizing the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics	Sections 901(a) and (b) of the National Defense Authorization Act for Fiscal Year 2017	Restructured the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics and distributed the responsibilities previously carried out by that office to two newly created undersecretary positions—the Under Secretary of Defense for Research and Engineering and the Under Secretary of Defense for Acquisition and Sustainment.

Source: GAO Analysis of National Defense Authorization Acts for Fiscal Years 2016 and 2017. | GAO-21-511T

Note: The statutes associated with several of these reforms have been amended by subsequent National Defense Authorization Acts since being signed into law.

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