United States Government Accountability Office

Report to Congressional Committees

JULY 2026

Weapon Systems Annual Assessment

Requiring Mature Technologies Could Enable Shift to Rapid Delivery

AIR FORCE SPACE FORCE NAVY ARMY

GAO-26-108457

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GAO Highlights

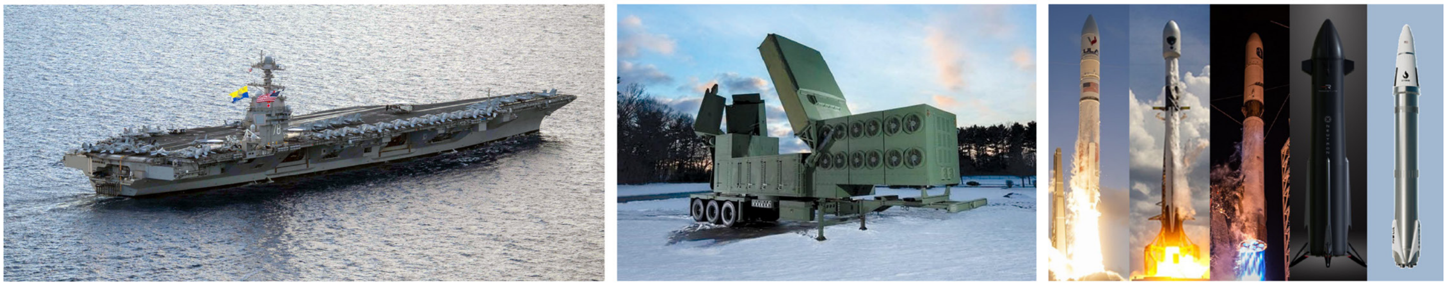
Highlights of GAO-26-108457

A Report to Congressional Committees July 2026

Weapon Systems Annual Assessment

Requiring Mature Technologies Could Enable Shift to Rapid Delivery

AIR FORCE **SPACE FORCE** **NAVY** **ARMY**



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Why GAO Did This Study

DOD plans to invest over $2.4 trillion to develop and acquire its costliest weapon programs. However, it continues to face persistent challenges in achieving the schedule and capability goals of these weapon systems. DOD is currently undertaking a new series of reforms, such as the November 2025 *Acquisition Transformation Strategy*, intended to ensure rapid delivery of effective solutions to meet warfighting needs. In June of 2024 and 2025, GAO found that DOD struggled to execute prior reforms that were also intended to help achieve speed in delivering capability. This resulted in a status quo of slow, linear development approaches.

This report, GAO's 24th annual assessment, responds to a provision Congress included in statute for GAO to annually review selected DOD acquisition programs and efforts. This report (1) assesses the characteristics and performance of 104 of DOD's costliest weapon programs; and (2) analyzes selected programs' implementation of leading practices for product development, as described in GAO-23-106222, among other objectives.

GAO identified programs for review based on cost and acquisition status; collected and analyzed program documents; used a questionnaire to obtain data from program offices; and interviewed DOD officials.

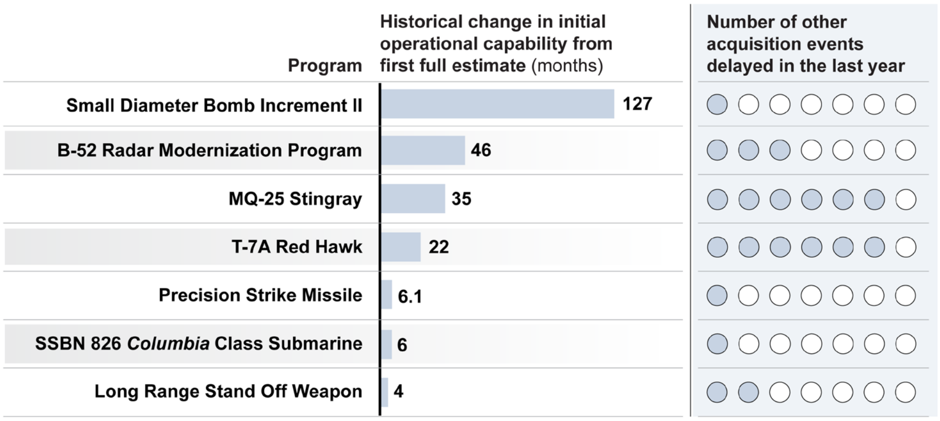
What GAO Found

The Department of Defense (DOD) continues to struggle to deliver technologies quickly and within budget. Since its last annual assessment, GAO found:

- Programs are delaying interim events and milestones for some of the costliest major defense acquisition programs (MDAP).
- DOD has increased its use of the middle tier of acquisition (MTA) rapid prototyping and fielding pathways—intended to be completed in 5 years.
- Some programs began on the MTA pathway with technologies that require more time to develop, hindering timely delivery of essential capabilities.
- Programs do not consistently follow leading practices for product development that could help DOD achieve its stated goals.

Schedule delays persisted across MDAPs, signaling overly optimistic time frames. The overall average time frame to deliver a capability increased this year to over 12 years. Further, several MDAPs have not set new delivery dates or are delaying critical interim milestones. By keeping delivery dates static, these programs raise questions about how realistic their estimates are. This means the 12-year average will likely increase in the future.

Selected Programs Delayed Acquisition Events Since Last Year



Source: GAO analysis of Department of Defense data. | GAO-26-108457

MTA portfolio size increased. DOD plans to invest at least $49 billion across 23 of its most expensive MTA programs. The cost of the MTA portfolio increased, mainly because more of the largest and most time-consuming programs used the pathway this year.

What GAO Recommends

GAO is recommending that DOD ensure that acquisition policies for programs rapidly delivering capabilities and integrating technologies, like those using the MTA pathway, require that programs start with mature technologies or develop associated immature technologies separately. DOD concurred with the recommendation.

View GAO-26-108457. For more information, contact Shelby S. Oakley at oakleys@gao.gov.

Some programs began the MTA pathway with immature technologies, hindering timely transition. In multiple annual assessments, GAO found that almost half the MTA programs entered the pathway with immature technologies. Leading practices call for programs to have mature technologies prior to beginning development. Leading practices also call for programs to off-ramp immature technologies that could delay delivery of a minimum viable product (MVP), which establishes an initial set of capabilities on which DOD can iterate.

However, DOD policy does not clearly require programs entering the MTA pathway to start with multiple technologies that are mature or direct programs to develop immature technologies separately from the MTA pathway. For example, between 2018 and 2025, 18 out of 40 programs have entered the MTA pathway with immature technologies. In addition, MTA programs GAO reviewed are ending without delivering a fieldable capability.

For example, GAO found that technologies for seven of eight programs currently on the pathway remain immature and will require additional development. Since 2018, nine programs that entered the MTA pathway with multiple immature technologies made limited progress in maturing those technologies, which could delay delivering fieldable capabilities to the warfighter.

Some MTA Programs Entered the Pathway with Immature Technologies

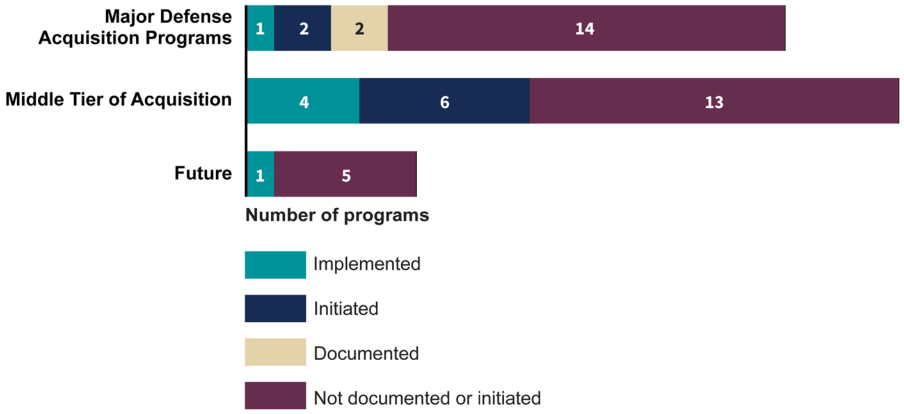
	MTA Initiation Year	Lowest Initial TRL	Lowest Current/ Final TRL	Number of Critical Technologies
Air Launched Rapid Response Weapon	2018	3	6	2
Extended Range Cannon Artillery	2018	4	6	9
Hypersonic Conventional Strike Weapon	2018	5	5	2
Next Generation Overhead Persistent Infrared GEO	2018	5	6	18
Protected Tactical Enterprise Service	2018	4	6	9
Protected Tactical SATCOM	2018	4	6	5
Conventional Prompt Strike Phase 1	2019	4	5	6
Deep Space Advanced Radar Capability	2021	4	4	4
Hypersonic Attack Cruise Missile	2022	4	4	5

MTA Middle tier of acquisition **TRL** Technology Readiness Level

Source: GAO analysis of Department of Defense data. | GAO-26-108457

Weapon systems do not consistently implement leading practices to deliver innovative capability with speed. Most programs, including newer programs like MTAs and future weapon system acquisitions, that GAO reviewed do not fully implement leading practices to achieve efficiencies. In reports dating back to 2022, GAO has recommended that DOD revamp its weapon system acquisition, test and evaluation, systems engineering, and digital engineering policies to fully incorporate iterative development and other leading practices. DOD concurred with many recommendations but has yet to fully implement them.

Most Programs Have Yet to Fully Incorporate a Minimum Viable Product



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

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Abbreviations

AAF	Adaptive Acquisition Framework
DAES	Defense Acquisition Executive Summaries
DAVE	Defense Acquisition Visibility Environment
DOD	Department of Defense
DRP	Deferred Resignation Program
IOC	initial operational capability
IT	information technology
MCA	major capability acquisition
MDAP	major defense acquisition program
MOSA	modular open systems approach
MTA	middle tier of acquisition
MVP	minimum viable product
OSD	Office of the Secretary of Defense
RDT&E	research, development, test, and evaluation
TRL	technology readiness level

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U.S. GOVERNMENT ACCOUNTABILITY OFFICE
**441 G St. N.W.
Washington, DC 20548**

July 2, 2026

Congressional Committees

The Department of Defense (DOD) expects to spend more than $2.4 trillion to develop and acquire its most expensive weapon systems. Despite the significant investment and reforms during the past 2 decades, DOD continues to face persistent challenges—such as working to meet overly prescriptive requirements—that delay delivering essential capabilities to the warfighter with speed.

DOD is in the process of implementing critical acquisition changes. In the past year, DOD took steps to transform its processes for acquiring weapon systems, with goals of ensuring rapid delivery of effective solutions at scale to address warfighter needs. These initiatives stemmed from executive and congressional direction to DOD in 2025 to reform the defense acquisition system.[1] DOD plans to do this by rebuilding the industrial base, empowering the workforce, and maximizing acquisition flexibility, among other things.[2]

Our body of reports have found that DOD has struggled to execute prior reforms to help achieve speed in delivering capability, resulting in a status

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[1] Exec. Order 14,265, 90 Fed. Reg. 15,621, *Modernizing Defense Acquisitions and Spurring Innovation in the Defense Industrial Base* (Apr. 9, 2025); National Defense Authorization Act for Fiscal Year 2026, Pub. L. 119-60 (2025). Executive Order 14,265 set forth the goal of reforming defense acquisition processes with an emphasis on speed, flexibility and execution. Among other things, the order directed the Secretary of Defense to (1) submit plans to the President for reforming DOD's acquisition processes and the acquisition workforce and (2) oversee review of acquisition-related DOD policy, guidance and regulations to eliminate or revise any unnecessary supplemental regulations or any other internal guidance and promote expedited and streamlined acquisitions. Exec. Order 14,265, 90 Fed. Reg. 15,621, *Modernizing Defense Acquisitions and Spurring Innovation in the Defense Industrial Base* (Apr. 9, 2025). See Department of Defense, Secretary of Defense Memorandum, *Transforming the Defense Acquisition System into the Warfighting Acquisition System to Accelerate Fielding of Urgently Needed Capabilities to Our Warriors* (Nov. 7, 2025); and Department of Defense, Secretary of Defense Memorandum, *Reforming the Joint Requirements Process to Accelerate Fielding of Warfighting Capabilities* (Nov. 7, 2025).

[2] Department of Defense, Secretary of Defense Memorandum, *Transforming the Defense Acquisition System into the Warfighting Acquisition System to Accelerate Fielding of Urgently Needed Capabilities to Our Warriors*.

quo of slow, linear development approaches.[3] We have also reported that program outcomes have not improved—it currently takes over a decade for many programs to deliver even an initial capability. Likewise, our last two annual reviews of DOD's weapon system acquisitions found that DOD is not well-positioned to field systems with speed—which is particularly concerning when adversaries are able to leverage new technologies and seize upon rapid innovation for their own military gain.[4]

As the department seeks to implement new policies and processes to accelerate fielding, taking steps to ensure that new solutions are effective would better position it to achieve its stated aim to gain a wartime footing. We have made numerous recommendations to address structural obstacles to achieving the kind of iterative, agile approach to development that DOD seeks to attain. For example, we recommended that DOD update its policies to ensure programs plan for early approaches that facilitate iteration—like starting with high-level capability needs, planning for digital twins and threads, and using modular open systems approaches (MOSA)—and provide a logical starting point for achieving better, more consistent outcomes.[5] Implementing our prior recommendations to apply leading practices for product development could provide DOD with a road map to help it achieve its stated goals and address recent congressional action aimed at defense acquisition reform.

In response to title 10, section 3072 of the U.S. Code, this report—GAO's 24th annual assessment—provides information on 104 of DOD's most

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[3] GAO, *Weapon Systems Acquisition: Beyond Business as Usual—Using Leading Practices to Curb Waste and Save Billions*, GAO-26-109135 (Washington, D.C.: June 9, 2026); *Weapon Systems Annual Assessment: DOD Leaders Should Ensure That Newer Programs Are Structured for Speed and Innovation*, GAO-25-107569 (Washington, D.C.: June 11, 2025); *Army Modernization: Leading Practices Could Better Support Delivery of Artillery and Missiles,* GAO-25-107263 (Washington, D.C.: June 5, 2025); *DOD Acquisition Reform: Military Departments Should Take Steps to Facilitate Speed and Innovation*, GAO-25-107003 (Washington, D.C.: Dec. 12, 2024); *Weapon Systems Annual Assessment: DOD Is Not Yet Well-Positioned to Field Systems with Speed [Reissued with revisions on July 18, 2024]*, GAO-24-106831 (Washington, D.C.: June 17, 2024); and *Middle-Tier Defense Acquisitions: Rapid Prototyping and Fielding Requires Changes to Oversight and Development Approaches*, GAO-23-105008 (Washington, D.C.: Feb. 7, 2023).

[4] GAO-25-107569; and GAO-24-106831.

[5] GAO, *Leading Practices: Agency Acquisition Policies Could Better Implement Key Product Development Principles,* GAO-22-104513 (Washington, D.C.: Mar. 10, 2022); GAO-25-107569; GAO-24-106831; and GAO-23-105008.

costly weapon programs.[6] Specifically, this report covers the following sets of programs:

- 75 major defense acquisition programs (MDAP),
- 23 programs currently using the middle tier of acquisition (MTA) pathway, and
- six future major weapon acquisitions.[7]

This report assesses (1) how DOD's portfolio of its costliest weapon programs and other selected programs have performed over time; (2) the extent to which opportunities exist to improve program outcomes using leading product development practices; and (3) the extent to which programs are implementing modern software development approaches and recommended cybersecurity practices.

To conduct our work, we generally obtained cost and schedule data from a variety of sources, including 2025 Defense Acquisition Executive Summaries (DAES); December 2023 Modernized Selected Acquisition Reports (latest available at the time of our review); MTA Program

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[6] Title 10, section 3072 of the U.S. Code includes a provision for us to submit to the congressional defense committees an annual assessment of selected DOD acquisition programs and initiatives by March 30 of each year from 2020 through 2029. Our assessment of the performance of DOD's IT programs is included in a separate report, which we also prepared in response to title 10, section 3072 of the U.S. Code. We plan to issue that report later this year.

[7] Throughout this report, 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 an eventual capability. For the purposes of this report, 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. For the purposes of this report, the phrase "future major weapon acquisitions" includes programs planning to develop their systems on the major capability acquisition (MCA) pathway, as well as efforts that are yet to be initiated on another pathway whose costs are expected to exceed the threshold for designation as an MDAP. This includes efforts in research and development and programs in pre-system development.

Identification Data; and cost data provided by program offices.[8] We determined that the 2025 DAES data, December 2023 Modernized Selected Acquisition Report data, and MTA program cost data were sufficiently reliable for the purposes of reporting program cost and schedule information.

We provided a questionnaire to 72 programs to obtain information on

- programs' schedule performance,
- the extent to which programs reported they were using leading acquisition practices, and
- programs' approaches to software development and cybersecurity practices.

These 72 programs represent a subset of the 104 programs included in our analysis of DOD's costliest weapon programs.[9] Specifically, it includes 38 MDAPs that are in development or the early stages of production; 24 MTA programs that are generally above the cost threshold for designation as an MDAP; and the six future major weapon

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[8] Department of Defense, *Operation of the Middle Tier of Acquisition*, DOD Instruction 5000.80 (Dec. 30, 2019) (incorporating change 1, Nov. 25, 2024). DOD Instruction 5000.80 requires components to submit updated program identification data with the President's Budget and Program Objective Memorandum submissions to the Office of the Secretary of Defense. This data includes the program's capability requirement, quantity, schedule, technology, and budget, among other things. In cases where DAES reporting was not available or found to be incomplete, we instead used data from the program's most recent acquisition program baseline or December 2023 Modernized Selected Acquisition Reports—the most recent available since DOD did not issue comprehensive Modernized Selected Acquisition Reports for fiscal year (FY) 2024. Officials stated this was due to the fact that DOD did not include a Future Years Defense Program as a part of its fiscal year 2025 President's Budget Request. We converted all cost information to fiscal year 2025 dollars, using conversion factors from DOD Comptroller's National Defense Budget Estimates for Fiscal Year 2025. Comptroller leadership made the decision not to publish an FY 2026 Green Book.

[9] We did not complete a one- or two-page assessment for the remaining 37 MDAPs because those programs have already reached full-rate production or, if there is no full-rate production milestone, initial operational capability (IOC). We also did not include certain programs because they were classified.

acquisitions, for which we completed more detailed program assessments (see app. I).[10]

Appendix II provides additional information on our objectives, scope, and methodology.

We conducted this performance audit from April 2025 to July 2026 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.

Background

Defense Acquisition Pathways

DOD generally acquires its weapon systems through a management process known as the Defense Acquisition System, governed by the overarching principles described in DOD Directive 5000.01 and DOD Instruction 5000.02.[11] According to DOD Directive 5000.01, the objective of the Defense Acquisition System is to support the National Defense Strategy through the development of a more lethal force, based on U.S. technological innovation and a “culture of performance” that yields a decisive and sustained U.S. military advantage. Further, delivering performance “at the speed of relevance” is one of the overarching policies governing the defense acquisition system. DOD Directive 5000.01 also states that the defense acquisition system will be designed to acquire

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[10] While we initially intended to assess 24 MTA efforts, we subsequently prepared 18 assessments. We combined assessments for the Conventional Prompt Strike (CPS) Rapid Prototyping and Rapid Fielding MTA programs; the Integrated Visual Augmentation System Rapid Prototyping and Rapid Fielding MTA programs; the Tracking Layer MTA programs; and the Transport Layer MTA programs. Tranche 3 Transport Layer was included in the program selection of 24 MTA efforts but was subsequently excluded from the final 23 MTA programs we assessed for cost and schedule because the Space Development Agency has yet to establish cost and quantities for Tranche 3. Additionally, two programs to which we sent questionnaires, the M-10 Booker and the Hypersonic Air-Launched Offensive Anti-Surface, were canceled and were, therefore, not included in the assessments. Lastly, two other programs, the Military GPS User Equipment Increment 2 and Future Operationally Resilient Ground Evolution (FORGE) MTA programs, transitioned to the Software Acquisition Pathway, which was outside the scope of our review.

[11] Department of Defense, *The Defense Acquisition System*, DOD Directive 5000.01 (Sept. 9, 2020) (incorporating change 1, July 28, 2022); and *Operation of the Adaptive Acquisition Framework*, DOD Instruction 5000.02 (Jan. 23, 2020) (incorporating change 1, June 8, 2022).

products and services that satisfy user needs with measurable and timely improvements to mission capability.

DOD established the Adaptive Acquisition Framework (AAF) in January 2020 to deliver effective, suitable, survivable, sustainable, and affordable solutions to the warfighter in a timely manner. The AAF emphasizes several principles that include simplifying acquisition policy, tailoring acquisition approaches, and conducting data-driven analysis. DOD Instruction 5000.02 establishes the groundwork for the operation of the 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 that DOD is acquiring. 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.[12] DOD issued policy documents to address each of these six acquisition pathways. It also issued functional policy documents in areas such as engineering and test and evaluation.[13] In November 2024, DOD issued updates to the MTA pathway policy.[14] Our prior work provides detailed explanation of these pathways and associated policies.[15]

In November 2025, DOD issued the *Acquisition Transformation Strategy*, a document intended to "transform the current defense acquisition system to ensure delivery of capabilities to the American warfighter at pace to deter and, if necessary, defeat our adversaries." Specifically, it aims to

- modernize systems engineering across all of the acquisition pathways to enable Agile development, technology insertion, and improved technology and manufacturing risk management;

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[12] According to DOD Instruction 5000.02, the milestone decision authority is the program decision authority and specifies the decision points and procedures for assigned programs. Milestone decision authorities for MDAPs and major systems will approve, as appropriate, the acquisition strategy at all major decision points.

[13] Additional functional policy documents include Department of Defense, *Engineering of Defense Systems*, DOD Instruction 5000.88 (Nov. 18, 2020); *Test and Evaluation*, DOD Instruction 5000.89 (Nov. 19, 2020); and *Cost Analysis Guidance and Procedures*, DOD Instruction 5000.73 (Oct. 24, 2024).

[14] Department of Defense, *Operation of the Middle Tier of Acquisition*, DOD Instruction 5000.80 (Dec. 30, 2019) (incorporating change 1, Nov. 25, 2024).

[15] GAO-25-107569; and GAO-24-106831.

- include technology maturation plans and critical technology elements as a guide and an oversight mechanism to MTA pathway programs; and
- explore opportunities to establish a new acquisition pathway or amend existing acquisition pathways to build, test, and deliver kill chains in a more agile, rapid manner aligned with operational demands.[16]

The strategy also identifies overarching outcomes that DOD will prioritize for a transformed acquisition system, including fielding technology and modernizing systems at a rate that outpaces our adversaries. In pursuit of these outcomes, the strategy emphasizes specific goals, including the need for programs to fully implement a MOSA in acquisition strategies to the maximum extent practicable, replace the analysis of alternatives process, and tailor test and evaluation plans based on the size and type of acquisition program and the responsible test organization. Additionally, the transformation strategy highlights the need to revise existing guidance to experiment with systems as close to the actual model as possible. For programs using rapid prototyping capabilities from the MTA pathway, the strategy further highlights that technology readiness assessments—which, according to the strategy, should be an input to every program's risk management process—could focus solely on integration during prototyping. Further, the strategy outlines a shift from "program-and platform-centric structures" to those that deliver an "integrated suite of capabilities across platforms and systems" under a capability portfolio management approach. This shift differs from how DOD currently manages its investments on a program-by-program basis, with the portfolio of weapon systems comprising the sum of individual programs.

DOD is currently working to implement important statutory changes related to its acquisitions. In the most recent National Defense Authorization Act, Congress included provisions aimed at reforming the defense acquisition system.[17] For example, the Secretary of Defense is now required to ensure that the defense acquisition system expeditiously provides the armed forces with the capabilities necessary to operate

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[16] Department of Defense, Office of the Under Secretary of Defense for Acquisition and Sustainment, *Acquisition Transformation Strategy* (November 2025). According to the strategy, the MTA pathway enables rapid prototyping and fielding of specific systems but is not designed for integrated capabilities and systems-of-systems architectures. Specifically, the strategy notes the absence of a fully resourced pathway that combines the urgent capability pathway with the MTA pathway to build, test, and deliver kill chains within 24 months of an operational demand signal using commercial-off-the-shelf products.

[17] National Defense Authorization Act for Fiscal Year 2026, Pub. L. No. 119-60, div. A, tit. XVIII (2025).

effectively, to address evolving threats, and to sustain the military advantage of the United States in the most cost-effective manner practicable.[18] The Secretary of Defense is also required to issue guidance in support of these objectives, and must ensure that the defense acquisition system prioritizes the needs of end users and is validated by direct engagement, experimentation, and iteration.[19]

Additionally, the National Defense Authorization Act included reforms focused on supporting capability portfolio management, increasing competition in defense contracting, and emphasizing the procurement of commercial products and commercial services.[20] These changes will likely have lasting effects on how DOD's acquisition process works. Some of these provisions also align with leading product development practices that we previously recommended to DOD and that may guide programs as they respond to the legislative changes.

Leading Practices for Product Development

We previously found that leading companies use iterative cycles to design, validate, and deliver complex cyber-physical products with speed.[21] Cyber-physical systems—sometimes called hybrid systems—are co-engineered networks of hardware and software that combine computation, communication, sensing, and actuation (the process of accepting a signal and converting it to a physical action) with physical systems. For example, software in a car's cyber-physical system would receive information about the environment through sensors (such as temperature and tire pressure) and then use these data to instruct physical hardware (such as motors or pumps). Major DOD acquisitions increasingly reflect this close interaction between digital and physical environments. For example, satellites, robotic autonomous systems, and aircraft are cyber-physical systems.

Iterative development allows companies to evolve and define requirements based on demonstrated achievement, with development focused on user needs and mission effect. This iterative approach, described in table 1, departs from the traditional, linear development

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[18] Pub. L. No. 119-60, § 1801 (amending 10 U.S.C. § 3102).

[19] Pub. L. No. 119-60, § 1801 (amending 10 U.S.C. § 3102).

[20] E.g., Pub. L. No. 119-60, §§ 824, 1801, 1802, 1822, 1826.

[21] GAO, *Leading Practices: Iterative Cycles Enable Rapid Delivery of Complex, Innovative Products*, GAO-23-106222 (Washington, D.C.: July 27, 2023). We identified 14 leading product development companies based on rankings in well-recognized lists and awards; recognition as successfully being innovative or having disruptive approaches to product development; records of financial stability and success; and industry type.

approach that develops hardware and software separately through sequential milestones.

Table 1: Comparison of Linear Development and Iterative Development

	Linear development	Iterative development
Requirements	Requirements are fully defined and fixed up front.	Requirements evolve and are defined in concert with demonstrated achievement.
Development	Development is focused on compliance with original requirements.	Development is focused on users and mission effect.
Performance	Performance is measured against an acquisition cost, schedule, and performance baseline set early in development.	Performance is measured through multiple value assessments—a determination of whether the outcomes are worth continued investment.

Source: GAO summary of prior work. | GAO-26-108457

Product teams may repeat iterative cycles, such as design modeling and simulation and validation, as they undertake continuous user engagement and testing of the design. As the cycles proceed, product teams at leading companies refine the design to achieve a minimum viable product (MVP)—one with the initial set of capabilities needed for customers to recognize value that can be fielded and followed by successive iterations.

Our work has found that, in addition to applying a sound technical process, leading companies apply equally robust business processes that enable iterative product development.[22] Specifically, leading companies employ a forward-looking, agile approach to managing their product portfolios—the overall mix of products, typically defined by broad capability area or technology. Through agile portfolio management, leading companies continuously evaluate product development opportunities and capability needs, align their portfolios to respond to those needs, and prioritize their investments. We have previously recommended that DOD identify ways to implement leading practices into its acquisition system and weapon systems programs.[23] Appendix III further describes leading practices that leverage knowledge gained through iterative development.

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[22] GAO, *Leading Practices: Agile Portfolio Management and Iterative Business Cases Drive Innovative Product Development*, GAO-25-107130 (Washington, D.C.: Sept. 17, 2025).

[23] GAO, *Weapon Systems Testing: DOD Needs to Update Policies to Better Support Modernization Efforts,* GAO-26-107009 (Washington, D.C.: Dec. 11, 2025); GAO-25-107569; GAO-25-107003; GAO-24-106831; and GAO-22-104513.

Software Development and Acquisition

DOD's ability to respond to evolving threats and to compete with countries, such as China and Russia, is increasingly determined by its ability to rapidly develop and deploy software-intensive weapon and IT systems. In April 2025, DOD released its Software Modernization Implementation Plan for Fiscal Years 2025–2026 with tasks to further software modernization progress.[24] Table 2 provides descriptions of key modern software development approaches employed by DOD's acquisition programs.

Table 2: Key Modern Software Development Approaches Employed by Department of Defense Acquisition Programs

Software development approach	Description
Agile	This approach breaks a product into components where, in each cycle or iteration, a working model of a component is delivered. The approach produces ongoing releases, each time adding small changes to the previous release. During each iteration, as the product is being built, it is also tested to ensure that at the end of the iteration the product is usable. Agile emphasizes collaboration, as the customers, developers, and testers work together throughout the project.
DevOps	DevOps combines "development" and "operations," emphasizing communication, collaboration, and continuous integration between software developers and users.
DevSecOps	DevSecOps is an iterative software development approach that combines "development," "security," and "operations" as key elements in delivering useful capability to the user of the software.

Source: GAO *Agile Assessment Guide* and GAO analysis of Department of Defense and software industry documentation. | GAO-26-108457

In prior work, we highlighted that DOD continues to face challenges in executing modern approaches and rapidly delivering software to users, which senior DOD leaders have acknowledged.[25]

In March 2025, the Secretary of Defense issued a memorandum noting that the department has struggled to reframe its acquisition process from a hardware-centric to a software-centric approach.[26] It stated that DOD must maximize the use of existing authorities, contracting strategies, and processes for software acquisition, and directed DOD components to adopt the software acquisition pathway as the preferred pathway for all software development components of weapon systems. DOD policy

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[24] Department of Defense, *Software Modernization Implementation Plan FY25-26* (April 2025).

[25] GAO, *Defense Software Acquisitions: Changes to Requirements, Oversight, and Tools Needed for Weapon Programs,* GAO-23-105867 (Washington, D.C.: July 20, 2023); and *Software Acquisition: Additional Actions Needed to Help DOD Implement Future Modernization Efforts,* GAO-23-105611 (Washington, D.C.: Apr. 5, 2023).

[26] Department of Defense, Secretary of Defense Memorandum, *Directing Modern Software Acquisition to Maximize Lethality* (Mar. 6, 2025).

requires programs on the software acquisition pathway to use requirements processes tailored to support Agile development, such as streamlined requirements documents and user agreements, which help ensure programs iteratively develop software aligned with user needs.[27]

In December 2023, we issued our updated *Agile Assessment Guide*, which describes best practices for Agile adoption and implementation.[28] It also includes metrics and management tools that programs are encouraged to use when pursuing Agile software development. These metrics and management tools are used to measure performance and outcomes intended to help meet customer needs, capture metrics and support decision-making. Our prior reports provide additional detail and explanation of these tools and metrics.[29]

Cybersecurity in DOD Weapon Programs

We previously reported that cyberattacks can target any weapon system that is dependent on software, potentially leading to an inability to complete military missions or even loss of life.[30] In November 2020, DOD Instruction 5000.89 was issued and established policy and procedures for test and evaluation across five of the six AAF pathways—including the major capability acquisition (MCA) and MTA pathways. The policy also addresses cybersecurity planning and execution.[31] In particular, the instruction requires all of DOD's acquisition programs and systems, regardless of acquisition pathway, to execute an iterative cybersecurity test and evaluation process. This process is detailed in the *DOD*

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[27] Department of Defense, *Operation of the Software Acquisition Pathway*, DOD Instruction 5000.87 (Oct. 2, 2020).

[28] GAO, *Agile Assessment Guide: Best Practices for Adoption and Implementation [Reissued with revisions on Dec. 15, 2023]*, GAO-24-105506 (Washington, D.C.: Nov. 28, 2023).

[29] GAO-25-107569; and GAO-24-106831.

[30] GAO, *Weapon Systems Cybersecurity: DOD Just Beginning to Grapple with Scale of Vulnerabilities*, GAO-19-128 (Washington, D.C.: Oct. 9, 2018).

[31] Department of Defense, *Test and Evaluation*, DOD Instruction 5000.89 (Nov. 19, 2020). The sixth pathway, defense acquisition of services, does not require test and evaluation policy and procedures. Portions of DOD Instruction 5000.89 relating to operational test and evaluation and live fire test and evaluation were superseded by DOD Instruction 5000.98 in December 2024.

Cybersecurity Test and Evaluation Guidebook.[32] Table 3 outlines the DOD cybersecurity test and evaluation phases from the guidebook.

Table 3: Department of Defense Cybersecurity Test and Evaluation Phases

Cybersecurity test and evaluation phase	Description
Phase 1: Understand cybersecurity requirements	Examine cybersecurity, system cyber survivability, and other requirements for developing approaches and plans for conducting test and evaluation.
Phase 2: Characterize the attack surface	Identify vulnerabilities an adversary may use to attack and make plans to evaluate impacts to the mission. This may include a cyber tabletop exercise—an intellectually intensive exercise to introduce and explore potential threats.
Phase 3: Cooperative vulnerability identification	Conduct early cyber vulnerability tests to identify known cybersecurity vulnerabilities, assess the risks associated with those vulnerabilities, and determine appropriate mitigations.
Phase 4: Adversarial cybersecurity developmental test and evaluation	Conduct tests of a system's cyber survivability and operational resilience in a mission context, using realistic threat exploitation techniques, while in a representative operating environment.
Phase 5: Cooperative vulnerability and penetration assessment	Conduct tests during operational test and evaluation to assess the system's ability to execute critical missions and tasks in the expected operational environment.
Phase 6: Adversarial assessment	Conduct tests to characterize the operational effects on critical missions caused by threat representative cyber activity against a unit trained and equipped with a system in an operational environment, as well as the effectiveness of the unit's defensive capabilities.

Source: GAO analysis of Department of Defense *Cybersecurity Test and Evaluation Guidebook*. | GAO-26-108457

Technology Maturity Poses Challenges to Delivering Capability with Speed

DOD plans to significantly increase spending across the current portfolio of individual weapon programs. It also risks additional delays in delivering capability to the warfighter. Further, over the last 8 years, 18 of 40 programs, or 45 percent, entered the MTA pathway with multiple immature technologies including seven programs this year—delaying a transition to other pathways or failing to deliver an essential capability with speed.

DOD Plans to Invest Over $2.4 Trillion in Its Weapons Portfolio

Since last year's report, the weapon systems portfolio that we assessed decreased by four programs while costs increased by over $50 billion. DOD's portfolio now exceeds $2.4 trillion. It consists of 104 programs: 75 MDAPs, 23 MTA programs, and six future major weapon acquisitions not

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[32] Department of Defense, *Cybersecurity Test and Evaluation Guidebook 2.0*, Change 1 (February 2020). DOD issued an updated guidebook, *Cyber Developmental Test and Evaluation Guidebook 3.0,* for developmental cybersecurity test and evaluation in June 2025. This aligned with DOW Manual 5000.103, *Cyber Developmental Test and Evaluation*, which published in February 2026. Substantive work for this year's report took place prior to these releases, and, therefore, we used the February 2020 guidance.

currently on an AAF pathway (see fig. 1).[33] These figures do not include total life-cycle sustainment costs or classified programs, which constitute a substantial portion of military department spending. Figure 2 highlights 1-year changes in DOD's MDAP portfolio.

Figure 1: Department of Defense Planned Investments in Selected Weapon Acquisitions (fiscal year 2025 dollars in billions)

Type of program	Number of programs reviewed	Total planned investment	Air Force	Army	Navy	Space Force	Joint
Major defense acquisition programs (MDAP)	75	2,350.0[a]	15	16	35	8	1
Middle tier of acquisition programs (MTA)	23	49.3[b]	3	9	4	7	0
Future major weapon acquisitions	6	11.1[c]	0	0	5	1	0
Total	104	2,410.4	18	25	44	16	1

Source: GAO analysis of Department of Defense data. | GAO-26-108457

[a] Planned investment amounts for MDAPs do not include two programs that have yet to provide official cost estimates since transitioning from the MTA pathway—B-52 Commercial Engine Replacement Program and Deep Space Advanced Radar Capability. Next Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites has yet to provide an updated baseline or submit a formal acquisition report but has indicated cost growth.

[b] Planned investment amounts for MTA programs reflect the current costs reported by those programs, many of which are planning follow-on efforts that are not included in these costs.

[c] Planned investment amounts for future major weapon acquisitions reflect current costs reported by those programs, which may not include the costs of later development and procurement efforts.

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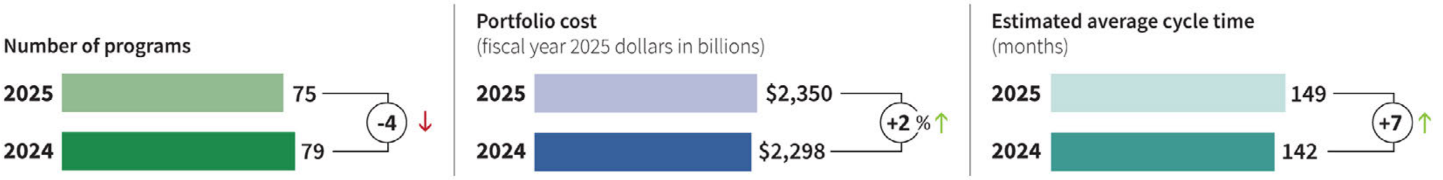
[33] As previously noted, DOD currently manages its portfolio of weapon systems on a program-by-program basis. Accordingly, we assessed DOD's portfolio within this structure this year. As DOD shifts to a capability portfolio management approach in the future, we expect to assess the performance of portfolios in delivering aggregated capabilities. Secretary of Defense Memorandum, *Transforming the Defense Acquisition System into the Warfighting Acquisition System to Accelerate Fielding of Urgently Needed Capabilities to Our Warriors* (Nov. 7, 2025). This aligns with the agile portfolio management practices we found leading companies use. See GAO-25-107130.

Figure 2: Comparison of DOD's 2024 and 2025 Major Defense Acquisition Program (MDAP) Portfolios



Source: GAO analysis of Department of Defense data. | GAO-26-108457

Note: Portfolio costs do not include three new major defense acquisition programs that have yet to provide official cost estimates. Estimated cycle time is defined as the number of months between program start and the planned achievement of initial operational capability. For MDAPs that began on the MTA pathway, program start is when the MTA effort began. The MDAPs in DOD's portfolio vary each year, accounting for some of the cost and schedule changes.

Costs Increased for the MDAP Portfolio That We Assessed

The estimated cost of programs that we included in our assessment of DOD's MDAP portfolio last year increased by $51.8 billion. Among the 72 MDAPs for which cost data was available, over half of the programs (46 of 72) reported cost increases totaling $122.08 billion. Sixteen programs reported decreases totaling $47.3 billion, with the other 10 reporting no change in cost.

As a subset of those 75 MDAP programs, we reviewed 32 MDAPs that, as of January 2026, were generally between the start of development and early stages of production. DOD plans to invest $798 billion to develop and produce those 32 MDAPs (see detailed assessments in app. I). This represents over a third of DOD's total estimated MDAP costs (see fig. 3 for breakdown by military service).[34] We reported on 31 of these 32 programs in our last report.[35] Quantity increases in the **CVN 78 *Gerald R. Ford* Nuclear Aircraft Carrier** program and increases in the cost of the **SSBN 826 *Columbia* Class Ballistic Missile Submarine** program contributed the largest increases to this total.

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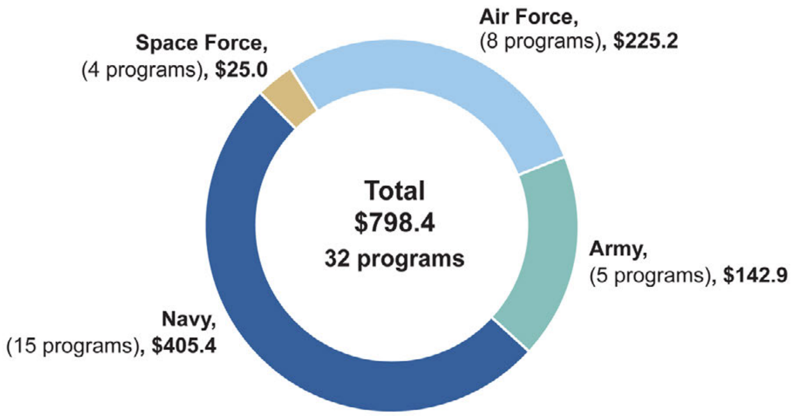
[34] We assessed 39 MDAPs, but cost information is available for only 36 of those programs because three MDAPs have yet to provide official cost estimates. Costs for four MDAP increments that we assessed are also not included on this page.

[35] One program, Lower Tier Air and Missile Defense Sensor, was a future major weapon acquisition in our 2025 annual report and was not included in our MDAP analysis.

Figure 3: Estimated Total Acquisition Cost of 32 Selected Weapon Systems by Military Service (fiscal year 2025 dollars in billions)



Source: GAO analysis of Department of Defense data. | GAO-26-108457

We reported last year that DOD remains deeply entrenched in a traditional linear acquisition structure—characterized by rigid, sequential processes—that has proven inadequate in adapting to evolving threats and integrating emerging innovation.[36] In its linear approach, DOD measures progress against cost, schedule, and performance baselines that are fixed early, before design and development begins. Thus, programs develop weapon systems to meet fixed requirements that were set years in advance, and risk delivering costly systems that are already obsolete. We found that MDAP and MTA programs structured as linear development efforts faced challenges delivering essential capability with speed.

For example, during our review, three programs— **M-10 Booker**, the **FFG 62 *Constellation* Class Frigate**, and the **Next Generation Operational Control System (OCX)**—reported that they were terminated or pending termination. These programs, respectively, spent over seven, five, and 13 years in development and billions of dollars before the decision to terminate. All of these program terminations were due to significantly extended time frames related to development challenges the programs could not overcome.

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[36] GAO-25-107569; and *Defense Acquisition Reform: Persistent Challenges Require New Iterative Approaches to Delivering Capability with Speed,* GAO-25-108528 (Washington, D.C.: June 11, 2025).

- The Army terminated the M-10 Booker program to “end procurement of obsolete systems and cancel or scale back ineffective or redundant programs,” according to the Army’s *Army Transformation and Acquisition Reform* memorandum.[37] This resulted in a cost decrease of 62 percent, although officials reported that the contract termination costs—not included in the cost decrease—for the program are estimated at $65 million.
- In November 2025, the Secretary of the Navy reduced the FFG 62 *Constellation* Class Frigate program from 20 ships to two ships following years of design instability. We previously made five recommendations to the Navy regarding this program, including that the program assess whether the functional and detail designs be complete prior to beginning construction on the second frigate, consistent with leading ship design practices.[38] In March 2026, senior Navy officials stated the Navy directed its shipbuilder to pause ordering material for FFG 62 and FFG 63 to evaluate its necessity as those ships remain under review. These officials also stated that they plan to use $2.0 billion in funds to secure alternative workload for Fincantieri Marinette Marine and provide workforce training, development, and retention opportunities.
- The Air Force acquisition executive recommended that DOD cancel the OCX program in late 2025 after spending over 13 years in development and more than $7 billion. DOD’s decision on the recommendation was pending as of March 2026. We previously reported that OCX would benefit from the use of leading practices, such as refining requirements and prioritizing capabilities to ensure they meet user needs. We found in 2019 that not incorporating user feedback resulted in a growing list of unaddressed issues, some of which were at risk of resulting in operational suitability concerns and delays to delivery to operation.[39]

Three of the 32 programs reported cost decreases in the last year—13 fewer than we reported last year. Of those three, the greatest change occurred in the **E-130J Take Charge and Move Out Modernization**

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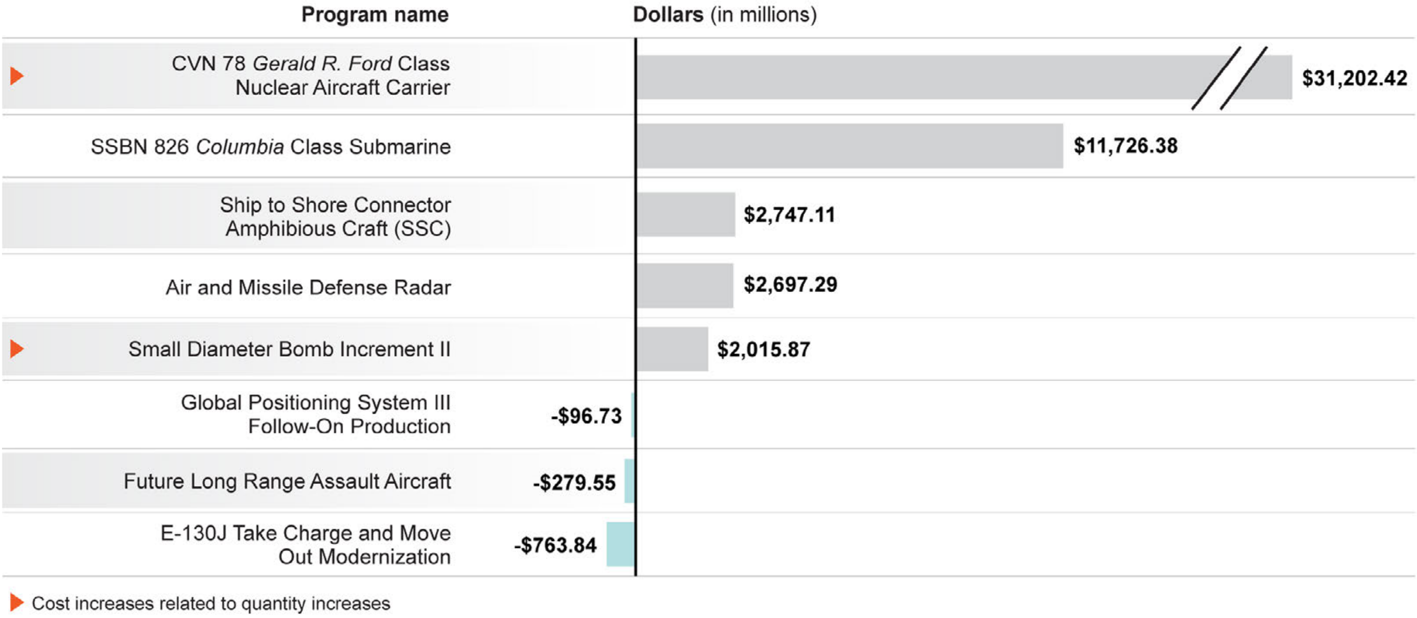
[37] Department of Defense, Secretary of Defense Memorandum, *Army Transformation and Acquisition Reform,* (Apr. 30, 2025).

[38] GAO, *Navy Frigate: Unstable Design Has Stalled Construction and Compromised Delivery Schedules*, GAO-24-106546 (Washington, D.C.: May 29, 2024).

[39] GAO, *DOD Space Acquisitions: Including Users Early and Often in Software Development Could Benefit Programs.* GAO-19-136 (Washington, D.C.: Mar. 18, 2019).

program, which decreased its costs due to a change in inflation calculations (see fig. 4).

Figure 4: Largest 1-Year Increases and Decreases in Projected Total Acquisition Cost



Source: GAO analysis of Department of Defense data. | GAO-26-108457

Note: FFG 62 *Constellation* Class Frigate and M-10 Booker experienced cost decreases, but those decreases were due to those programs' cancelations and are thus not included here.

Some MDAPs Risk Late Capability Deliveries

Consistent with our prior reporting, the MDAP portfolio we assessed this year continues to reflect a linear development approach that leads to slow cycle times, rather than an iterative approach that delivers capabilities with speed. The expected cycle time of DOD's MDAP portfolio increased to just over 12 years from program start to delivery. However, this average does not include six programs that have yet to set a new initial capability date, most of which are establishing new baselines due to extensive delays. In addition, some MDAPs in our review reported that they have been delayed due to immature technology, software deficiencies, or poor test results, among other reasons. These delays have compressed the time frames for additional acquisition events that, in a linear approach, lead to initial operational capability (IOC).[40] Many of

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[40] IOC usually means that a capability is available in its minimum, usefully deployable form. This typically means that some units or organizations have received the system and can operate and maintain it.

these programs have previously delayed that milestone, indicating that the current plans for IOC could be overly optimistic.

We found minimal variation in cycle times—the time from program start to achieving IOC—between programs that have achieved IOC and those that have yet to achieve IOC. Specifically, across the 75 MDAPs in DOD's portfolio:

- 43 programs that have achieved IOC took an average of 132 months (about 11 years) from program start to IOC.
- 17 programs that have yet to achieve IOC have an estimated average cycle time of 149 months (over 12 years).[41]

We further assessed 32 MDAP programs that are included in appendix I. Of those 32 programs, seven have already achieved IOC. Another 15 have not achieved IOC and reported an average expected cycle time of about 11 years.[42] However, compressed time frames for internal milestones suggest that it may be unreasonable to expect programs' planned operational capability dates to remain static. Based on our previous reporting, additional IOC delays are likely.[43] Last year, we reported that six programs had delayed IOC by more than 12 months. This year, we found two programs had officially delayed IOC by a similar time frame. However, eight additional programs delayed the acquisition events and milestones that underpin a weapon system's ability to achieve IOC in a linear development approach, such as start or completion of initial operational testing, the production readiness review, or the full-rate production decision (see fig. 5).

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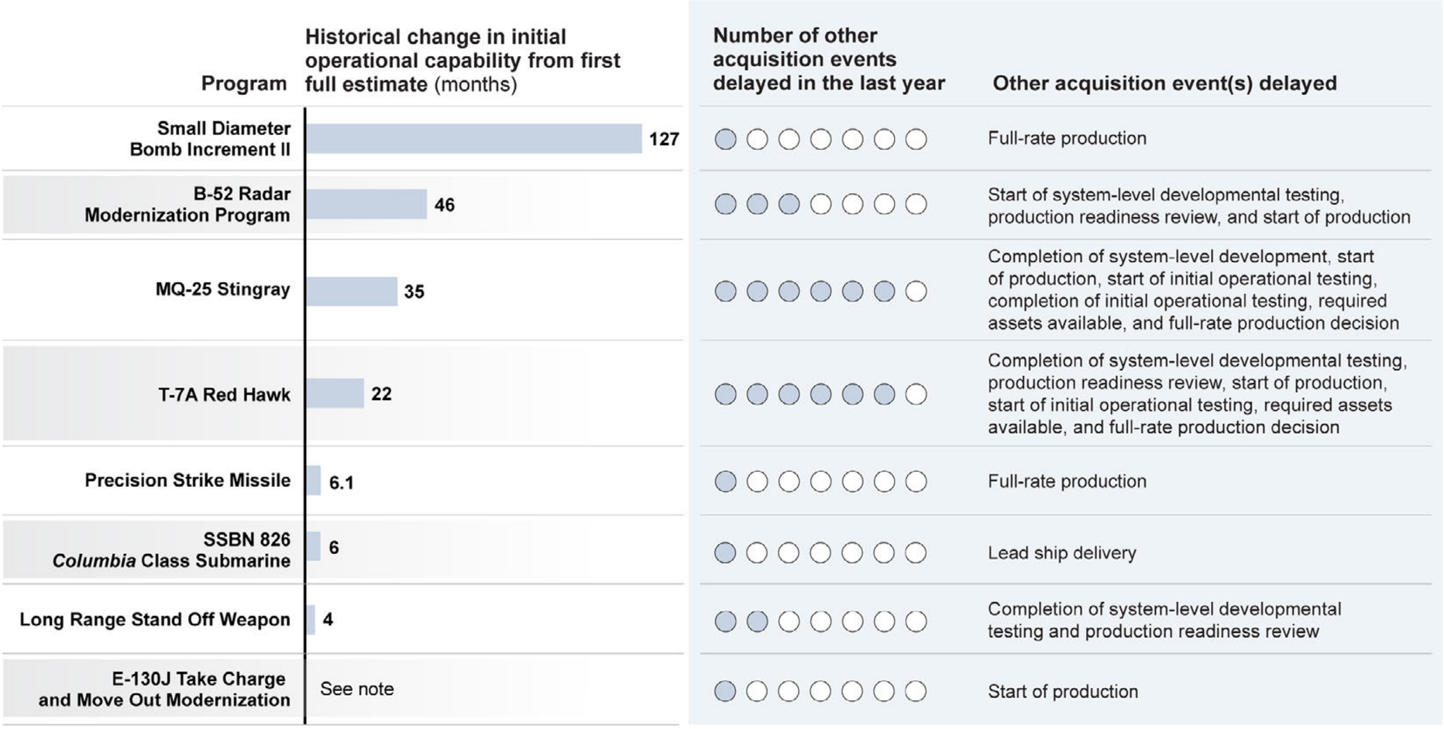
[41] Of the total 75 MDAPs, an additional 15 programs have yet to report an IOC date or the IOC is classified.

[42] An additional 10 programs have yet to report an IOC date or the IOC is classified.

[43] GAO-24-106831.

Figure 5: Weapon Systems' Initial Operational Capability Changes Since First Full Estimate, Alongside Other Acquisition Events Delayed in the Last Year



Source: GAO analysis of Department of Defense data. | GAO-26-108457

Notes: The Navy reported that the E-130J Take Charge and Move Out Modernization program has a classified initial operational capability date. Without reporting that date we cannot provide a change in cycle time.

While SSBN 826 *Columbia* Class Ballistic Missile Submarine data shows that the program's IOC date is delayed 6 months, the program has estimated that the lead ship is at least 18 months behind its contracted delivery date.

In addition, six programs are currently developing new IOC estimates (see fig. 6). Although these programs have yet to document new IOC dates, they have been under development for over a year without specified time frames to deliver capability to the warfighter.

Figure 6: Selected Programs Have Yet to Establish New Initial Operational Capability Dates

Air Force

KC-46A Tanker Modernization Program[a]
LGM-35A Sentinel[a]

Army

Future Long Range Assault Aircraft

Navy

DDG 1000 *Zumwalt* Class Destroyer
Next Generation Jammer Low-Band
Ship to Shore Connector Amphibious Craft

Source: GAO analysis of Department of Defense data. | GAO-26-108457

Note: The KC-46A Tanker Modernization Program (KC-46A) officially declared IOC in October 2024. However, the KC-46A program has yet to achieve required assets available.

[a] These programs also did not provide an initial operational capability date in our 2025 report.

DOD Plans to Invest at Least $49 Billion Across 23 of Its Largest MTA Programs

DOD continues to make increasing use of the MTA pathway for its costliest weapon programs. Seven new programs, equivalent to MDAPs in terms of estimated cost, have initiated on the MTA pathway.[44] The Space Force’s MTA programs continue to account for nearly 50 percent of all MTA costs (see fig. 7).

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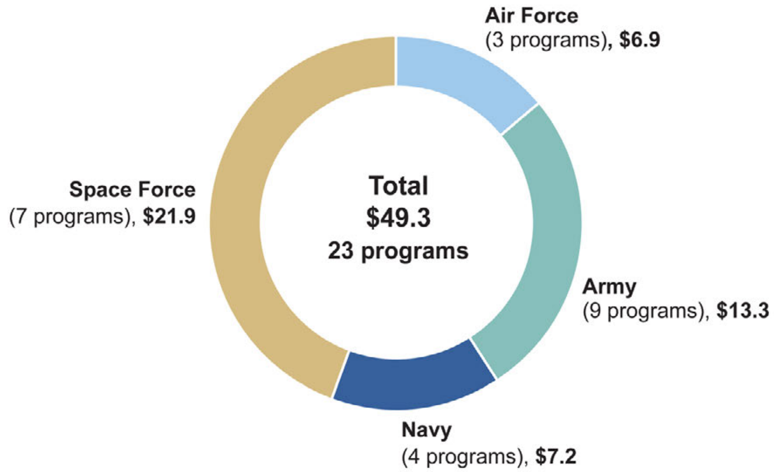
[44] We identified current MTA efforts that have estimated costs above the equivalent threshold cost for designation as an MDAP or were included in our scope last year. The thresholds for designation as an MDAP are, based on fiscal year 2024 constant dollars, an estimated total expenditure on research, development, test, and evaluation of more than $1 billion or an estimated total expenditure on procurement of more than $4.5 billion. Programs can also be designated an MDAP by the Secretary of Defense. MTA efforts are statutorily excluded from being defined as MDAPs. Department of Defense, *Major Capability Acquisition*, DOD Instruction 5000.85 (Aug. 6, 2020) (incorporating change 1, Nov. 4, 2021); 10 U.S.C. § 4201.

Figure 7: Estimated Cost of 23 Current Middle Tier of Acquisition Programs GAO Reviewed by Service (fiscal year 2025 dollars in billions)



Source: GAO analysis of Department of Defense data. | GAO-26-108457

Between our 2025 and 2026 assessments, the combined costs for the 16 MTA programs that we reviewed in both assessments trended down slightly by $413 million (1 percent). In addition, the **Navy's Hypersonic Air-Launched Offensive Anti-Surface Warfare** completed its MTA effort earlier than planned, though without delivering capabilities; and the Space Force's **Future Operationally Resilient Ground Evolution (FORGE)** transitioned to the software pathway.

MTA Programs with Immature Technology That We Reviewed Were Unable to Deliver Essential Capability with Speed

We found that several MTA programs we reviewed are continuing to enter the pathway with immature technology. As a result, many programs struggle to mature technologies in time to be rapidly prototyped and fielded, leaving the warfighter without essential capabilities when they are needed.

Immature technology. Between 2018 and 2025, 18 out of 40 programs, or 45 percent, entered the MTA pathway with immature technologies—meaning those with a technology readiness level (TRL) of 6 or lower—

some with TRLs of 3 or 4.[45] The technologies for seven of the eight programs currently on the pathway remain immature and will require additional development before providing a fieldable capability to the warfighter. In contrast, we found that some programs that entered the MTA pathway with mature technology were more successful in providing fieldable capability. For example, the **F-15EX** program, which entered the rapid fielding pathway with critical technologies determined to be at TRL 7 or higher, successfully transitioned to full-rate production within 5 years. We previously found that the readiness of critical technologies at the start of technology development affects the schedule and cost of developing a product.[46]

In addition, since 2018, 11 programs have initiated either as MTA rapid prototyping or rapid fielding programs without identifying critical technologies.[47] Identifying critical technologies as early as possible helps programs understand which technologies must be successfully developed to meet an operational need and triggers an assessment of their maturity. The programs at initiation had not identified or planned to identify critical technologies later during the MTA effort. However, some of these programs later identified critical technologies that needed further development. For example, **XM30 Mechanized Infantry Combat Vehicle (XM30)** did not identify critical technologies until this year—7 years after it

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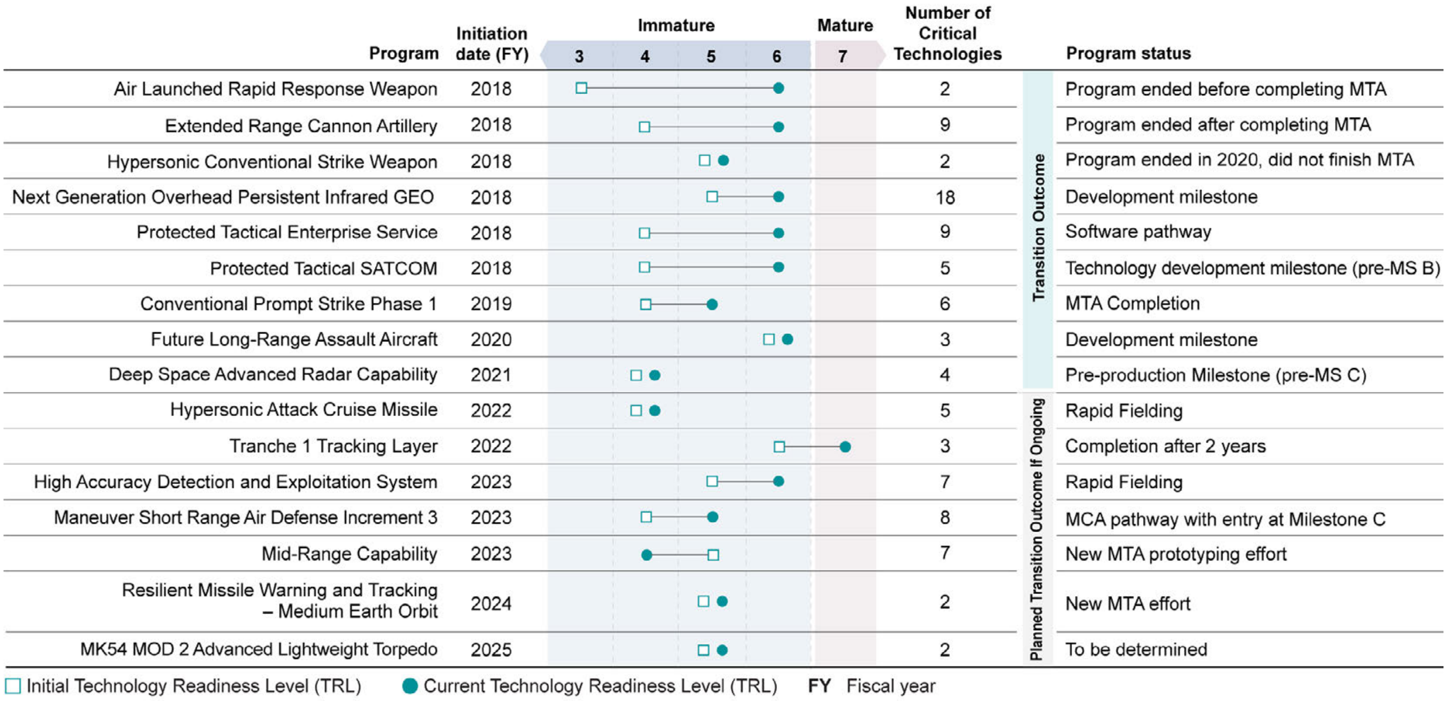
[45] In the product development phase, technologies are considered mature when they have reached a TRL of 7. However, satellite technologies that have achieved a TRL of 6 are assessed as mature due to the difficulty of demonstrating maturity in a realistic environment (space). GAO, *Technology Readiness Assessment Guide*, GAO-20-48G (Washington, D.C.: Jan. 7, 2020). See appendix IV for more specifics on the individual TRLs.

[46] GAO-20-48G.

[47] According to DOD’s *Technology Readiness Assessment Guidebook*, a critical technology is “a new or novel technology on which a program or platform depends to successfully develop a system or to meet an operational threshold. A [critical technology] may be hardware, software, or a process critical to the performance of a larger system or to the fulfillment of a key objective, such as a cyber-related capability. The Office of the Under Secretary of Defense for Research and Engineering defines a technology element as ‘critical’ if the system being acquired depends on this technology element to meet operational requirements and if the technology element or its application is either new or novel or in an area that poses major technological risk during detailed design or demonstration.” See Department of Defense, Office of the Under Secretary of Defense for Research and Engineering, *Technology Readiness Assessment Guidebook* (February 2025).

was designated as an MTA.[48] The Army identified multiple of these critical technologies as immature, increasing the risk that technical maturation or integration challenges could drive schedule delays. Meanwhile, since 2018, one of the four programs that entered the MTA pathway as a rapid fielding effort has fully transitioned to production, indicating that these rapid fielding programs also required further refinement after their efforts. Figure 8 illustrates MTA programs' progress in developing technologies since initiation and the programs' eventual outcomes or planned outcomes.

Figure 8: Selected Middle Tier of Acquisition (MTA) Programs' Development of Critical Technology Since Initiation



Source: GAO analysis of Department of Defense data. | GAO-26-108457

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[48] XM30 was designated an MTA in 2018, but funds were first obligated in 2021, which the Office of the Under Secretary of Defense for Acquisition and Sustainment used to calculate the 5-year time frame for the MTA pathway. The MTA initiation date is generally the date that the program was designated, which is the date that an acquisition decision memorandum was signed, initiating the MTA rapid prototyping or MTA rapid fielding program. But, according to DODI 5000.80, MTA programs that were designated before December 30, 2019, maintain their MTA program start date as the date funds were first obligated, which sometimes differs from the MTA designation date.

Note: For programs with multiple critical technologies, the figure represents the critical technology with the lowest TRL at initiation and the critical technology with the lowest TRL as of program status. In addition, we excluded two programs that had only one critical technology.

Lack of clear policy. The MTA programs that we reviewed initiated with immature technology. Current DOD policy includes imprecise language about the level of acceptable technical maturity for programs entering the MTA pathway. Specifically, DOD's policy does not require that programs start with technologies that are mature. DOD policy states that the MTA pathway is for capabilities with a level of maturity that allows them to be rapidly prototyped or fielded within 5 years of program start, and that the MTA pathway is not intended for programs that are primarily focused on technology development. The MTA policy also states that the pathway may be used to accelerate capability maturation before transitioning to another pathway, and that a rapid prototyping effort can transition to a rapid fielding effort or a new or existing acquisition program, including to an MCA program at development start. In the absence of more specific and clear guidance, the MTA programs we reviewed are generally starting with critical technologies around TRL 5 or lower and expecting to meet the MTA time frame. We found that leading product development companies include only those technologies that will be mature—such as those that demonstrate a TRL 7—by the time product development begins to ensure they can deliver needed capabilities quickly.[49]

To field a prototype within the 5-year MTA time frame, most of the MTA programs that we reviewed will need to successfully integrate multiple critical technologies into the planned capability. We previously found that leading companies build fully integrated prototypes that incorporate all system components, which includes all critical technologies.[50] Before they finalize a product's design, leading companies test prototypes with users in an operational environment to ensure the product works as planned and can meet user needs. Relatedly, DOD's November 2025 *Acquisition Transformation Strategy* states that MTA rapid prototyping programs could include a sole focus on integration during prototyping.

Our prior work also found that leading companies off-ramp immature technologies to deliver essential ones—within an MVP—with speed. However, we found that many MTA programs do not take steps to identify the most essential capabilities. Fourteen of 23 selected programs reported that they do not intend to develop an MVP, while nine plan to do

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[49] GAO-25-107130.

[50] GAO-23-106222.

so. In addition, we found that some of the MTA programs we reviewed that entered the pathway did not intend to deliver an MVP and are ending the MTA effort without delivering a residual operational capability, sometimes after significant time and cost have been expended.

Delayed delivery of capability. DOD's highest cost MTA efforts are likely to continue to lag in delivering critical capabilities to the warfighter because the policies discussed above do not ensure at program outset that technologies can be matured in a timely fashion. In addition, policies for pathways designed for speed do not ensure steps to off-ramp technologies to insert into future programs. Previously, we found that some programs that initiate as MTA efforts can take longer than the pathway's intended 5-year time frame to deliver an initial capability. For example, we found that at least two programs—**Conventional Prompt Strike (CPS)** and **Hypersonic Attack Cruise Missile**—with immature technologies have delayed their transition by at least 1 year. In addition, the **B-52 Commercial Engine Replacement Program** delayed start of development after transitioning from the MTA pathway to the MCA pathway and now plans to take an additional 7 years before providing initial capability. This is a total of 14 years from MTA initiation. Other programs have also delayed their MTA completion or IOC dates, allowing for more time to develop capabilities, but further prolonging delivery of initial capabilities to the warfighter. Without clear policy ensuring that programs initiate with mature technologies, programs are at risk of continued delays in delivering essential capability to the warfighter.

More broadly, these findings contribute to growing evidence that programs using the MTA pathway are not delivering fieldable capabilities faster. Rather, the use of the MTA pathway has largely been to develop immature technologies that the department has deemed important for acquisition programs with estimated costs equivalent to an MDAP.[51] However, those programs lack an alternative mechanism to mature immature technologies to the point that they can be rapidly inserted into an iterative program of record. DOD is taking steps to address this issue. DOD's January 2026 memorandum on transforming the defense innovation ecosystem acknowledged its current limitations, attributing them in part to a linear model for maturing technologies. The memorandum also directed the Chief Technology Officer to lead efforts to modernize and align innovation organizations to quickly deliver new

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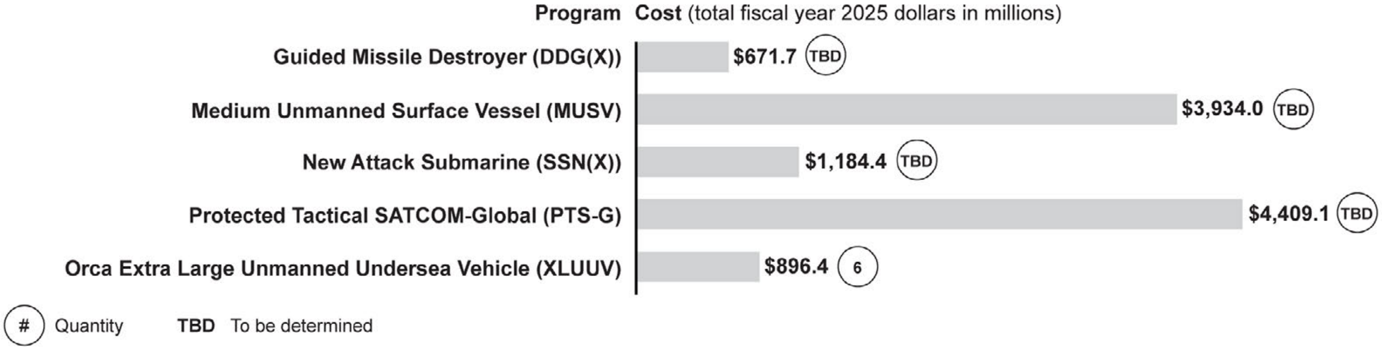
[51] In our June 2024 assessment, we found that most MTA rapid prototyping programs planned to continue using linear development schedules to develop capabilities over multiple efforts extending beyond 5 years. See GAO-24-106831.

innovations to warfighters.[52] We will continue to monitor DOD's efforts in this broader area to modernize and align innovations with acquisition programs to iteratively develop and deliver capabilities.

DOD Has Limited Insight into Costly Future Efforts

Many of DOD's future efforts are not tracked in detail until they start on an AAF pathway, so DOD does not have insight into future programs' total estimated costs until they are formally initiated. Among the future major weapon acquisitions that we reviewed, estimated costs reported to us by the individual efforts totaled $11.1 billion. However, four programs have not reported estimated quantities, which could significantly affect their costs. Figure 9 shows the total cost and quantity reported by the five programs.

Figure 9: Estimated Costs and Quantities of Future Major Weapon Acquisitions



Source: GAO analysis of Department of Defense weapon acquisition programs' reported data. | GAO-26-108457

Note: The Sea-Launched Cruise Missile-Nuclear (SCLM-N) program is excluded because the Navy determined its cost data was not releasable.

Several efforts that we reported on in previous years have since transitioned to AAF pathways. This includes the MK-54 MOD 2 Advanced Lightweight Torpedo program and the Medium Landing Ship program, which both transitioned to the MTA pathway. The current efforts are intended to provide cruise missiles and naval vessels and plan to initiate at various points on different pathways (see fig. 10).

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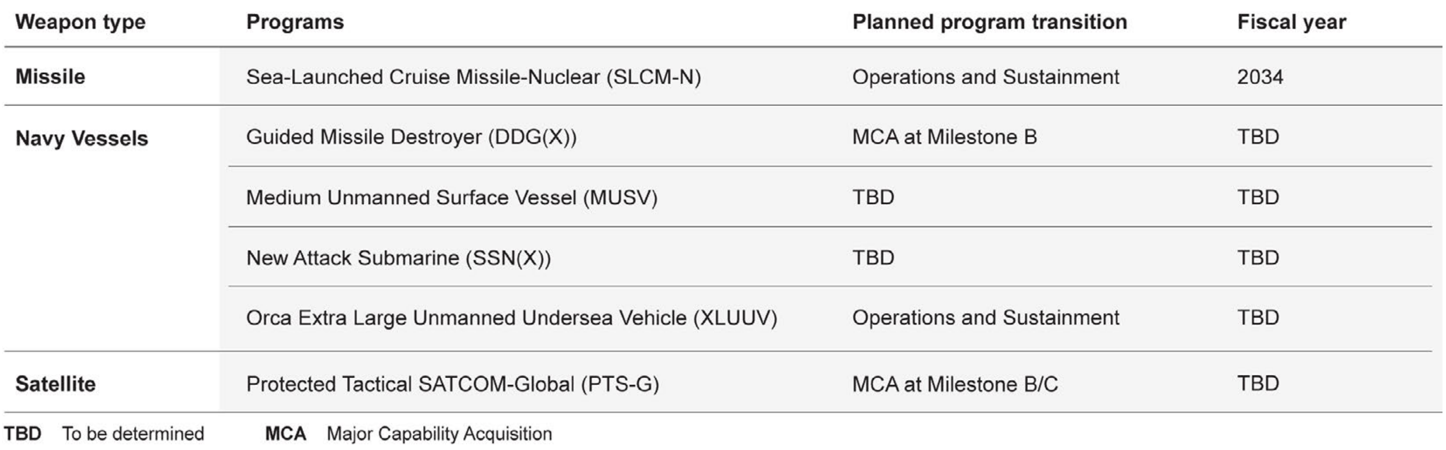
[52] Department of Defense, Secretary of Defense Memorandum, *Transforming the Defense Innovation Ecosystem to Accelerate Warfighting Advantage*, (Washington, D.C.: Jan. 9, 2026).

Figure 10: Future Major Weapon Acquisition Plans for Transitions to Acquisition Pathways



Weapon type	Programs	Planned program transition	Fiscal year
Missile	Sea-Launched Cruise Missile-Nuclear (SLCM-N)	Operations and Sustainment	2034
Navy Vessels	Guided Missile Destroyer (DDG(X))	MCA at Milestone B	TBD
	Medium Unmanned Surface Vessel (MUSV)	TBD	TBD
	New Attack Submarine (SSN(X))	TBD	TBD
	Orca Extra Large Unmanned Undersea Vehicle (XLUUV)	Operations and Sustainment	TBD
Satellite	Protected Tactical SATCOM-Global (PTS-G)	MCA at Milestone B/C	TBD

TBD To be determined **MCA** Major Capability Acquisition

Source: GAO analysis of Department of Defense weapon acquisition programs' reported data. | GAO-26-108457

Leading Practices Could Help Acquisition Programs Deliver Innovative Capability with Speed

We previously recommended that DOD should implement leading practices that facilitate iterative development to deliver complex weapon systems with speed.[53] These approaches could help the department achieve its goals of ensuring rapid delivery of effective solutions to meet warfighter needs. However, based on our current review, we found that DOD has continued to inconsistently apply leading practices that could enable rapid development and delivery of capabilities to quickly meet user needs.

Few Programs Are Fully Benefiting from Developing a Minimum Viable Product

Most programs have yet to incorporate an MVP that fully meets leading practices, which are outlined below.[54]

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[53] GAO-25-107569; GAO-24-106831; and GAO-23-105008.

[54] When discussing the range of the 48 programs we assessed for leading practices, we use the term "none" to represent zero programs, "few" for one to 16 programs, "several" for 17 to 24 programs, "majority" for 25 to 31 programs, "most" for 32 to 47 programs, and "all" for 48 programs.

Key Elements of a Minimum Viable Product

In an iterative approach, high-level operational needs are refined into an initial set of capabilities that can be fielded most quickly to meet end user needs, comprising a minimum viable product (MVP). Key elements of an MVP are as follows:

1. **Refines high-level operational needs into an initial set of capabilities**

   Unlike linear development, in which requirements are fully defined and fixed at the start, iterative development focuses on evolving requirements. Leading companies translate high-level capabilities into specific technical features and functions that a product will include as it progresses toward an MVP. Leading companies continue to define these features and functions until they arrive at an MVP, at which point the planned product capabilities become stabilized as deliverable features and functions, or requirements.

2. **Prioritizes capabilities that can be fielded most quickly to meet user needs**

   To achieve speed to market, leading companies evaluate the most critical functions and offramp product capabilities that are not essential when those capabilities pose a risk to delivering the product on schedule.

3. **Incorporates both stakeholder and end user feedback to inform the MVP**

   Leading companies use ongoing engagement with stakeholders and end users to understand their specific needs, ensure that the capabilities and product requirements are still the right priorities, and increase confidence that users' needs can be met. Leading companies then use the results of tests and user feedback to update the product design, as needed, and prepare the MVP for production.

4. **Incorporates both stakeholder and end user feedback to inform future iterations**

   Leading companies continue to engage with users and customers after they deliver the first iteration of the product. They use this feedback to identify new features to include in subsequent iterations or new products.

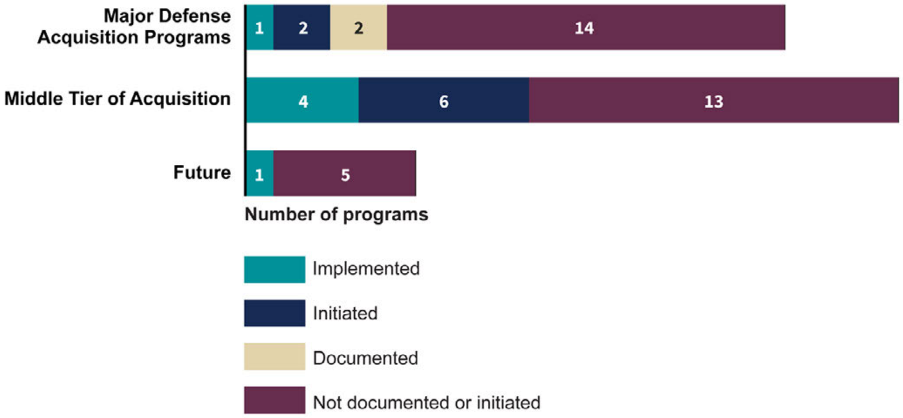
5. **Accommodates successive updates through modular open systems**

   Leading companies gain efficiencies and flexibilities through modularity in both design and manufacturing. Moreover, systems with modular designs and open interfaces are better positioned to accept upgrades rapidly and affordably as part of future iterations. A modular system design isolates functions in individual component modules. This design makes the system easier to develop, maintain, and modify because components can be changed without majorly affecting the remainder of the system. Interface standards specify the physical, power, data, and other connections between components.

Source: GAO analysis of leading companies. | GAO-26-108457

One-third (16 of 48) of the programs we reviewed reported implementing, starting development, or planning to start development of an MVP that fully meets key elements of the leading practice (see fig. 11).

Figure 11: Few Programs Reported Implementing or Starting Development of a Minimum Viable Product



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

Three examples of programs that implemented or are in the process of implementing an MVP that fully meets leading practices are described in figure 12.

Figure 12: Examples of Programs Implementing a Minimum Viable Product (MVP)

Source: U.S. Navy.

MQ-25 Unmanned Aircraft System

The Navy's **MQ-25 Unmanned Aircraft System** program refined its high-level operational needs into two key performance parameters within an initial "operational envelope" documenting the performance boundaries. The program then iterated on this operational envelope as it progressed through testing during the engineering and manufacturing development phase of the program. Despite implementing an MVP, the program reported that it had challenges with modifying its contracts to remove or realign requirements that do not correlate with MVP capabilities.

Source: Lockheed Martin with edits from U.S. Army RCCTO.

Mid-Range Capability

The Army's **Mid-Range Capability (MRC)** program incorporated stakeholder and end user feedback into decisions about the system's MVP design. For example, program officials stated that changes to the wireless communications and reduced size of the battery operations center were based on combatant command feedback. Moreover, program officials told us that the MRC program participates in regular soldier evaluations and training events each year, then holds after action reviews focused on training improvements and material upgrades to incorporate into the MRC design.

Source: Boeing Defense, Mobility, Bombers, and Surveillance.

E-7A Rapid Prototyping

According to program officials, the Air Force's **E-7A Rapid Prototyping (E-7A RP)** program is iterating on its MVP to add additional DOD requirements such as anti-tamper and cybersecurity measures, upgraded mobile radio, and global positioning systems. Program officials told us that they are incorporating stakeholder and end user feedback to inform this iteration. For example, according to program officials the E-7A program holds monthly user demonstrations and quarterly system maturity and capability demonstrations through software-in-the-loop testing, in which stakeholders and end users provide feedback on defects or anomalies that require improvement.

Source: GAO analysis of Department of Defense documentation and interviews. | GAO-26-108457

Additionally, 10 programs reported plans to develop MVPs that partially met the five elements of the leading practices. These programs further identified the elements they had not incorporated (see fig. 13).

Figure 13: Ten Programs Reported Meeting Some Elements of a Minimum Viable Product (MVP)

Programs	Refines high-level operational needs into an initial set of capabilities	Prioritizes capabilities that can be fielded most quickly to meet user needs	Incorporates both stakeholder and end user feedback to inform the MVP	Incorporates both stakeholder and end user feedback to inform future iterations	Accommodates successive updates through modular open systems
B-52 Radar Modernization Program	●	●	●	○	○
Conventional Prompt Strike	●	●	●	●	○
Indirect Fire Protection Capability Increment 2	●	●	○	●	●
Next-Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites	●	○	●	○	●
Tranche 1 Tracking Layer	●	●	○	●	●
Tranche 2 Tracking Layer	●	●	○	●	●
Tranche 3 Tracking Layer	●	●	○	●	●
Tranche 1 Transport Layer	●	●	○	●	●
Tranche 2 Transport Layer	●	●	○	●	●
Tranche 3 Transport Layer	●	●	○	●	●

Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

While all 10 of these programs reported refining high-level operational needs into an initial set of capabilities, none fully met the additional key elements of an MVP. Examples of programs that reported meeting some, but not all, the key elements of an MVP are described in figure 14.

Figure 14: Examples of Programs Meeting Some Minimum Viable Product Elements

Source: U.S. Space Force.

Next-Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites

The Space Force's **Next-Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites** program reported that its product development does not prioritize capabilities that can be fielded most quickly to meet user needs.

Source: U.S. Army.

Indirect Fire Protection Capability Increment 2

According to program officials, the Army's **Indirect Fire Protection Capability Increment 2** program took steps to collect and incorporate end user feedback for the second interceptor. The program then incorporated that feedback into the program's updated capability development document to inform future system development and operational use. However, the program did not get specific feedback from the user community on its baseline product, according to program officials.

Source: U.S. Air Force.

B-52 Radar Modernization Program

The Air Force's **B-52 Radar Modernization Program** reported that it decided to defer and reassess some requirements in future programming cycles, but it does not plan to incorporate stakeholder and end-user feedback to inform future iterations.

Source: U.S. Navy.

Conventional Prompt Strike

The Navy's **Conventional Prompt Strike** program reported it is developing an MVP, but it does not plan to include modularity until a future iteration, limiting its flexibilities. Systems with modular designs and open interfaces are better positioned to accept upgrades rapidly and affordably as part of future iterations.

Source: GAO analysis of Department of Defense documentation and interviews. | GAO-26-108457

These programs have made progress but are limited by not fully meeting the elements of an MVP. Programs will be best positioned to deliver capabilities with speed if they fully implement MVP leading practices. We previously made recommendations to DOD on updating its policies to ensure programs implement MVPs and will continue to monitor DOD's implementation of the leading practices for an MVP in future work.[55]

Most Programs Reported Incorporating End User Feedback, but Few Have User Agreements in Place

Most programs reported incorporating end user feedback to inform their products to some extent, but few made use of formal user agreements that help ensure continual user involvement. Our prior work found that, without the expectation of regular user involvement during development, programs risk falling into a traditional linear approach to development.

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[55] GAO-25-107569; GAO-24-106831; and GAO-22-104513.

Such an approach entails fully defining and fixing requirements based on user needs early but limits users' ability to provide insight or contribute until the capability delivery years later.[56]

User Feedback

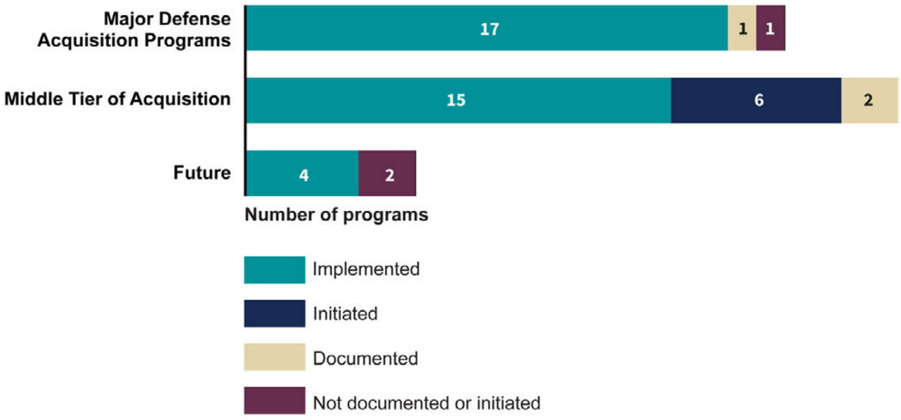
Iterative development relies on **regular end user feedback** to prioritize capabilities and identify the minimum viable product. End users provide input to define the design specifications for the MVP throughout multiple iterations. When validating the MVP, end users agree that the design meets their needs, or else leading companies continue iterating. At production, end users provide feedback on desired product improvements, which will inform subsequent iterations.

A **user agreement** defines responsibilities and expectations for the user and program and ensures that feedback is implemented as effectively as possible. User agreements are not required for iterative programs on pathways other than the software acquisition pathway. However, user agreements help to ensure that the user community is represented and engaged throughout development by defining responsibilities and expectations for user involvement and interaction.

Source: GAO analysis of leading companies and DOD policy. | GAO-26-108457

Almost all programs (45 of 48) reported incorporating or planning to incorporate end user feedback (see fig. 15).

Figure 15: Most Programs Reported Incorporating End User Feedback



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

However, less than one-third (13 of 48) of programs have or plan to have user agreements in place for development (see fig. 16).

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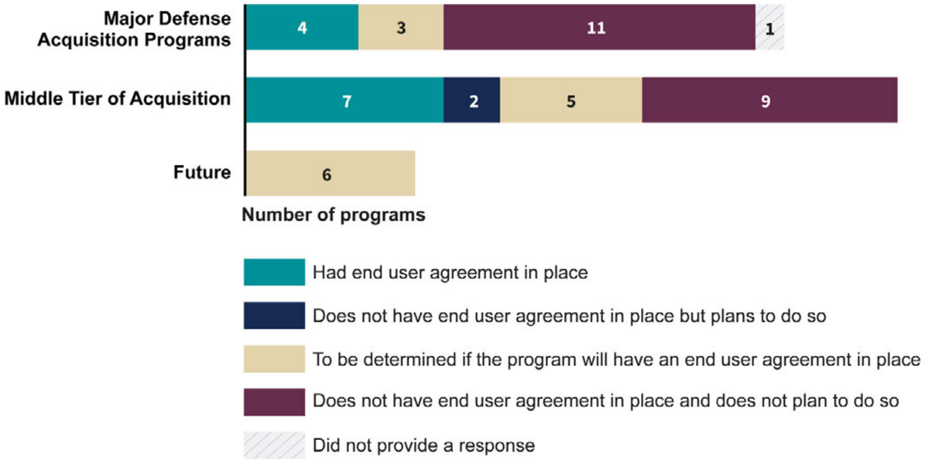
[56] GAO-23-105867.

Figure 16: Few Programs Have End User Agreements for Development



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

DOD recently acknowledged the need for end user feedback in the early phases of acquisition. DOD's *Acquisition Transformation Strategy* reports that the department will integrate feedback loops into its weapon systems' acquisition strategies and formalize warfighter feedback as a metric for evaluating whether an industry solution might meet the end users' needs.[57] We will continue to monitor these efforts.

Most Programs Reported They Are Not Consistently Using Digital Engineering Tools

Most of the 48 programs we reviewed are not consistently using digital engineering tools—such as digital twins and digital threads—that fully meet leading practices. Consequently, most programs cannot achieve the full efficiencies associated with these tools when designing, developing, and testing system-level physical and digital prototypes in an operational environment.

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[57] Department of Defense, *Acquisition Transformation Strategy*.

Key Elements of a Digital Twin and Digital Thread

A **digital twin** is a virtual representation of a product, system, or process. Digital twins use the best available models, sensor information, and data collected from the physical system and, importantly, provide real-time, automated data inputs. Digital twins use these data to dynamically change with the corresponding physical system in real time, to predict system activities and performance over the life of the physical system, and to inform system design changes over time. Key elements of a digital twin are as follows:

- Data incorporated into the digital twin are accurate and similar to the real-world model.
- The digital twin is continuously tested and correlated to the physical model in a real-world environment.
- The digital twin changes and updates in real time as new information becomes available without requiring the manual input of new data.

A **digital thread** is a common, authoritative source of information that informs decision-makers throughout a system's life cycle by providing the capability to access, integrate, and transform data into actionable information. The digital thread allows different audiences with different perspectives to extract data from and adjust usage of models to carry out different activities and supports the feedback loop over the life cycle, through design, validation, and production and delivery. In other words, the digital thread becomes the digital "backbone" for an effort wherein all data, including data from digital twins, are connected and adjustments can be updated in real time. Key elements of a digital thread are as follows:

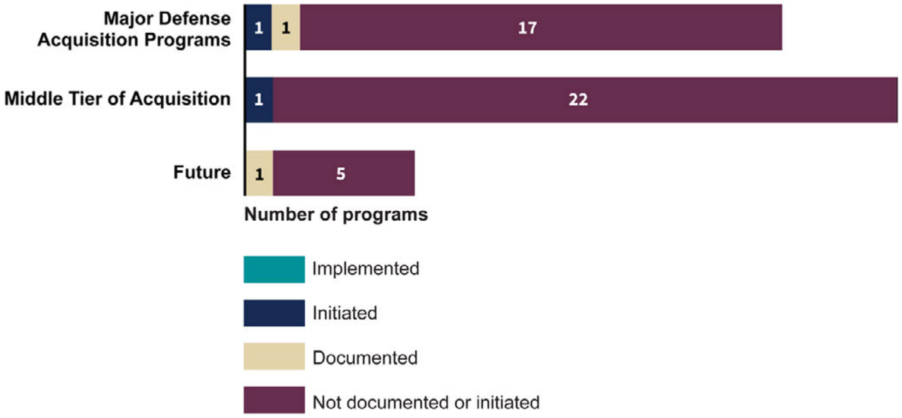
- Captures data from iterative cycles in real time, including design, validation, or production.
- Provides access to real-time data to program staff, stakeholders, and end users.
- Includes digital twin simulation data fed into digital thread.

Source: GAO analysis of leading companies and Department of Defense policy. | GAO-26-108457

Digital Twins

Four of 48 programs reported developing or planning to develop a full system-level digital twin consistent with leading practices (see fig. 17). Although these four programs have documented how they plan to incorporate a digital twin, they are in the process of determining how best to implement these plans.

Figure 17: Few Programs Reported Developing Digital Twins That Fully Meet Leading Practices



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

These four programs are:

- The Army's Future Long Range Assault Aircraft (FLRAA) program has initiated digital twin development. The FLRAA program is an Army-designated "pathfinder" for its pioneering digital engineering efforts in the engineering and development phase of the MCA pathway.
- The Space Force's Resilient Missile Warning and Tracking Medium Earth Orbit program has initiated a plan to incorporate a digital twin that meets all leading practices. Program officials reported that the digital twin will be built out over time for the program and will include the linking of model-based systems engineering to performance models, which enable simulation and feedback.[58]
- The Navy's MQ-25 Unmanned Aircraft System (MQ-25 Stingray) program has documented plans for developing a digital twin that meets leading practices. The program has a digital twin in place that receives data quarterly from the original equipment manufacturers, rather than changing and updating in real time as new information becomes available. However, the MQ-25 Stingray program plans to use the Navy's databases to automatically feed information into the digital twin.
- The Navy's New Attack Submarine (SSN(X)) program also documented a plan to incorporate a digital twin that meets all leading practices. The SSN(X) program developed a digital engineering strategy that identifies the use of digital twins to reduce reliance on physical prototypes and accelerate development timelines. SSN(X) plans to use digital model libraries in collaboration with other Navy organizations and shipbuilders.

Further, four of 48 programs are planning or developing a digital twin that partially meets all key elements of the leading practice, with the four programs reporting that they will not incorporate real-time data into their "digital twin" (see fig. 18). Real-time data is essential to receive the full benefits of a digital twin, and it is the real-time automated data connection

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[58] Model-based systems engineering is the formalized application of modeling to support system requirements, design, analysis, verification, and validation activities beginning in the conceptual design phase and continuing throughout development and later system life-cycle phases. Department of Defense, *Digital Engineering*, DOD Instruction 5000.97 (Dec. 21, 2023).

that distinguishes a digital twin from digital prototypes, models, simulations, and shadows.[59]

Figure 18: Few Programs Reported Developing Digital Twins That Do Not Incorporate Real-Time Data

Programs	Data incorporated into the digital twin are accurate and similar to the real-world model	The digital twin is continuously tested and correlated to the physical model in a real-world environment	The digital twin changes and updates in real time as new information becomes available without requiring the manual input of new data
Conventional Prompt Strike	●	●	○
Deep Space Advanced Radar Capability	●	●	○
E-130J Take Charge and Move Out Modernization	●	○	○
Orca Extra Large Unmanned Undersea Vehicle	●	●	○

Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

Programs reported that the development and maintenance of a digital twin is complex, involving a substantial front-loaded investment in hardware, software, and skilled staff with specialized expertise. For example, the Army's Indirect Fire Protection Capability Increment 2 program, which has yet to determine whether it will develop a digital twin, stated that developing a digital twin requires an up-front investment in tools, data infrastructure, and skilled personnel within an already constrained budgetary environment. Moreover, the program reported that ensuring models are accurate, performing in real time, and that systems are interoperable are major technical challenges; and it takes significant time to build, validate, and integrate the model into legacy systems. The program also reported potential future data challenges, such as proprietary data and data rights discussions with system developers; as well as incomplete, inconsistent, or siloed information delaying development and reducing the effectiveness of digital twins.

Not all programs are currently required to implement digital engineering practices. According to DOD Instruction 5000.97 Digital Engineering, programs initiated before December 21, 2023, may incorporate digital

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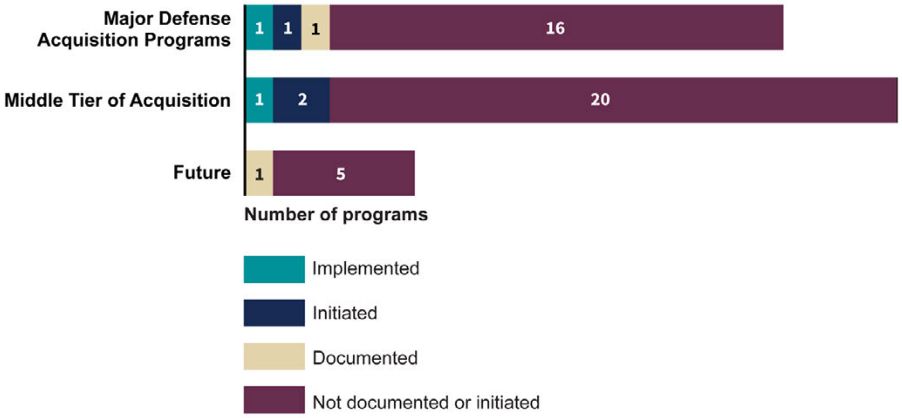
[59] According to the Defense Acquisition University, a digital shadow is a digital engineering tool that, unlike a digital twin, automates data from the physical asset to the digital asset, but data from the digital asset is manual from the digital asset to the physical asset. Defense Acquisition University, *Digital Twins for Real-Time Insights as an Enabler for Agile Approach* (Apr. 23, 2025).

engineering when it is practical, beneficial, and affordable, but they are not required to do so.[60] However, some programs initiated prior to December 2023 are early in the acquisition life cycle and may benefit from incorporating digital engineering into their programs, as allowed for under DOD's instruction. These programs, such as the Air Force's B-52 Commercial Engine Replacement Program, could still take full advantage of digital engineering efficiencies, like the ability to optimize manufacturing efficiencies, move more quickly and efficiently through the design process, and reduce the need for costly changes later in the programs' life cycle.

Digital Threads

Seven of the 48 programs that we reviewed reported developing or plans to develop a digital thread that incorporated the key elements to meet leading practices (see fig. 19).

Figure 19: Few Programs Reported Developing Digital Threads That Meet Leading Practices



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

For example, the Air Force's Hypersonic Attack Cruise Missile program reported that it started development of a digital thread. According to program officials, simulations from a singular high fidelity digital model—which matches the end product and can be run through simulations—are fed into the digital thread. Moreover, program officials stated that the

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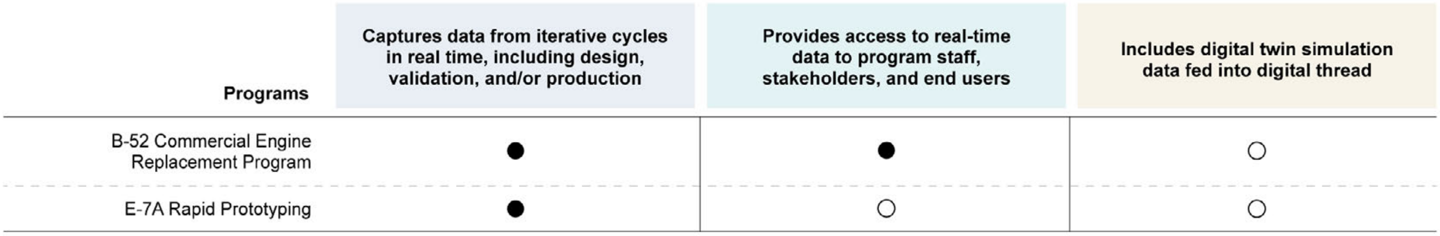
[60] Department of Defense, *Digital Engineering*, DOD Instruction 5000.97 (Dec. 21, 2023). According to this DOD Instruction, programs initiated after the date of this issuance will incorporate digital engineering for the capability in development unless the program's decision authority provides an exception.

digital thread is tracking and retaining digital manufacturing data for every part with a serial number incorporated into the system. Program officials reported that, at the completion of the rapid prototyping effort, the digital thread will contain all the knowledge and design data developed.

Further, four programs reported developing or plans to develop a digital thread that partially meets all key elements of a digital thread. For example, two programs identified specific key elements of a digital thread that they incorporated (see fig. 20).

Figure 20: Examples of Programs Reporting Meeting Some Elements of Digital Threads



Programs	Captures data from iterative cycles in real time, including design, validation, and/or production	Provides access to real-time data to program staff, stakeholders, and end users	Includes digital twin simulation data fed into digital thread
B-52 Commercial Engine Replacement Program	●	●	○
E-7A Rapid Prototyping	●	○	○

Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

Several programs identified challenges with providing access to real-time data to program staff, stakeholders, and end users due to difficulties integrating the thread across digital environments.

- **Multiple environments.** Integrating a digital thread across multiple digital environments can be complicated. For example, the Navy's **MQ-25 Stingray** program identified integrating multiple environments across a system of systems as a challenge. Similarly, the Space Force's **Next Generation Overhead Persistent Infrared Space Polar** program encountered challenges in connecting data models together to enable a specific software program to transfer data to another software program.
- **Classified environments.** Integrating a digital thread across secure and classified digital environments can create additional challenges. In iterative design, stakeholders and users must be able to access the information in a digital thread to further define requirements, identify preferred design options, collaborate on design strategies and decisions, and determine the MVP. Completing these elements becomes complicated when information must be restricted only to individuals who are authorized to access specific levels of classified

information on a need-to-know basis.[61] The Army's **Long Range Standoff (LRSO)** program reported challenges related to developing a digital thread while operating in an air-gapped environment related to classified systems.[62] The Navy's **E-130J Take Charge and Move Out Modernization** program similarly identified classified networks as a challenge, reporting that development of a digital thread was more difficult due to the limited availability of networks at the correct classification levels during planning stages.

Other reported challenges to developing a digital thread varied but included extensive costs, schedule delays, reduced staffing, and limited data storage (see fig. 21).

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[61] Deputy National Manager for National Security Systems, Committee on National Security Systems, *Committee on National Security Systems (CNSS) Glossary*, CNSSI 4009 (Ft. Meade, MD: Mar. 2, 2022); Exec. Order No. 13,526, 75 Fed. Reg. 707 (Dec. 9, 2009).

[62] An air gap is an interface between two systems at which (a) they are not connected physically and (b) any logical connection is not automated (i.e., data are transferred through the interface only manually, under human control). Deputy National Manager for National Security Systems, Committee on National Security Systems, *Committee on National Security Systems (CNSS) Glossary*, CNSSI 4009 (Ft. Meade, MD: Mar. 2, 2022).

Figure 21: Program Examples of Challenges Developing a Digital Thread

Source: Boeing Defense, Mobility, Bombers, and Surveillance.

Source: U.S. Navy.

Source: U.S. Army.

Source: Northrop Grumman on behalf of USSF/SSC/BCBG/DARC PMO.

E-7A Rapid Prototyping

The Air Force's **E-7A Rapid Prototyping** program, for example, reported that it was cost prohibitive to make the prime contractor recreate existing design artifacts using model-based systems engineering.

Conventional Prompt Strike

The Navy's **Conventional Prompt Strike** program's schedule delays due to multiple flight retests negatively affected the program's ability to mature the digital thread, as limited resources had to be diverted to prioritize the retests.

Long Range Hypersonic Weapon System

The Army's **Long Range Hypersonic Weapon System** program reported that its aggressive execution schedule and smaller staffing levels drove the program to focus on traditional system engineering over digital engineering.

Deep Space Advanced Radar Capability

The Space Force's **Deep Space Advanced Radar Capability** program reported that the bulk of data produced would be too much to store on a digital thread.

Source: GAO analysis of Department of Defense documentation. | GAO-26-108457

DOD is making efforts to improve the use of digital engineering tools, including digital twins and threads, for capability development. According to DOD Instruction 5000.97 *Digital Engineering*, programs initiated after December 21, 2023, must incorporate digital engineering for the capability in development unless the program's decision authority provides an exception.[63] DOD's *Acquisition Transformation Strategy* also emphasized the need for programs to incorporate digital threads and use elements of a digital twin to inform decision-making.[64]

In December 2025, Congress directed each Secretary of a military department to develop and implement a standard reference architecture

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[63] Department of Defense, *Digital Engineering*, DOD Instruction 5000.97 (Dec. 21, 2023).

[64] The *Acquisition Transformation Strategy* directed DOD to carefully review how data is currently used and ingested, and where improvement is needed to address gaps, to ensure the proper use of digital threads and ability to use real-time data to inform decision-making. Department of Defense, *Acquisition Transformation Strategy.*

to guide the use of and best practices for digital engineering for program design, development, and testing within each covered armed force under the jurisdiction of that Secretary.[65] We have ongoing work that will continue to monitor and assess DOD’s implementation of these digital engineering efforts.

Few Programs Reported Testing Digital or Physical Prototypes Connected to Digital Twins or Threads

Few programs reported plans to test a digital prototype in a digital operational environment, but most programs reported plans to test a physical prototype. However, because few programs incorporate or plan to incorporate digital twins or digital threads that fully meet leading practices, the majority of programs are unable to connect data from a physical prototype test to such digital engineering tools.

System-Level Digital and Physical Prototype Testing

Leading companies validate design using combinations of digital and physical prototypes to test the complete product. System-level integrated prototyping incorporates all hardware and software system components to test the product’s full functionality in its operating environment. This includes mature technologies and the successful integration of the key subsystems needed for the system.

Digital twins inform physical prototypes—which are built from digital designs—and incorporate testing results from the physical prototypes to better simulate the product’s functionality. In some cases, leading companies use digital twins to gain insight into a system’s design that cannot be obtained physically.

Source: GAO analysis of leading companies. | GAO-26-108457

Four of 48 programs plan to test or started testing a system-level fully integrated digital prototype in a digital operational environment (see fig. 22). These programs are the Navy’s MQ-25 Stingray program, the Army’s FLRAA program, the Space Force’s Resilient Missile Warning and Tracking Medium Earth Orbit program, and the **Navy’s Next Generation Jammer Low-Band** program.

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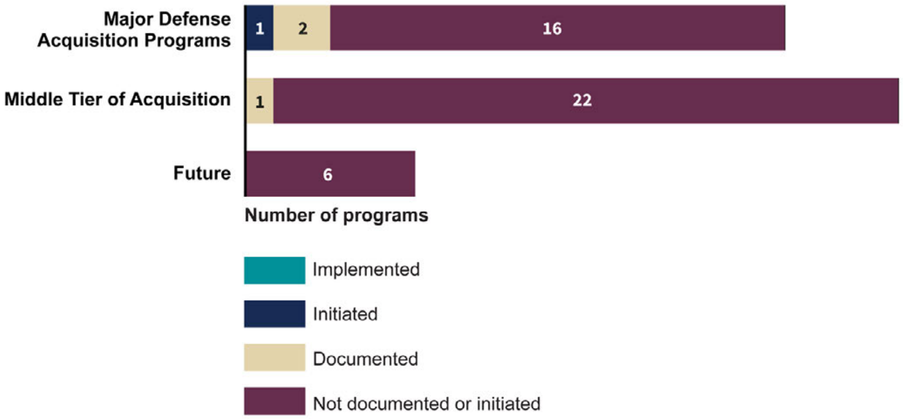
[65] National Defense Authorization Act for Fiscal Year 2026, Pub. L. No. 119-60, § 221 (2025).

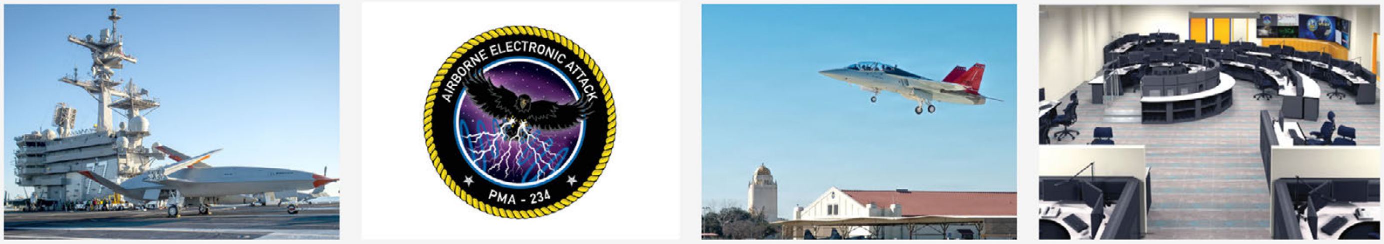
Figure 22: Few Programs Testing a System-Level Integrated Fully Digital Prototype in a Digital Operational Environment



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

Four programs, including the MQ-25 Stingray program and Next Generation Jammer Low-Band program mentioned above, described their perspectives on developing a digital prototype for testing in a digital operational environment, as shown in figure 23.

Figure 23: Examples of Program Perspectives on Developing a Digital Prototype for Testing



Source: U.S. Navy.

MQ-25 Unmanned Aircraft System

The Navy's **MQ-25 Unmanned Aircraft System** program reported challenges developing failure mode and effects modeling to evaluate the second- and third-order effects of initial failure in a digital prototype. Officials said that additional resourcing would help the program to improve the design and develop higher fidelity training for air vehicle pilots.

Source: AVIAN CSS.

Next Generation Jammer Low-Band

The Navy's **Next Generation Jammer Low-Band** program reported that it plans to integrate source data into digital models when it becomes available and then will use the model to validate system design in a digital operational environment.

Source: U.S. Air Force.

T-7 Advanced Pilot Training

The Air Force's **T-7 Advanced Pilot Training** program is not planning to test a digital prototype. The program reported that this is, in part, because it does not have control over the digital operational environment where any test would occur.

Source: U.S. Air Force.

Next Generation Operational Control System

The Space Force's **Next Generation Operational Control System (OCX)** program reported that it does not plan to implement a full digital twin concept that would allow full digital prototype testing. However, program officials told us that prior to the Air Force acquisition executive's recommendation that OCX be canceled, the program implemented a partial digital twin that allows for requirements verification and anomaly resolution, among other features.

Source: GAO analysis of Department of Defense documentation. | GAO-26-108457

At least 30 out of 41 programs tested or plan to test a system-level integrated physical prototype in an operational environment. However, five of the 41 programs plan to connect the prototype to a digital twin or digital thread that meets the associated key elements (see fig. 24).[66] The low prevalence of programs with digital twins and digital threads that met leading practices meant few programs would be validating hardware and software in conjunction with these digital tools.

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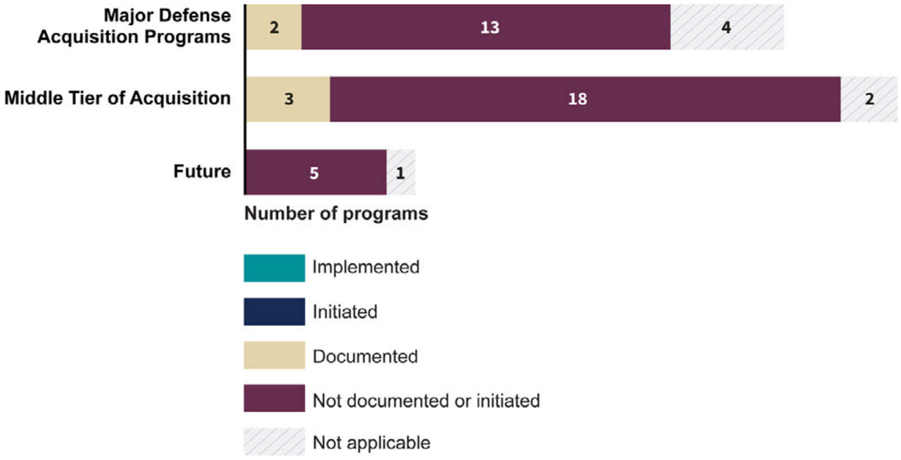
[66] Testing a system-level integrated physical prototype in an operational environment was deemed not applicable for seven programs. Six were due to the difficulty of conducting tests in the operational environment—space. One program, OCX, is primarily software.

Figure 24: Few Programs Reported Testing a System-Level Physical Prototype in an Operational Environment, Connected to Digital Twin or Thread



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

For example, the Army's **XM30** program has documented a plan that is in line with the leading practice. According to XM30 program officials, they coordinated with the Army Test and Evaluation Command to develop a digital data mesh between the Army's digital engineering environment and the digital engineering environment where XM30's digital twin is located.[67] Consequently, the program reported that all data from the physical testing, as well as modeling, simulation, and analysis will be tied to the digital twin prior to XM30's Production Prove-out test.

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[67] A data mesh is a decentralized organizational and technical approach to share, access, and manage data in large-scale environments within or across organizational boundaries. This approach links disparate sources through centrally managed sharing and governance guidelines. The result is a domain-oriented, federated approach where data is created and consumed as a product. Office of the Director of National Intelligence, *Data Management Lexicon* (Washington, D.C.: May 2024).

Most Programs Reported Incorporating a Modular Open Systems Approach

Overall, more than half of DOD's MDAP and MTA programs we reviewed reported that they incorporated a MOSA.[68] However, many programs are not maximizing the effectiveness of a MOSA because they are not consistently using the other leading practices. We found that leading practices are most effective when they are used together as part of an iterative approach.

Key Elements of a Modular Open Systems Approach

Leading companies are moving toward more modular hardware that can be plugged in and pulled out, and in some cases even upgraded by the user in the field. A **modular open systems approach (MOSA)** for weapon systems includes a combination of engineering and business practices in which weapons systems are designed with modular components that are linked by clearly defined system interfaces. Our prior work found that leading companies gain efficiencies and flexibilities through modularity in both design and manufacturing. These same leading companies collect feedback to continue improving products in subsequent iterations.

Key elements of a MOSA are as follows:

- Employs a modular design that uses modular system interfaces between major systems, major system components and modular systems.
- Is subject to verification to ensure that relevant modular system interfaces comply with, if available and suitable, widely supported and consensus-based standards, or the program has obtained government purpose rights to the interface specifications.
- Uses a system architecture that allows several major system components and modular systems at the appropriate level to be incrementally added, removed, or replaced throughout the major system platform's life cycle.

Source: GAO analysis of leading companies, DOD policy, and U.S. statute. | GAO-26-108457

Most MDAPs (13 of 19) and MTA programs (16 of 23) reported that they expect to use a MOSA that fully meets leading practices (see fig. 25). Our prior work found that systems with modular components and open interfaces can receive several benefits over systems without, including increased innovation, enhanced interoperability, faster and less costly repairs and upgrades, and lower prices from increased industry competition.[69] For example, the Air Force's LRSO program implemented a MOSA to make it easier to insert new technology and to pursue

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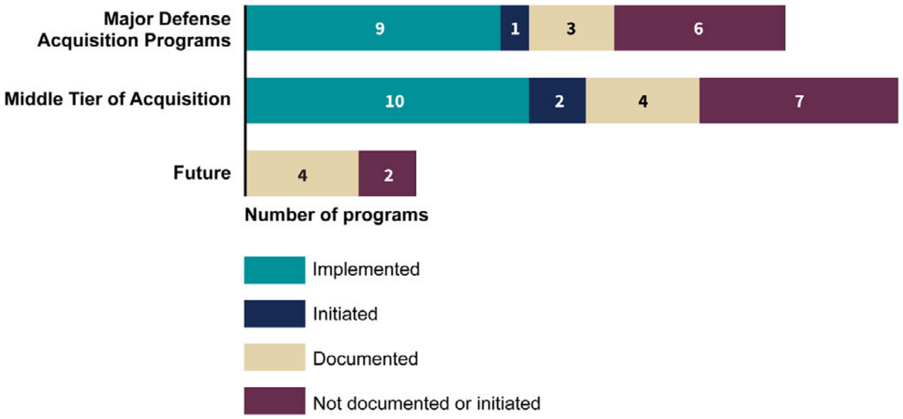
[68] Legislation has required DOD to implement a MOSA to the maximum extent practicable, which is a change from the way DOD buys and designs weapon systems. In the National Defense Authorization Act for Fiscal Year 2017, Congress mandated that all MDAPs entering technology development or system development—milestones A or B, respectively—after January 1, 2019, implement MOSA to the maximum extent practicable. The William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 expanded this requirement mandating that all other acquisition programs also implement MOSA to the maximum extent practicable. These requirements are codified at 10 U.S.C. §§ 4401–4403.

[69] GAO, *Weapon Systems Acquisition: DOD Needs Better Planning to Attain Benefits of Modular Open Systems,* GAO-25-106931 (Washington, D.C.: Jan. 22, 2025).

upgrades to certain components and subsystems throughout the weapon system's entire life cycle.

Figure 25: Most Programs Reported Incorporating or Planning a Modular Open Systems Approach



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

In January 2025, we found that DOD's approach to planning for, coordinating, and resourcing MOSAs, along with incomplete policies, guidance, and regulations, hindered it from fully realizing MOSA benefits. We made 14 recommendations to DOD, including that it improves military department processes for ensuring quality MOSA planning documents. DOD concurred, and it has since implemented three of these recommendations, in part, by issuing guidance that covers MOSA implementation across DOD's various weapon system acquisition pathways. DOD has yet to take action to implement the remaining 11 recommendations, as of January 2026.[70]

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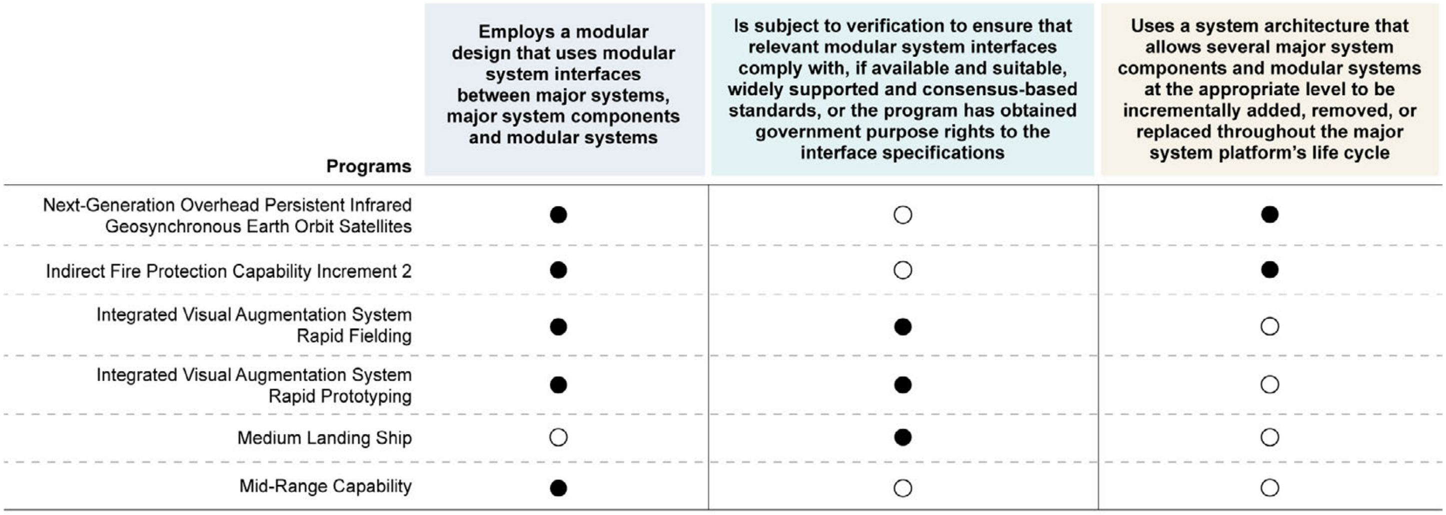
[70] GAO-25-106931.

Figure 26: Examples of Programs Meeting Some Elements of a Modular Open Systems Approach



Programs	Employs a modular design that uses modular system interfaces between major systems, major system components and modular systems	Is subject to verification to ensure that relevant modular system interfaces comply with, if available and suitable, widely supported and consensus-based standards, or the program has obtained government purpose rights to the interface specifications	Uses a system architecture that allows several major system components and modular systems at the appropriate level to be incrementally added, removed, or replaced throughout the major system platform's life cycle
Next-Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites	●	○	●
Indirect Fire Protection Capability Increment 2	●	○	●
Integrated Visual Augmentation System Rapid Fielding	●	●	○
Integrated Visual Augmentation System Rapid Prototyping	●	●	○
Medium Landing Ship	○	●	○
Mid-Range Capability	●	○	○

Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

Some programs that meet our MOSA leading practice reported challenges with adapting to changing MOSA policies and guidance. For example:

- Two MDAP programs meeting leading practices—the Army's **Improved Turbine Engine Program** and the Air Force's LRSO program—reported that the greatest challenge when incorporating a MOSA is responding to changes in MOSA policies, guidance, and standards once the program was already in the process of verifying the design.
- Two MTA programs meeting leading practices similarly identified challenges with adapting to evolving MOSA standards. The Air Force's **CH-47F Modernized Cargo Helicopter** program reported difficulties trying to implement elements of MOSA reference architecture that were still being defined by the Army. The Navy's **CPS** program reported challenges with managing contractors that were hesitant to adopt new MOSA standards, despite the program believing the new standards would make design changes easier in the future, officials told us.

Weapon Systems Reported Not Taking Full Advantage of Innovation Organizations

Programs have developed continuous pipelines to new technology by incorporating feedback from innovation organizations, but some programs are currently siloed. For example:

- Among the 20 MTA programs that report having critical technologies, nine reported that they work with innovation organizations, while 11 did not.
- Among the 25 MDAPs that report having critical technologies, 11 reported that they work with innovation organizations, while 14 did not.

MTA programs and MDAPs work with a variety of innovation organizations, including Federally Funded Research and Development Centers, national laboratories, and academic institutions. MTA programs and MDAPs also rely on other government organizations that conduct research and development, such as the Defense Advanced Research Projects Agency, or leverage emerging commercial technologies, such as those developed by the Defense Innovation Unit. Examples of programs working with innovation organizations are described in figure 27.

Figure 27: Examples of Programs That Worked with Innovation Organizations

Source: U.S. Air Force.

Long Range Standoff

Officials from the Air Force's **Long Range Standoff** program reported that it plans to work with Federally Funded Research and Development Centers and other resources to explore artificial intelligence tools for use in secure environments and potential applications to support production and sustainment.

Source: U.S. Navy.

DDG(X) Guided Missile Destroyer

Officials from the Navy's **DDG(X) Guided Missile Destroyer** program reported that they are partnering with the Defense Innovation Unit to canvass the commercial maritime industry to identify, test, and rapidly mature technology that meets the program's design requirements.

Source: U.S. Space Force.

Resilient Missile Warning and Tracking Medium Earth Orbit

Officials from the Space Force's **Resilient Missile Warning and Tracking Medium Earth Orbit** program reported that the program is leveraging vendors from the Space Modernization Initiative, which funds technical maturation, data exploitation, and demonstrations.

Source: GAO analysis of Department of Defense documentation and interviews. | GAO-26-108457

Defense innovation organizations can provide analysis in the area of weapon systems development to support critical technology maturation similar to how leading companies analyze market and technology trends.[71] For example, National Security Innovation Capital, a component of the Defense Innovation Unit, funds domestic start-up companies that produce hardware technologies in critical areas that can be used for both military and commercial applications. This funding is intended to accelerate companies' progress in developing minimally viable products that can be tested or fielded to meet military needs.[72] We will continue to monitor programs' use of innovation organizations to analyze technology trends for weapon systems development.

The Majority of Programs Reported Assessing the Industrial Base and Incorporating Manufacturer and Supplier Feedback

The majority of the 48 programs we reviewed for leading practices reported conducting or planning to conduct an industrial base assessment. Further, most programs have incorporated or plan to incorporate manufacturer and supplier feedback.

Defense Industrial Base

The **defense industrial base** includes companies that develop and manufacture weapon systems, such as contractors, subcontractors, and suppliers of parts, components, and raw materials. Assessing related risks is consistent with leading practices.

Leading companies' product design teams include those designing the product as well as stakeholders producing it after testing and validation. Manufacturer and supplier stakeholders are involved throughout product design to ensure the manufacturing process can accommodate the design of the product. Leading companies incorporate **manufacturer and supplier feedback** prior to moving into production to ensure that the product under development is manufacturable. Leading companies start production planning while they are still designing the minimum viable product.

Source: GAO analysis of leading companies. | GAO-26-108457

The majority of programs (31 out of 48) reported conducting or planning to conduct assessments of the defense industrial base to identify potential manufacturing capacity and capability risks (see fig. 28). Program offices

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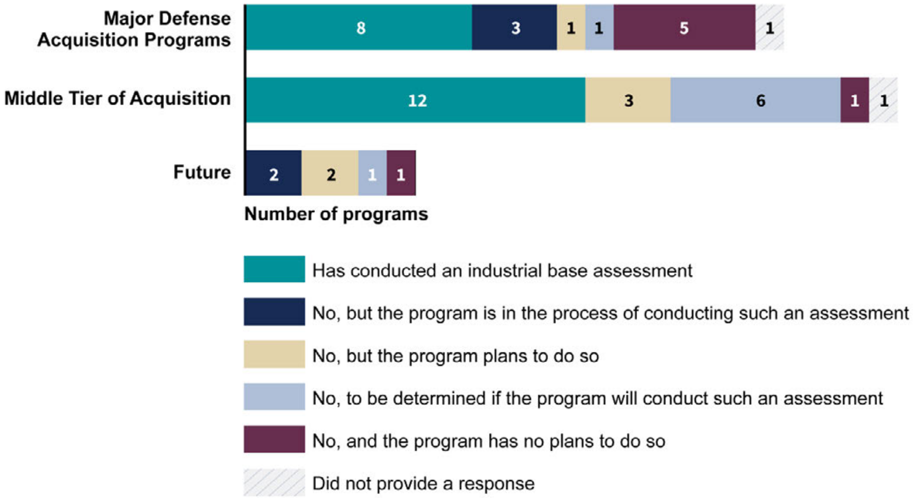
[71] Our prior work has found that leading companies analyze market and technology trends and monitor relevant developments that may influence the types of capabilities that users are likely to demand in the future. See GAO-25-107130.

[72] GAO, *Defense Innovation Unit: Actions Needed to Assess Progress and Further Enhance Collaboration,* GAO-25-106856 (Washington, D.C.: Feb. 27, 2025).

for MCA pathway programs are instructed by policy to incorporate industrial base analyses into their acquisition planning.[73]

Figure 28: The Majority of Programs Reported Conducting an Industrial Base Assessment



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

In particular, the number of MDAPs that reported assessing the industrial base this year (11 out of 18, or 61 percent) represents an improvement from our prior findings. Specifically,

- In June 2025, we found that 10 of 17 MDAPs (59 percent) reported assessing the industrial base.[74]
- In July 2022, we found that 15 of 28 MDAPs (54 percent) either completed or were scheduled to complete such an assessment. We recommended that DOD report its progress toward mitigating industrial base risks, among other things.[75] DOD concurred with this recommendation and identified actions that it plans to take through July 2026 to implement the recommendation.

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[73] Department of Defense, *Major Capability Acquisition*.

[74] GAO-25-107569.

[75] GAO, *Defense Industrial Base: DOD Should Take Actions to Strengthen Its Risk Mitigation Approach*, GAO-22-104154 (Washington, D.C.: July 7, 2022).

Our prior work shows that programs that do not conduct industrial base assessments prior to beginning production face increased risks of schedule delays and cost overruns.[76] For example, three interconnected systems rely on the same production line, but none of these programs conducted an industrial base assessment prior to beginning production. The programs experienced production issues that a timely assessment could have highlighted:

- The Army's **Long Range Hypersonic Weapon System (LRHW)** program, which developed batteries for ground-launched hypersonic missiles, identified issues with missing, inconsistent, and unclear work standards for missile production. These problems created a production bottleneck, resulting in the delayed delivery of the second LRHW battery and missiles by at least 6 months.
- The Navy's **CPS** program, which is developing the ship- and submarine-fired missile, discovered issues during production that resulted in the program and contractor having to address quality issues on the missile production line.
- The Navy's **DDG 1000 *Zumwalt* Class Destroyer**, which is integrating the CPS missile onto the ship, delayed CPS integration, in part, because of these production line delays.

For these interrelated programs, DOD took steps towards improving the rate of missile production. According to program officials, both the LRHW and CPS programs are now conducting production quality reviews. For example, program officials told us that the Army worked with a third-party consultant to identify production challenges. Similarly, program officials told us that the Navy is conducting its own reviews. Leading companies start production planning while they are in the process of designing the MVP, including analysis of the industrial base. Moreover, leading companies involve manufacturer and supplier stakeholders throughout product design to ensure the manufacturing process can accommodate the design of the product.

Most programs (33 of 48) reported incorporating feedback or planning to incorporate feedback from both manufacturers and suppliers during the design phase, with more MTA programs than MDAP programs planning to do so (see fig. 29).

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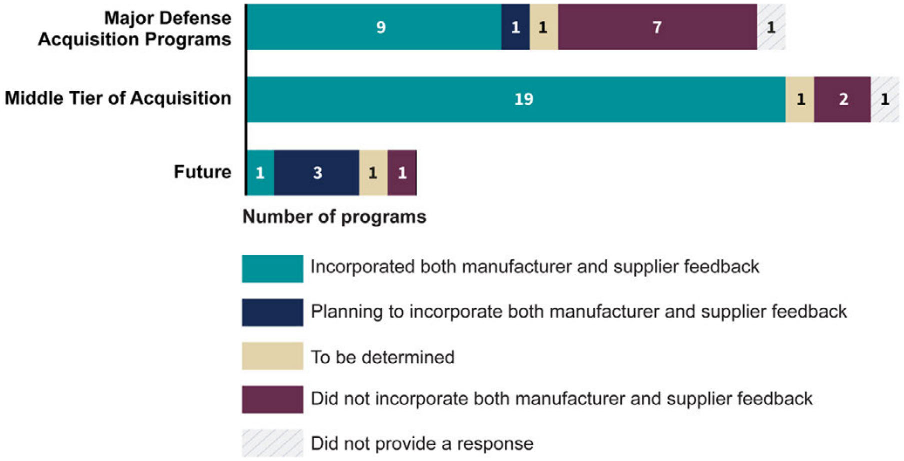
[76] GAO, *Weapon Systems Annual Assessment: Challenges to Fielding Capabilities Faster Persist,* GAO-22-105230 (Washington, D.C.: June 8, 2022).

Figure 29: Most Programs Reported Incorporating or Planning to Incorporate Manufacturing and Supplier Feedback During Design



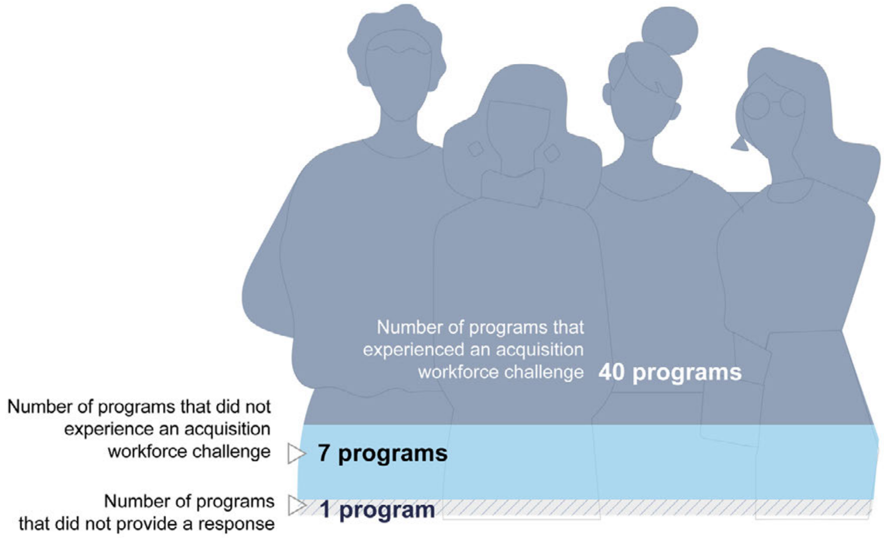
Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

We will continue to monitor programs’ industrial base assessments and associated efforts to incorporate manufacturer and supplier feedback throughout development and prior to production.

Most Programs Reported Acquisition Workforce Challenges

Most (40 of 48) of the programs we assessed against leading practices also reported that they experienced acquisition workforce challenges, such as staff reductions or difficulties hiring and retaining staff (see fig. 30).

Figure 30: Most Programs Reported Experiencing Acquisition Workforce Challenges



Source: GAO analysis of Department of Defense documentation and interviews; Hurca!/stock.adobe.com (illustration). | GAO-26-108457

Specifically, 37 programs reported reductions to the number of military, civilian, or contracting staff for the program, and 33 programs reported challenges with hiring and retaining staff.[77] Programs attributed acquisition workforce reductions to several factors, such as DOD's Deferred Resignation Program (DRP) (see fig. 31).[78]

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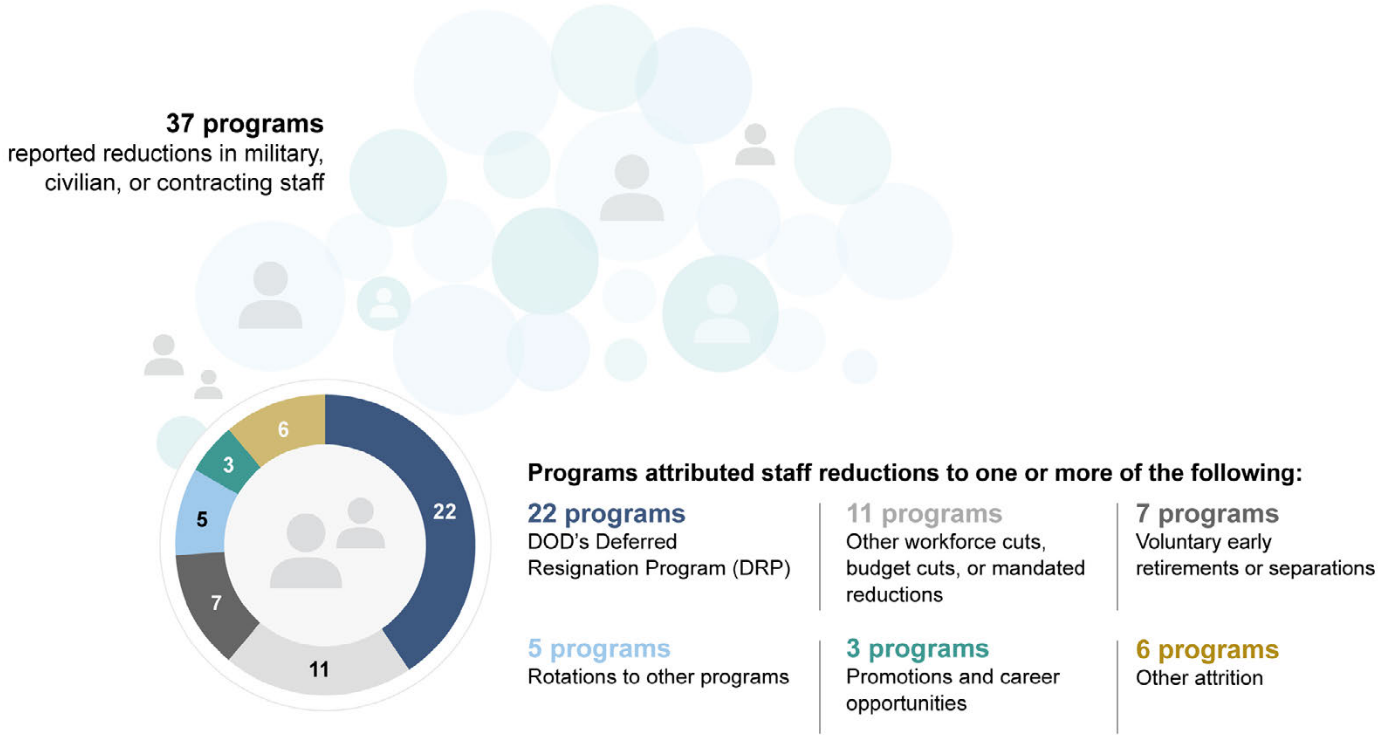
[77] We did not receive responses from one program.

[78] On January 28, 2025, the Office of Personnel Management announced that federal employees could voluntarily resign via a DRP. Employees electing to resign would have their duties reassigned or eliminated by their agencies and would be placed on paid administrative leave until their effective resignations, but no later than September 30, 2025 (or up to December 31, if they were retiring and requested to extend their resignation date to match their retirement date). GAO, *Federal Agency Workforce Changes: Update for January to June 2025*, GAO-26-108719 (Washington, D.C.: Feb. 24, 2026). The Secretary of Defense announced DOD's DRP for all eligible civilian employees on March 28, 2025. Department of Defense, Secretary of Defense Memorandum, *Initiating the Workforce Acceleration & Recapitalization Initiative* (Mar. 28, 2025).

Figure 31: Programs Attributed Staff Reductions to Several Factors



Source: GAO analysis of Department of Defense documentation and interviews. | GAO-26-108457

From January to June 2025, over 48,000 DOD employees were approved for the DRP program, representing 6.3 percent of the department's workforce.[79] Most programs in our review reported acquisition workforce losses. For example, one program reported that it lost 31 people from its department as part of the DRP, which represented close to 6 percent of its workforce. In another example, one program reported that, from December 2024 to December 2025, the program office lost 38 percent of its core personnel and was only able to successfully replace one-third of the departed team members.

The majority of these programs reported that they were not able to fully backfill their acquisition staff (see fig. 32). Twenty-five programs reported that DOD's ongoing civilian hiring freeze made it more difficult for them to

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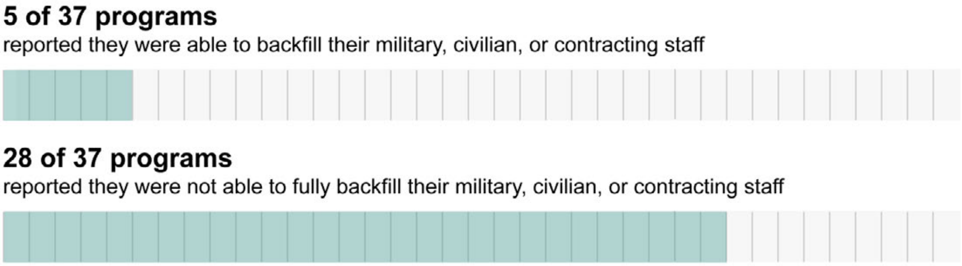
[79] GAO-26-108719.

hire additional staff, and another nine programs reported that the expertise required for the program made hiring additional staff difficult.

Figure 32: Most Programs Reported Not Backfilling Acquisition Workforce



Source: GAO analysis of Department of Defense documentation and interviews. | GAO-26-108457

Note: Four programs experienced staff reductions but did not specify if the program has backfilled these staff.

For example, one program reported that it faced staffing reductions of greater than 10 percent stemming from the voluntary separation initiative and a concurrent hiring freeze. Another program reported that it has consistently had to re-advertise positions multiple times to get a qualified candidate. Another program reported that it takes between 8 months and a year for the program office to hire someone from outside the government, obtain the required security clearances, and gain sufficient program knowledge before they become a contributing team member.

The effects of the changes to DOD's acquisition workforce have yet to be fully determined. However, some programs reported experiencing higher workloads (12 programs) and losing valuable institutional knowledge (seven programs) due to staff reductions or hiring difficulties. For example, one program lost seven civilian positions due to the DRP, and it has not been able to backfill due to the ongoing hiring freeze. Those program officials said that the program distributes the same work to the fewer remaining people, and those employees work across weekends to ensure the reductions have not resulted in tangible delays or deficiencies in executing the program. Another program reported that it lost both its most experienced personnel as well as junior staff. This resulted in cutting off both ends of the experience spectrum (i.e., losing the most experienced and not developing future experience).

DOD acknowledged the need to address acquisition workforce challenges in its *Acquisition Transformation Strategy*. Specifically, the strategy discusses the need for DOD to build and augment the acquisition workforce by recruiting, retaining, and training highly skilled and experienced operators and subject matter experts. Additionally, the strategy identifies the need for the department to have leaders serve in critical leadership and functional positions long enough to have an effect to achieve the benefits of their expertise. We will continue to monitor DOD’s efforts to transform its acquisition workforce.

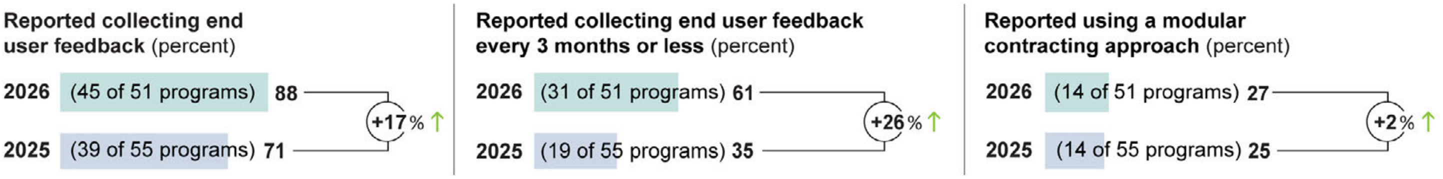
Weapon Systems Have Increased Use of Modern Software Approaches Outside of the Software Acquisition Pathway

DOD is in the process of modernizing its software development and continues to improve cybersecurity in weapon systems. This year, more programs reported using modern software approaches that intend to develop and deliver software quickly and iteratively based on user needs. Many of these programs also reported using Agile metrics and tools. However, very few programs reported using the software acquisition pathway. A March 2025 memorandum from the Secretary of Defense directed programs to adopt the pathway as the preferred pathway for all software development components of weapon system programs.[80] The software acquisition pathway facilitates a rapid, iterative approach to software development, among other things. Further, most MTA rapid prototyping programs reported they did not complete or plan to complete cybersecurity assessments recommended by guidance in place at the time of our review before transitioning to another pathway.

Programs Reported Mixed Progress in Using Modern Software Approaches, but Many Lack Key Elements

Since our last report, we found that the number of programs using a modern software approach, such as Agile, DevOps, and DevSecOps, has slightly decreased from 55 to 51 programs. However, some programs included in last year’s review, as well as some new programs added to the portfolio, incorporate elements tied to successful software development, such as end user feedback and modular contracting. As a result, the percentage of programs incorporating these elements increased since our last report (see fig. 33).

Figure 33: Programs Using Modern Software Elements Compared with GAO’s 2025 Annual Assessment



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

Additionally, we found that the same number or more programs reported using all of the metrics and tools recommended by our Agile Guide and

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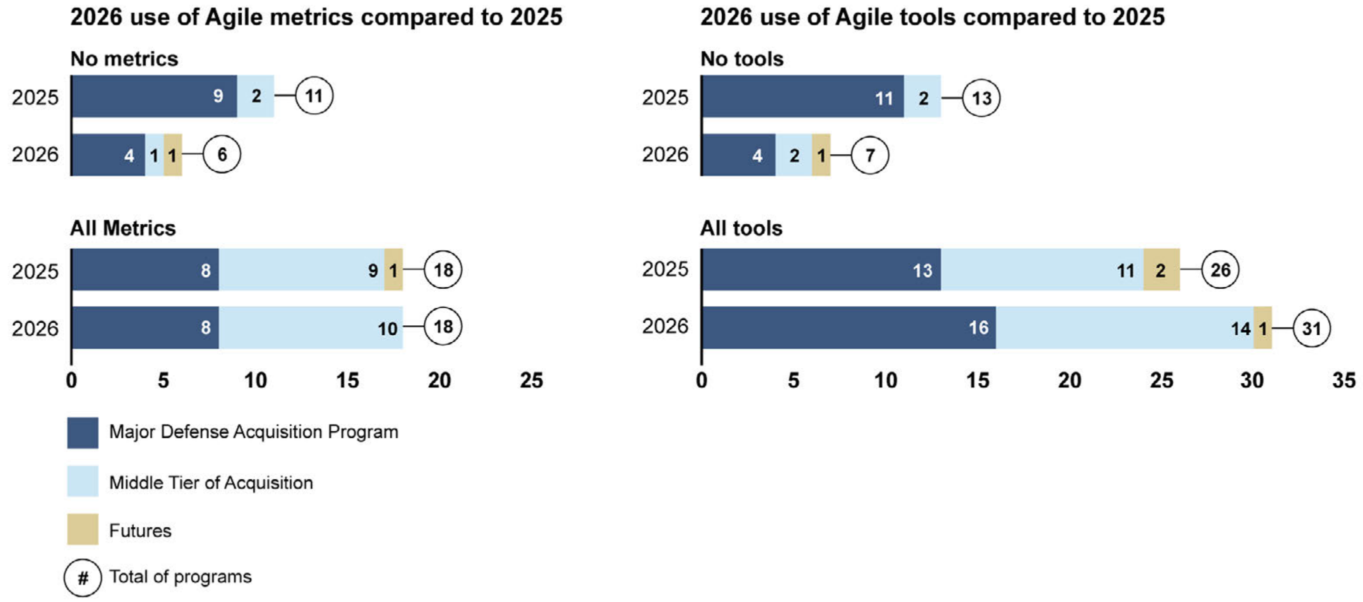
[80] Department of Defense, Secretary of Defense Memorandum, *Directing Modern Software Acquisition to Maximize Lethality* (Washington, D.C.: Mar. 6, 2025).

DOD guidance, and that fewer programs reported using none of the recommended metrics or tools (see fig. 34).[81] We previously reported that these metrics and management tools provide opportunities for increased visibility into software performance and are best practices for Agile adoption.[82]

Figure 34: Use of Recommended Agile Metrics and Tools Among Programs Reporting Modern Software Development Approaches



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

For the past 5 years, we have reported on program implementation of selected software practices recommended by the Defense Science Board in February 2018 to help DOD modernize its software development

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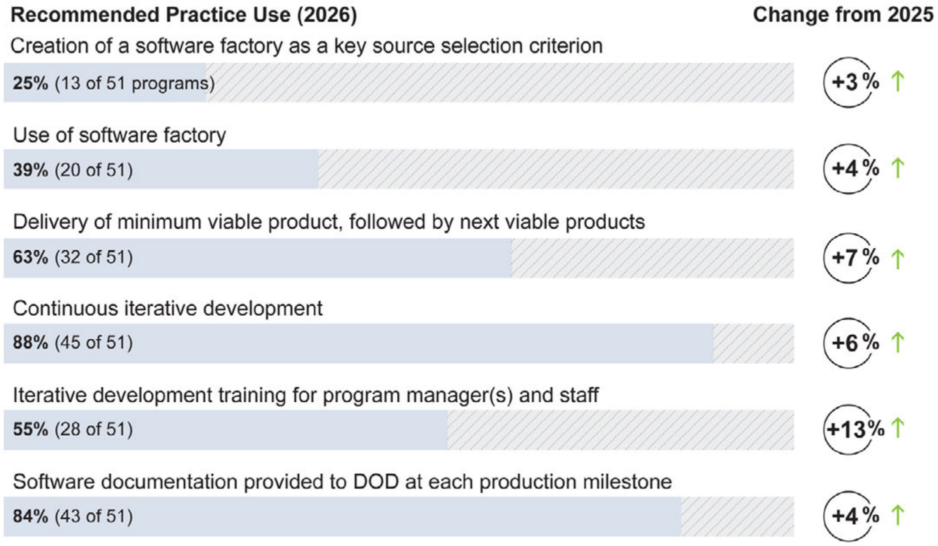
[81] These metrics and tools are used to measure performance and outcomes intended to help meet customer needs and are best practices for Agile adoption and implementation. Several of these metrics and management tools are consistent with those in DOD's guidance. See GAO-24-105506. See also Department of Defense, *Agile Metrics Guide: Strategy Considerations and Sample Metrics for Agile Development Solutions,* Version 1.2 (Nov. 11, 2020); and *DevSecOps Fundamentals Guidebook* (March 2021).

[82] GAO, *IT Systems Annual Assessment: DOD Needs to Improve Performance Reporting and Cybersecurity Planning,* GAO-25-107649 (Washington, D.C.: June 12, 2025); GAO-24-105506; and GAO-23-105867.

approach.[83] The recommendations to create a software factory and to incorporate the software factory as a key evaluation criterion on the source selection process were foundational to all other recommendations. According to the Defense Science Board study, this is because Agile development begins with the creation of a software factory—the set of tools that enable the developers, users, and management to work together on a daily tempo. The number of programs implementing these practices increased from last year; however, less than 50 percent of programs reported using a software factory or considering it as a key source selection criterion (see fig. 35). DOD's FY25-26 Software Modernization Implementation Plan includes the goal to make mission owners use the software factory ecosystem as the default.[84] We will continue to monitor these efforts.

Figure 35: Implementation of 2018 Defense Science Board Recommended Practices by Programs That Reported Using a Modern Software Development Approach



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

This year, three programs in our review reported using the software acquisition pathway—**XM30**, **FORGE**, and the second increment of the

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[83] Defense Science Board, *Design and Acquisition of Software for Defense Systems* (Washington, D.C.: Feb. 14, 2018).

[84] Department of Defense, *Software Modernization Implementation Plan FY25-26* (April 2025).

Military GPS User Equipment (MGUE Increment 2). XM30 reported a parallel effort on the software acquisition pathway to develop additional capabilities beyond the embedded software being developed by vendors on the MTA pathway. FORGE and Military GPS User Equipment Increment 2 both began as MTA rapid prototyping efforts and, after their 5-year MTA efforts expired, both transitioned to the software pathway to develop and deliver operational capability. Three programs use of the pathway reflects an increase in the use of the software acquisition pathway from last year, when no programs reported using the pathway. However, the remaining 48 programs use of a modern software development approach on another pathway may not fully incorporate Agile practices. We previously found that programs on other acquisition pathways may not be positioned to conduct effective oversight of iteratively delivered software capabilities. This is because DOD's requirements processes that are used by weapon programs developing software on a non-software pathway generally do not incorporate Agile principles.[85] We recommended that DOD should incorporate oversight of Agile development and Agile principles into requirements policy and guidance for all programs using Agile for software development. Officials have stated that the department is also updating other acquisition policy and guidance to strengthen oversight of Agile programs. However, DOD has not yet taken action to address these recommendations. We will continue to monitor these efforts.

MDAPs and MTA Programs Have Made Limited Progress in Implementing Some Cybersecurity Practices

The number of MDAPs that are conducting cybersecurity assessments prior to key program events decreased as compared to last year (see fig. 36).[86]

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[85] GAO-23-105867.

[86] Department of Defense, *Cybersecurity Test and Evaluation Guidebook 2.0*, Change 1 (February 2020). DOD issued an updated guidebook, *Cyber Developmental Test and Evaluation Guidebook 3.0,* for developmental cybersecurity test and evaluation in June 2025. This aligned with DOW Manual 5000.103 *Cyber Developmental Test and Evaluation*, which was published in February 2026. Substantive work for this year's report took place prior to these releases, and, therefore, we used the February 2020 guidance.

Figure 36: Number of Major Defense Acquisition Programs Completing Key Cybersecurity Assessments Before Applicable Program Event

Cybersecurity assessment	Applicable program event	2026	Percentage change from 2025
Cooperative Vulnerability Identification	Start of production (Milestone C)	**25%** (4 of 16)	**Decreased**
Adversarial Cybersecurity Developmental Test and Evaluation	Start of production (Milestone C)	**11%** (2 of 19)	**Decreased**
Cooperative Vulnerability and Penetration Assessment	Initial operational test and evaluation	**33%** (4 of 12)	**Decreased**
Adversarial Assessment	Full-rate production decision	**33%** (5 of 15)	**Decreased**

Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

Consistent with last year, most MTA programs did not report that they completed or plan to complete cybersecurity assessments before transitioning to another pathway, as recommended by guidance in place at the time of our review. As shown in figure 37, four of the 19 programs reported doing so, which is a lower percentage of programs than what we reported last year (three of 12).

Figure 37: Number of Middle Tier of Acquisition Programs Completing or Planning to Complete Key Cybersecurity Assessments Before Planned Transition Date

Transition Plan	Recommended cybersecurity assessments to be completed before transition	Number of programs reported in 2026 completing or planning to complete all recommended assessments before transition	Percentage change from 2025
To MDAP production start (Milestone C)	CVI, ACD	**33%** (1 of 3)	**Unchanged**
To MTA rapid fielding	CVI, ACD, CVPA, AA	**33%** (1 of 3)	**Increased**
To operations and sustainment	CVI, ACD, CVPA, AA	**15%** (2 of 13)	**Decreased**
		0 20 40 60 80 100	

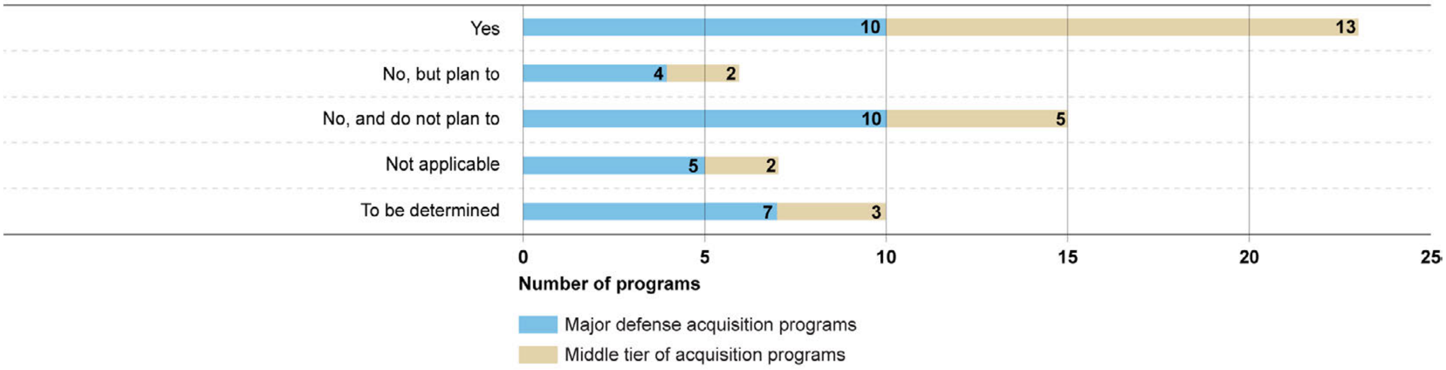
AA	Adversarial Assessment
ACD	Adversarial Cybersecurity Developmental Test and Evaluation
CVI	Cooperative Vulnerability Identification
CVPA	Cooperative Vulnerability and Penetration Assessment
MDAP	Major defense acquisition program
MTA	Middle tier of acquisition

Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

As discussed in previous reports, early and regular discovery of mission-impacting system vulnerabilities are used to make informed program decisions, to fix vulnerabilities more easily, and to reduce risk to schedule.[87] Several programs reported that they have completed or plan to complete other cybersecurity testing later than was recommended. While any testing can be considered a positive step for programs, this is not in accordance with the timing for cybersecurity assessments recommended by the guidance in place at the time of our review.

In addition, while more programs reported implementing zero trust principles this year than last year, most programs are not implementing a zero trust strategy. Zero trust is a set of cybersecurity principles that are founded on the concept that nothing operating outside of or within an organization's IT security perimeter should be trusted, and anything that attempts to establish access to the systems, services, and networks should be verified. This set of principles is significant for iterative development because it ensures that code is protected and that outside entities receive access to certain code while protecting the rest of the program's software. DOD plans for all its IT organizations to adopt zero trust cybersecurity principles by 2027. In 2025, DOD developed additional zero trust guidance for operational technology that supports weapon systems, and the department indicated that it would develop separate guidance for weapon systems in the future. Given the increasing reliance of DOD weapon systems portfolio on network and application-based capabilities, we will continue to monitor DOD's efforts to implement zero trust cybersecurity within individual weapon programs (see fig. 38).

Figure 38: MDAP and MTA Programs Reported Zero Trust Strategy Status



Source: GAO analysis of programs' questionnaire responses. | GAO-26-108457

Programs provided several reasons for not developing a zero trust strategy. These included that the program preceded the requirement for a

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[87] GAO-25-107569; and GAO, *Weapon Systems Annual Assessment: Programs Are Not Consistently Implementing Practices That Can Help Accelerate Acquisitions,* GAO-23-106059 (Washington, D.C.: June 8, 2023).

zero trust strategy, it did not have network connectivity, and there were no IT systems supporting the program system. Reasons for a zero trust strategy not being applicable included that the programs did not meet the requirements for a zero trust strategy, that the program used commercial off-the-shelf technology, or that zero trust efforts would be addressed in a follow-on effort. We will continue to monitor DOD efforts to adopt zero trust principles.

Conclusions

As DOD embarks on acquisition reforms to deliver capability with speed and enable innovation, it can act where prior reforms fell short and fully implement leading practices to meet rapidly evolving warfighter needs. Further, it will be important that DOD take advantage of opportunities already at its disposal that could lead to efficiencies, such as using available acquisition pathways, like the MTA pathway, in a way that rapidly delivers essential capability with speed. Thus far, the MTA programs we reviewed have largely not delivered the desired outcomes of providing capabilities with speed. DOD acquisition reform efforts could address this gap using existing levers. Under DOD policy, the MTA pathway is intended for capabilities with a level of maturity that allows them to be rapidly prototyped or fielded within 5 years of MTA program start, but programs often begin on the MTA pathway with technologies that integrate into capabilities that require more time to mature than 5 years. This results in delays delivering an MVP that can be fielded quickly. Developing immature technologies separately from the pathway would help programs focus on using mature technologies to rapidly deliver capability to the warfighter, rather than spending time and resources to develop immature technologies that cannot deliver capability in 5 years.

Without policy to ensure the costliest programs entering pathways designed for speed do so with mature technology, these programs may continue to languish while maturing technologies instead of delivering crucial capabilities to keep pace with warfighter needs.

Recommendation for Executive Action

The Secretary of Defense should ensure that acquisition policies for programs intending to rapidly deliver capabilities that integrate multiple technologies, including those using the MTA pathway, require that such programs initiate with only technologies considered mature or develop associated immature technologies separate from the program effort. (Recommendation 1)

Agency Comments

We provided a draft of this report to DOD for review and comment. In its comments, which are reproduced in appendix V, DOD concurred with our recommendation. DOD also provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense, the Secretaries of the Army, Navy, and Air Force, and other interested parties. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

If you or your staff have any questions concerning this report, please contact me at oakleys@gao.gov. Contact points for our Offices of Congressional Relations and Media Relations may be found on the last page of this report. Staff members making key contributions to this report are listed in appendix VI.

//SIGNED//

Shelby S. Oakley
Director, Contracting and National Security Acquisitions

List of Committees

The Honorable Roger Wicker
Chairman
The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate

The Honorable Mitch McConnell
Chair
The Honorable Christopher Coons
Ranking Member
Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Mike Rogers
Chairman
The Honorable Adam Smith
Ranking Member
Committee on Armed Services
House of Representatives

The Honorable Ken Calvert
Chairman
The Honorable Betty McCollum
Ranking Member
Subcommittee on Defense
Committee on Appropriations
House of Representatives

Appendix I: Program Assessments

This section contains 62 assessments of 68 weapon programs.[1]

For 19 major defense acquisition programs (MDAP) in development, we produced two-page assessments discussing program performance including cost and schedule performance, leading product development practices, software and cybersecurity efforts, and other program issues.[2] For these MDAPs, we also assessed program implementation of selected leading product development practices. See figure 39 for an illustration of the layout of each two-page assessment.

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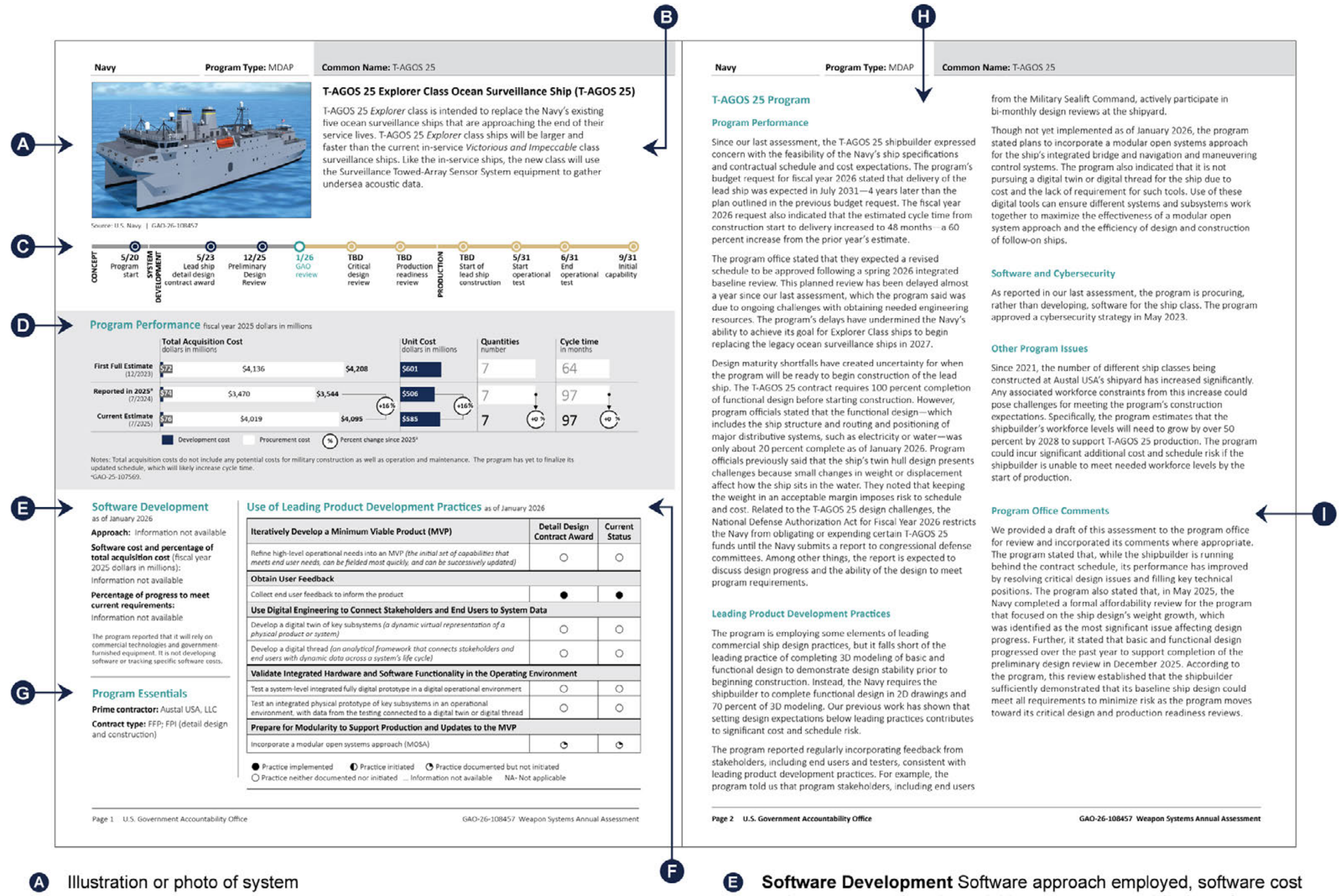
[1] We reviewed 68 total programs within 62 assessments because the Space Force's Tranche 1, Tranche 2, and Tranche 3 Tracking Layer; and Tranche 1, Tranche 2, and Tranche 3 Transport were reviewed together in consolidated assessments, respectively. Additionally, the Army's Integrated Visual Augmentation System efforts were reviewed together in one assessment and the Navy's Conventional Prompt Strike efforts were reviewed together in one assessment. The assessments also contain basic information about the program, including the prime contractor(s) or other identified contractors and contract type(s). We abbreviated the following contract types: cost reimbursement (CR), cost-plus-award-fee (CPAF), cost-plus-fixed-fee (CPFF), cost-plus-incentive-fee (CPIF), firm-fixed-price (FFP), fixed-price-award-fee (FPAF), fixed-price incentive (FPI), and indefinite delivery/indefinite quantity (IDIQ). For some FPI contracts, we distinguished between their forms: firm target (FPIF) and successive targets (FPIS). We also abbreviated Department of Defense (DOD), middle tier of acquisition (MTA), minimum viable product (MVP), and modular open systems approach (MOSA).

[2] For shipbuilding programs, the schedule of key program events in relation to acquisition milestones varies for each program. Our work on shipbuilding leading practices has identified the detail design contract award and the start of lead ship fabrication as the points in the acquisition process roughly equivalent to development start and design review for other programs.

Figure 39: Illustration of Two-Page Major Defense Acquisition Program Assessment



Navy **Program Type:** MDAP **Common Name:** T-AGOS 25

T-AGOS 25 Explorer Class Ocean Surveillance Ship (T-AGOS 25)

T-AGOS 25 *Explorer* class is intended to replace the Navy's existing five ocean surveillance ships that are approaching the end of their service lives. T-AGOS 25 *Explorer* class ships will be larger and faster than the current in-service *Victorious and Impeccable* class surveillance ships. Like the in-service ships, the new class will use the Surveillance Towed-Array Sensor System equipment to gather undersea acoustic data.

Source: U.S. Navy | GAO-26-108457

CONCEPT
5/20 Program start
SYSTEM DEVELOPMENT
5/23 Lead ship detail design contract award
12/25 Preliminary Design Review
1/26 GAO review
TBD Critical design review
TBD Production readiness review
PRODUCTION
TBD Start of lead ship construction
5/31 Start operational test
6/31 End operational test
9/31 Initial capability

Program Performance fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions: Development cost	Procurement cost	Total	Unit Cost dollars in millions	Quantities number	Cycle time in months
First Full Estimate (12/2023)	$72	$4,136	$4,208	$601	7	64
Reported in 2025ᵃ (7/2024)	$74	$3,470	$3,544	$506	7	97
Current Estimate (7/2025)	$76	$4,019	$4,095	$585	7	97
Percent change since 2025ᵃ			+16%	+16%	+0%	+0%

▮ Development cost ▯ Procurement cost (%) Percent change since 2025ᵃ

Notes: Total acquisition costs do not include any potential costs for military construction as well as operation and maintenance. The program has yet to finalize its updated schedule, which will likely increase cycle time.
ᵃGAO-25-107569.

Software Development
as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):
Information not available

Percentage of progress to meet current requirements:
Information not available

The program reported that it will rely on commercial technologies and government-furnished equipment. It is not developing software or tracking specific software costs.

Program Essentials

Prime contractor: Austal USA, LLC

Contract type: FFP; FPI (detail design and construction)

Use of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA- Not applicable

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Navy **Program Type:** MDAP **Common Name:** T-AGOS 25

T-AGOS 25 Program

Program Performance

Since our last assessment, the T-AGOS 25 shipbuilder expressed concern with the feasibility of the Navy's ship specifications and contractual schedule and cost expectations. The program's budget request for fiscal year 2026 stated that delivery of the lead ship was expected in July 2031—4 years later than the plan outlined in the previous budget request. The fiscal year 2026 request also indicated that the estimated cycle time from construction start to delivery increased to 48 months—a 60 percent increase from the prior year's estimate.

The program office stated that they expected a revised schedule to be approved following a spring 2026 integrated baseline review. This planned review has been delayed almost a year since our last assessment, which the program said was due to ongoing challenges with obtaining needed engineering resources. The program's delays have undermined the Navy's ability to achieve its goal for Explorer Class ships to begin replacing the legacy ocean surveillance ships in 2027.

Design maturity shortfalls have created uncertainty for when the program will be ready to begin construction of the lead ship. The T-AGOS 25 contract requires 100 percent completion of functional design before starting construction. However, program officials stated that the functional design—which includes the ship structure and routing and positioning of major distributive systems, such as electricity or water—was only about 20 percent complete as of January 2026. Program officials previously said that the ship's twin hull design presents challenges because small changes in weight or displacement affect how the ship sits in the water. They noted that keeping the weight in an acceptable margin imposes risk to schedule and cost. Related to the T-AGOS 25 design challenges, the National Defense Authorization Act for Fiscal Year 2026 restricts the Navy from obligating or expending certain T-AGOS 25 funds until the Navy submits a report to congressional defense committees. Among other things, the report is expected to discuss design progress and the ability of the design to meet program requirements.

Leading Product Development Practices

The program is employing some elements of leading commercial ship design practices, but it falls short of the leading practice of completing 3D modeling of basic and functional design to demonstrate design stability prior to beginning construction. Instead, the Navy requires the shipbuilder to complete functional design in 2D drawings and 70 percent of 3D modeling. Our previous work has shown that setting design expectations below leading practices contributes to significant cost and schedule risk.

The program reported regularly incorporating feedback from stakeholders, including end users and testers, consistent with leading product development practices. For example, the program told us that program stakeholders, including end users from the Military Sealift Command, actively participate in bi-monthly design reviews at the shipyard.

Though not yet implemented as of January 2026, the program stated plans to incorporate a modular open systems approach for the ship's integrated bridge and navigation and maneuvering control systems. The program also indicated that it is not pursuing a digital twin or digital thread for the ship due to cost and the lack of requirement for such tools. Use of these digital tools can ensure different systems and subsystems work together to maximize the effectiveness of a modular open system approach and the efficiency of design and construction of follow-on ships.

Software and Cybersecurity

As reported in our last assessment, the program is procuring, rather than developing, software for the ship class. The program approved a cybersecurity strategy in May 2023.

Other Program Issues

Since 2021, the number of different ship classes being constructed at Austal USA's shipyard has increased significantly. Any associated workforce constraints from this increase could pose challenges for meeting the program's construction expectations. Specifically, the program estimates that the shipbuilder's workforce levels will need to grow by over 50 percent by 2028 to support T-AGOS 25 production. The program could incur significant additional cost and schedule risk if the shipbuilder is unable to meet needed workforce levels by the start of production.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that, while the shipbuilder is running behind the contract schedule, its performance has improved by resolving critical design issues and filling key technical positions. The program also stated that, in May 2025, the Navy completed a formal affordability review for the program that focused on the ship design's weight growth, which was identified as the most significant issue affecting design progress. Further, it stated that basic and functional design progressed over the past year to support completion of the preliminary design review in December 2025. According to the program, this review established that the shipbuilder sufficiently demonstrated that its baseline ship design could meet all requirements to minimize risk as the program moves toward its critical design and production readiness reviews.

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Ⓐ Illustration or photo of system

Ⓑ Program description

Ⓒ Timeline identifying key dates for the program including, the start of development, major decision reviews, production decision and planned operational capability. Where applicable, "major capability transition" indicates when the program transitioned to the major capability acquisition pathway.

Ⓓ **Program Performance**
Cost, quantity, and schedule data as of the program's first full estimate (baseline), estimate as of last year (GAO's 2025 assessment) and current estimate. We depict only the program's main elements of acquisition cost – research and development and procurement. However, total program costs may also include military construction and acquisition operation and maintenance. Schedule data is presented as a cycle time comparison of planned number of months from program start to initial capability.

Ⓔ **Software Development** Software approach employed, software cost and percentage of total acquisition cost accounted for by software development, and percentage of progress to meet current requirements

Ⓕ **Implementation of Leading Product Development Practices** Depiction of selected leading product development practices and the program's progress in attaining that knowledge

Ⓖ **Program Essentials** Programmatic information including prime contractor (or other identified contractors) and contract type

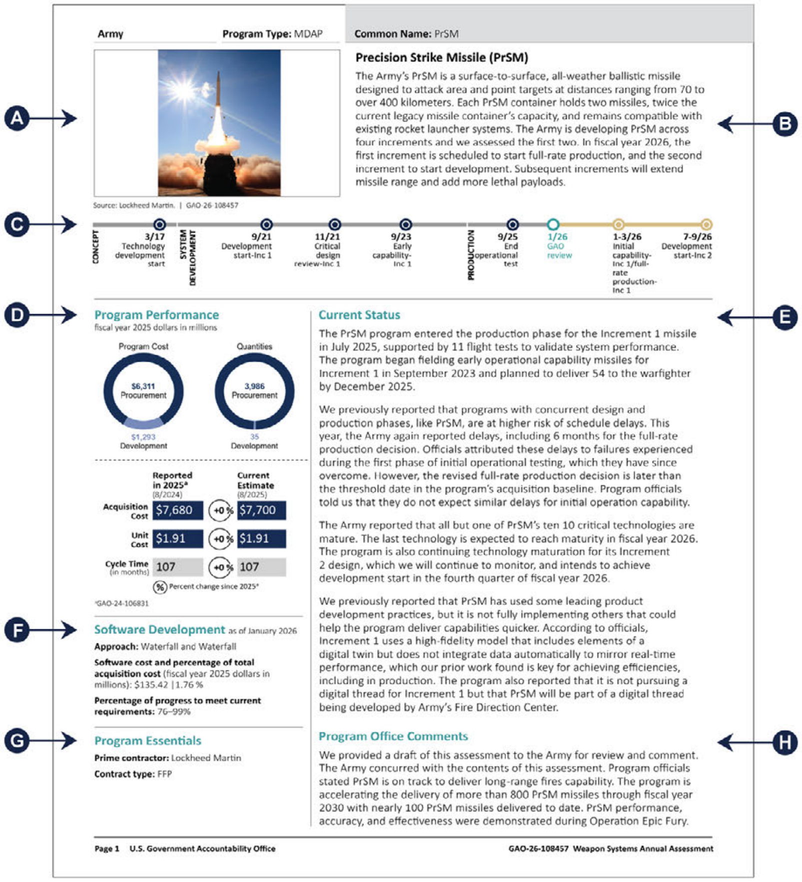
Ⓗ Assessment of program performance, implementation of leading product development practices, as well as software, cybersecurity, and other program issues.

Ⓘ **Program Office Comments** General comments provided by the cognizant military service or program office

Source: GAO. | GAO-26-108457

For 15 MDAPs that reached production as of May 2025, we produced one-page assessments discussing the program's cost and schedule performance as well as the current status of the program.[3] See Figure 40 for an illustration of the layout of each one-page assessment.

Figure 40: Illustration of One-Page Major Defense Acquisition Program Assessment



Army **Program Type:** MDAP **Common Name:** PrSM

Precision Strike Missile (PrSM)

The Army's PrSM is a surface-to-surface, all-weather ballistic missile designed to attack area and point targets at distances ranging from 70 to over 400 kilometers. Each PrSM container holds two missiles, twice the current legacy missile container's capacity, and remains compatible with existing rocket launcher systems. The Army is developing PrSM across four increments and we assessed the first two. In fiscal year 2026, the first increment is scheduled to start full-rate production, and the second increment to start development. Subsequent increments will extend missile range and add more lethal payloads.

Source: Lockheed Martin. | GAO-26-108457

Program Performance
fiscal year 2025 dollars in millions

	Reported in 2025[a] (8/2024)		Current Estimate (8/2025)
Acquisition Cost	$7,680	+0 %	$7,700
Unit Cost	$1.91	+0 %	$1.91
Cycle Time (in months)	107	+0 %	107

(%) Percent change since 2025[a]

[a]GAO-24-106831

Software Development as of January 2026

Approach: Waterfall and Waterfall

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): $135.42 | 1.76 %

Percentage of progress to meet current requirements: 76–99%

Program Essentials

Prime contractor: Lockheed Martin

Contract type: FFP

Current Status

The PrSM program entered the production phase for the Increment 1 missile in July 2025, supported by 11 flight tests to validate system performance. The program began fielding early operational capability missiles for Increment 1 in September 2023 and planned to deliver 54 to the warfighter by December 2025.

We previously reported that programs with concurrent design and production phases, like PrSM, are at higher risk of schedule delays. This year, the Army again reported delays, including 6 months for the full-rate production decision. Officials attributed these delays to failures experienced during the first phase of initial operational testing, which they have since overcome. However, the revised full-rate production decision is later than the threshold date in the program's acquisition baseline. Program officials told us that they do not expect similar delays for initial operation capability.

The Army reported that all but one of PrSM's ten 10 critical technologies are mature. The last technology is expected to reach maturity in fiscal year 2026. The program is also continuing technology maturation for its Increment 2 design, which we will continue to monitor, and intends to achieve development start in the fourth quarter of fiscal year 2026.

We previously reported that PrSM has used some leading product development practices, but it is not fully implementing others that could help the program deliver capabilities quicker. According to officials, Increment 1 uses a high-fidelity model that includes elements of a digital twin but does not integrate data automatically to mirror real-time performance, which our prior work found is key for achieving efficiencies, including in production. The program also reported that it is not pursuing a digital thread for Increment 1 but that PrSM will be part of a digital thread being developed by Army's Fire Direction Center.

Program Office Comments

We provided a draft of this assessment to the Army for review and comment. The Army concurred with the contents of this assessment. Program officials stated PrSM is on track to deliver long-range fires capability. The program is accelerating the delivery of more than 800 PrSM missiles through fiscal year 2030 with nearly 100 PrSM missiles delivered to date. PrSM performance, accuracy, and effectiveness were demonstrated during Operation Epic Fury.

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Ⓐ Illustration or photo of system

Ⓑ Program description

Ⓒ Timeline identifying key dates for the program such as program initiation, contract award, and significant relevant programmatic decision points. Where applicable, "major capability transition" indicates when the program transitioned to the major capability acquisition pathway.

Ⓓ **Program Performance** Cost, quantity, and schedule data as of the program's current estimate and estimate as of last year (GAO's 2025 assessment). We depict only the program's main elements of acquisition cost – research and development and procurement. However, total program costs may also include military construction and acquisition operation and maintenance. Schedule data is presented as a cycle time comparison of planned number of months from program start to initial capability.

Ⓔ **Current Status** Updated status of the program

Ⓕ **Software Development** Software approach employed, software cost and percentage of total acquisition cost accounted for by software development, and percentage of progress to meet current requirements

Ⓖ **Program Essentials** Programmatic information including prime contractor (or other identified contractors) and contract type

Ⓗ **Program Office Comments** General comments provided by the cognizant military service or program office

Source: GAO. | GAO-26-108457

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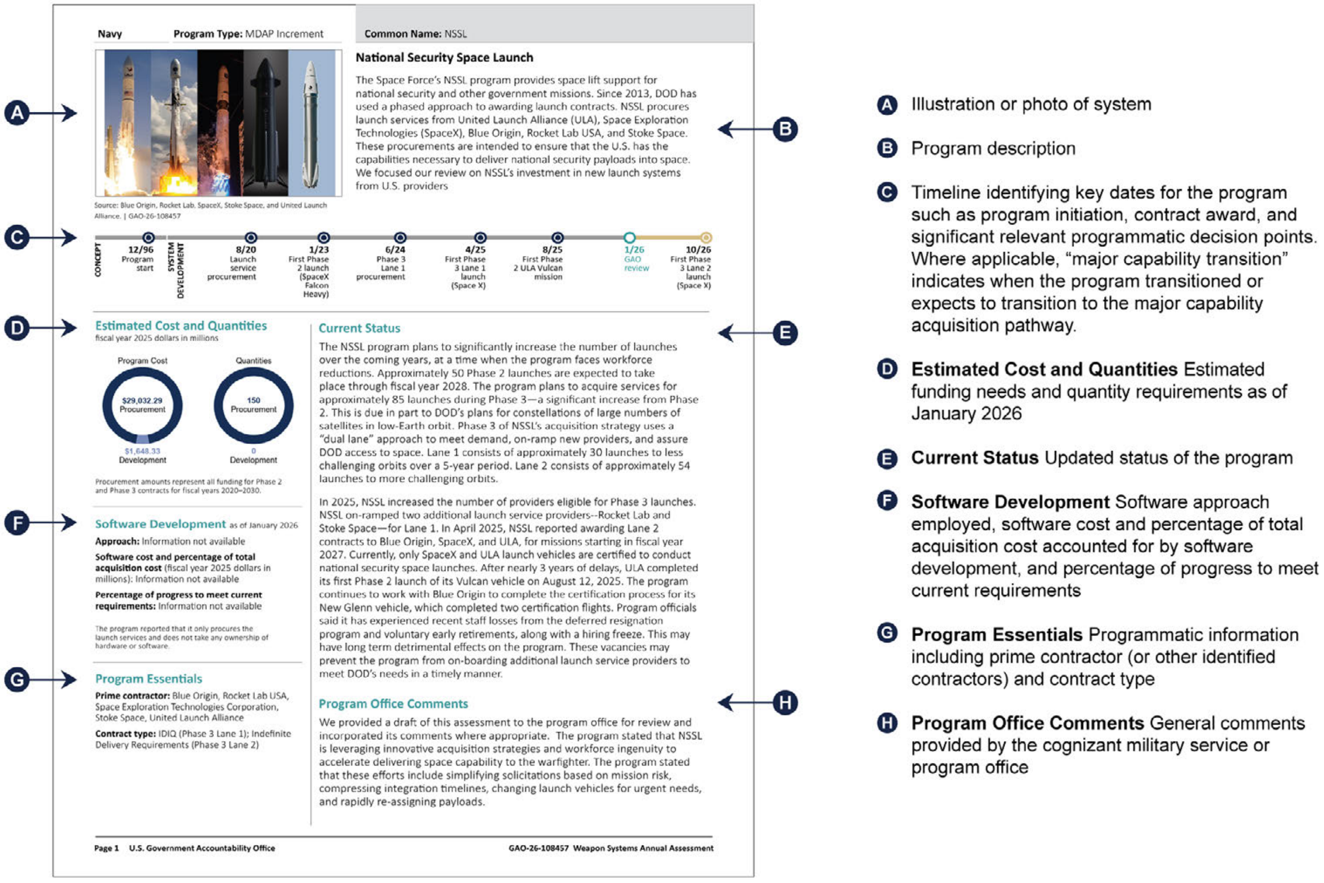
[3] For shipbuilding programs, our work identifies detail design and construction as the point at which programs typically award construction of the lead ship.

In addition, we produced four one-page MDAP assessments for programs that were well into production, but planned to introduce new increments of capability, which we refer to as MDAP increments.

See Figure 41 for an illustration of the layout of each one-page assessment.

Figure 41: Illustration of Major Defense Acquisition Program Increment Assessment



Navy **Program Type:** MDAP Increment **Common Name:** NSSL

National Security Space Launch

The Space Force's NSSL program provides space lift support for national security and other government missions. Since 2013, DOD has used a phased approach to awarding launch contracts. NSSL procures launch services from United Launch Alliance (ULA), Space Exploration Technologies (SpaceX), Blue Origin, Rocket Lab USA, and Stoke Space. These procurements are intended to ensure that the U.S. has the capabilities necessary to deliver national security payloads into space. We focused our review on NSSL's investment in new launch systems from U.S. providers

Source: Blue Origin, Rocket Lab, SpaceX, Stoke Space, and United Launch Alliance. | GAO-26-108457

CONCEPT
12/96 Program start
SYSTEM DEVELOPMENT
8/20 Launch service procurement
1/23 First Phase 2 launch (SpaceX Falcon Heavy)
6/24 Phase 3 Lane 1 procurement
4/25 First Phase 3 Lane 1 launch (Space X)
8/25 First Phase 2 ULA Vulcan mission
1/26 GAO review
10/26 First Phase 3 Lane 2 launch (Space X)

Estimated Cost and Quantities
fiscal year 2025 dollars in millions

Program Cost
$29,032.29 Procurement
$1,648.33 Development

Quantities
150 Procurement
0 Development

Procurement amounts represent all funding for Phase 2 and Phase 3 contracts for fiscal years 2020–2030.

Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: Information not available

The program reported that it only procures the launch services and does not take any ownership of hardware or software.

Program Essentials

Prime contractor: Blue Origin, Rocket Lab USA, Space Exploration Technologies Corporation, Stoke Space, United Launch Alliance

Contract type: IDIQ (Phase 3 Lane 1); Indefinite Delivery Requirements (Phase 3 Lane 2)

Current Status

The NSSL program plans to significantly increase the number of launches over the coming years, at a time when the program faces workforce reductions. Approximately 50 Phase 2 launches are expected to take place through fiscal year 2028. The program plans to acquire services for approximately 85 launches during Phase 3—a significant increase from Phase 2. This is due in part to DOD's plans for constellations of large numbers of satellites in low-Earth orbit. Phase 3 of NSSL's acquisition strategy uses a "dual lane" approach to meet demand, on-ramp new providers, and assure DOD access to space. Lane 1 consists of approximately 30 launches to less challenging orbits over a 5-year period. Lane 2 consists of approximately 54 launches to more challenging orbits.

In 2025, NSSL increased the number of providers eligible for Phase 3 launches. NSSL on-ramped two additional launch service providers--Rocket Lab and Stoke Space—for Lane 1. In April 2025, NSSL reported awarding Lane 2 contracts to Blue Origin, SpaceX, and ULA, for missions starting in fiscal year 2027. Currently, only SpaceX and ULA launch vehicles are certified to conduct national security space launches. After nearly 3 years of delays, ULA completed its first Phase 2 launch of its Vulcan vehicle on August 12, 2025. The program continues to work with Blue Origin to complete the certification process for its New Glenn vehicle, which completed two certification flights. Program officials said it has experienced recent staff losses from the deferred resignation program and voluntary early retirements, along with a hiring freeze. This may have long term detrimental effects on the program. These vacancies may prevent the program from on-boarding additional launch service providers to meet DOD's needs in a timely manner.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that NSSL is leveraging innovative acquisition strategies and workforce ingenuity to accelerate delivering space capability to the warfighter. The program stated that these efforts include simplifying solicitations based on mission risk, compressing integration timelines, changing launch vehicles for urgent needs, and rapidly re-assigning payloads.

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A Illustration or photo of system

B Program description

C Timeline identifying key dates for the program such as program initiation, contract award, and significant relevant programmatic decision points. Where applicable, "major capability transition" indicates when the program transitioned or expects to transition to the major capability acquisition pathway.

D **Estimated Cost and Quantities** Estimated funding needs and quantity requirements as of January 2026

E **Current Status** Updated status of the program

F **Software Development** Software approach employed, software cost and percentage of total acquisition cost accounted for by software development, and percentage of progress to meet current requirements

G **Program Essentials** Programmatic information including prime contractor (or other identified contractors) and contract type

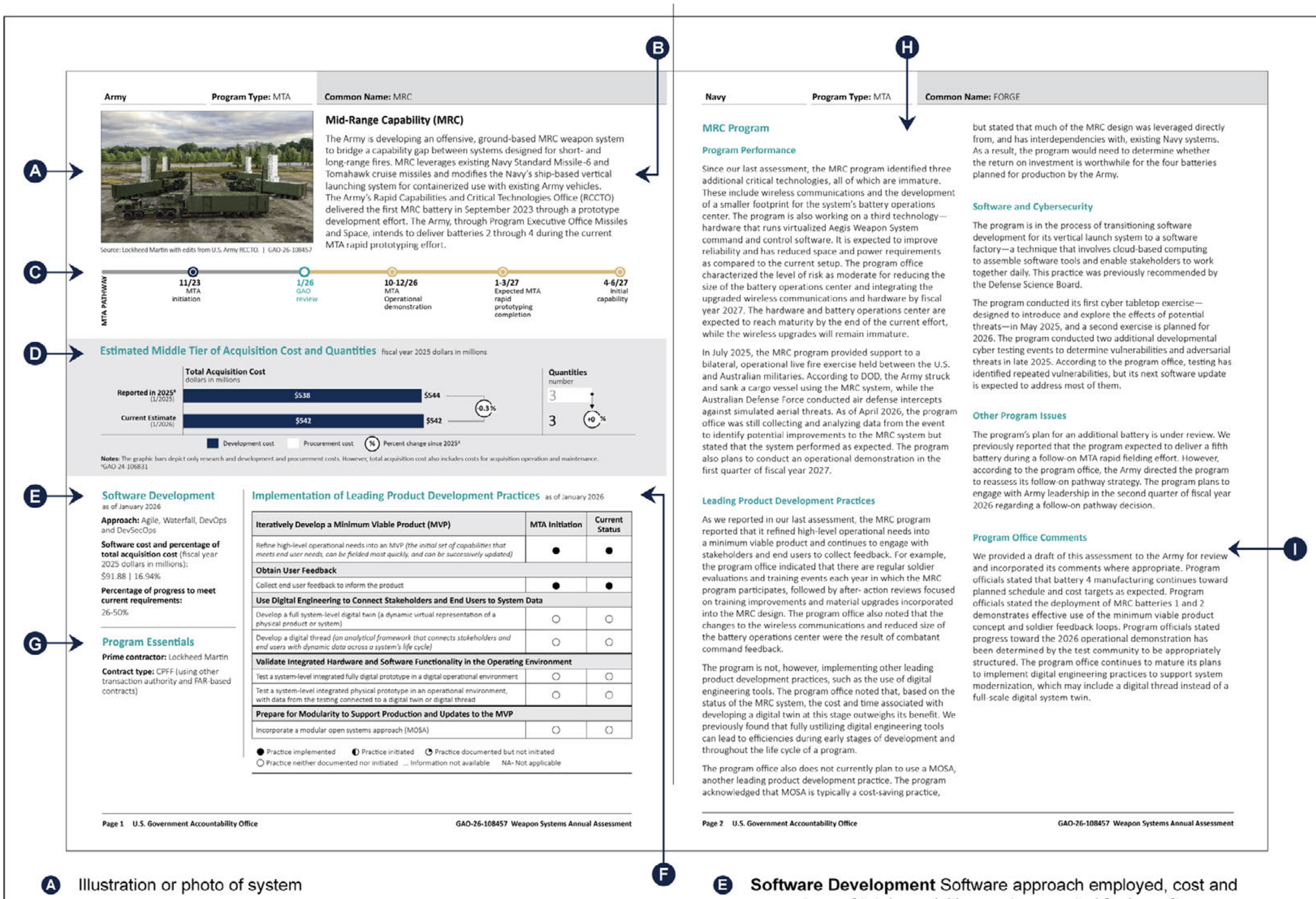
H **Program Office Comments** General comments provided by the cognizant military service or program office

Source: GAO. | GAO-26-108457

We produced 18 two-page assessments for 24 programs using the middle tier of acquisition (MTA) pathway. These two-page assessments discuss program performance including cost and schedule performance;

leading product development practices; software and cybersecurity efforts; and other program issues. See Figure 42 for an illustration of the layout of each two-page MTA program assessment.

Figure 42: Illustration of Two-Page Assessment of Programs Using the Middle Tier of Acquisition Pathway



Army **Program Type:** MTA **Common Name:** MRC

Mid-Range Capability (MRC)

The Army is developing an offensive, ground-based MRC weapon system to bridge a capability gap between systems designed for short- and long-range fires. MRC leverages existing Navy Standard Missile-6 and Tomahawk cruise missiles and modifies the Navy's ship-based vertical launching system for containerized use with existing Army vehicles. The Army's Rapid Capabilities and Critical Technologies Office (RCCTO) delivered the first MRC battery in September 2023 through a prototype development effort. The Army, through Program Executive Office Missiles and Space, intends to deliver batteries 2 through 4 during the current MTA rapid prototyping effort.

Source: Lockheed Martin with edits from U.S. Army RCCTO. | GAO-26-108457

MTA PATHWAY

11/23	1/26	10-12/26	1-3/27	4-6/27
MTA initiation	GAO review	MTA Operational demonstration	Expected MTA rapid prototyping completion	Initial capability

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions		Percent change since 2025	Quantities number	Percent change since 2025
Reported in 2025[a] (1/2025)	$538	$544	-0.3%	3	+0%
Current Estimate (1/2026)	$542	$542		3	

■ Development cost ☐ Procurement cost (%) Percent change since 2025[a]

Notes: The graphic bars depict only research and development and procurement costs. However, total acquisition cost also includes costs for acquisition operation and maintenance.
[a]GAO-24-106831

Software Development
as of January 2026

Approach: Agile, Waterfall, DevOps and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):
$91.88 | 16.94%

Percentage of progress to meet current requirements:
26-50%

Program Essentials

Prime contractor: Lockheed Martin

Contract type: CPFF (using other transaction authority and FAR-based contracts)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	●	●
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin (a dynamic virtual representation of a physical product or system)	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA- Not applicable

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Navy **Program Type:** MTA **Common Name:** FORGE

MRC Program

Program Performance

Since our last assessment, the MRC program identified three additional critical technologies, all of which are immature. These include wireless communications and the development of a smaller footprint for the system's battery operations center. The program is also working on a third technology—hardware that runs virtualized Aegis Weapon System command and control software. It is expected to improve reliability and has reduced space and power requirements as compared to the current setup. The program office characterized the level of risk as moderate for reducing the size of the battery operations center and integrating the upgraded wireless communications and hardware by fiscal year 2027. The hardware and battery operations center are expected to reach maturity by the end of the current effort, while the wireless upgrades will remain immature.

In July 2025, the MRC program provided support to a bilateral, operational live fire exercise held between the U.S. and Australian militaries. According to DOD, the Army struck and sank a cargo vessel using the MRC system, while the Australian Defense Force conducted air defense intercepts against simulated aerial threats. As of April 2026, the program office was still collecting and analyzing data from the event to identify potential improvements to the MRC system but stated that the system performed as expected. The program also plans to conduct an operational demonstration in the first quarter of fiscal year 2027.

Leading Product Development Practices

As we reported in our last assessment, the MRC program reported that it refined high-level operational needs into a minimum viable product and continues to engage with stakeholders and end users to collect feedback. For example, the program office indicated that there are regular soldier evaluations and training events each year in which the MRC program participates, followed by after- action reviews focused on training improvements and material upgrades incorporated into the MRC design. The program office also noted that the changes to the wireless communications and reduced size of the battery operations center were the result of combatant command feedback.

The program is not, however, implementing other leading product development practices, such as the use of digital engineering tools. The program office noted that, based on the status of the MRC system, the cost and time associated with developing a digital twin at this stage outweighs its benefit. We previously found that fully ustilizing digital engineering tools can lead to efficiencies during early stages of development and throughout the life cycle of a program.

The program office also does not currently plan to use a MOSA, another leading product development practice. The program acknowledged that MOSA is typically a cost-saving practice, but stated that much of the MRC design was leveraged directly from, and has interdependencies with, existing Navy systems. As a result, the program would need to determine whether the return on investment is worthwhile for the four batteries planned for production by the Army.

Software and Cybersecurity

The program is in the process of transitioning software development for its vertical launch system to a software factory—a technique that involves cloud-based computing to assemble software tools and enable stakeholders to work together daily. This practice was previously recommended by the Defense Science Board.

The program conducted its first cyber tabletop exercise—designed to introduce and explore the effects of potential threats—in May 2025, and a second exercise is planned for 2026. The program conducted two additional developmental cyber testing events to determine vulnerabilities and adversarial threats in late 2025. According to the program office, testing has identified repeated vulnerabilities, but its next software update is expected to address most of them.

Other Program Issues

The program's plan for an additional battery is under review. We previously reported that the program expected to deliver a fifth battery during a follow-on MTA rapid fielding effort. However, according to the program office, the Army directed the program to reassess its follow-on pathway strategy. The program plans to engage with Army leadership in the second quarter of fiscal year 2026 regarding a follow-on pathway decision.

Program Office Comments

We provided a draft of this assessment to the Army for review and incorporated its comments where appropriate. Program officials stated that battery 4 manufacturing continues toward planned schedule and cost targets as expected. Program officials stated the deployment of MRC batteries 1 and 2 demonstrates effective use of the minimum viable product concept and soldier feedback loops. Program officials stated progress toward the 2026 operational demonstration has been determined by the test community to be appropriately structured. The program office continues to mature its plans to implement digital engineering practices to support system modernization, which may include a digital thread instead of a full-scale digital system twin.

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Ⓐ Illustration or photo of system

Ⓑ Program description

Ⓒ Timeline identifying key dates for the program such as program initiation, funds obligation, contract award, expected MTA completion, initial capability, and significant relevant programmatic decision points. Where applicable, "major capability transition" indicates when the program expects to transition to the major capability acquisition pathway. "Initial capability" refers to the envisioned initial operational capability, initial warfighting capability, or equivalent

Ⓓ **Estimated Middle Tier of Acquisition Cost and Quantities** Comparison of current cost and quantity estimates as of January 2026, and the estimates as of last year (GAO's 2025 assessment)

Ⓔ **Software Development** Software approach employed, cost and percentage of total acquisition cost accounted for by software development, and percentage of progress to meet current requirements

Ⓕ **Implementation of Leading Product Development Practices** Depiction of selected leading product development practices and the program's progress in attaining that knowledge as of January 2026

Ⓖ **Program Essentials** Programmatic information including prime contractor (or other identified contractors) and contract type

Ⓗ Assessment of program performance and implementation of leading product development practices, as well as software, cybersecurity, and other program issues

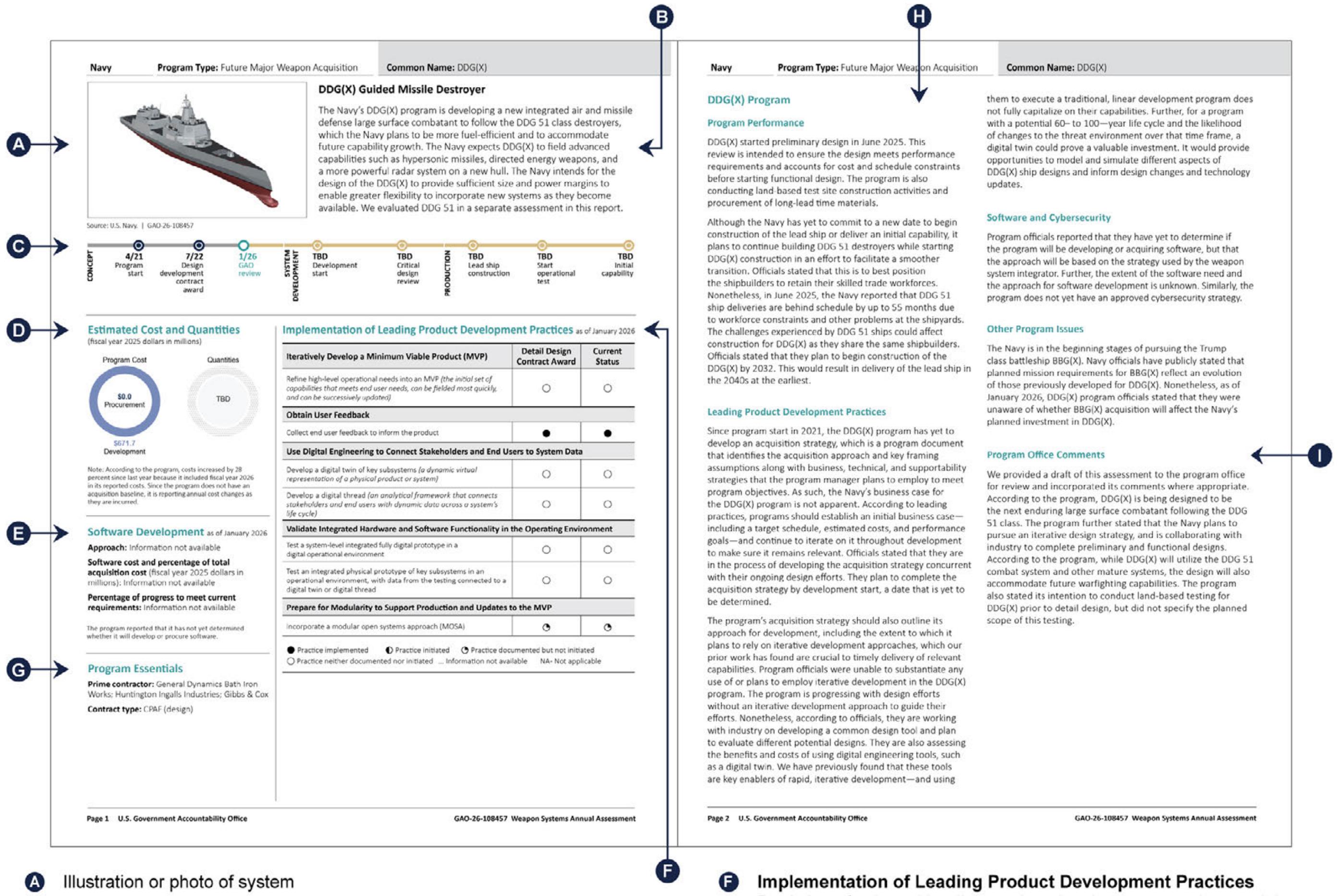
Ⓘ **Program Office Comments** General comments provided by the cognizant military service or program office

Source: GAO. | GAO-26-108457

For six future major weapons acquisitions—programs planning to develop their systems on the major capability acquisition pathway or another pathway whose costs are expected to exceed the threshold for designation as an MDAP—we produced two-page assessments discussing program performance including cost and schedule performance; leading product development practices; software and cybersecurity efforts; and other program issues.

See Figure 43 for an illustration of the layout of each two-page assessment.

Figure 43: Illustration of Future Major Weapon Acquisition Program Assessment



Navy **Program Type:** Future Major Weapon Acquisition **Common Name:** DDG(X)

DDG(X) Guided Missile Destroyer

The Navy's DDG(X) program is developing a new integrated air and missile defense large surface combatant to follow the DDG 51 class destroyers, which the Navy plans to be more fuel-efficient and to accommodate future capability growth. The Navy expects DDG(X) to field advanced capabilities such as hypersonic missiles, directed energy weapons, and a more powerful radar system on a new hull. The Navy intends for the design of the DDG(X) to provide sufficient size and power margins to enable greater flexibility to incorporate new systems as they become available. We evaluated DDG 51 in a separate assessment in this report.

Source: U.S. Navy. | GAO-26-108457

CONCEPT
4/21 Program start
7/22 Design development contract award
1/26 GAO review
SYSTEM DEVELOPMENT
TBD Development start
TBD Critical design review
PRODUCTION
TBD Lead ship construction
TBD Start operational test
TBD Initial capability

Estimated Cost and Quantities
(fiscal year 2025 dollars in millions)

Program Cost
$0.0 Procurement
$671.7 Development

Quantities
TBD

Note: According to the program, costs increased by 28 percent since last year because it included fiscal year 2026 in its reported costs. Since the program does not have an acquisition baseline, it is reporting annual cost changes as they are incurred.

Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: Information not available

The program reported that it has not yet determined whether it will develop or procure software.

Program Essentials

Prime contractor: General Dynamics Bath Iron Works; Huntington Ingalls Industries; Gibbs & Cox

Contract type: CPAF (design)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA- Not applicable

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Navy **Program Type:** Future Major Weapon Acquisition **Common Name:** DDG(X)

DDG(X) Program

Program Performance

DDG(X) started preliminary design in June 2025. This review is intended to ensure the design meets performance requirements and accounts for cost and schedule constraints before starting functional design. The program is also conducting land-based test site construction activities and procurement of long-lead time materials.

Although the Navy has yet to commit to a new date to begin construction of the lead ship or deliver an initial capability, it plans to continue building DDG 51 destroyers while starting DDG(X) construction in an effort to facilitate a smoother transition. Officials stated that this is to best position the shipbuilders to retain their skilled trade workforces. Nonetheless, in June 2025, the Navy reported that DDG 51 ship deliveries are behind schedule by up to 55 months due to workforce constraints and other problems at the shipyards. The challenges experienced by DDG 51 ships could affect construction for DDG(X) as they share the same shipbuilders. Officials stated that they plan to begin construction of the DDG(X) by 2032. This would result in delivery of the lead ship in the 2040s at the earliest.

Leading Product Development Practices

Since program start in 2021, the DDG(X) program has yet to develop an acquisition strategy, which is a program document that identifies the acquisition approach and key framing assumptions along with business, technical, and supportability strategies that the program manager plans to employ to meet program objectives. As such, the Navy's business case for the DDG(X) program is not apparent. According to leading practices, programs should establish an initial business case—including a target schedule, estimated costs, and performance goals—and continue to iterate on it throughout development to make sure it remains relevant. Officials stated that they are in the process of developing the acquisition strategy concurrent with their ongoing design efforts. They plan to complete the acquisition strategy by development start, a date that is yet to be determined.

The program's acquisition strategy should also outline its approach for development, including the extent to which it plans to rely on iterative development approaches, which our prior work has found are crucial to timely delivery of relevant capabilities. Program officials were unable to substantiate any use of or plans to employ iterative development in the DDG(X) program. The program is progressing with design efforts without an iterative development approach to guide their efforts. Nonetheless, according to officials, they are working with industry on developing a common design tool and plan to evaluate different potential designs. They are also assessing the benefits and costs of using digital engineering tools, such as a digital twin. We have previously found that these tools are key enablers of rapid, iterative development—and using them to execute a traditional, linear development program does not fully capitalize on their capabilities. Further, for a program with a potential 60– to 100—year life cycle and the likelihood of changes to the threat environment over that time frame, a digital twin could prove a valuable investment. It would provide opportunities to model and simulate different aspects of DDG(X) ship designs and inform design changes and technology updates.

Software and Cybersecurity

Program officials reported that they have yet to determine if the program will be developing or acquiring software, but that the approach will be based on the strategy used by the weapon system integrator. Further, the extent of the software need and the approach for software development is unknown. Similarly, the program does not yet have an approved cybersecurity strategy.

Other Program Issues

The Navy is in the beginning stages of pursuing the Trump class battleship BBG(X). Navy officials have publicly stated that planned mission requirements for BBG(X) reflect an evolution of those previously developed for DDG(X). Nonetheless, as of January 2026, DDG(X) program officials stated that they were unaware of whether BBG(X) acquisition will affect the Navy's planned investment in DDG(X).

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. According to the program, DDG(X) is being designed to be the next enduring large surface combatant following the DDG 51 class. The program further stated that the Navy plans to pursue an iterative design strategy, and is collaborating with industry to complete preliminary and functional designs. According to the program, while DDG(X) will utilize the DDG 51 combat system and other mature systems, the design will also accommodate future warfighting capabilities. The program also stated its intention to conduct land-based testing for DDG(X) prior to detail design, but did not specify the planned scope of this testing.

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Ⓐ Illustration or photo of system

Ⓑ Program description

Ⓒ Timeline identifying key dates for the program such as development start, contract award, operational testing, initial capability, and significant relevant programmatic decision points. Where applicable, "major capability transition" indicates when the program expects to transition to the major capability acquisition pathway. "Initial capability" refers to the envisioned initial operational capability, initial warfighting capability, or equivalent.

Ⓓ **Estimated Future Major Weapon Acquisition Cost and Quantities** Estimated funding needs and quantity requirements as of January 2026

Ⓔ **Software Development** Software approach employed, cost and percentage of total acquisition cost accounted for by software development, and percentage of progress to meet current requirements

Ⓕ **Implementation of Leading Product Development Practices** Depiction of selected leading product development practices and the program's progress in attaining that knowledge as of January 2026

Ⓖ **Program Essentials** Programmatic information including prime contractor (or other identified contractors) and contract type

Ⓗ Assessment of program performance and implementation of leading product development practices, as well as software, cybersecurity, and other program issues

Ⓘ **Program Office Comments** General comments provided by the cognizant military service or program office

Source: GAO. | GAO-26-108457

For 43 of our 62 assessments, we used scorecards to depict the extent of the program's implementation of leading practices.[4] These scorecards display key leading practices that we found enable complex systems to be developed and delivered with speed to meet warfighter needs.[5]

For each scorecard, we used the following scoring conventions:

- A closed circle to denote a leading product development practice the program implemented.
- A half-closed circle to denote a leading product development practice has been initiated.
- A quarter-closed circle to denote a leading product development practice has been documented but not initiated.
- An open circle to denote a leading product development practice has been neither documented nor initiated.
- An ellipsis to denote that the program did not provide us with enough information to make a determination.
- NA to denote a practice that was not applicable to the program.

We included explanatory notations for the scorecards where appropriate. Appendix II provides additional detail on our scorecard methodology. Figures 44 and 45 provide examples of the knowledge scorecards we used in our assessments.

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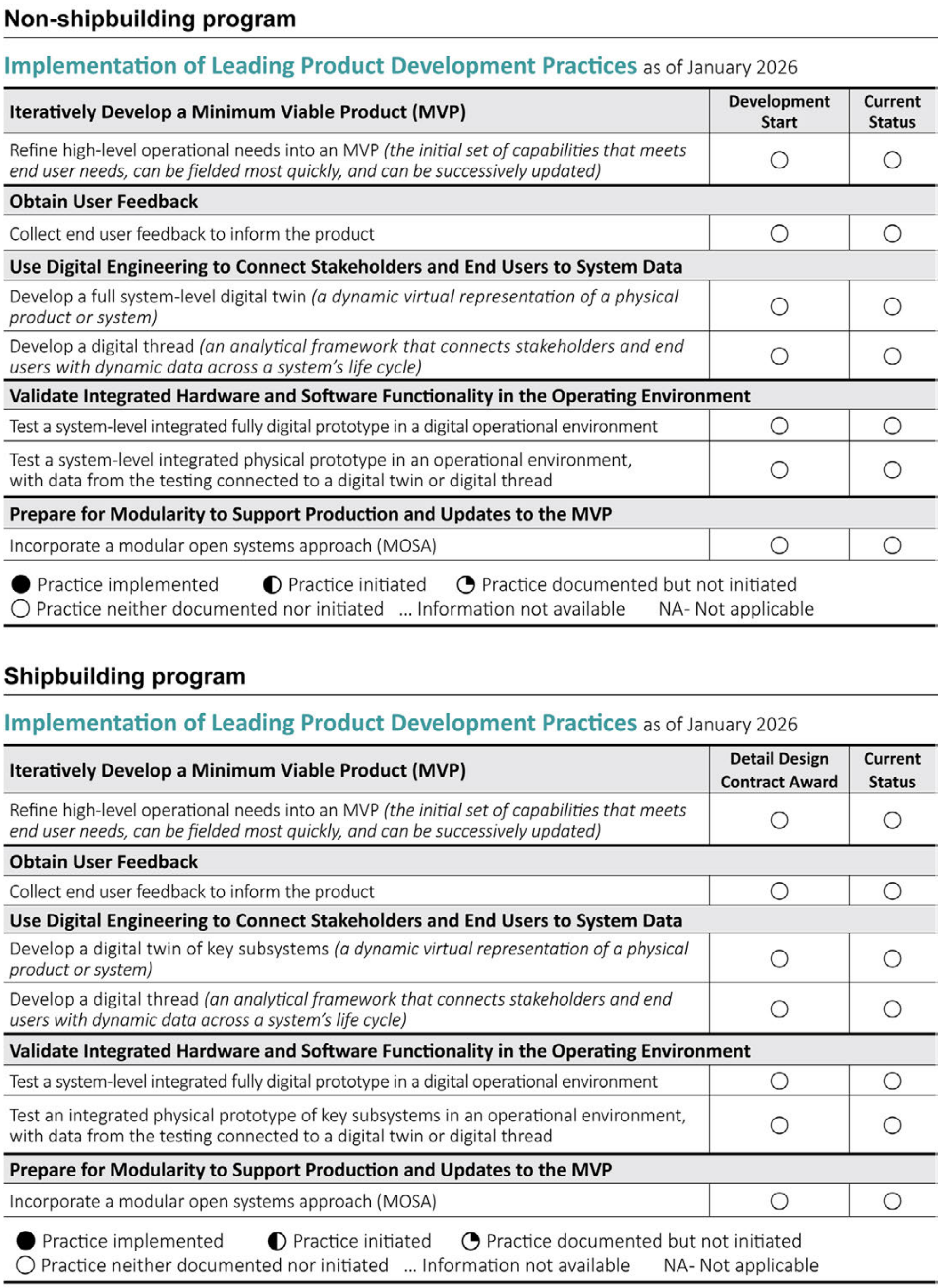
[4] We used leading practices scorecards for 19 MDAPs, 18 MTA programs, and six future major weapon acquisition program assessments. We did not use scorecards for 15 MDAP one-page assessments and the four MDAP increments we assessed, because these programs are well into production. We assessed some leading product development practices for ships differently than for other programs. These shipbuilding practices were informed by our prior work on leading ship design practices, such as using digital twins. See GAO, *Navy Shipbuilding: Increased Use of Leading Design Practices Could Improve Timeliness of Deliveries*, GAO-24-105503 (Washington, D.C.: May 2, 2024).

[5] We included an additional measurement to assess if programs obtain user feedback in the implementation of leading product development practices. We have previously reported that leading companies solicit and implement feedback from customers early and often throughout development to inform the initial product and subsequent deliveries. See GAO, *Leading Practices: Agency Acquisition Policies Could Better Implement Key Product Development Principles*, GAO-22-104513 (Washington, D.C: Mar. 10, 2022); and *Leading Practices: Iterative Cycles Enable Rapid Delivery of Complex, Innovative Products*, GAO-23-106222 (Washington, D.C.: July 27, 2023).

Figure 44: Examples of Scorecards on Two-Page Major Defense Acquisition and Future Major Weapon Acquisition Program Assessments



Non-shipbuilding program

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	**Development Start**	**Current Status**
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA- Not applicable

Shipbuilding program

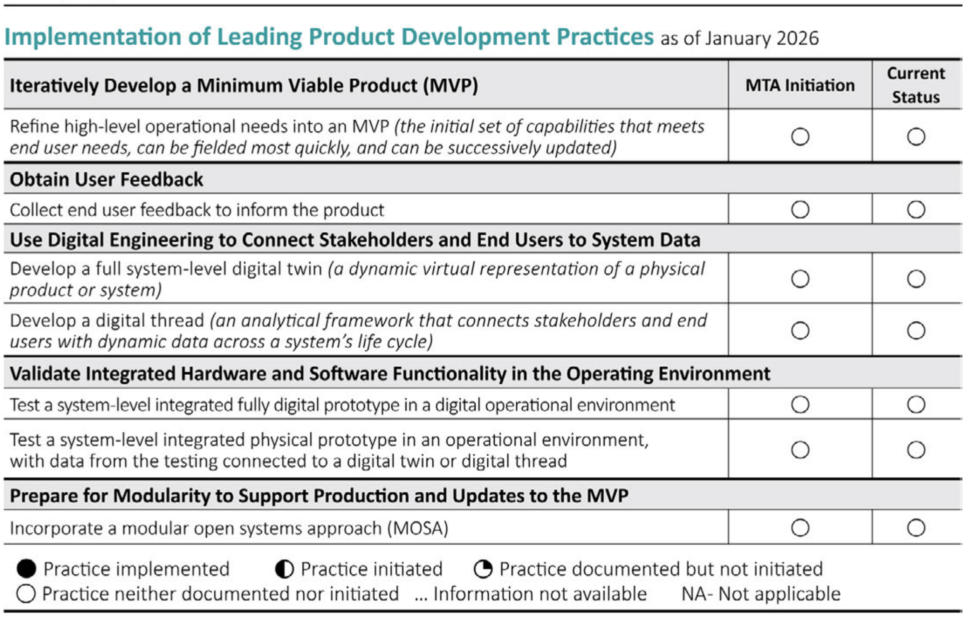
Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	**Detail Design Contract Award**	**Current Status**
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA- Not applicable

Source: GAO analysis of DOD data. | GAO-26-108457

Figure 45: Example of Scorecard on Middle Tier of Acquisition Assessments



MTA program

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	**MTA Initiation**	**Current Status**
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA- Not applicable

Source: GAO analysis of DOD data. | GAO-26-108457

AIR FORCE

Program Assessments

▲ B-52 Commercial Engine Replacement Program (B-52 CERP)

Program name	Assessment type	Page
B-52 Commercial Engine Replacement Program (B-52 CERP)	MDAP	79
B-52 Radar Modernization Program (B-52 RMP)	MDAP	81
E-7A Rapid Prototyping (E-7A RP)	MTA	83
F-22 Sensor Enhancements (F-22 SeE)	MTA	85
Hypersonic Attack Cruise Missile (HACM)	MTA	87
KC-46A Tanker Modernization Program (KC-46A)	MDAP	89
LGM-35A Sentinel (Sentinel)	MDAP	91
Long Range Standoff (LRSO)	MDAP	93
MH-139A Grey Wolf Helicopter (MH-139A)	MDAP	95
Small Diameter Bomb Increment II (SDB II)	MDAP	96
T-7A Red Hawk (T-7A)	MDAP	97
VC-25B Presidential Aircraft Recapitalization (VC-25B)	MDAP	99

Source (previous page image): U.S. Air Force / Senior Airman K. Mullikin. | GAO-26-108457

Source: U.S. Air Force. | GAO-26-108457

B-52 Commercial Engine Replacement Program (B-52 CERP)

The Air Force's B-52 CERP plans to support nuclear and conventional operations by replacing the aircraft's engines with military-configured commercial engines. Along with the new engines, the B-52 CERP will replace associated subsystems, such as engine struts, the electrical power generation system, and cockpit displays for the B-52H fleet. In December 2023, B-52 CERP transitioned from the MTA pathway to the MCA pathway. The transition from the former effort, known as the B-52 CERP rapid virtual prototype, occurred prior to the start of system development.

Program Performance fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions	Unit Cost dollars in millions	Quantities number	Cycle time in months
First Full Estimate (1/2026)	**Program has not developed formal cost or schedule estimates**			
Reported in 2025[a]	**Program had not developed formal cost or schedule estimates for GAO's 2025 assessment**			
Current Estimate (1/2026)	**Program has not developed formal cost or schedule estimates**			

■ Development cost ☐ Procurement cost

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$80.70 | Percentage not available due to lack of formal cost estimate

Percentage of progress to meet current requirements: 1-25%

The program reported that it updated its software development cost estimate based on the latest software information provided by the integration contractor.

Program Essentials

Prime contractor: Boeing, Rolls Royce

Contract Type: CPIF; CPFF; FFP

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	...	○
Obtain User Feedback		
Collect end user feedback to inform the product	...	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	...	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	...	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	...	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	...	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	...	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated

○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess B-52 CERP implementation of leading product development practices at development start because the program has yet to reach that event.

B-52 CERP Program

Program Performance

Officials stated that B-52 CERP plans to establish a formal acquisition program baseline and enter development in the third quarter of 2026—nearly 2 years later than planned after transitioning to the MCA pathway in December 2023. As of October 2025, the program demonstrated technical and programmatic maturity but development start was deferred due to an ongoing affordability study. Officials stated the study is reassessing the capability, cost, and availability of the B-52H versus the CERP-modified B-52J. In the meantime, the program awarded a task order to continue pre-development activities up to the physical modification of test aircraft.

In addition, the nearly 2-year-long delay also stems from resolving ongoing engine inlet issues the program found during design testing, according to program officials. Specifically, there was a critical issue with engine inlet distortion—a non-uniform flow of air affecting the engine's performance and operability—resulting in a redesign of the engine inlet. Those issues were resolved in June 2025. Officials stated that engine source selection duration, funding constraints, and detailed engine and wiring design time frame contributed to a 3-year delay to the critical design review. However, officials stated they are tracking two risks—availability of CERP parts and software development—that could further impact the program schedule.

Leading Product Development Practices

Program officials stated that the program is not implementing an iterative development strategy because the engine replacement effort requires full functionality for all flight-critical systems. Officials stated that they have incorporated feedback from stakeholders and end users prior to development start. For example, stakeholders provided feedback on layout and content of the upgraded displays planned for the B-52J CERP. Officials also stated that they engage with users through multiple forums, including crew working groups and various reviews.

B-52 CERP implemented some elements of a digital thread. For example, officials reported using data from various models—such as aerodynamics or propulsion models—to inform decisions throughout design, development, and testing cycles, and that models will provide users with real-time data access. Officials stated that these models, validated by wind tunnel results, gave the program confidence in the redesigned engine inlet. The digital artifacts such as the system model will transition into the B-52 platform where they will be used during sustainment for the life of the fleet. However, officials stated the digital thread will not be updated with real-time data from a digital twin, because development of a digital twin was outside the program's scope as a sustainment effort. Our prior work found that applying digital engineering practices, such as an automated digital thread and twin, can provide efficiencies throughout a product's life cycle, including sustainment.

Program officials stated they will not implement a full MOSA, but plan to leverage open system principles where practical. For example, program officials said that they are integrating mostly new components from modified commercial-off-the-shelf parts and are using standard interface protocols. However, most new components are modified commercial items that cannot be modularized, according to officials.

Software and Cybersecurity

As of February 2026, officials stated that the first software delivery—a simulation software suite—was completed. Officials stated that it is being integrated into the Software Development Laboratory with an estimated completion date of third quarter fiscal year 2026. Officials stated that end users—aircrew and maintenance personnel—provide feedback every few months, which has been incorporated into the software design.

The next cybersecurity assessment has been delayed 4 months due to the delayed system critical system design review. In addition, the program plans to conduct two key cybersecurity development tests after the start of production. DOD guidance in place at the time of our review recommends these tests to occur during development, as late testing makes it more difficult to fix system vulnerabilities due to lack of time and funding before deployment.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. Program officials stated that the B-52 CERP addresses an urgent need to replace the B-52H's aging original engines. Program officials also stated that the program uses digital engineering best practices, where practical, to integrate modern systems into the 1950s-era B-52 design.

Program officials also stated that the program's production strategy strikes a balance between risk and urgency in capability delivery. For example, officials stated that extensive component and subsystem testing in integration laboratories, augmented by digital modeling, is structured to reduce technical risk prior to production. Officials added that a production decision will occur after two test aircraft are delivered, and flight testing will be underway for 18 months prior to beginning the first production aircraft modification.

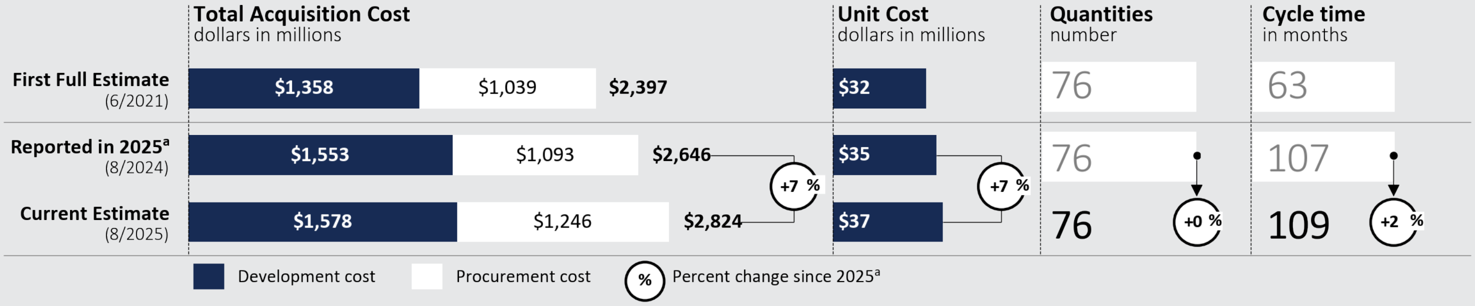
Air Force | **Program Type:** MDAP | **Common Name:** B-52 RMP

Source: U.S. Air Force. | GAO-26-108457

B-52 Radar Modernization Program (B-52 RMP)

The Air Force's B-52 RMP plans to replace the current APQ-166 radar on all 76 B-52H aircraft with a modern off-the -shelf Active Electronically Scanned Array radar. The new radar is expected to provide improved functionality and reliability to support both nuclear and conventional B-52H missions while allowing for mission-essential aircraft navigation and weather avoidance. The Air Force plans for continued B-52H operations through the 2050s.

Program Performance fiscal year 2025 dollars in millions



ªGAO-25-107569.

Software Development

as of January 2026

Approach: Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$164.28 | 5.82%

Percentage of progress to meet current requirements: 51-75%

Program Essentials

Prime contractor: Boeing

Contract Type: CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

B-52 RMP Program

Program Performance

B-52 RMP continues to struggle with cost increases and schedule delays. Since our last assessment, the program office completed its revised cost estimate. In May 2025, the Secretary of the Air Force reported to Congress a breach of a statutory significant unit cost threshold—known as a Nunn-McCurdy breach—due to unit costs increasing by more than 15 percent over the baseline estimate at that time. As result, the Air Force service acquisition executive approved the program's updated cost and schedule estimates and implemented affordability measures. These affordability measures included delivering aircraft kits in a way that increases installation efficiency, buying radars directly from the supplier, and delivering a minimum set of requirements. In coordination with users at Air Force Global Strike Command, the program office determined that it would not task Boeing to integrate five of the originally planned 25 radar capabilities. Program officials stated these capabilities are already present in the radar and could be incorporated in a follow-on modernization program.

The program plans to begin low-rate initial production in fiscal year 2026, nearly 31 months later than planned. Program officials attributed the delays to longer lead time on radars, late deliveries of essential integration lab components, and underestimating kit complexity and installation time.

Leading Product Development Practices

The Air Force does not plan to iteratively develop a minimum viable product. The Air Force began RMP under a traditional development approach in which desired capabilities were predetermined and requirements were fully defined prior to system development. However, to mitigate cost and schedule challenges, the Air Force descoped settled requirements after the service committed time and money to developing them. While the Air Force refers to the delivered capabilities as a minimum viable product, removing capabilities after a development contract has been awarded does not align with leading practices for product development and could pose additional cost and schedule risks in the future. For RMP, this approach resulted in increased program costs and decreased capabilities. Our work has found that leading companies use an iterative development approach to develop, test, and collaborate with users to establish a minimum viable product and use off-ramping decisions largely based on customer and user needs. RMP's minimum viable product is not the result of iterative design or off-ramping in the way that leading practices intend.

B-52 RMP is not employing digital engineering leading practices such as creating a digital twin or using a digital thread, which can provide predictive knowledge about a system's performance and allow for faster design and production iterations.

The production decision is planned with very little development flight testing completed. Program officials believe that this approach balances acquisition and operational risks as the radar is a mature design used on some fighter platforms. Our previous work has found that beginning production with limited testing of a fully integrated system often results in costly and time-intensive rework if the program discovers issues later.

B-52 RMP does not plan to fully implement MOSA. The program reports it is impractical to redesign commercial-off-the-shelf products. The program is incorporating open system architecture attributes into feasible areas, such as display solutions.

Software and Cybersecurity

Software development is delayed and contributed to cost increases. The Air Force's decision to shift the radar to fewer capabilities descoped the original software requirements and officials stated that development, integration, and test activities are simplified. However, program officials assess software development and integration as a moderate risk due to insufficient time to mature aircraft and radar software integration and to address any software problems discovered during flight testing. In addition, B-52 RMP plans to conduct two key cybersecurity developmental tests after it starts production. This is out of line with DOD guidance in place at the time of our review that suggests these cybersecurity tests should occur during development and increases software risk during production.

Program Office Comments

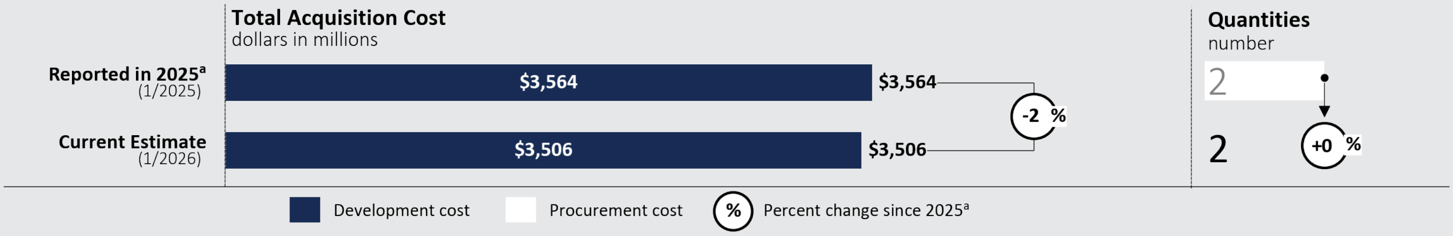
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that B-52 RMP addresses an urgent need to replace the aging and increasingly unsustainable APQ-166 and that fielding a reliable all-weather navigation and targeting capability is critically important to provide a credible deterrent through 2050. It added that the program recently achieved two significant milestones with Boeing's completion of the initial test software as well as the company's delivery of the program's first fully modified test aircraft. Program officials highlighted the fact that limited on-aircraft ground and flight test demonstrations will be completed in support of the production decision. The program highlighted how the affordability measures adopted after its Nunn-McCurdy breach, coupled with increased leadership oversight, have resulted in marked improvements to the program's cost, schedule, and performance metrics. The program office stated that it is consequently postured to mitigate concurrency risks as the effort progresses over the coming year.

Source: Boeing Defense, Mobility, Bombers, and Surveillance. | GAO-26-108457

E-7A Rapid Prototyping (E-7A RP)

The Air Force's E-7A RP program plans to modify an existing aircraft design to replace the aging E-3 Sentry aircraft. The Air Force initiated the MTA rapid prototyping effort in February 2023 to build prototypes to demonstrate enhanced airborne warning and control system aircraft with advanced detection, tracking, identification, and targeting capabilities.

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$396.58 | 11.31%

Percentage of progress to meet current requirements: 26-50%

Program Essentials

Prime Contractor: Boeing

Contract type: CPIF/CPFF/FFP (development)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	◔	◐
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

E-7A RP Program

Program Performance

The Air Force initiated the MTA rapid prototyping effort in February 2023 to build two prototypes of the E-7A RP and planned to initiate an MCA effort concurrently to place orders for long-lead items.

However, program officials said that the Air Force approved slowing work on the MTA effort and pausing the contracts in July 2025 based on DOD's announcement to cancel the program. Specifically, program officials said that the program does not plan to complete previously scheduled milestones, such as operational demonstration. The E-7A RP program ordered two commercial aircraft to support building the two prototypes before DOD's announcement. The program reported it took delivery of both commercial aircraft for conversion to E-7A prototypes. The National Defense Authorization Act for Fiscal Year 2026 and the Consolidated Appropriations Act, 2026, both prevent DOD from using appropriated funds to terminate the E-7A program. Congress also included additional funds in the fiscal year 2026 appropriations for the E-7A program. In January 2026, the program reported an overall program schedule delay of 5½ months.

Leading Product Development Practices

The E-7A RP program identified the MVP as the aircraft version that the United Kingdom uses with additional DOD requirements. Officials said that the MVP was based on stakeholder and end user feedback and documented in the rapid prototyping requirements document at program initiation. The program reported that it continues to incorporate stakeholder and end user feedback as a part of its iterative process. For example, operators reported challenges identifying sensor feeds on the displays and recommended solutions to improve them. The United Kingdom version of the aircraft is a mature platform. Additional DOD requirements include capabilities and upgrades such as mobile military satellite communications as well as an upgraded global positioning system on the aircraft.

The program is not developing a digital twin and digital thread. Program officials said that using a digital model for systems engineering is more cost-effective than developing a twin and digital thread. Program officials said that developing a digital twin and thread would have been costly, since the E-7A is based on an existing aircraft and other existing equipment, such as the radar, and the related data rights are complex to navigate. However, our prior work found that digital twins and digital threads provide real-time data to inform production decisions and provide efficiencies throughout development, operations, and sustainment.

Software and Cybersecurity

The E-7A RP program reported its software costs increased due to requirements changes, such as additional DOD-mandated requirements and Air Force security updates, after program initiation. For example, the program required enhanced security engineering after the program's initiation that was not originally included in the base cost estimate.

The program provides regular opportunities for stakeholder feedback on the E-7A software, such as monthly user demonstrations and quarterly system maturity and capability demonstrations through testing software in a simulated environment. Officials stated that feedback includes input from end users, such as the air battle managers.

Other Program Issues

Program officials stated that there were significant staffing challenges to the program due to deferred resignations and hiring freezes. They stated that eight civilian staff took deferred resignations, and the program has 23 positions that remain vacant due to the hiring freeze. The Air Force added staff through an internal reorganization and maintained existing contract support staff levels to help address the challenges.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program reported that the Air Force directed Boeing to resume reporting and increase staffing in the United Kingdom conversion facility based on receipt of funding in November 2025. The program office also reported that, due to a slowdown in staffing the facility, it is working with Boeing to revise the performance measurement baseline to account for government-caused schedule and cost impacts to the staffing efforts at the facility. In preparation for anticipated additional congressional funding, the program office is preparing an acquisition strategy to transition from the MTA pathway to the MCA pathway, pending Air Force approval and receipt of funds.

Air Force | Program Type: MTA | Common Name: F-22 SeE

Source: Defense Visual Information Distribution Service. | GAO-26-108457

F-22 Sensor Enhancements (F-22 SeE)

The Air Force's F-22 SeE program is an MTA rapid fielding effort intended to complete development and initial fielding of sensor enhancements on F-22 aircraft. These enhancements, which were developed under a prior rapid prototyping effort, are expected to extend adversary detection and tracking. The Air Force is using the MTA pathway to begin production of these enhancements as quickly as possible while it works to transition to the major capability acquisition pathway to begin low-rate initial production.

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions	Quantities number
Reported in 2025[a] (1/2025)	Not approved for public release by the Air Force	---
Current Estimate (1/2026)	Not approved for public release by the Air Force	30

■ Development cost ☐ Procurement cost

Quantities not reported in GAO 2025 assessment.
[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Incremental, DevOps, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Not approved for public release by the Air Force.

Percentage of progress to meet current requirements: Not approved for public release by the Air Force.

Program Essentials

Prime Contractors: Lockheed Martin Aerospace; Raytheon

Contract type: CPFF (tech demo and development); FPIF (production); CPAF (software development)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We assessed the program's implementation of leading product development practices for the MTA rapid fielding effort.

F-22 SeE Program

Program Performance

The F-22 SeE program is expected to complete its current MTA effort by September 2026 with less time for testing than previously planned. The program planned to conduct its first flight test with the sensor enhancements hardware installed on F-22 aircraft in March 2026, but has delayed this test to May 2026. Officials said that a subcomponent failure delayed deliveries of hardware needed for the flight test. As a result, the program reports that it will reduce the amount of time for flight tests to complete the MTA effort as planned.

According to program officials, the Air Force could not transition the program to the major capability acquisition pathway and begin production immediately following the rapid prototyping effort because of insufficient flight test data to meet production decision requirements. In the meantime, the Air Force elected to use an MTA rapid fielding effort to further set up sensor enhancements production while testing continued. This effort includes procuring in advance hardware for 30 sensor enhancements while the program collects flight test data. Officials acknowledge that there is concurrency in the program, but they stated that they needed to take on risk to meet the urgent need of the customer. Such risks include discoveries made during flight tests that could lead to hardware changes that affect costs and schedule.

The program plans to transition to the MCA pathway and begin low-rate initial production in the fourth quarter of fiscal year 2026. However, program officials stated that they are evaluating whether to delay the transition due to cascading effects from the hardware delivery delay noted above. Ongoing manufacturing, workmanship, and supply chain challenges could affect the program schedule as it enters production. To address these challenges, officials said that they visited suppliers, consulted with subject matter experts, and applied risk management lessons learned.

Leading Product Development Practices

F-22 SeE is not incorporating most of the leading practices for product development. The program office reported that it believes its approach meets the intent of a minimum viable product (MVP), citing its efforts to refine high-level needs into two increments of detailed requirements. The program also reported collecting user feedback to inform these requirements, such as how a pilot vehicle interface should function. However, the initial product lacks key characteristics of an MVP. The program has defined the content for a future increment before it begins development, which limits the ability to update requirements based on user feedback from the previous increment. This runs counter to an iterative approach that quickly delivers an MVP and then collects user feedback to inform future iterations.

Further, the program does not expect to use a digital twin or digital thread for hardware or software development. However, program officials reported that they intend to test a prototype in a digital environment established by the Navy, which could replace some open-air testing. Officials said that they still need to integrate F-22 with the digital environment and they have yet to use the simulation in an official capacity.

Software and Cybersecurity

The program reported that it consolidated and transitioned all F-22 software modernization efforts including sensor enhancements to the software acquisition pathway in October 2025. Program officials stated that this allows the broader F-22 modernization program to prioritize between F-22 software developmental efforts and gain efficiencies by combining work across other F-22 programs. Additionally, the program is planning to conduct cybersecurity and Cooperative Vulnerability Penetration Assessments in the future.

Other Program Issues

The Air Force initiated the F-22 SeE program to meet a requirement to produce and field the initial sets of sensor enhancements hardware by fiscal year 2028. However, program officials stated that the Air Force recognized at F-22 SeE initiation that due to the complexity of the program, the best supportable date to meet the requirement was fiscal year 2029. Officials stated they do not expect to complete the requirement until June 2029.

Program Office Comments

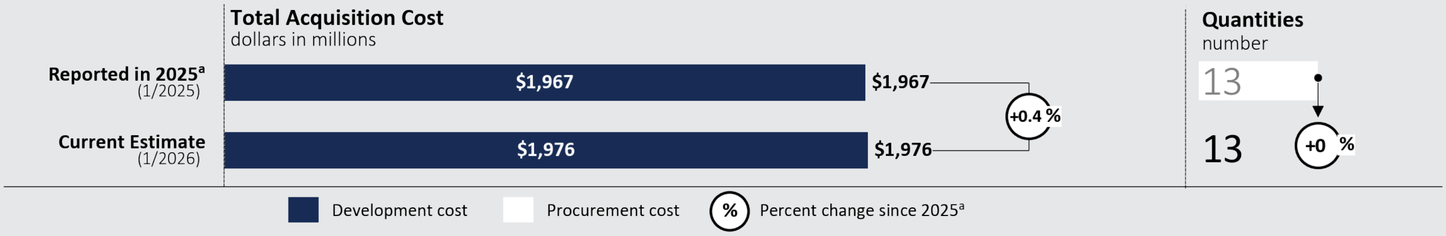
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office acknowledged schedule delays and programmatic risks; however, it stated that the acquisition risk is appropriate to provide capability as quickly as possible. Additionally, the program office stated that it is actively managing challenges related to hardware, manufacturing, and the supply chain.

Source: Raytheon. | GAO-26-108457

Hypersonic Attack Cruise Missile (HACM)

The Air Force's HACM program, a rapid prototyping MTA effort, is developing a conventional, air-launched hypersonic missile that can be carried by an F-15 tactical aircraft. The missile consists of two stages, a rocket booster and a scramjet cruiser, which separates from the booster and eventually dives toward its target. The Air Force plans to produce 13 missiles during the rapid prototyping effort, including test assets, test spares, and operational rounds. The Air Force also plans to initiate an overlapping rapid fielding MTA, among other efforts, to prevent a break in production and rapidly increase inventory. We assessed the rapid prototyping effort.

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



The HACM program is acquiring 13 missiles during the rapid prototyping effort. According to officials, seven are test assets. Four are test spares. Two provide a residual operational capability.

[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$92.33 | 4.67%

Percentage of progress to meet current requirements: 51-75%

Program Essentials

Prime Contractor: Raytheon Company

Contract type: CPFF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	◐
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	◐
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	◔
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

HACM Program

Program Performance

The HACM program is on track to conduct its first flight test in the second quarter of fiscal year 2026, but officials said there is effectively zero margin left in the schedule for the rapid prototyping effort. The program has already descoped the rapid prototyping effort from seven to five planned flight tests. If a significant flight test failure occurs, it is likely that the program will not be able to complete all five tests within the 5-year rapid prototyping timeframe. According to the program, completing at least the first three flight tests is critical for informing the Air Force's decision to initiate a rapid fielding effort and procure HACM in fiscal year 2027.

The HACM program has taken on risk to maintain its current schedule. According to program officials, maintaining the schedule has required aggressively resequencing activities to focus almost exclusively on those necessary to support the first flight test date. In some cases, officials said this has involved risky strategies, such as concurrently performing parts validation testing while completing the system's design, which could require the redesign of key parts if they fail validation testing.

Leading Product Development Practices

The HACM program continued to implement some leading practices for product development. The program identified a minimum viable product for the current effort using most of the elements of iterative development. For example, the program refined high-level operational needs into an initial set of capabilities, prioritized capabilities that can be fielded quickly, and incorporated stakeholder and end user feedback to inform its initial product as well as future iterations.

The program has initiated the development of a digital thread, but does not plan to develop and maintain a full digital twin. The program has planned for and adopted a digital thread from the start of the rapid prototyping effort and has continued to update it as design has proceeded. The program is not planning to develop a digital twin on a missile-by-missile basis that will be continuously maintained into the sustainment phase. According to the program, this form of twinning is not suited to the life cycle of expendable munition. Officials said they are exploring alternatives to digital twinning, such as "digital cousins," which is a single digital twin for a specific production lot of missiles. Officials also stated that they will have a high-fidelity digital model of HACM at the end of the rapid prototyping effort. This model could provide the basis for a full digital twin in the future.

Finally, the program is not using a fully modular open systems standard, opting instead for an older standard with less emphasis on physical modularity than leading practices recommend.

Software and Cybersecurity

According to the program, completing the originally planned software effort has proven more difficult and costly than expected. The prime contractor has not been able to meet software productivity goals, which has led to additional costs to stay on schedule. According to officials, the prime contractor also uses a single, limited pool of developers to support multiple programs, which can result in conflicting priorities that have contributed to software risks.

The program has had an approved cybersecurity strategy since April 2024, and testing is progressing. Officials stated that no design changes or software updates have been required based on tests to date.

Other Program Issues

The Air Force is planning a series of overlapping acquisition efforts to further develop HACM, avoid a production break, and build up inventories, but this strategy has risks. The Air Force plans to buy more operational missiles to bridge a production gap between the rapid prototyping effort and the rapid fielding effort it plans to initiate in the first quarter of fiscal year 2027. These efforts will commence before the rapid prototyping effort has concluded and before the flight test program has demonstrated all aspects of HACM's planned performance. We have found that starting production before demonstrating a system will work as intended increases the risk of discovering deficiencies that require costly, time-intensive rework.

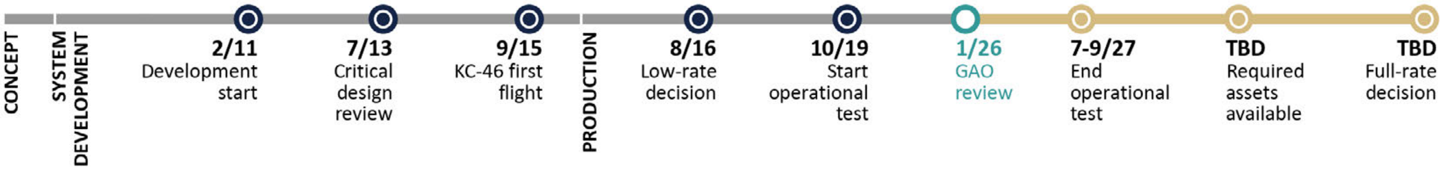
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate.

KC-46A Tanker Modernization Program (KC-46A)

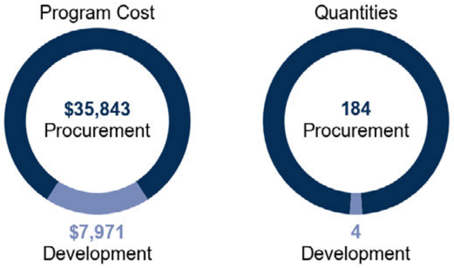
Source: U.S. Air Force. | GAO-26-108457

The Air Force's KC-46A program is fielding a converted Boeing 767 aircraft designed for commercial use into an aerial refueling tanker for operations with Air Force, Navy, Marine Corps, and allied aircraft. The program is the first of three planned phases to replace roughly a third of the Air Force's aging aerial refueling tanker fleet comprised of KC-135s. The KC-46A is equipped with defensive systems for operations in contested environments and has enhanced refueling capacity, efficiency, cargo, and aeromedical capabilities over the KC-135. It includes a remote vision system that enables a crew member to remotely maneuver the refueling boom and insert it into receiver aircraft.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (7/2024)		Current Estimate (7/2025)
Acquisition Cost	$45,065	+3 %	$46,350
Unit Cost	$246.26	+0 %	$246.54
Cycle Time (in months)	TBD	N/A %	TBD

(%) Percent change since 2025[a]

GAO-25-107569.

Software Development as of January 2026

Approach: Waterfall and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 76-99%

The program reported that it did not track software costs under the firm-fixed price contract.

Program Essentials

Prime contractor: Boeing

Contract type: FPI (development); FFP (procurement)

Current Status

Despite declaring the KC-46A as initially capable, the program reported Boeing has yet to deliver the required assets available—18 aircraft, nine sets of wing aerial refueling pods (WARPs), and two spare engines. The program stated that this is due in part to the WARPs' certification and production quality issues. The program stated that it is re-evaluating its schedule and considering other delivery methods for the WARPs capability. The full-rate decision depends on the resolution of the issues with the subsystems. For example, the program stated that it delayed implementing the redesigned remote vision system and the refueling boom—a rigid telescope that delivers fuel to the receiver aircraft—by another year due to recurring developmental challenges. As we previously reported, visual acuity and depth perception problems with the original subsystems could lead operators to scratch stealth aircraft with the boom. The program has not developed a digital twin—which could provide efficiencies in testing redesigns, production, and sustainment—but stated that it may look for future opportunities to do so. The program also continues to work towards fixing its cracked aerial refueling receptacle drain lines, which it discovered in 2020. While Boeing identified a design solution as of September 2025, the program stated that it estimates fielding and retrofit to begin in April 2026, after achieving Federal Aviation Administration (FAA) certification. Until then, the Air Force continues to procure more KC-46As that will need to be retrofitted with the redesigned subsystems. The program said that as of January 2026, the Air Force procured 173 total aircraft and Boeing delivered 101 of them. In April 2024, the Air Force increased the total planned aircraft quantity to 188 for flexibility to procure more aircraft later. In addition, in June 2025, the Air Force established a production extension effort as a subprogram within the KC-46A program to procure up to 75 more aircraft.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated comments where appropriate. The program office stated that accepting production KC-46s while fixing deficiencies and undergoing operational testing is the fastest and most cost-effective path to full capability. The Air Force also stated that it is engaging with Boeing and the FAA on certification efforts; minimizing further delays; focusing on production quality and schedules; and improving aircraft availability and overall readiness.

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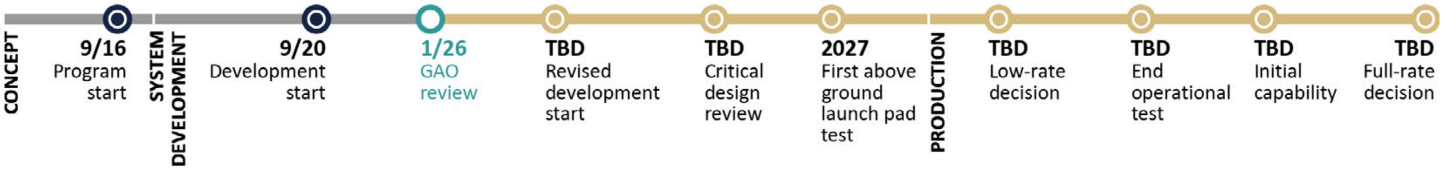
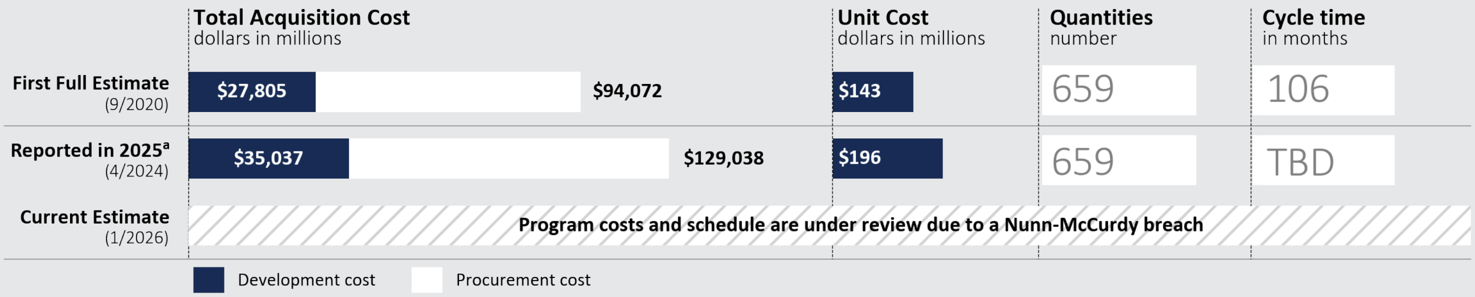
LGM-35A Sentinel (Sentinel)

The Air Force's Sentinel, formerly the Ground Based Strategic Deterrent, is intended to replace the Minuteman III intercontinental ballistic missile system. Sentinel's large program scope includes the development of a new missile, command and control, and ground systems, as well as replacing Minuteman III's infrastructure. Sentinel is expected to enhance the capability, security, and reliability of the land-based portion of the nuclear triad. The Air Force is restructuring Sentinel following a critical program acquisition unit cost breach reported to Congress in January 2024.

Source: U.S. Air Force. | GAO-26-108457



Program Performance fiscal year 2025 dollars in millions



Total quantities comprise 25 development quantities and 634 procurement quantities. Cost estimates will be revised as the program progresses toward a new development start decision, and the current rebaselining following the program's Nunn-McCurdy breach concludes. The graphic bars depict only research and development and procurement costs. The graphic bars do not include costs for military construction or acquisition operations and maintenance. We examined the identified causes of Sentinel's Nunn-McCurdy breach and the steps DOD is taking to avoid similar problems in our restricted report, GAO, *Nuclear Modernization: Sentinel Program Taking Steps to Restructure After Cost Breach*, GAO-25-107615SU (Washington, D.C.: Apr. 24, 2025).

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Waterfall, Agile, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 1-25%

The program reported that cost estimates will be revised as the program progresses toward a development start decision.

Program Essentials

Prime contractor: Northrop Grumman Systems Corp.

Contract Type: CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	◔
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

We assessed the LGM-35A Sentinel program at its initial development start of Sept. 15, 2020. As of January 2026, the program was in rebaselining following a Nunn-McCurdy breach and finalizing its documentation. As a result, the assessment of leading practices reflects the program's interim status as of January 2026. Our assessment of Sentinel's testing of a system-level integrated physical prototype does not include testing of a nuclear capability in an operational environment.

Sentinel Program

Program Performance

Over the last year, the Sentinel program continued restructuring—a process it began after breaching a critical program acquisition unit cost threshold in January 2024, was reassessed, and then certified to continue in July 2024. Cost and schedule estimates continue to evolve through technical maturation and risk reduction. Until that process is completed and final estimates are agreed to, with the completion of Milestone B, it remains unclear whether the preliminary cost and schedule estimates developed during the Nunn-McCurdy review are reliable.

This year, the program decreased its critical technologies list from 18 to 15 items, with four assessed as mature. Officials stated that the list was updated to focus more on technologies that need to be matured and not on large-scale engineering efforts. The program plans to mature and demonstrate most of the technologies during first flight and full system functional tests, which last year it planned for March 2028 and December 2030, respectively. The program developed an alternate flight test strategy that changes the scope and requirements for the various flight tests to test sooner with fewer requirements and learn about system performance earlier. For example, the first flight was originally planned to be launched from a silo, but now the first five flights will be launched from a pad above ground beginning in 2027. The first silo-based launch, which was previously reported as first flight, is now planned for the third quarter of fiscal year 2030.

Leading Product Development Practices

The program reported plans to implement leading practices, but specifics are yet to be determined. For example, program officials stated that they re-evaluated the program's initial minimum viable product approach and decided they preferred an incremental delivery approach instead due to Sentinel's nuclear deterrence mission. The program also reported that stakeholder feedback is currently solicited from end users more than once per year.

Officials reported plans to develop a digital twin, with an implementation plan expected by fourth quarter fiscal year 2026. Similarly, the program has yet to develop a digital thread but estimates that formal plans for the development of one will be completed by May 2027. The program stated that modular architecture is a key tenet of the Sentinel weapon system and has begun the process to incorporate a MOSA.

Software and Cybersecurity

Program officials stated that software development has been identified as high risk due to several factors, including inadequate accounting for software requirements in the allocated baseline, and the volume of source code requiring nuclear certification exceeding current projections, among others. We found that approximately 18 percent of total software coding has been completed. And, although the program leverages several leading practice software development approaches, such as Agile and DevSecOps, progress continues to be slow. According to officials, the total lines of written software code has remained largely unchanged since late calendar year 2024 since the team shifted its focus to developing and maturing software requirements first. Additionally, the program does not currently have an approved cybersecurity strategy, but it plans to update its strategy in conjunction with an approval to return to full system development.

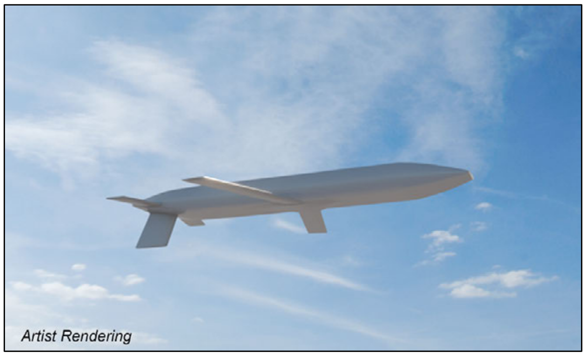
Other Program Issues

Key elements of Sentinel—such as the launch silo and launch control center—are being designed, and until those designs are more mature cost and schedule estimates will continue to evolve. Additionally, although the Air Force points to the missile itself as the portion of the program that is most mature, several missile components exhibited issues during ground testing that may drive changes in both design and production. These changes could, in turn, result in cost or schedule growth. According to DOD officials, the recent establishment of the Sentinel Direct Reporting Portfolio Manager (DRPM) is intended to drive positive changes to the program that will be reflected over time.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. Officials stated that under the DRPM, Sentinel is using a disciplined process to develop a high-fidelity plan aimed at development start in December 2026 and fielding in the early 2030s. Officials stated that in 2025 they focused on systems engineering, developing applications for an updated concept of operations with plans for May 2026 requirements and fall 2026 functional reviews. The program said that it used an MVP approach for earlier fielding and learning from initial operations while addressing risk through proactive, real-world efforts, including a fiber optic pilot to validate construction methods and a full-scale silo prototype. Officials said that software progressed as a managed risk with improved requirements, maturing cyber requirements such as zero trust architecture, to ensure resiliency and advanced threat protection.

Air Force | **Program Type:** MDAP | **Common Name:** LRSO



Source: U.S. Air Force. | GAO-26-108457

Long Range Standoff (LRSO)

The Air Force is designing the LRSO weapon as a long-range, survivable, nuclear-capable cruise missile to penetrate advanced threat air defense systems. LRSO is slated to replace the Air Launched Cruise Missile. The Air Force manages the development of the LRSO cruise missile while the Department of Energy (DOE) manages the W80-4 nuclear warhead that the missile will carry. The warhead is undergoing a life-extension program in parallel with the missile's development. When integrated on both a legacy and future bomber, the LRSO weapon is expected to help modernize the bomber segment of the nuclear triad.

Program Performance fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions: Development cost	Procurement cost	Total	Unit Cost dollars in millions	Quantities number	Cycle time in months
First Full Estimate (6/2021)	$7,164	$9,397	$16,704	$15.37	1,087	107
Reported in 2025[a] (7/2024)	$6,799	$8,623	$15,561	$14.32	1,087	107
Current Estimate (7/2025)	$6,747	$9,023	$15,908	$14.63	1,087	111
Percent change since 2025[a]			+2 %	+2 %	+0 %	+4 %

Total quantities comprise 67 development and 1,020 procurement end items. The graphic bars depict only research and development and procurement costs. However, total acquisition costs may also include costs for military construction as well as acquisition operation and maintenance. The acquisition costs and quantities shown are for the LRSO missile body only.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Waterfall, Incremental, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$193.64 | 1.22%

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Raytheon Missiles & Defense

Contract Type: CPFF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	●	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

The status for implementation of leading product development practices reflects only the Air Force's development of the LRSO missile. It does not include DOE's warhead life-extension program efforts.

LRSO Program

Program Performance

LRSO reported unfavorable cost and schedule changes over the past year. For example, flight testing challenges, largely due to the poor readiness rates of legacy aircraft supporting LRSO testing, resulted in a 4-month delay to its initial capability. LRSO officials stated they remain committed to achieving this milestone by November 2030 in keeping with the program's approved baseline schedule and planned fielding. In addition, program costs increased by $347 million after Air Force leadership directed a 1-year extension to LRSO production due to near-term budget constraints. The missile's technology maturity has advanced since our last assessment, with only two out of the six critical technologies still approaching maturity. They are both expected to be fully mature in fiscal year 2026, about 5 years after development start. DOE also identified critical technologies for the warhead, of which 80 percent are considered mature, more than double the percentage reported last year. However, DOE may not mature all the remaining warhead technologies until the fourth quarter of fiscal year 2026. As we previously reported, both the missile and warhead started development with immature technologies, requiring parallel technology and design maturity efforts. This method falls short of the best practice to start with mature technologies and would have minimized the risks of future cost increases and schedule delays associated with concurrency during system development.

LRSO flight testing has been progressing with nine test flights conducted since the start of developmental testing in October 2024. Since our last assessment, program officials realigned the test schedule, leaving less time to complete the 27 remaining test flights before operational testing starts in September 2027. However, they noted that some re-testing can still be accommodated. The program recently engaged the Defense Contract Management Agency to conduct an industrial capability assessment with an initial report expected in May 2026 that will focus on the missile airframe and energetics supply base. These results will inform the second phase with a final report expected in February 2027 to support the LRSO production start decision.

Leading Product Development Practices

The Air Force is not using an iterative approach for LRSO development. Instead, the program reported that LRSO is being fielded in a single increment with full capability. Program officials stated that LRSO is being designed with continuous end user feedback and that user feedback was used to refine initial requirements. However, this feedback is not being used to refine the design and prioritize the requirements into an MVP. Officials added that the feedback informs a modular open systems approach, which allows for possible upgrades to some components in the future.

The LRSO program has yet to begin to develop a digital twin or digital thread, but it expects to do so in fiscal year 2026. A program official stated that the federal government shutdown in fall 2025 delayed the completion of a digital thread planning documentation to February 2026. This resulted in a change to the program's response from our last review that the LRSO program already began development of a digital thread. According to program officials, both of these digital tools will be completed in fiscal year 2028. However, the digital twin will not be fully correlated with the physical weapon due to weapon storage conditions and infrequent combat readiness testing. In addition, program officials reported that developing a digital thread will be challenging due to the staffing levels needed to support this effort.

Software and Cybersecurity

Program officials stated that 12 of 14 software releases are delivered, with the final delivery planned for March 2026. According to program officials, nuclear certification of LRSO software continues to be a risk that they expect to fully address by November 2026. As we reported last year, the program risks delays if additional LRSO software development is needed to satisfy this certification requirement. LRSO cybersecurity testing continues with some delays reported during the past year. Program officials stated these delays did not bring about any cost or schedule changes, with the final cybersecurity assessment still planned for September 2027.

Other Program Issues

As we previously reported, Office of the Secretary of Defense and Air Force officials continue to work together to resolve a $1.9 billion difference between their production cost estimates for future LRSO production. While a fully updated estimate is not expected until later in 2026, program officials now agree that OSD's higher cost estimate provides an appropriate basis for the program's fiscal year 2027 budget request and future year procurement funding needs.

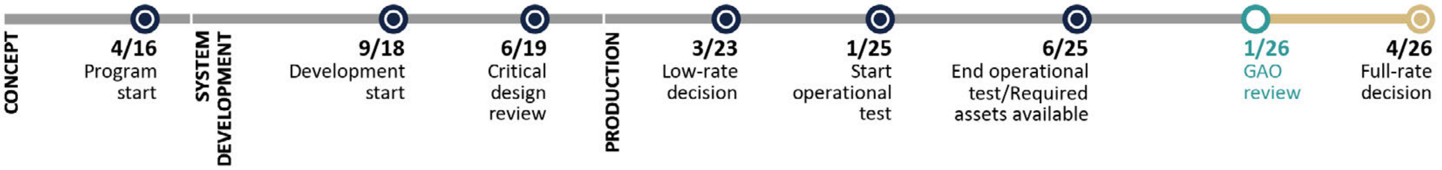
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated comments where appropriate. According to program officials, LRSO remains on track to complete development—maturing its technology, software, and cybersecurity at an appropriate pace—to support a production start decision as planned in 2027 and an on-time weapon system fielding in 2030. LRSO successfully completed seven ground tests and six flight tests in 2025, which continued to provide program officials with high confidence in the missile's design and technical maturity. Program officials also stated that the warhead's maturity continues to be on track to meet its first production unit milestone in fiscal year 2027.

Source: U.S. Air Force. | GAO-26-108457

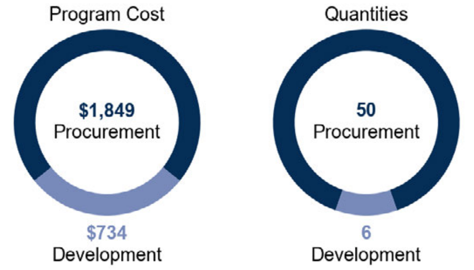
MH-139A Grey Wolf Helicopter (MH-139A)

The MH-139A program will replace the Air Force's UH-1N utility helicopters. The MH-139A helicopter's missions will include securing intercontinental ballistic missile sites and convoys. The MH-139A program is acquiring a militarized version of a commercial helicopter that will be integrated with previously developed systems. The Air Force also plans to acquire an integration laboratory, training system, and support and test equipment as part of the program.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (6/2024)		Current Estimate (7/2025)
Acquisition Cost	$2,923	+0 %	$2,932
Unit Cost	$52.20	+0 %	$52.36
Cycle Time (in months)	81	+0 %	81

(%) Percent change since 2025[a]

[a]GAO-25-107569.

Software Development as of January 2026

Approach: Agile

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 100%

The program reported that it does not have visibility into specific software costs, which are included in the firm-fixed price contract.

Program Essentials

Prime contractor: Boeing

Contract type: FFP (development)

Current Status

Since our last assessment, the program completed operational testing, accepted two aircraft to meet required assets available in June 2025, and received four additional aircraft in December 2025. Officials stated that initial operational capability was not achieved in September 2025 and will be reevaluated in April 2026—equating to at least a 14-month delay compared to previous plans. Officials stated this delay is a result of low aircraft availability to transition pilots from the UH-1 to the MH-139 platform. In addition, the program delayed its full-rate production decision by an additional 5 months, from November 2025 to April 2026. Although some deficiencies remain, the Air Force does not expect further delays to the full-rate production decision. Officials stated that they plan to evaluate how to incorporate corrections to these deficiencies in the future.

MH-139's current development approach may make it difficult to incorporate new capabilities without causing schedule delays and increasing costs. Although the program accepted operational aircraft and started production, it is seeking to add new capabilities that it says will require design changes. Specifically, the program is testing the aircraft's ability to identify friendly forces, which it plans to complete in 2026 and integrate into production at a later, undetermined date. Despite expected design changes, officials stated that the program continues to field aircraft and will incrementally retrofit as needed. However, any design changes needed to address new capabilities requiring retrofits to existing units could cause delays and future cost increases. Our prior work has found that leading companies take an iterative development approach to quickly deliver the most critical capabilities to users first, followed by subsequent iterations that address evolving user needs. This approach provides for adding improvements based on user feedback on the delivered system, while ensuring users still have key capabilities in the field.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate.

Air Force | **Program Type:** MDAP | **Common Name:** SDB II

Source:© 2009 Raytheon Company. | GAO-26-108457

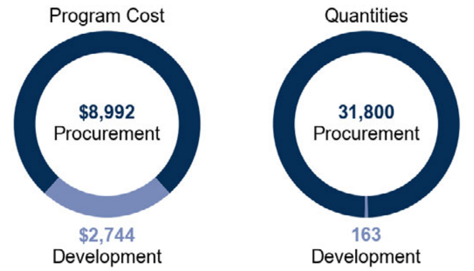
Small Diameter Bomb Increment II (SDB II)

The Air Force's SDB II StormBreaker is a joint-interest program with the Navy that is designed to provide attack capability against stationary and mobile targets in all weather from extended range. It combines radar, infrared, and semiactive laser sensors to acquire, track, and engage targets. It uses airborne and ground data links to update target locations, as well as a GPS and an inertial navigation system to ensure accuracy. SDB II will be integrated with various Air Force and Navy aircraft.

CONCEPT
5/06 Program start
SYSTEM DEVELOPMENT
7/10 Development start
1/11 Critical design review
PRODUCTION
5/15 Low-rate decision
5/19 End operational test
9/22 F-15E initial capability
1/26 F/A-18E/F initial capability
1/26 GAO review
Fiscal Year 27 Full-rate production
1-3/27 F-35 initial capability

Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (8/2024)	Percent change since 2025[a]	Current Estimate (8/2025)
Acquisition Cost	$9,720	+21%	$11,736
Unit Cost	$0.36	+1%	$0.37
Cycle Time (in months)	194	+3%	199

[a]GAO-25-107569

Software Development as of January 2026

Approach: Agile

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$342.5 | 2.92%

Percentage of progress to meet current requirements: 76-99%

The program reported that the software costs represent one-third of the total costs for design efforts that entailed software development, hardware, and support costs. The program does not track software costs separately. The costs above are for the current effort only.

Program Essentials

Prime contractor: Raytheon

Contract type: FPI/FFP (procurement)

Current Status

The program faces challenges integrating new parts, which presents new schedule risks. But it noted that it resolved production issues related to obsolescence and part shortages by finding additional sources, among other things. However, program officials consider integration of the new advanced electronics, which were updated as a result of obsolescence, to pose a high risk to the future production schedule. By November 2027, program officials expect to complete weapon system-level qualification testing with these new components to ensure they can be cut into the production line and avoid any production delays. The program, however, does not plan to incorporate manufacturer or supplier feedback into production planning, which our leading practices found can reduce the risk that manufacturing issues delay delivery.

After over 5 years of delays due to operational testing problems and other factors that we previously reported, the program achieved initial capability for the F/A-18E/F in January 2026 and has successfully employed it in combat operations. SDB II initial capability on the F-35 is delayed 2 years and program officials said that it might be delayed 2 more years due to F-35 software development issues. The program is coordinating with DOD leadership to decouple SDB II full-rate production and F-35 initial capability so that SDB II can achieve full-rate production in fiscal year 2027.

Development of the GPS military code (M-code) receiver—which provides a stronger, encrypted GPS signal intended to help military users overcome signal jamming—is now complete. The receivers are expected to incorporate M-code capability for SDB deliveries in 2028.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that it is working toward full-rate production in the second quarter of fiscal year 2027, after it completes operational testing on the F/A-18E/F. It also stated that it will continue operational testing on the F-35 as necessary to complete integration. The program stated that it is conducting system-level testing to incorporate a new configuration with M-code capability into Lot 12 production and that it is addressing affordability through a technology refresh.

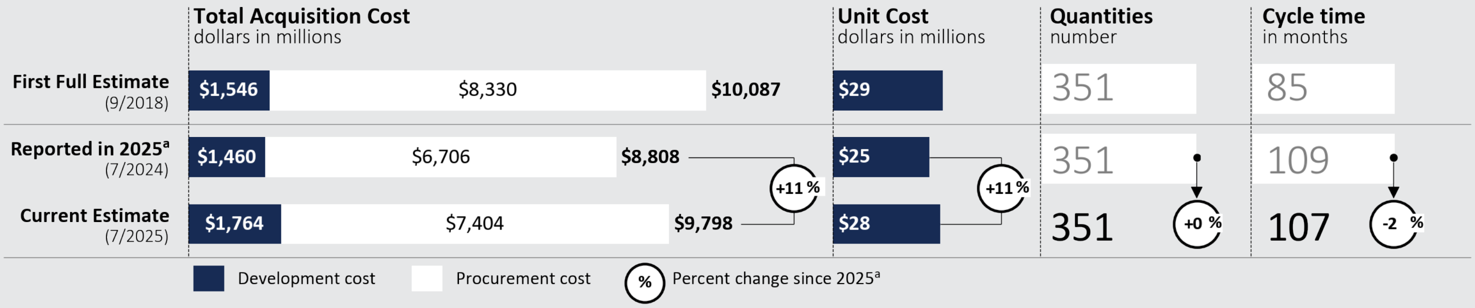
Air Force | **Program Type:** MDAP | **Common Name:** T-7A

Source: U.S. Air Force. | GAO-26-108457

T-7 Advanced Pilot Training Program (T-7A)

The Air Force's T-7A program is expected to replace the Air Force's legacy T-38C trainer fleet and related ground equipment. To field newer, more technologically advanced trainer aircraft, the program is developing two major components for the T-7A—the air vehicle and an associated Ground-Based Training System. The T-7A program seeks to address the Air Force's advanced fighter pilot training needs and close training gaps that the T-38C cannot fully address.

Program Performance fiscal year 2025 dollars in millions



[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 76-99%

The program reported that it does not track software costs because the contract is fixed price.

Program Essentials

Prime contractor: Boeing
Contract Type: FPIF; FFP (development)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

T-7A Program

Program Performance

Since our last assessment, the T-7A program reported that it is experiencing significant delays in the completion of developmental testing. These delays are a largely a result of (1) the need to complete additional engineering analysis; (2) lower than anticipated aircraft availability due to maintenance personnel issues and lack of spare parts; and (3) finalizing software requiring more time than originally expected. As a result, program officials stated the developmental program underwent a replan to provide a meaningful training capability to the user. Consequently, the majority of developmental testing will be completed by April 2028, with lower priority requirements completing testing by May 2029. Despite these delays, the program plans to make a low-rate production decision in April 2026, at which point the Air Force will have limited test information to support the production contract award. High levels of concurrency, or overlap, between testing and production often results in cost overruns and schedule delays.

The program also faces other schedule-related issues. For example, although the escape system has undergone system level testing, the program does not plan to fully qualify the system until after the April 2026 production decision. In addition, development efforts for the Ground Based Training System have reportedly encountered projector issues. As a result, the program recently pivoted to a new projector system that is considered slightly less mature. Less mature technologies often result in design changes, increasing the risk for cost growth and schedule delays.

In the last year, the program’s estimated total acquisition cost increased by 11 percent. Program officials largely attributed cost increases to changes in the contract, including increased incentives, support costs, and inflation adjustments.

Leading Product Development Practices

The Air Force is not using an iterative approach for development of aircraft, with no plan to have a minimum viable product. Instead, the Air Force plans use an incremental approach, with highly concurrent low-rate production deliveries in parallel with the end of development to mitigate future delays. While the program uses a digital model, it does not plan to develop a digital twin or digital thread. Our prior work found that digital twins and digital threads provide real-time testing and validation data to inform production decisions and could reduce the program’s concurrency risk.

The program reported that it gathers feedback from the end users at the Air Education and Training Command on areas such as Acceptance Test Procedures and System Performance Evaluation. Officials stated this feedback included areas where the program could make future trade-offs.

The program began incorporating all three elements of a MOSA in 2019 and updated its MOSA documentation in August 2025. The program has not reported any challenges in its MOSA implementation.

Software and Cybersecurity

The T-7A program is using a hybrid Agile and iterative software development approach. We previously reported that the flight control software version delivered at the end of 2024 brought full functionality and critical fixes for flight control laws, which is essential for the aircraft to complete developmental testing. Since our last assessment, the program experienced challenges with the incremental release schedule. The contractor estimates that four additional incremental releases, plus a subsequent software release, will be required to properly provide a usable initial aircraft capability.

Other Program Issues

The program anticipates completing developmental testing of initial capabilities in the summer of 2027 and operational testing of initial capabilities by April 2028. However, testing for a system-level integrated prototype, which will include linking the Ground Based Training System with the aircraft in flight, is not expected until July 2027—nearly 18 months after the production decision and nearly 3 years later than originally planned. Officials reported that discoveries made during flight test performance resulted in prioritizing specific test activities that will support the delivery of an initial capability to the program end users. As a result, some lower priority activities were pushed into fiscal years 2027–2029, causing developmental testing to lag behind operational testing.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program said it is executing a phased production start strategy to optimize the programmatic risk of the T-7 against the operational risks of continuing to fly and sustain a 60-year-old T-38C. The program said that this approach presents explicit decision points against verified criteria, which illustrates readiness for future lot buys and manages concurrency risk. The program said that this has helped it to achieve a minimum viable product approach, delivering an initial capability to the warfighter with top-level requirements and a low risk of hardware redesign. It also stated that full capability for the T-7 will come at a later date as the program completes the test program and future software updates.

Air Force

Program Type: MDAP

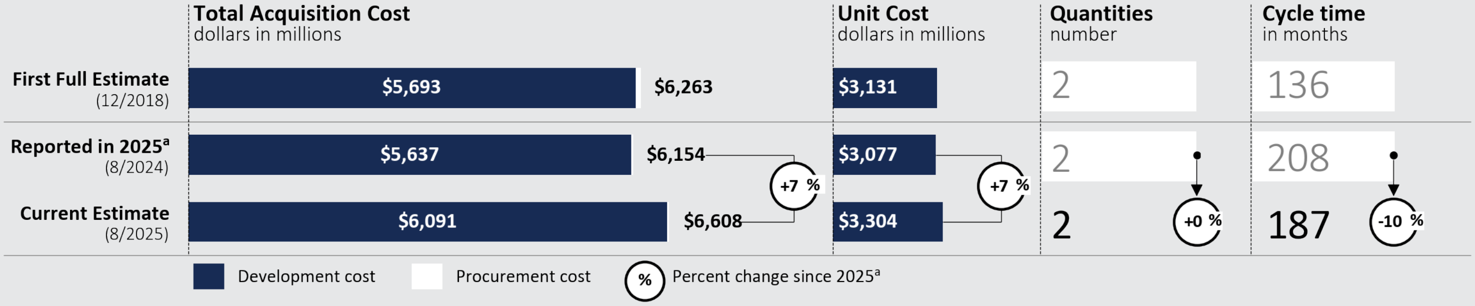
Common Name: VC-25B

VC-25B Presidential Aircraft Recapitalization (VC-25B)

Source: The Boeing Company. | GAO-26-108457

Through its VC-25B program, the Air Force is replacing the current two VC-25A presidential aircraft with two modified Boeing 747-8 aircraft. The Air Force plans to modify the commercial aircraft to provide the U.S. President, staff, and guests with safe and reliable air transportation, with the same level of security and communications available in the White House. Aircraft modifications will include structural modifications, electrical power upgrades, a mission communication system, military avionics, executive interiors, and other systems.

Program Performance fiscal year 2025 dollars in millions



ªGAO-25-107569.

Software Development

as of January 2026

Approach: Agile and Waterfall

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 76-99%

The program reported that it does not track software costs under the firm-fixed price contract.

Program Essentials

Prime contractor: Boeing

Contract Type: FFP (development)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

VC-25B Program

Program Performance

In October 2025, the VC-25B program completed final configuration design about 6 years after its critical design review. This final design facilitates engineering design releases and allows modification work to progress.

Boeing made progress on some of the schedule risks that we previously reported, such as completing the engineering design for the environmental control system, resolving cabin decompression issues, and hiring and retaining more qualified mechanics. Program officials stated that other schedule risks remain, including the detailed designs for the aircraft interiors, fabrication of the wire bundles, and rework to correct defects in structural modifications.

The program is revising the VC-25B test plan to support the transition of aircraft airworthiness certification from the Federal Aviation Administration to the Air Force, according to program officials. They said that the transition increases flexibility in the approach to addressing technical challenges, while shifting risk to the government from the contractor. In addition, they said that the compressed time frame for testing continues to be the biggest risk for the program moving forward. The program is developing 80 certification plans to demonstrate aircraft airworthiness. The Air Force approved seven of these plans as of October 2025. The Air Force has yet to determine when operational testing will begin.

Leading Product Development Practices

The VC-25B program has not implemented leading product development practices, which we have found help companies deliver complex products with speed. Program officials said that

- the VC-25B has specific performance parameters that cannot be modified, so iterative development and a minimum viable product are not possible;
- the program had no requirement for digital engineering and does not plan to develop a digital twin or a digital thread;
- the program tests subsystem prototypes in lab environments, but does not have a system-level or digital prototype. It plans to test requirements using the final delivery assets; and
- the program is leveraging modular systems where possible to improve sustainment, but this approach has not been formally documented.

Even though the VC-25B is well into development, the adoption of modern tools and methods could help ensure the system works as intended throughout operations and increase future agility so that the system remains relevant and effective.

Software and Cybersecurity

VC-25B officials said that they do not track software costs because Boeing is developing it under a fixed-price contract and software modifications primarily extend existing capabilities. They also said that cybersecurity requirements were excluded from the VC-25B contract. The program office plans to conduct cybersecurity assessments of flight deck avionics in 2028 and 2029. If a vulnerability is found, program officials said that Boeing would address the issue and the engineering efforts to address cyber vulnerabilities would be paid for by the program.

Other Program Issues

According to program documents, Boeing is almost 3 years behind its current baseline schedule in delivering the two aircraft. In September 2025, Boeing provided a revised schedule that would accelerate the aircraft delivery, to mid-2028 and mid-2029, respectively. Program officials said the revised schedule reflects changes to the airworthiness certification approach and aircraft requirements, including interior designs, weight limitations, and storage. They said that the supply chain is ramping up to ensure that parts are delivered on time to support the schedule. They also noted that they are exploring use of the organic industrial base to mitigate supply chain risks and ensure a diversity of suppliers.

Repairs of the VC-25B stress corrosion cracks are ongoing and are expected to be completed in 2026, according to officials. They are planning ongoing inspections after delivery.

The Air Force plans to upgrade mission communications systems after the aircraft are delivered, but the timelines are still being developed, according to program officials.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate.

ARMY

Program Assessments

▲ Indirect Fire Protection Capability Increment 2 (IFPC Inc 2)

Program name	Assessment type	Page
CH-47F Block II Modernized Cargo Helicopter (CH-47F Block II)	MTA	103
Future Long Range Assault Aircraft (FLRAA)	MDAP	105
High Accuracy Detection and Exploitation System (HADES)	MTA	107
Improved Turbine Engine Program (ITEP)	MDAP	109
Indirect Fire Protection Capability Increment 2 (IFPC Inc 2)	MTA	111
Integrated Visual Augmentation System (IVAS)	MTA	113
Long Range Hypersonic Weapon System (LRHW)	MTA	115
Lower-Tier Air and Missile Defense Sensor (LTAMDS)	MDAP	117
Maneuver Short Range Air Defense Increment 3 (M-SHORAD Inc 3)	MTA	119
Mid-Range Capability (MRC)	MTA	121
Precision Strike Missile (PrSM)	MDAP	123
XM30 Mechanized Infantry Combat Vehicle (XM30)	MTA	125

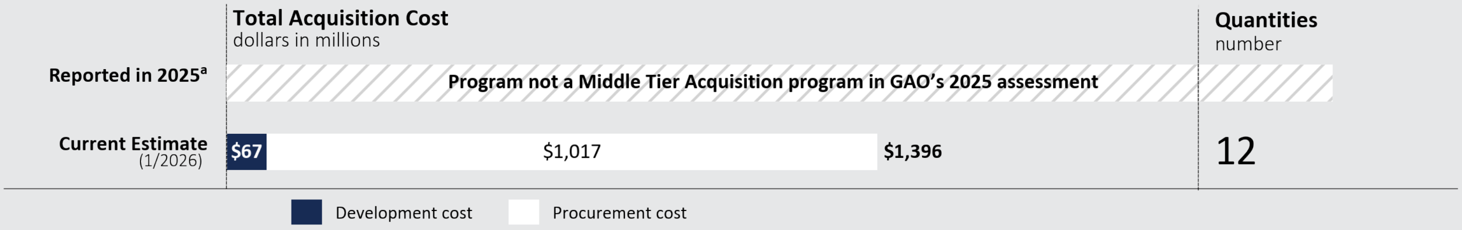
Source (previous page image): U.S. Army. | GAO-26-108457

Source: U.S. Army. | GAO-26-108457

CH-47F Block II Modernized Cargo Helicopter (CH-47F Block II)

The Army's CH-47F Block II program upgrades the CH-47F aircraft and provides enhanced capability, reach, and payload capacity. Improvements include a strengthened airframe and drive train, improved flight controls, and upgraded fuel and electrical systems. The Army expects the CH-47F Block II fuel and rotor system improvements to reduce operating and support costs. CH-47F helicopters are scheduled to remain in service as the Army's only heavy-lift capability through 2060. In September 2025, the program transitioned to the MTA rapid fielding pathway.

Program Performance fiscal year 2025 dollars in millions



ᵃGAO-25-107569.

Software Development

as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$9.20 | 0.66%

Percentage of progress to meet current requirements: 76-99%

The software cost reflects the program's current MTA effort.

Program Essentials

Prime contractor: Boeing

Contract Type: CPIF (development); FPI/IDIQ/FFP (production before low-rate production decision)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	●	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We assessed the program's implementation of leading product development practices for its rapid fielding effort.

CH-47F Block II Program

Program Performance

In September 2025, the Army transitioned the CH-47F Block II program from the MCA pathway to the MTA rapid fielding pathway, as part of the Army's broader transformation and modernization efforts. Officials stated that as a result, the Army plans to make its production decision in 2027, approximately 2 years later than previously planned. The Army has yet to finalize its force structure and is reconsidering the previously planned procurement quantity of 432 aircraft. Officials stated that the total procurement quantities for the program are to be determined. The Army's planned production decision in fiscal year 2027 will correspond with a decision on whether the program will transition back to the MCA pathway or to another MTA effort.

The Army is reassessing its program needs and priorities to meet near-term requirements. Officials stated that using the MTA pathway will enable the program to provide critical capabilities to brigades supporting high priorities, including Indo-Pacific Command. According to officials, this approach will enable the Army to procure up to 24 CH-47F Block II aircraft to support near-term priorities in fiscal years 2025 and 2026. The Army procured six aircraft in fiscal year 2025 and plans to procure up to six more in fiscal year 2026. The program plans to field the aircraft to two brigades—the first brigade by fiscal year 2028 and the second brigade by fiscal year 2030. Army officials stated that the MTA transition fits within the overall Army aviation transformation efforts, allows for quicker deliveries, and gives the Army additional time to determine how the program will meet the Army's future needs.

Leading Product Development Practices

The program reported that it is not using an iterative approach—including developing a minimum viable product—due to the legacy CH-47 Chinook platform operating in the fleet for more than 60 years. However, regardless of how long a legacy platform has been produced, opportunities exist to achieve some efficiencies by leveraging iterative development as the program modifies aircraft for increased capabilities. Our prior work has found that leading companies use an iterative development approach to develop, test, and collaborate with users to establish a minimum viable product.

The program is incorporating stakeholder feedback through multiple activities. For example, the program reported that it conducts working groups that allow members of the crew to participate in a simulated flight environment to provide feedback on upgrades to their stations within the aircraft. The program also reported that it obtains contractor feedback to identify supply chain risks. The program also holds quarterly design reviews where developed capabilities are demonstrated to end users for their feedback. Lastly, the Army stated that the program employs special user evaluations to validate requirements and make improvements to the CH-47F Block II's design and training ahead of initial operational testing planned for 2027.

The program reported that it did not develop a digital twin or digital thread. Army officials stated that, because this program is based on a previous version of the CH-47 that did not have a digital thread, the utility of implementing one now would be limited. However, the program is collecting lessons learned about digital engineering from other Army programs. And, according to the Army, the program is looking for opportunities to develop a digital thread as the program considers upgrades for adding future capabilities. We found that leading companies create digital twins and use digital threads to enable efficiencies throughout product life cycles, including during production and sustainment. These tools provide the ability to anticipate potential design flaws, optimize manufacturing, and reduce costs.

In addition, the program reported that it incorporates a modular open systems approach for its subsystems, such as a common avionics architecture system. This aligns with leading product development practices. According to Army officials, this approach helped to reduce obsolescence and mitigate the effects of limited supply sources, and allows the Army to integrate technology as it evolves.

Software and Cybersecurity

The program considers its development of software to be low risk. Officials stated that the contractor's evolving electrical system and blade designs, which were expected to stabilize before software development, contributed to risk in early development. However, the contractor managed later design changes more effectively, which helped reduce risks.

The program conducted additional cybersecurity tests in spring of 2026. The Army stated that these cybersecurity assessments can identify potential vulnerabilities that the program could address in future software iterations.

Program Office Comments

We provided a draft of this assessment to the Army for review and incorporated its comments where appropriate. The Army stated that the program continues to demonstrate progress, showing that CH-47F Block II aircraft can do what the Army intended—with enhanced payload, distance, and sustainability during user demonstrations. The Army stated that the program has delivered six of 12 CH-47F Block II aircraft and, following the Army's September 2025 MTA decision, plans to procure and field up to 24 aircraft by fiscal year 2030. The Army stated that the program is conducting qualification tests to prepare for operational demonstration in fiscal year 2027 and is looking for opportunities to accelerate fielding of the CH-47F Block II aircraft into fiscal year 2027 to support the Army's near-term needs in high priority areas.

Army | **Program Type:** MDAP | **Common Name:** FLRAA

Source: Bell Textron, Inc. | GAO-26-108457

Future Long Range Assault Aircraft (FLRAA)

FLRAA is a top modernization priority for the Army. It is intended to be a medium-sized assault and utility aircraft and deliver speed, range, agility, endurance, and sustainability improvements as compared with current Black Hawk helicopters. The Army also expects the program to provide combatant commanders with tactical capabilities at operational and strategic distances. The Army is accelerating production activities for the aircraft and plans to update the program schedule in fiscal year 2026 to reflect this acceleration.

Program Performance fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions		Unit Cost dollars in millions	Quantities number		Cycle time in months	
First Full Estimate (8/2024)	$8,100	$100,947	$74	1,358		N/A	
Reported in 2025[a] (8/2024)	$8,100	$100,947	$74	1,358		N/A	
Current Estimate (1/2026)	**Not approved for public release by the Army**			1,358	0 %	N/A	N/A %

■ Development cost ☐ Procurement cost

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Incremental, and Develops

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$457.03 | 0.45%

Percentage of progress to meet current requirements: 1-25%

Program Essentials

Prime contractor: Bell Textron, Inc.

Contract Type: CPIF/FPI (development)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated*)	◔	◔
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	◐	◐
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	◔	◐
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	◔	◔
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	◔	◔
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	●	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

FLRAA Program

Program Performance

FLRAA program leadership plans to accelerate the schedule despite findings during the preliminary design review that the schedule is high risk. Specifically, the Army Acquisition Executive issued two decision memorandums to advance the delivery of the physical prototype by a minimum of 3 months and the start of low-rate production by 18 months. FLRAA officials stated they are currently working on updating program plans to reflect the changes resulting from the acceleration and have yet to formally determine the new program schedule.

However, senior Army leaders made these decisions despite the findings of the program's March 2024 system-level preliminary design review and schedule risk assessment, which stated that FLRAA was at high risk of not achieving its schedule. Schedule risk analysis from the preliminary design review showed that the program's production start could be delayed by as much as 18 months due to challenges the program was already experiencing.

As we reported in last year's assessment, the aircraft's weight growth continues to place planned mission capabilities at risk. Program officials stated that they are continuing to address this issue by consulting with the contractor through a working group to explore weight reduction strategies, some of which have already been integrated into the aircraft's design. Officials also stated that the decision to accelerate delivery of the program's physical prototype has affected their ability to incorporate weight reduction prior to the new delivery date. The officials noted that they have identified additional future opportunities for weight reduction.

Leading Product Development Practices

The program planned to identify the minimum viable product and finalize it—incorporating stakeholder and end user feedback—by the second quarter of fiscal year 2026. Specifically, program officials said that they have engaged more than 250 Army users during four user evaluations. Users provided feedback that shaped the cabin configuration for crew and passengers and influenced the placement of flight, navigation, and mission displays. In last year's assessment, we reported the program had refined high-level operational needs into a minimum viable product. However, this year we lowered the score for the program's leading practice of developing a minimum viable product because officials stated this process is ongoing.

The program—an Army-designated "pathfinder" for its pioneering digital engineering efforts—continued to incorporate digital engineering, officials reported. It is initiating a digital twin and digital thread. In 2025, the program received a pathfinder study report that provided recommendations intended to capitalize on the opportunities offered by digital engineering. Program officials reported continuing to incorporate digital engineering, such as initiating a digital twin and digital thread. Our prior work shows that these practices allow for design, validation, and delivery of complex products with speed.

Program officials reported that they received two virtual prototypes in July 2025. The contractor is currently manufacturing physical prototypes and plans to transfer the first prototype to its test facility in early 2027 to start pre-flight testing. The program plans to achieve first flight in early 2028.

Software and Cybersecurity

The independent technical risk assessment for FLRAA rated the software risk for the program as medium. The assessment noted that the program has documented few of its software-specific requirements, but that the program can determine its full software requirements with further effort. It also noted that the program office still needs to determine some portions of the software design. The project manager and program executive officer approved the program's cybersecurity strategy in May 2024.

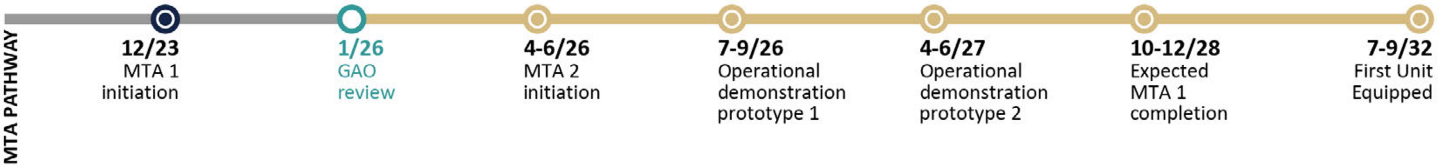
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated comments where appropriate. The program stated that FLRAA is the next generation vertical lift, tactical lift, tactical air assault, and MEDEVAC aircraft, providing transformational increases in speed, reach, improved sustainability, maneuverability, agility, and survivability. It stated that FLRAA will execute operational and tactical air assault/movement to assist in the dis-integration of the enemy's standoff systems and enable the rapid exploitation of freedom of maneuver to isolate and dislocate enemy ground forces.

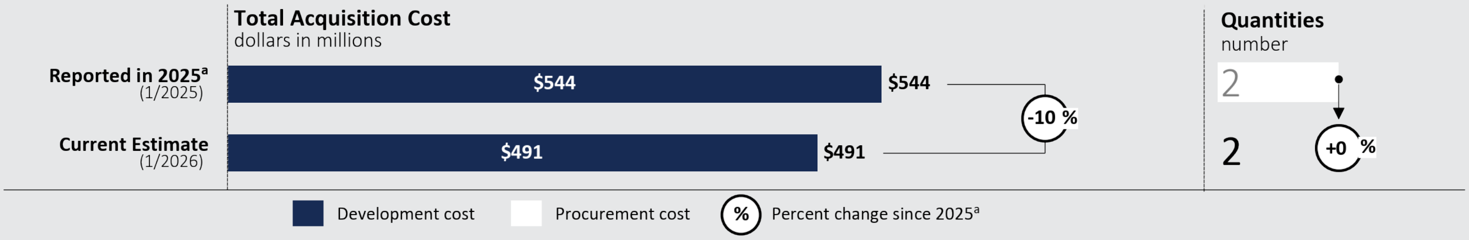
Source: PEO-Avn, FWPO(SEMA) HADES. | GAO-26-108457

High Accuracy Detection and Exploitation System (HADES)

The Army's HADES program intends to integrate a commercial-variant business jet with long-range, multi-intelligence sensors to provide enhanced battlefield surveillance for mission command and long-range weapon systems. HADES is expected to provide a decisive advantage in intelligence and targeting through early indications and warnings, providing commanders with enhanced reaction time. As part of the Multi-Domain Sensing System concept, HADES's capabilities aim to help the Army and Joint Forces achieve wartime objectives against peer adversaries. We assessed MTA 1, the first of several expected HADES MTA efforts.



Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



Quantities shown for MTA 1 effort only.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements:

Information not available

The program reported that no software development is expected under the MTA effort.

Program Essentials

Prime Contractor: Learjet (aircraft); Sierra Nevada Corporation (lead system integrator)

Contract type: FFP agreement (using experimental purposes authority)(aircraft); fixed price and cost reimbursement types (integrator)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated*)	○	●
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

HADES Program

Program Performance

The Army approved MTA 1 to develop the first two prototype aircraft to include finalizing the aircraft design. HADES conducted a key system design review for MTA 1 in September 2025 and addressed all associated activities from this review by November 2025. According to officials, the Army previously expected to complete MTA 1 in the fourth quarter of fiscal year 2027, which includes the first two prototypes. However, the Army now estimates HADES MTA 1 completion in the first quarter of fiscal year 2028. According to Army officials, this delay was to use the full 5-year time frame for MTAs rather than the result of additional work needed on the program. HADES expects to initiate a second MTA effort (MTA 2) in second quarter of fiscal year 2026 for the development and production of a third prototype aircraft.

Compared with the prior year, fiscal year 2026 estimated costs for HADES decreased by about 10 percent, approximately $53 million. HADES officials attributed a reduction in funding for the program to shifting Army priorities. HADES planned to integrate four fully mature new critical technologies for sensors and other military equipment in the first prototype. However, Army officials told us that funding constraints led to postponing development of one technology, the new sensors. Instead, the Army is leveraging legacy sensors for the second prototype, along with three additional new critical technologies that are already mature.

Leading Product Development Practices

Army officials reported using elements of leading product development practices. For example, the program reported that the first prototype is the minimum viable product and that the Army may decide to transition it to the product line following a training and demonstration period. The program said that it has incorporated stakeholder and end user feedback into decisions about the system's design, such as ergonomic characteristics and information distribution from the HADES platform to communication networks.

We previously reported that HADES intended to develop a digital twin as well as leverage an Army-wide digital environment for system design and development once it was available. The Army has since decided it will not develop a digital twin nor use the Army-wide digital environment. Army officials said they view HADES development as past the point where these tools would be of use. Instead, HADES reported that it plans to use a system integration lab and flight testing to evaluate system integration and a commercial software tool for model-based systems engineering. The program also reported that it has yet to determine whether it will develop a digital thread. We previously found that a digital twin and thread enable real-time collaboration and allow for informed decision-making with stakeholders and users throughout the product development life cycle, from early design through development, operations, and sustainment. Not having a digital environment slows development timelines by limiting the amount of model-based systems engineering HADES can perform. A digital twin could also assist HADES in testing a system-level integrated prototype, to ensure it functions as planned, and incorporating design changes for the next iteration, as well as provide essential data throughout operations and sustainment.

HADES reported implementation of a modular open systems approach. As we previously reported, officials said that they are leveraging a modular approach with a piece of fully mature hardware, called the canoe—a reconfigurable external housing unit for mission hardware and software. The canoe is detachable from the aircraft so updates can occur on the ground, which according to Army officials will allow HADES to make changes to the system in a matter of months rather than years.

Software and Cybersecurity

HADES has yet to conduct any cybersecurity exercises or assessments. Officials reported that the program has one cybersecurity exercise planned and will do more if there is a transition to another acquisition pathway. We previously found that early and regular discovery of system vulnerabilities makes it easier to fix them and reduces risk.

Other Program Issues

The Army intends to procure additional aircraft upon completion of the two prototypes from MTA 1 and the one aircraft from MTA 2. According to officials, the Army originally planned to procure 12 production aircraft but has since reduced the quantity to six. Army officials told us the reduction was the result of an Army transformation initiative and will not affect HADES's schedule, cost, or performance during development.

Program Office Comments

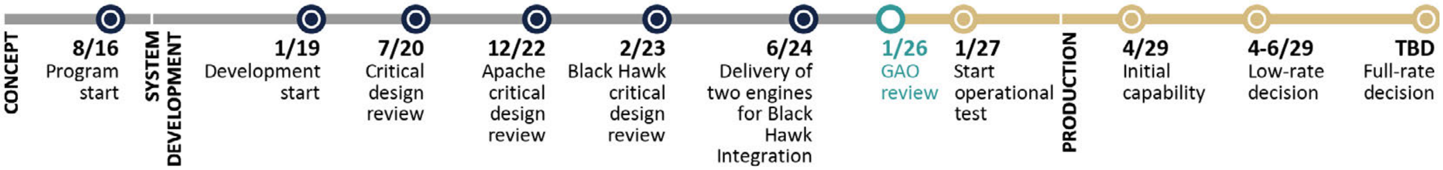
We provided a draft of this assessment to the Army for review and incorporated its comments where appropriate. Program officials stated that HADES continues to exceed program goals, within cost estimates and on schedule for deliveries. Prototypes will begin delivery in fiscal year 2027 and will incorporate the user feedback from the Special User Demonstrations into the rapid fielding of HADES.

Army | **Program Type:** MDAP | **Common Name:** ITEP

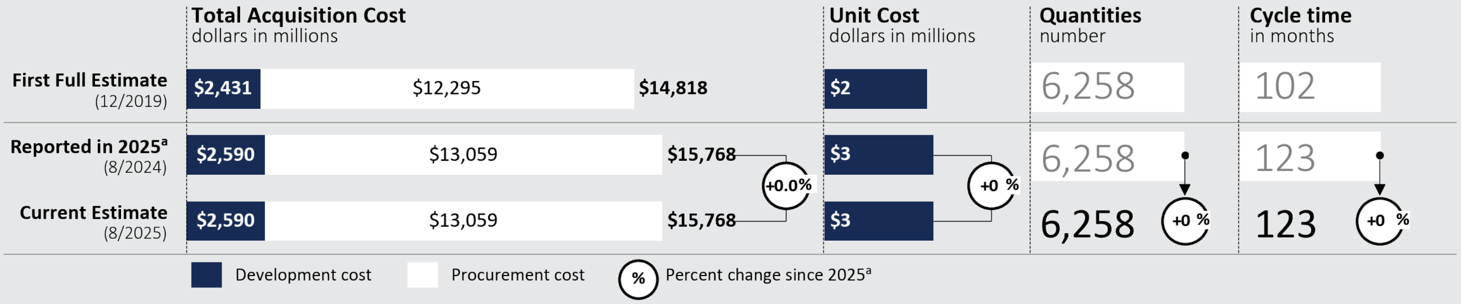
Improved Turbine Engine Program (ITEP)

The Army's ITEP is developing a next generation turbo-shaft engine for the Black Hawk and Apache helicopter fleets. The program includes engine development, manufacturing, platform integration, and qualification. The Army intends for the engine to fit inside the existing engine compartments of the Black Hawk and Apache helicopters and expects that the engine will provide power, fuel efficiency, reliability, and sustainment improvements.

Source: U.S. Army. | GAO-26-108457



Program Performance fiscal year 2025 dollars in millions



	Total Acquisition Cost dollars in millions				Unit Cost dollars in millions		Quantities number		Cycle time in months	
First Full Estimate (12/2019)	$2,431	$12,295	$14,818		$2		6,258		102	
Reported in 2025[a] (8/2024)	$2,590	$13,059	$15,768		$3		6,258		123	
Current Estimate (8/2025)	$2,590	$13,059	$15,768	+0.0%	$3	+0 %	6,258	+0 %	123	+0 %

■ Development cost ☐ Procurement cost (%) Percent change since 2025[a]

[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$165.60 | 1.05%

Percentage of progress to meet current requirements: 51-75%

Program Essentials

Prime contractor: GE Aerospace

Contract Type: CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	◐

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

ITEP Program

Program Performance

The Army made significant changes to the Improved Turbine Engine Program as it adjusted its funding request after restructuring its Future Vertical Lift aviation portfolio. As we previously reported, in February 2024 the Army ceased development of one of the platforms planned for integration with the engine, the Future Attack and Reconnaissance Aircraft. The President's budget request for fiscal year 2026 contained no funding for ITEP. Program officials stated that the $130 million in fiscal year 2025 funding would enable the program to continue to conduct safety testing of the engine in a test cell environment with the prime contractor and conduct further integration flight testing in the UH-60M Black Hawk. According to program officials, without further funding, the contractor, GE, and integrator, Sikorsky, would have stopped work in 2026, further delaying production. However, Congress appropriated an additional $175 million for the program in fiscal year 2026.

The Army delayed production start for the engine about 3 years to fiscal year 2029 in order to allow more time for integration with the Black Hawk and Apache platforms. The program plans to complete integration, testing, and qualification of the engine with Black Hawk before production start, and with the Apache after production start. In May 2025, the Army published the Army Transformation Initiative outlining further potential changes for Army aviation.

GE reported anticipated cost overruns. According to the Army, GE and its suppliers have struggled to develop manufacturing and quality processes at the original cost targets. This is partially due to high turnover in subject matter expertise resulting in the rework of engine hardware and associated documentation.

Leading Product Development Practices

Program officials reported that they have collected soldier feedback since development start through working groups, training groups, and quarterly integrated product team meetings. These efforts include collecting feedback from pilots and maintainers on the engine's physical design and the ability to access engine components, the system's virtual interactive training software, and the system's maintenance training tools.

However, the program reported it is not using feedback to inform an iterative development approach and does not plan to have a minimum viable product—slowing delivery of critical capabilities to users and hindering innovations for the next system. Officials reported that the program will deliver the full required capability upon delivery of the first engines to the warfighter.

Program officials reported that they are not using digital engineering, including development of a digital twin or digital thread, missing opportunities for engineering efficiencies and cost reductions. Program officials stated that a combination of timing, and that the engine is a subcomponent of a larger platform, led to this decision. Officials stated that when the DOD Digital Engineering Strategy was released in July 2018, the engine had progressed through its preliminary design review and digital twinning was not part of its requirements.

The program plans to use a modular open systems approach for the Black Hawk and Apache interfaces, which was documented at program start in 2019, noted program officials. The Black Hawk modular open systems approach continues to receive updates as it undergoes testing, and the program office verified the latest revision of the Apache requirements in an integration lab.

Software and Cybersecurity

The engine control software is a small part of the ITEP development effort and has been left to the engine manufacturer, per program officials. They stated that the program does not have visibility into the contractor's internal software development, but receives annual software updates for pilot feedback during the course of testing. The program remains on schedule to test software, despite a 50 percent reduction in software engineers. Program officials have plans to conduct a key cybersecurity test after production approval, even though DOD guidance in place at the time of our review suggests this test should occur during development. This may further increase software risk during production.

Program Office Comments

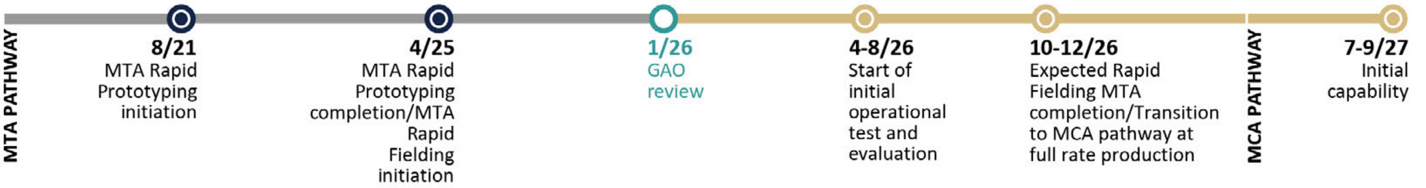
We provided a draft of this assessment to the Army for review and incorporated comments where appropriate. The Army stated that despite initial hardware delays, the program has achieved significant results. The Army also stated that the program is on track to complete a key safety milestone that enables engine integration into future platforms in fiscal year 2026. The Army stated that, while it did not originally plan for a minimum viable product, the program is in the process of conducting an assessment and has developed courses of action to accelerate fielding. The Army stated that the program is not using digital engineering as the toolsets, DOD policies, and the skillset required were not mature enough at program start. Additionally, the Army stated that the engine is a component of a larger weapon system that does not currently incorporate a digital thread. The Army further stated that software development metrics are managed at the prime and subcontractor levels and officials review reoccurring deliverables to ensure program requirements are achieved. The Army stated that the contractor's software development process is similar to Agile and ITEP's software development plan defines the contractor's metrics for the process.

Army | **Program Type:** MTA | **Common Name:** IFPC Inc 2

Source: U.S. Army. | GAO-26-108457

Integrated Fires Protection Capability Increment 2 (IFPC Inc 2)

The Army's IFPC Inc 2 is a mobile, ground-based weapon system designed to defeat subsonic cruise missiles, uncrewed aircraft systems, and other aerial threats. IFPC Inc 2 consists of the Army's Sentinel A4 radar, the Army's Integrated Air and Missile Defense Battle Command System, the Navy's AIM-9X interceptor, and a new air defense launcher. IFPC Inc 2 completed an MTA rapid prototyping effort in April 2025 and is currently using the MTA rapid fielding pathway. Following completion of the rapid fielding effort in the first quarter of fiscal year 2027, the program expects to transition to the MCA pathway at production start.



Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions	**Rapid Prototype Effort** number	**Rapid Fielding Effort** number
Reported in 2025[a] (1/2025)	$628	16	NA
Current Estimate (1/2026)	$1,770	NA	66

■ Rapid Prototyping Program cost □ Rapid Fielding Program cost

[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$32.23 | 5.13% (Rapid Prototyping)

$90.39 | 5.11% (Rapid Fielding)

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime Contractor: Dynetics, Inc.

Contract type: FFP/CPFF IDIQ

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

IFPC Inc 2 Program

Program Performance

The Army decided to change the planned pathway for IFPC Inc 2 as part of its overall acquisition restructuring effort. The IFPC Inc 2 program planned to transition to the MCA pathway at production start in the second quarter of fiscal year 2025, following completion of its rapid prototyping effort under the MTA pathway. However, in April 2025, the Army directed the IFPC Inc 2 program to initiate a rapid fielding effort instead. Program officials stated that Army leadership made this decision, in part, to more rapidly field assets to United States Forces South Korea. The program reported that it anticipates that Army leadership will approve a transition plan for the MTA rapid fielding effort in the third quarter of fiscal year 2026, which will document exit criteria to support transition to the MCA pathway at full rate production start in the first quarter of fiscal year 2027.

We previously reported that an Office of the Director, Operational Test and Evaluation (DOT&E) official stated that the model the Army used to test a subsystem had not been accredited for the way in which the Army used it. Program officials reported in November 2025 that the Army is working with the subsystem's contractor and the Army Test and Evaluation Command to update accreditation of the model so that it is representative of how this subsystem will be used. In addition, we previously reported DOT&E's concerns with changes to the Army's plans to conduct elements of IFPC's operational assessment. A test official stated that the changes raised the possibility that testing was not truly representative of real-world conditions. These changes elevate the risk of IFPC being unable to provide the warfighter with the full capability it is intended to provide. Program officials reported in November 2025 that the program elected to return to original testing conditions for this assessment.

Leading Product Development Practices

IFPC continues to implement limited aspects of leading practices for product development. As previously reported, IFPC took steps to obtain user feedback during its rapid prototyping effort and noted that several areas for improvement were identified during that effort. For example, improvements in the design and software allow for quicker re-loading of magazines onto the launcher. Program officials reported that such improvements allow IFPC to leverage the rapid fielding effort to enable a user-centric design.

We previously recommended that programs implement digital engineering tools to improve efficiency in delivering capability to the warfighter. However, the IFPC program reported that it has no plans to create a system-level digital twin. Our prior work found that digital twins and threads provide real-time data to inform design decisions and provide efficiencies, including in production and sustainment.

We previously reported that the program was implementing one of the three elements of a modular open systems approach—using modular system interfaces between major systems, major system components, and modular systems. However, it was not incorporating two other elements of modularity advocated by leading practices—ensuring relevant modular system interfaces comply with widely supported standards and using a system architecture that allows severable major system components and modular systems to be incrementally added, removed, or replaced throughout the platform's life cycle. Program officials reported that, following an April 2025 update, IFPC's requirements now include language about modular open systems because of stakeholder feedback regarding how a future interceptor could be used with the launcher being developed. Given that a second interceptor program is still early in development, it is unknown the extent to which the program will incorporate additional elements of a modular open systems approach.

Software and Cybersecurity

Program officials reported that they have yet to incorporate a Zero Trust Strategy for cybersecurity because the Army has yet to provide guidance on implementing such a strategy for tactical weapon systems. DOD weapon systems are increasingly reliant on software for developing and maintaining capability. Program officials noted that zero trust capabilities must be engineered directly into the weapon system by the contractor, which has not occurred. Program officials noted that they recognize the importance of adopting a zero trust architecture to enhance the security of the system. Further, officials reported that they plan to work with the contractor to identify components and processes required for that architecture.

Program Office Comments

We provided a draft of this assessment to the Army for review and incorporated comments where appropriate. The program stated that IFPC Inc 2 is an industry-built launcher, interceptor, and an All-Up Round Magazine solution integrated with the Army's Integrated Air and Missile Defense Battle Command System. It stated that IFPC Inc 2 will defeat subsonic cruise missiles and unmanned aircraft systems with residual capability against fixed and rotary wing threats.

Army | **Program Type:** MTA | **Common Name:** IVAS

Source: U.S. Army. | GAO-26-108457

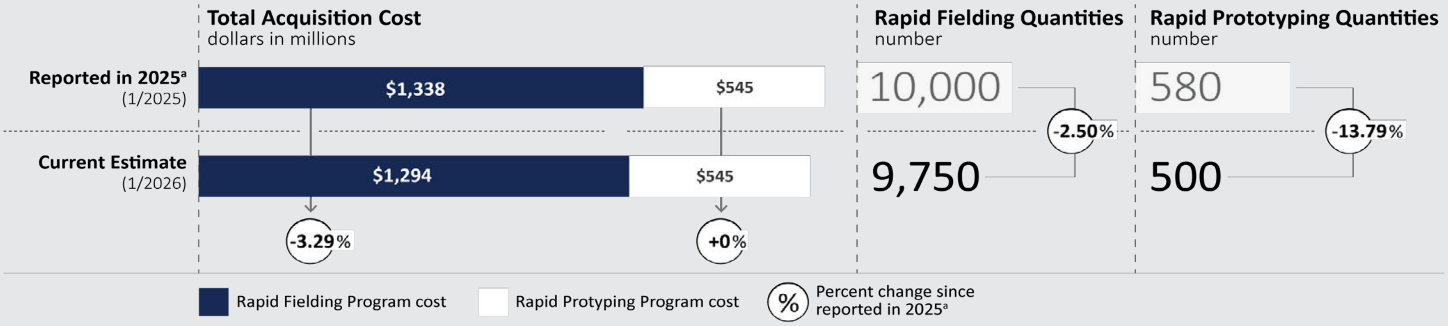
Integrated Visual Augmentation System (IVAS)

The Army's IVAS program sought to improve warfighter close combat capabilities by providing a single platform to fight, rehearse, and train using augmented-reality headgear. The system includes a heads-up display, sensors, on-body computer, and other elements. The Army developed versions 1.0, 1.1, and 1.2 between 2018 and 2025 through multiple MTA efforts. However, the Army determined that none of these developed units will be fielded. Instead, the Army plans to use version 1.2 to begin a new rapid prototyping effort, Soldier Borne Mission Command (SBMC). This assessment reviews the completed version 1.0/1.1 rapid fielding and 1.2 rapid prototyping efforts as the program transitions to SBMC.

MTA PATHWAY

12/20	Rapid Fielding initiation
5/22	Rapid Fielding operational demonstration
12/22	Rapid Prototyping initiation
1/23	Rapid Prototyping critical design review
9/23	Rapid Fielding first unit issued
12/25	Rapid Fielding completion
1/26	GAO review
1-3/26	Soldier Borne Mission Command Rapid Prototyping initiation

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, DevOps, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$8.32 | 0.64% (Rapid Fielding)

$95.28 | 17.47% (Rapid Prototyping)

Percentage of progress to meet current requirements: 100%

The program reported that the last major software release occurred in fiscal year 2025.

Program Essentials

Prime Contractor: Microsoft; Anduril

Contract type: FFP (production) (using other transaction authority)

Implementation of Leading Product Development Practices as of January 2026

	1.0/1.1 Rapid Fielding		1.2 Rapid Prototyping	
Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status	MTA Initiation	Current Status
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	◔	●	○	●
Obtain User Feedback				
Collect end user feedback to inform the product	●	●	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data				
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment				
Test a system-level integrated fully digital prototype in a digital operational environment	○	○	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○	○	○
Prepare for Modularity to Support Production and Updates to the MVP				
Incorporate a modular open systems approach (MOSA)	○	○	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

IVAS Program

Program Performance

After 7 years of development and producing almost 10,000 units that will not be fielded, the IVAS prototype will transition to a separate effort, SBMC, to develop new prototypes. IVAS completed its rapid fielding effort in December 2025, under which it produced almost 10,000 units divided between versions 1.0 and 1.1. An Army evaluation reported that soldiers found the headsets difficult to wear and noted that they did not perform better than existing equipment. As a result, the nearly 10,000 units that were produced are obsolete and will remain in storage.

In fiscal year 2025, the program initially continued rapid prototyping for version 1.2 as the full-rate production model. As we previously reported, version 1.2 was expected to address reliability and wearability issues identified in the previous versions such as comfort and low-light performance.

Although the program conducted production qualification testing in the first and second quarters of fiscal year 2025, the Army will not produce version 1.2 units. Instead, it plans to use 400 1.2 units to inform the design for the new SBMC effort, which the Army stated will be launched in the second quarter of fiscal year 2026. The Army reprogrammed IVAS funding to support the first phase of SBMC development and in April 2025 approved a transfer of the contract from Microsoft to Anduril.

Leading Product Development Practices

While IVAS used limited elements of leading practices in its prior efforts, the program's minimal implementation of these contributed to IVAS concluding with no fielded capability. Problems that users reported with the 1.0 and 1.1 versions were not adequately addressed in 1.2. These included poor performance in low-light conditions and the added weight on users' helmets. The program's failure to adequately incorporate user feedback into design updates resulted in a product that users report is less useful than legacy equipment.

Further, the program proceeded with production of 1.0 and 1.1 units with limited evidence from testing in an operational environment to show that the system met users' needs. For version 1.0, soldiers reported negative feedback during operational testing. For version 1.1, the program did not conduct it. This runs counter to our prior work, which found that systems-integrated testing in an operational environment helps ensure product designs meet user needs before significant funding is spent on production. As a result, the Army has almost 10,000 units that are not being fielded.

The program developed a minimum viable product—a practice we found enables rapid design, development, and delivery of capabilities. However, the Army does not plan to field the developed MVP because the IVAS effort is ending and SBMC will be a new capability. The program did not conduct a planned operational assessment that it expected would lead to validating an MVP for version 1.2. Instead, the new contractor will conduct continuous operational assessments on version 1.2 units through an Army initiative that fields equipment to brigades to get user feedback. The program expects to use these assessments to collect feedback and inform the first phase of SBMC, which aligns with leading practices to make improvements in subsequent iterations.

The program did not plan to use digital twins or digital threads for version 1.2, stating that the tools would not provide cost savings until a production model was approved. However, we have found that these tools enable rapid iterative design cycles that incorporate user feedback early in the development process.

We previously reported that the program did not use a system architecture that would allow major system components and modular systems to be incrementally added, removed, or replaced over the platform's life cycle. As a result, it will not be possible to update or repurpose components from versions 1.0 and 1.1. The Army said that it plans to use a MOSA for its future SBMC rapid prototyping effort.

Software and Cybersecurity

The last major software release for IVAS was delivered in fiscal year 2025. The program will not receive any further major software updates until software development shifts to SBMC. The program will also shift efforts to determine zero trust cybersecurity implementation to SBMC.

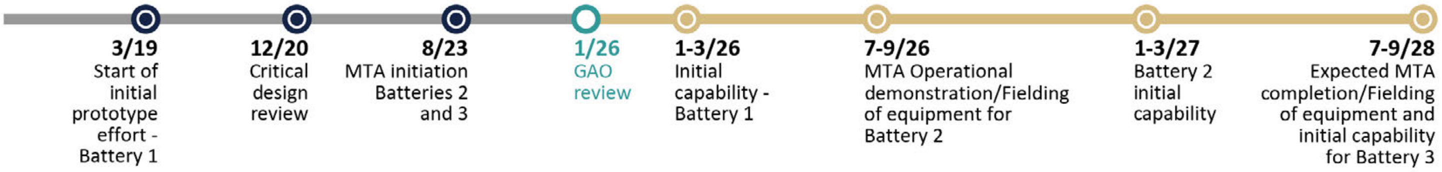
Program Office Comments

We provided a draft of this assessment to the Army for review and incorporated its comments where appropriate. The Army stated that SBMC builds on lessons learned and the demonstrated capabilities of IVAS, but in a modular approach and with an increased focus on the flexibility to add capabilities in the future. The Army stated that the transition from IVAS to SBMC reflects the Army's commitment to evolving night vision and situational awareness capabilities based on operational lessons learned from recent conflicts and initiatives. The Army also stated that this evolution leverages the latest advancements in digital sensor technology and extended reality systems. The Army stated that SBMC will be its future day/night situational awareness and mission command platform and that SBMC increases lethality, mobility, and situational awareness by enhancing how soldiers see, process, and understand the battle space above and beyond current capabilities.

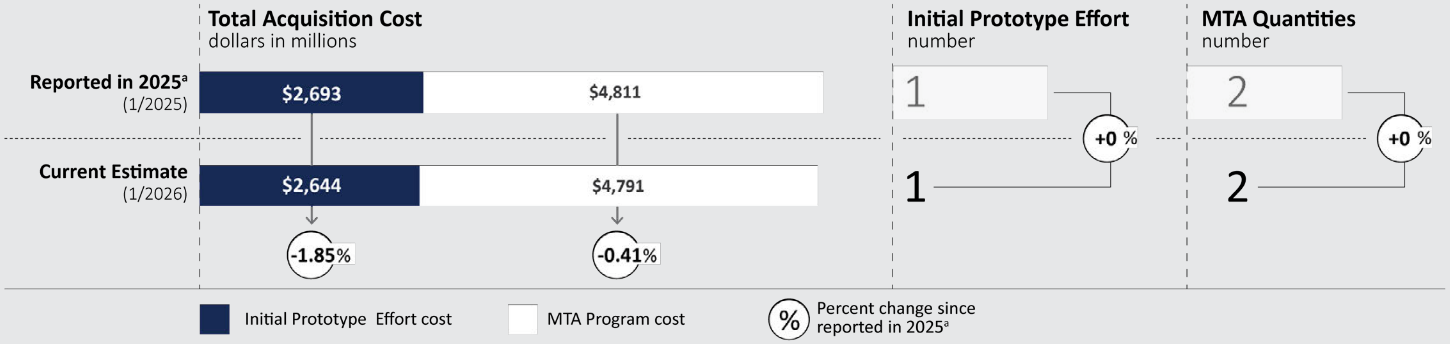
Source: U.S. Army. | GAO-26-108457

Long Range Hypersonic Weapon System (LRHW)

The Army's LRHW system is a ground-launched hypersonic missile battery designed to engage an adversary's long-range weapons and high-value, time-critical targets. The Army has two ongoing LRHW efforts. The first aims to field an initial prototype battery, consisting of four launchers, related equipment, and eight missiles. The missile is common with the Navy's Conventional Prompt Strike (CPS) program, which is developing a ship-fired version. The Army has a separate MTA rapid fielding effort to field two more LRHW batteries. We assessed both LRHW efforts. CPS is assessed separately in this report.



Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



We include the launchers and related equipment for batteries 2 and 3, as well as the missiles for these batteries, in the MTA program cost. The Army procures the missiles through the Navy and does not include them in its MTA cost estimate. We include the same items in the battery 1 cost. Quantities are the number of batteries.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 76-99%

The program reported that it is currently in the process of implementing software cost reporting.

Program Essentials

Prime Contractor: Lockheed Martin; Dynetics, Inc.; Dynetics Technical Solutions

Contract type: CPIF/CPFF/FFP (includes use of other transaction authority)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated*)	○	◐
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	◐

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We assessed the program's implementation of leading product development practices for its initial prototyping and rapid fielding efforts.

LRHW Program

Program Performance

Program officials stated that the Army will not field its first LRHW battery—including missiles—until at least the second quarter of fiscal year 2026. This is over 2 years later than its initial goal and 9 months later than our last assessment. The Army resolved launcher and missile quality issues, which we previously reported on, and conducted a successful end-to-end missile flight test—the first using its launch system—in the first quarter of fiscal year 2025. Some of the problems discovered during earlier flight tests created a production bottleneck as the Army and Navy paused production until the missile was successfully tested. Officials stated that the contractor has continued to experience issues at its facility. The program worked with a third-party consultant to identify challenges and make recommendations to increase the rate of missile production. The program said that it was working with the contractor and Navy to implement the recommendations.

The Army will also not meet one of its fielding goals for the LRHW MTA effort. Program officials stated that the Army will not field its second LRHW battery—including missiles—until the second quarter of fiscal year 2027 due to missile delivery delays of at least 6 months. The second battery also includes a missile with minor modifications, which has not been flight tested as of January 2026. Officials stated that production challenges delayed testing of this missile until the second quarter of fiscal year 2026. The third battery could also face similar delays because the Navy's CPS program, which develops missiles for the LRHW program, has not finalized the design as of January 2026. The Army plans to field these missiles sooner than the Navy. The program stated that it is working with the Navy to finalize the design, but the time needed to test it remains a concern. Officials said the Army exercised the contract option for the third battery's launchers and related equipment in the third quarter of fiscal year 2025—6 months later than planned—due to funding delays associated with a continuing resolution. The program does not expect that delay to affect its fielding goal.

Leading Product Development Practices

The LRHW program is implementing some aspects of leading practices for product development. As we previously reported, program officials stated that they developed the first battery as the minimum viable product for the MTA effort and validated it in a flight test. However, this year, program officials clarified that soldier feedback was not included in the test findings and subsequent design updates because the soldiers' participation in the event was minimal. The program stated that it is still tracking soldier feedback and plans to address it in planning for future system builds.

The LRHW program made limited use of digital engineering tools. In July 2024, we recommended that the LRHW program assess implementing digital engineering. The Army completed the assessment in December 2024 and concluded that LRHW was not a viable program for digital twinning because the Army does not have plans to produce more than three batteries. It also determined that there was little benefit to augmenting the program's software-only digital thread given the program's stage of development. We previously found, however, that digital twins and digital threads can provide efficiencies throughout the product life cycle, including during sustainment.

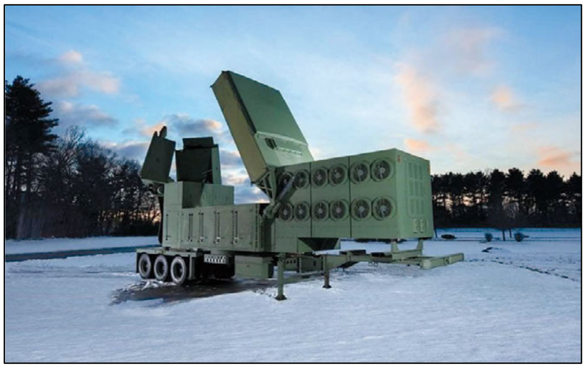
Software and Cybersecurity

The LRHW software efforts have been more complex than expected, according to the program. Challenges integrating LRHW and CPS software products contributed to software development risk. The program made fewer software deliveries than planned due, in part, to completing fewer tests than expected. This provided less opportunity to gather feedback and identify issues. The program completed one software delivery in fiscal year 2025 and expects to make two software deliveries per year starting in fiscal year 2027.

The program reported that its cybersecurity strategy is under review. LRHW completed cybersecurity exercises in fiscal year 2020 and 2025 and did not identify any repeat vulnerabilities.

Program Office Comments

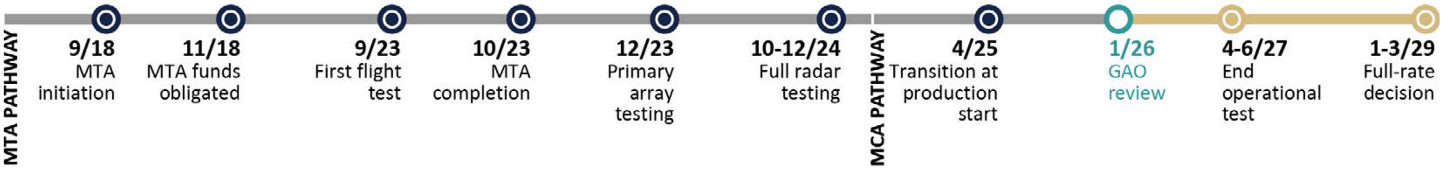
We provided a draft of this assessment to the Army for review and incorporated its comments where appropriate. The Army stated that it will field the third LRHW battery on time using the missile configuration that is current at the time of fielding. In addition, the Army and the Navy will continue to test updated missile designs and field them as available. The Army also stated that it completed a number of cybersecurity events in 2025 and 2026. These events are part of the cybersecurity strategy, which according to the Army is in final review and will improve the survivability and cyber protection for the already fielded battery. After our review, the Army and Navy conducted a flight test in March 2026, and the Army stated that it coordinated with the Navy's CPS program to resolve design issues for the third battery.



Source: © 2020 Raytheon Company. | GAO-26-108457

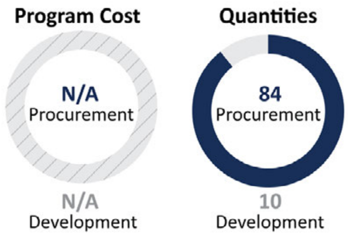
Lower Tier Air and Missile Defense Sensor (LTAMDS)

The Army's LTAMDS is expected to be a multifunction radar that will replace the current Patriot radar. As part of the Army's Integrated Battle Command System architecture, LTAMDS intends to address critical capability gaps, modernize technology, and increase reliability and maintainability. LTAMDS completed its rapid prototyping effort in October 2023 but continued developmental testing throughout 2024. LTAMDS entered the Major Capability Acquisition pathway as a major defense acquisition program at production start in the third quarter of fiscal year 2025.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (N/A)		Current Estimate (8/2025)
Acqusition Cost	N/A	N/A%	N/A
Unit Cost	N/A	N/A%	N/A
Cycle Time (in months)	N/A	N/A%	108

(%) Percent change since 2025[a]

LTAMDS was not a major defense acquisition program in GAO's 2025 assessment, so previously reported costs and cycle time are not comparable.

[a] GAO-25-107569

Software Development as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Raytheon

Contract type: FPIF/CPFF (production); FFP (build and test prototypes) (using other transaction authority); CPFF/FFP (incorporate improvements) (using other transaction authority)

Current Status

The Army updated LTAMDS's cost and schedule estimates when it entered low-rate initial production in April 2025. Officials stated that the new cost estimate covers LTAMDS's entire life cycle. The new schedule projects that LTAMDS will reach initial operational capability in the fourth quarter of fiscal year 2027. Officials said they have positioned two operational production-representative radars in Guam to reduce risk before reaching this milestone.

The program reported implementing some leading practices for product development. For example, the program reported it is developing a digital thread and soliciting end user feedback on factors such as capabilities, usability, and warfighter machine interface. Soldiers in Guam are also providing feedback on how they will use LTAMDS, which will be incorporated into system upgrades. In addition, officials stated that they are using data from software and the production-representative radars in Guam to run simulations prior to range testing. Our prior work has found that digital twins and threads provide real-time data to inform design decisions and provide efficiencies, including in production and sustainment.

Officials stated that digital modeling and simulation reduces risks in software development, hardware testing, and integration. The program uses a continuous software integration and delivery approach to add capability to defeat threats and correct defects throughout LTAMDS's life cycle.

Program Office Comments

We provided a draft of this assessment to the Army for review and incorporated its comments where appropriate. The Army stated that the two production-representative LTAMDS sent to Guam have provided benefits through soldier feedback and in situational observations. The Army also stated that the LTAMDS program continues to adopt leading and best practices to rapidly develop capabilities and is focused on accelerating sensor capabilities to the warfighter.

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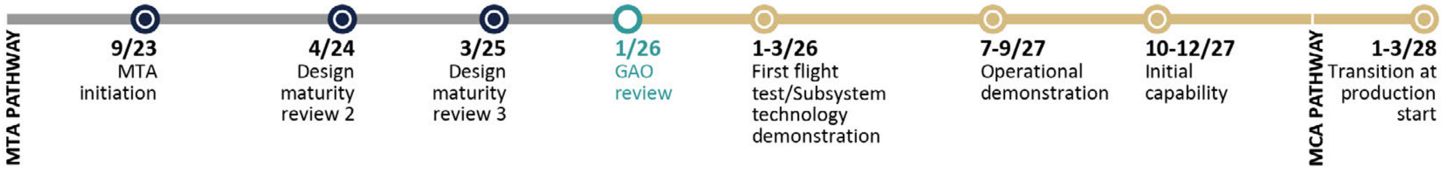
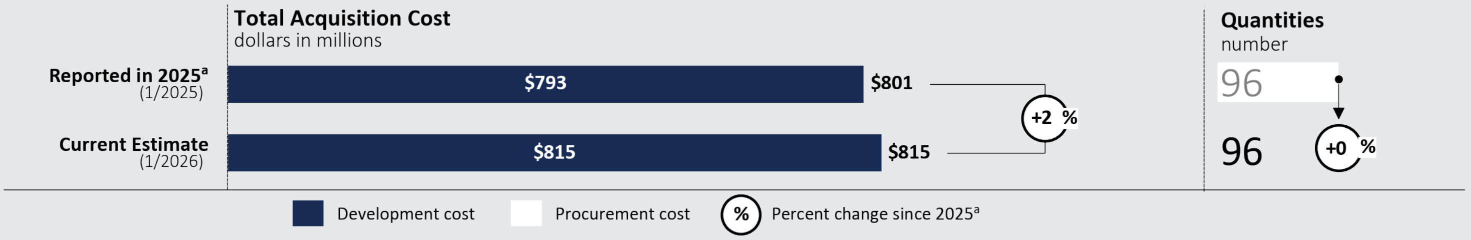
Source: U.S. Army. | GAO-26-108457

Maneuver Short Range Air Defense Increment 3 (M-SHORAD Inc 3)

M-SHORAD Inc 3 is an MTA rapid prototyping effort intended to modernize the Army's air and missile defenses by replacing the Stinger missile for M-SHORAD with a next generation short range interceptor (NGSRI). The Army intends for NGSRI to have greater range and lethality than the Stinger. A separate effort will develop new 30-millimeter ammunition for M-SHORAD Inc 3. We assessed the effort to develop the short-range interceptor. The program intends to transition to the major capability acquisition pathway and make a low-rate initial production decision in fiscal year 2028.



Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



Program officials told us that quantities do not reflect an additional 240 missile test assets that will be expended during testing.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Incremental, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 51-75%

The program reported that one of the contractors did not report periodic cost and software data and, therefore, aggregated software costs are not available.

Program Essentials

Prime Contractor: Raytheon; Lockheed Martin

Contract type: CPFF (using other transaction authority)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	●	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

M-SHORAD Inc 3 Program

Program Performance

M-SHORAD Inc 3 reported that none of its critical technologies are fully mature. The program found through its own assessment that some critical technologies are less mature than the contractors reported. Program officials told us that they have independently assessed all critical technologies. While they could not definitively state why there was a discrepancy between the contractors' and the program's maturity assessments, program officials noted that it may be due to contractors interpreting technology maturity in less restrictive terms than the program office. Program officials anticipate fully maturing all critical technologies by the fourth quarter of fiscal year 2028. Our prior work has shown that increasing even one maturity level can take multiple years and becomes more challenging as the technology approaches maturity. Any delays to technology development could affect the planned production start in the second quarter of fiscal year 2028.

The Army selected two contractors to design, develop, and test a prototype NGSRI during the rapid prototyping effort. It plans to select one contractor to proceed with the effort after completing an operational assessment in the fourth quarter of fiscal year 2027 and transition to the production phase of the MCA pathway. Program officials told us that each contractor finalized its design approach in the second quarter of fiscal year 2025.

Leading Product Development Practices

M-SHORAD Inc 3 implemented some leading practices but not others. For example, the two competing contractors for NGSRI used teams of soldiers and Marines to obtain feedback on the operation of the command launch assembly, including its controls and ergonomics. Program officials told us that after a missile test, it plans to test user interfaces and integrate user feedback by the end of the operational assessment in the fourth quarter of fiscal year 2027.

However, the program reported that, as a missile system, M-SHORAD Inc 3 will not develop a minimum viable product—one that could incorporate the user feedback the program is already collecting—because all functions are critical to meeting requirements. Our prior work found that refining operational needs into an MVP enables rapid delivery of an initial set of capabilities that meets user needs. Program officials stated they plan to complete testing for a system-level integrated physical prototype in an operational environment by the end of the third quarter of fiscal year 2026. However, the program does not plan to connect it to a digital twin or thread, which could incorporate testing results from the physical prototype to better simulate the product's functionality. Our prior work found that digital twins and threads provide real-time data to inform design decisions and provide efficiencies, including in design and production.

M-SHORAD Inc 3 officials stated that they have a plan to integrate a modular open systems approach for five major subsystems, including avionics and propulsion. According to program officials, the government-owned interfaces between these subsystems will allow for future upgrades.

Software and Cybersecurity

The program's contractors are developing software for the NGSRI's guidance, navigation, control system, and the command and launch assembly. The program plans to have an approved cybersecurity strategy by the fourth quarter of fiscal year 2026. While the program reported that not all cybersecurity zero trust principles apply to its planned system, they will apply zero trust principles to the system where applicable.

Other Program Issues

Program officials stated that M-SHORAD Inc 3 experienced schedule delays in 2025 due to receiving less funding than requested. Specifically, the Army delayed the system technology demonstration for one contractor by 3 months, which also delayed the start of developmental testing by 3 months. Program officials stated that further funding shortfalls could result in the program's failure to meet the 5-year time frame for MTA efforts.

Program Office Comments

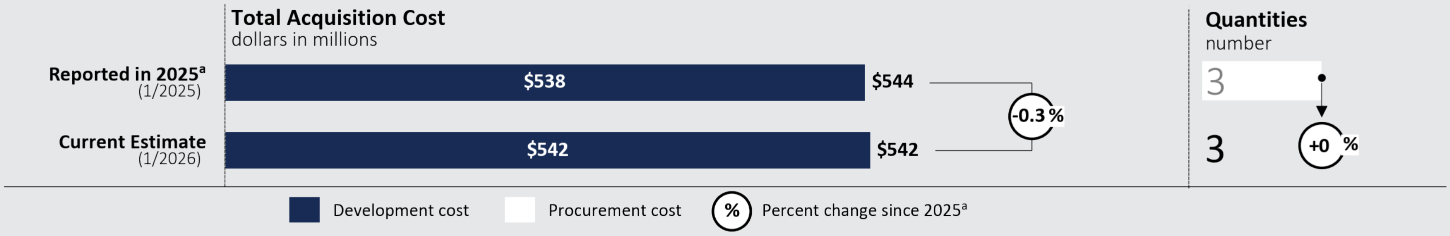
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. Program officials stated that M-SHORAD Inc 3 will include the NGSRI to replace the current Stinger missile and integrate a new 30-millimeter Multi-Mode Proximity Airburst ammunition to enhance lethality. Both the interceptor and 30-millimeter ammunition are compatible with the M-SHORAD Inc 1 platform. Program officials also stated that the new 30-millimeter ammunition is developed by a separate program called Maneuver Ammunition Systems.

Source: Lockheed Martin with edits from U.S. Army RCCTO. | GAO-26-108457

Mid-Range Capability (MRC)

The Army is developing an offensive, ground-based MRC weapon system to bridge a capability gap between systems designed for short- and long-range fires. MRC leverages existing Navy Standard Missile -6 and Tomahawk cruise missiles and modifies the Navy's ship-based vertical launching system for containerized use with existing Army vehicles. The Army's Rapid Capabilities and Critical Technologies Office (RCCTO) delivered the first MRC battery in September 2023 through a prototype development effort. The Army, through Program Acquisition Executive, Fires intends to deliver batteries 2 through 4 during the current MTA rapid prototyping effort.

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



The graphic bars depict only research and development and procurement costs. However, total acquisition cost also includes costs for acquisition operation and maintenance.
[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Waterfall, DevOps and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$91.88 | 16.94%

Percentage of progress to meet current requirements: 26-50%

Program Essentials

Prime Contractor: Lockheed Martin

Contract type: CPFF (using other transaction authority and FAR-based contracts)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	●	●
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

MRC Program

Program Performance

Since our last assessment, the MRC program identified three additional critical technologies, all of which are immature. These include wireless communications and the development of a smaller footprint for the system's battery operations center. The program is also working on a third technology—hardware that runs virtualized Aegis Weapon System command and control software. It is expected to improve reliability and has reduced space and power requirements as compared to the current setup. The program office characterized the level of risk as moderate for reducing the size of the battery operations center and integrating the upgraded wireless communications and hardware by fiscal year 2027. The hardware and battery operations center are expected to reach maturity by the end of the current effort, while the wireless upgrades will remain immature.

In July 2025, the MRC program provided support to a bilateral, operational live fire exercise held between the U.S. and Australian militaries. According to DOD, the Army struck and sank a cargo vessel using the MRC system, while the Australian Defense Force conducted air defense intercepts against simulated aerial threats. As of April 2026, the program office was still collecting and analyzing data from the event to identify potential improvements to the MRC system but stated that the system performed as expected. The program also plans to conduct an operational demonstration in the first quarter of fiscal year 2027.

Leading Product Development Practices

As we reported in our last assessment, the MRC program reported that it refined high-level operational needs into a minimum viable product and continues to engage with stakeholders and end users to collect feedback. For example, the program office indicated that there are regular soldier evaluations and training events each year in which the MRC program participates, followed by after-action reviews focused on training improvements and material upgrades incorporated into the MRC design. The program office also noted that the changes to the wireless communications and reduced size of the battery operations center were the result of combatant command feedback.

The program is not, however, implementing other leading product development practices, such as the use of digital engineering tools. The program office noted that, based on the status of the MRC system, the cost and time associated with developing a digital twin at this stage outweighs its benefit. We previously found that fully using digital engineering tools can lead to efficiencies during early stages of development and throughout the life cycle of a program.

The program office also does not currently plan to use a MOSA, another leading product development practice. The program acknowledged that MOSA is typically a cost-saving practice, but stated that much of the MRC design was leveraged directly from, and has interdependencies with, existing Navy systems. As a result, the program would need to determine whether the return on investment is worthwhile for the four batteries planned for production by the Army.

Software and Cybersecurity

The program is in the process of transitioning software development for its vertical launch system to a software factory—a technique that involves cloud-based computing to assemble software tools and enable stakeholders to work together daily. This practice was previously recommended by the Defense Science Board.

The program conducted its first cyber tabletop exercise—designed to introduce and explore the effects of potential threats—in May 2025, and a second exercise is planned for 2026. The program conducted two additional developmental cyber testing events to determine vulnerabilities and adversarial threats in late 2025. According to the program office, testing has identified repeated vulnerabilities, but its next software update is expected to address most of them.

Other Program Issues

The program's plan for an additional battery is under review. We previously reported that the program expected to deliver a fifth battery during a follow-on MTA rapid fielding effort. However, according to the program office, the Army directed the program to reassess its follow-on pathway strategy. The program plans to engage with Army leadership in the second quarter of fiscal year 2026 regarding a follow-on pathway decision.

Program Office Comments

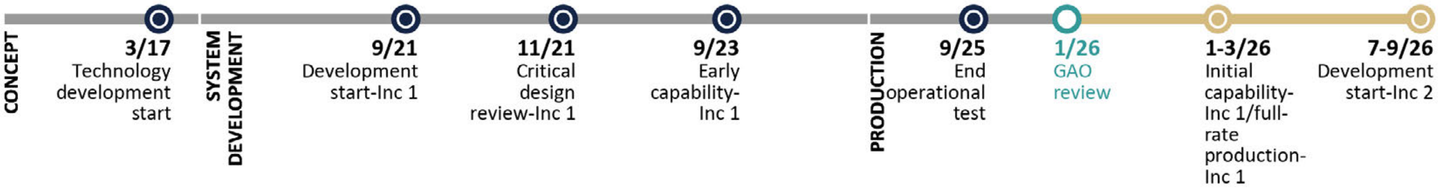
We provided a draft of this assessment to the Army for review and incorporated its comments where appropriate. Program officials stated that battery 4 manufacturing continues toward planned schedule and cost targets as expected. Program officials stated the deployment of MRC batteries 1 and 2 demonstrates effective use of the minimum viable product concept and soldier feedback loops. Program officials stated progress toward the 2026 operational demonstration has been determined by the test community to be appropriately structured. The program office continues to mature its plans to implement digital engineering practices to support system modernization, which may include a digital thread instead of a full-scale digital system twin.

Army **Program Type:** MDAP **Common Name:** PrSM

Source: Lockheed Martin. | GAO-26-108457

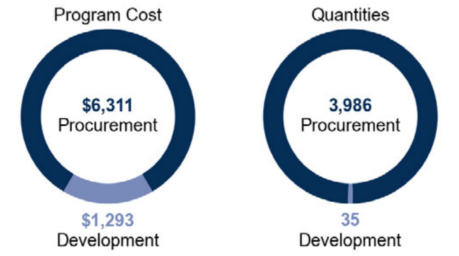
Precision Strike Missile (PrSM)

The Army's PrSM is a surface-to-surface, all-weather ballistic missile designed to attack area and point targets at distances ranging from 70 to over 400 kilometers. Each PrSM container holds two missiles, twice the current legacy missile container's capacity, and remains compatible with existing rocket launcher systems. The Army is developing PrSM across four increments and we assessed the first two. In fiscal year 2026, the first increment is scheduled to start full-rate production, and the second increment to start development. Subsequent increments will extend missile range and add more lethal payloads.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (8/2024)		Current Estimate (8/2025)
Acquisition Cost	$7,680	+0 %	$7,700
Unit Cost	$1.91	+0 %	$1.91
Cycle Time (in months)	107	+0 %	107

(%) Percent change since 2025[a]

[a]GAO-25-107569

Software Development as of January 2026

Approach: Agile and Waterfall

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$135.42 |1.76 %

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Lockheed Martin

Contract type: FFP

Current Status

The PrSM program entered the production phase for the Increment 1 missile in July 2025, supported by 11 flight tests to validate system performance. The program began fielding early operational capability missiles for Increment 1 in September 2023 and planned to deliver 54 to the warfighter by December 2025.

We previously reported that programs with concurrent design and production phases, like PrSM, are at higher risk of schedule delays. This year, the Army again reported delays, including 6 months for the full-rate production decision. Officials attributed these delays to failures experienced during the first phase of initial operational testing, which they have since overcome. However, the revised full-rate production decision is later than the threshold date in the program's acquisition baseline. Program officials told us that they do not expect similar delays for initial operational capability.

The Army reported that all but one of PrSM's 10 critical technologies are mature. The last technology is expected to reach maturity in fiscal year 2026. The program is also continuing technology maturation for its Increment 2 design, which we will continue to monitor, and intends to achieve development start in the fourth quarter of fiscal year 2026.

We previously reported that PrSM has used some leading product development practices, but it is not fully implementing others that could help the program deliver capabilities quicker. According to officials, Increment 1 uses a high-fidelity model that includes elements of a digital twin but does not integrate data automatically to mirror real-time performance, which our prior work found is key for achieving efficiencies, including in production. The program also reported that it is not pursuing a digital thread for Increment 1 but that PrSM will be part of a digital thread being developed by Army's Fire Direction Center.

Program Office Comments

We provided a draft of this assessment to the Army for review and comment. The Army concurred with the contents of this assessment. Program officials stated PrSM is on track to deliver long-range fires capability. The program is accelerating the delivery of more than 800 PrSM missiles through fiscal year 2030 with nearly 100 PrSM missiles delivered to date. PrSM performance, accuracy, and effectiveness were demonstrated during Operation Epic Fury.

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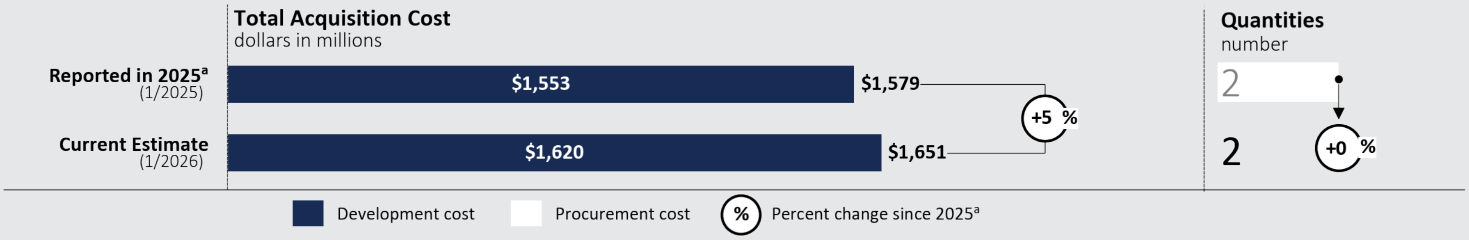
Army | **Program Type:** MTA | **Common Name:** XM30

XM30 Mechanized Infantry Combat Vehicle (XM30)

The XM30 is the Army's planned solution to maneuver warfighters on the battlefield to advantageous positions for close combat. It is intended to replace the existing Bradley Infantry Fighting Vehicle. The program is currently in Phase 4 of its five-phase plan. This phase builds on the previous work done to refine requirements and develop the design and will result in the production and testing of physical prototypes from two contractors. The program is developing additive software separately on the software acquisition pathway.

Source: U.S. Army. | GAO-26-108457

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Incremental, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$212.3 | 13%

Percentage of progress to meet current requirements: 26-50%

Program Essentials

Prime Contractor: General Dynamics Land Systems; American Rheinmetall

Contract type: FFP

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	◐
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	◔
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	●	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We assessed the program's implementation of leading product development practices for the MTA rapid prototyping effort.

XM30 Program

Program Performance

Since our prior assessment, XM30 completed its critical design review. Program officials reported that XM30 received verbal approval for development start, but has yet to transition to the MCA pathway as anticipated. Program officials stated that they are currently evaluating strategies to accelerate the program and may leverage other acquisition pathways to do so. Officials expect the milestone decision authority approval of the proposed acceleration and transition to a new acquisition pathway in the third quarter of fiscal year 2026.

In the last year, the Army identified 16 critical technologies for XM30. Two of these—high-voltage, high-power density batteries and a starter motor generator—are not mature. Program officials stated that the contractors are currently prototyping the technologies and expect to test them toward the end of fiscal year 2026. We previously noted that identifying critical technologies late in development may result in carrying immature technologies through the start of the MCA pathway and increases the risk of redesign—leading to cost increases and schedule delays.

Leading Product Development Practices

XM30 incorporated some elements of leading practices for product development. We previously reported that program officials stated that they identified a minimal viable product as part of concept design during Phase 2. Officials stated that Phases 3 and 4 will result in a fielded MVP. Officials plan to add capabilities to the system in the future. However, the intended outcome of XM30 development is already defined by highly detailed requirements, which could limit its ability to refine capabilities as user needs evolve. In contrast, we previously found that leading companies allow for requirements to evolve based on demonstrated progress through testing and user feedback.

XM30 continues to incorporate stakeholder and end user feedback. Program officials said that they generally hold soldier touchpoints every 6 months, after which soldiers provide feedback to each contractor. Officials also said that they frequently receive user input from other events and sources such as maintainers and logisticians. With the prototype design finalized, officials said that they plan additional touchpoints on turret and user interfaces.

The Army designated XM30 as a "pathfinder" program for pioneering digital engineering efforts. For example, program officials reported that they will develop requirements for a full-system digital twin in the fourth quarter of fiscal year 2026. The program is also developing plans for a digital thread but has yet to document its plans for a digital twin and thread. The Army plans for these to be deliverables in the Phase 5 production contract. We previously found that leading companies use digital twins to refine designs and optimize manufacturing. However, XM30 will not have a digital twin until after the start of the production phase, which limits its ability to refine design.

Software and Cybersecurity

XM30 is developing software through two parallel efforts—the basic vehicle software associated with the prototypes through the MTA effort and additive software using the software acquisition pathway.

Program officials said that the contractors' use of the government-provided DevSecOps environment increased as they approached critical design review in 2025. However, officials said that this environment unexpectedly became unavailable in the fourth quarter of fiscal year 2025. Officials said that the program later moved to a new Army-based environment. According to program officials, while the contractors were onboarded into the new DevSecOps environment in October 2025, they continue to work in their own environments and are slowly integrating software deployment into the new environment, though software development continues to lag. As a result, completing software development in time for testing remains a risk.

Other Program Issues

We previously reported that XM30 was not conducting a full industrial base assessment. Instead, the program plans to conduct assessments as part of the low-rate initial production decision. Program officials report that contractors have conducted internal manufacturing readiness assessments for key subsystems and components. The contractors will complete an assessment focusing on their main suppliers in early fiscal year 2027. Program officials previously conceded that there was some risk in conducting the full assessment after selecting a prototype for low-rate initial production.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. Program officials stated that XM30 remains on track, with Phase 3 and 4 prototypes scheduled for delivery later this year. Officials stated these prototypes will undergo rigorous testing and evaluation to ensure soldier feedback informs the final design. Officials also stated that the decision not to finalize Milestone B last year was a deliberate step to maintain flexibility and explore options to accelerate vehicle production. They noted this approach ensures that the XM30 evolves based on real-world operational insights, enabling the Army to deliver a vehicle that meets the needs of today's warfighters while remaining adaptable for future requirements.

NAVY

Program Assessments

▲ Conventional Prompt Strike (CPS)

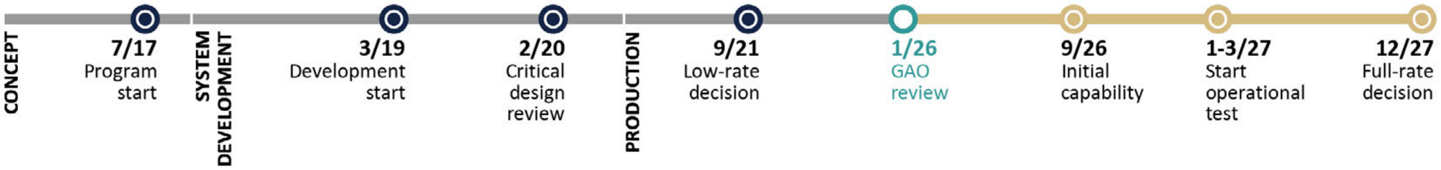
Program name	Assessment type	Page
Advanced Anti-Radiation Guided Missile - Extended Range (AARGM-ER)	MDAP	129
Air and Missile Defense Radar (AMDR)	MDAP	130
Conventional Prompt Strike (CPS)	MTA	131
CVN 78 Gerald R. Ford Nuclear Aircraft Carrier (CVN 78)	MDAP	133
DDG 1000 Zumwalt Class Destroyer (DDG 1000)	MDAP	134
DDG 51 Arleigh Burke Class Destroyer, Flight III (DDG 51 Flight III)	MDAP	135
DDG(X) Guided Missile Destroyer (DDG(X))	Future Major Weapon Acquisition	137
E-130J Take Charge and Move Out Modernization (E-130J)	MDAP	139
F/A-18E/F Infrared Search and Track (IRST)	MDAP	141
FFG 62 Constellation Class Frigate (FFG 62)	MDAP	143
Medium Landing Ship (LSM)	MTA	145
Medium Unmanned Surface Vehicle (MUSV)	Future Major Weapon Acquisition	147
MK 54 MOD 2 Advanced Lightweight Torpedo Increment 1 (MK 54 MOD 2 ALWT INC 1)	MTA	149
MQ-25 Unmanned Aircraft System (MQ-25 Stingray)	MDAP	151
MQ-4C Triton Unmanned Aircraft System (MQ-4C Triton)	MDAP	153
Next Generation Jammer Low-Band (NGJ LB)	MDAP	155
Next Generation Jammer Mid-Band (NGJ MB)	MDAP	157
Orca Extra Large Unmanned Undersea Vehicle (XLUUV)	Future Major Weapon Acquisition	159
Sea-Launched Cruise Missile Nuclear (SLCM-N)	Future Major Weapon Acquisition	161
Ship to Shore Connector Amphibious Craft (SSC)	MDAP	163
SSBN 826 Columbia Class Ballistic Missile Submarine (SSBN 826)	MDAP	165
SSN 774 Virginia Class Submarine (VCS) Block V (VCS Block V)	MDAP	167
T-AGOS 25 Explorer Class Ocean Surveillance Ship (T-AGOS 25)	MDAP	169
T-AO 205 John Lewis Class Fleet Replenishment Oiler (T-AO 205)	MDAP	171
The New Attack Submarine (SSN(X))	Future Major Weapon Acquisition	173

Source (previous page image): U.S. Navy. | GAO-26-108457

Source: Northrop Grumman Innovation Systems. | GAO-26-108457

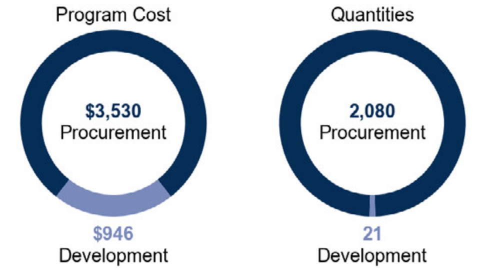
Advanced Anti-Radiation Guided Missile—Extended Range (AARGM-ER)

The Navy's AARGM-ER program is an upgrade to the AGM-88E AARGM. The AARGM-ER is an air-launched missile that is intended to provide increased range, higher speed, and more survivability to counter enemy air defense threats. It will incorporate upgrades to the AARGM missile's guidance and control sections, as well as a new rocket motor, warhead, and control actuation system, which includes fins that help steer the missile. AARGM-ER will be integrated on the F/A-18E/F and EA-18G aircraft and configured to be carried on the F-35 aircraft.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (9/2024)		Current Estimate (9/2025)
Acquisition Cost	$4,456	+0%	$4,477
Unit Cost	$2.13	+0%	$2.13
Cycle Time (in months)	TBD	N/A%	92

(%) Percent change since 2025[a]

[a] GAO-25-107569.

Software Development as of January 2026

Approach: Spiral

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$26.87 | 0.60%

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Northrop Grumman Defense Systems

Contract type: CPIF (development); FFP (procurement)

Current Status

The AARGM-ER program continued to experience significant delays due to software problems discovered during testing. Software development challenges were also a main driver of prior delays. According to the program, a February 2025 flight test failed due to a software issue, which it attributed to a lack of rigor in the contractor's software development and testing process. The program did not use a modern approach to software, and the program office did not have visibility into software metrics, which could have provided insights into issues sooner. Program officials stated that the contractor updated its software development processes, and the program instituted additional software reviews for future flight tests. The program is conducting four flight tests in fiscal year 2026 before fielding an initial operational capability. According to program officials, the December flight test was successful. The program expected to reach initial operational capability in July 2024, but officials now expect to do so over 2 years later in September 2026.

The AARGM-ER program continues to experience production delays. The program reported that the delays were related to missile qualification, hardware capability, and software problems discovered during testing. Program officials expect initial missile deliveries to start in mid-2026. Initial missile deliveries were originally planned for late 2023. According to program officials, they withheld certain payments to the contractor due to the delays. The program also told the contractor it will not accept missile deliveries until qualification and flight tests verify the missile is safe to employ and performs as expected. The program expects to complete missile qualification in June 2026. We found that starting production before demonstrating a system will work as intended—which the Navy did—increases the risk of discovering deficiencies that require costly, time-intensive rework.

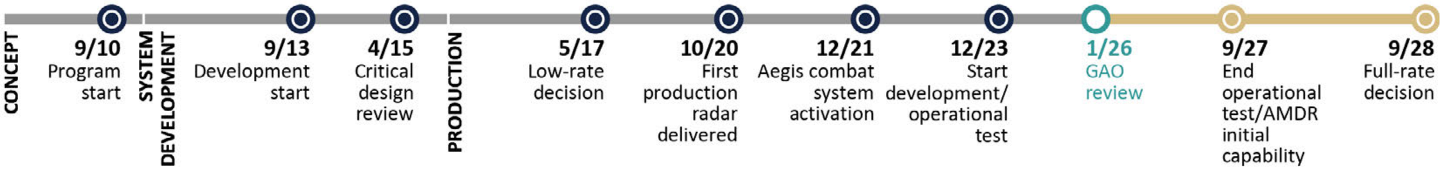
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that it is progressing towards initial operational capability in September 2026. Additionally, the program office stated that it expects to begin delivering production missiles in mid-2026, and that it is on track to meet updated milestones due to cooperative efforts between the Navy, foreign military partners, and the prime contractor.

Source: Huntington Ingalls Industries. | GAO-26-108457

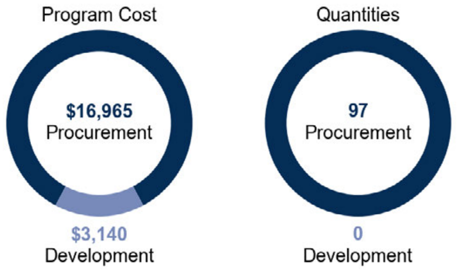
Air and Missile Defense Radar (AMDR)

The Navy's AMDR is a radar program supporting surface warfare and integrated air and missile defense. The Navy plans to make these "family of radars" common across the entire Navy surface fleet. The Navy expects the radars to provide increased sensitivity for long-range detection to improve ballistic missile defense against advanced threats. The Navy is also developing a radar suite controller to provide integrated air and missile defense for DDG 51 Flight III destroyers. In January 2023, the Navy added two Enterprise Air Surveillance Radar variants to the program, and in February 2024, the Navy added a fourth radar variant. This family of variants will provide radars for other ship classes.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (8/2024)		Current Estimate (7/2025)
Acquisition Cost	$17,446	+15%	$20,144
Unit Cost	$183.65	+13%	$207.67
Cycle Time (in months)	204	+0%	204

% Percent change since 2025[a]

[a] GAO-25-107569

Software Development as of January 2026

Approach: Agile and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$2,038.83 | 10.12%

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Raytheon

Contract type: FFP (procurement); CPFF (engineering)

Current Status

Due to continuing shipbuilding delays and advanced radar manufacturing improvements, radar production continues to outpace ship production. This production mismatch has required the Navy to store some delivered radars until ships become available for installation. To mitigate the costs of storage, in January 2025, the program established a government-secure facility to store unclassified and classified material. The facility is currently storing eight radars and one partial system. Program officials stated the cost to lease storage space and store the radars is $1.6 million per year through 2030. AMDR program officials told us that, due to negotiated pricing, it was significantly more cost efficient to store the radars than to reduce procurement or stop production. However, the program said that updated storage costs and procuring two more radars, among other factors, contributed to the program's increased costs.

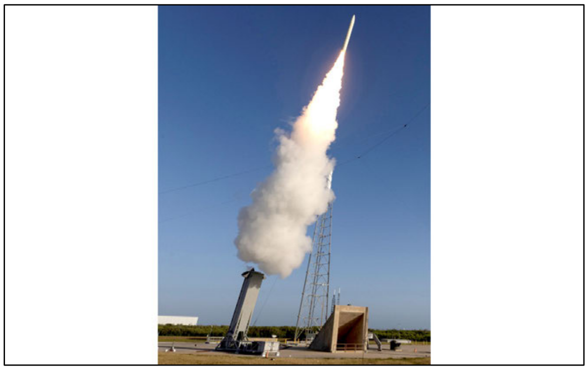
The contractor made several advanced manufacturing improvements that are in line with our leading practices and that are yielding results. For example, the contractor has a digital thread that documents radar production and allows the contractor to quickly diagnose and fix production errors. The contractor also has a digital twin of the production facility, enabling more efficient production and manufacturing techniques, such as using digital tooling for the final assembly of the radars. Additionally, the contractor is assessing an artificial intelligence tool to use next year for software development to increase productivity.

According to program officials, maintaining the current planned initial capability date of September 2027 will depend on promptly identifying and resolving any critical issues discovered during each scheduled test event.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that the program remains on track to support all variants including radars for DDG Flight III and DDG Flight IIA backfit. It also stated that DDG 125 is continuing the at-sea test program with new incremental builds of radar and combat system software, with updates from ongoing testing and defect corrections. The program office said that the test schedule remains stable and on track to support the planned initial operational capability date.

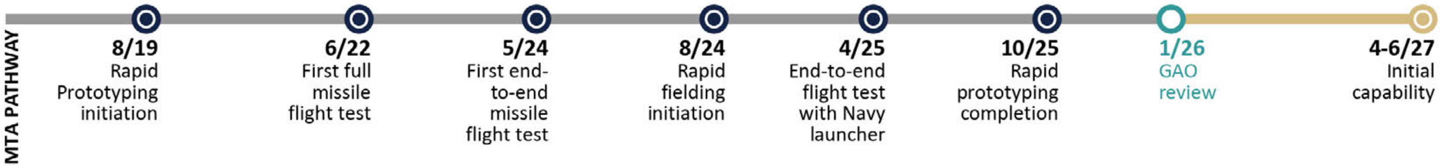
Navy | **Program Type:** MTA | **Common Name:** CPS



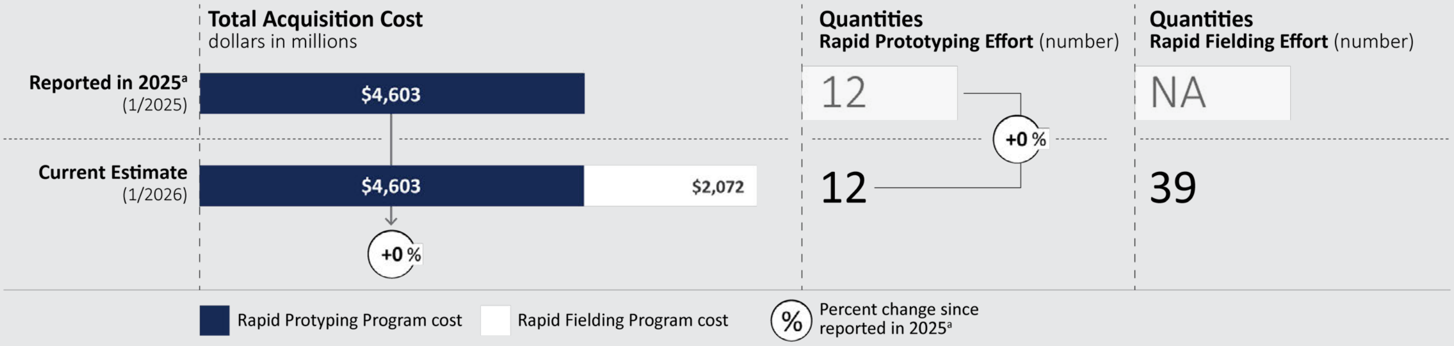
Source: U.S. Navy. | GAO-26-108457

Conventional Prompt Strike (CPS)

The Navy's CPS program aims to develop an intermediate-range, hypersonic weapon system in phases. We assessed phases one and two, an MTA rapid prototyping and rapid fielding effort, respectively. Phase one tested the missile using the Navy's planned launch method. Phase two aims to field the weapon system on a DDG 1000 *Zumwalt* class destroyer by 2027. Phase three, a planned major defense acquisition program, aims to field the weapon system on *Virginia* class submarines by the early 2030s. The CPS program partners with the Army's Long Range Hypersonic Weapon (LRHW) program. LRHW is assessed separately in this report.



Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



The CPS program is acquiring 12 test assets to support the rapid prototyping phase. Four are complete missiles to support flight tests, and eight are other types of test assets.

[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Waterfall, Incremental, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): $110.30 | 2.40%

Percentage of progress to meet current requirements: 51-75%

The software costs above are for the MTA rapid prototyping effort. The program also reported an additional $116 million (fiscal year 2025 dollars) for software development on planned efforts.

Program Essentials

Prime Contractor: Lockheed Martin

Contract type: CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	◐	◐
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	◔	◔
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We assessed the program's implementation of leading product development practices for the MTA rapid fielding effort, which includes its use of leading practices during the completed MTA rapid prototyping effort.

CPS Program

Program Performance

The CPS program achieved the main objective of the MTA rapid prototyping effort in April 2025 by successfully conducting an end-to-end flight test from a Navy cold-gas launcher. The Navy plans to use a cold-gas launch to eject the missile a safe distance from a launch platform before the booster ignites. The test was slightly delayed because the contractor took longer than expected to complete the test missile. DOD previously extended the rapid prototyping effort for 1 year from October 2024 to October 2025 due to testing issues.

The Navy initiated the CPS MTA rapid fielding effort in August 2024, and according to program schedules, it is on track to field the system on a DDG 1000 *Zumwalt* class destroyer in 2027. The MTA rapid fielding effort will culminate with a flight test off a *Zumwalt* class destroyer in 2027. The CPS program reported that the contractor integrating CPS onto the ship completed initial at-sea testing in January 2026. It also stated that the testing focused on the non-CPS work conducted on the ship; CPS at-sea testing will occur later. The DDG 1000 program stated that it expects the ship to be ready for the CPS flight test in 2027.

One of the major risks CPS program officials identified for fielding the system on *Zumwalt* class destroyers is missile availability for testing. The risk is driven by long-standing missile production challenges. Some of the problems discovered during earlier flight tests required the program and contractor to review and refine missile production processes. The problems also created a production bottleneck as the Army and Navy reported putting a hold on missile production until the weapon system was successfully tested. CPS officials said that these peaks and valleys in production demand have made maintaining steady contractor staffing a challenge. For example, officials said that the contractor has not had the same staff in the same roles in successive production runs, which limits learning and harms efficiency. The Army has also raised concerns about the contractor’s capacity to meet its needs for LRHW fielding. The Army worked with a third party to make recommendations to increase the rate of missile production. The LRHW program said that it was working with the contractor and Navy to implement the recommendations.

Leading Product Development Practices

The CPS program continued to implement some leading practices for product development. For example, the program reported incorporating user feedback into the design. In addition, as we previously reported, the program stated that it identified a minimum viable product (MVP). However, this year, the program clarified that the MVP does not accommodate successive updates through a modular open system—one of the key elements of an MVP. The program has yet to incorporate a modular open system approach but it has documented plans to do so in future iterations of the weapon. We previously found that leading companies use modularity to update and improve products after delivery.

The CPS program started developing digital threads and had plans for a full system-level digital twin but, as we previously reported, it scaled back those plans due to cost and time constraints. The program reported that it is in the process of developing digital twins of major components and plans to flow data from them into existing digital threads in the future. We previously found that these digital design tools are useful in the design and validation process and can lead to efficiencies in production and sustainment. Without them, the CPS program may take longer to make needed changes in future iterations of the weapon system.

Software and Cybersecurity

The CPS program delivered software on time to support key tests but, according to officials, software development remains a high risk. The program lacks a common digital environment for its various software developers, which makes integration more difficult. The program also identified its limited capacity to conduct hardware and software integration testing as a challenge. The program is evaluating options for establishing a common software developmental environment and additional government-owned test capacity.

Program Office Comments

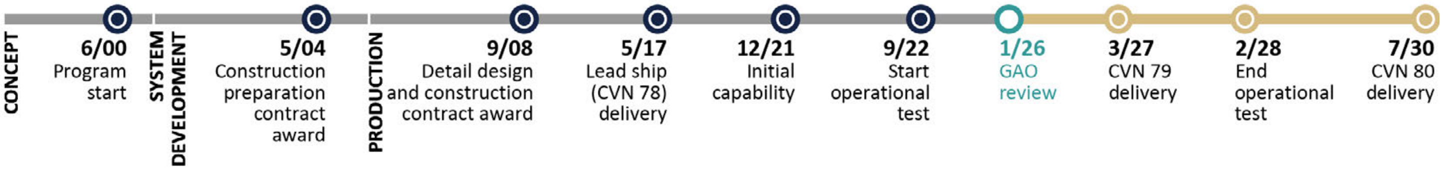
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that it has completed multiple successful end-to-end flight tests of the newly developed common hypersonic missile, including the first CPS flight test using the cold-gas launch approach that will be used in Navy sea-based platforms. The program reported it is collaborating closely with the prime contractor and Navy quality oversight officials to improve production efficiencies in support of future tests and tactical deliveries. The program also stated that it continues to evaluate incorporating a modular open system architecture into its technology insertion process in order to fully apply the MVP approach to the weapon system. The program reported that it continues to closely coordinate with the *Zumwalt* class and *Virginia* class programs to support design, development, and testing in preparation for sea-based specific fielding of the CPS weapon system.

Navy | **Program Type:** MDAP | **Common Name:** CVN 78

Source: U.S. Navy. | GAO-26-108457

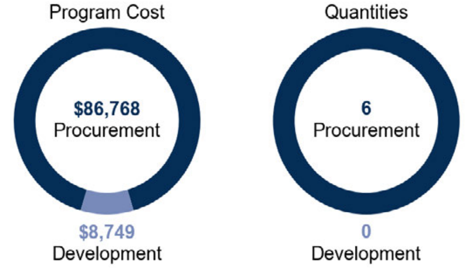
CVN 78 *Gerald R. Ford* Nuclear Aircraft Carrier (CVN 78)

The Navy developed the CVN 78 (or *Ford* class) nuclear-powered aircraft carrier to create operational efficiencies and increase the rate of sustained flight operations compared with legacy aircraft carriers. The *Ford* class introduced new propulsion, aircraft launch and recovery, and survivability capabilities to the carrier fleet. CVN 78 is the successor to the *Nimitz* class aircraft carriers. The Navy also expects the new technologies to enable *Ford* class carriers to operate with smaller crews than *Nimitz* class ships.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (7/2024)	Percent change since 2025[a]	Current Estimate (9/2025)
Acquisition Cost	$65,200	+48%	$96,402
Unit Cost	$16,300	-1 %	$16,067
Cycle Time (in months)	212	+0 %	212

The Navy added two additional CVN units this year and averaged cost across all six ships. As a result, the unit cost reflects a percentage decrease, even though costs for three ships already in development increased.

[a] GAO-25-107569

Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: Information not available

The program reported it does not separately track software as software is provided by other Navy programs.

Program Essentials

Prime contractor: Huntington Ingalls Industries; Newport News Shipbuilding

Contract type: FPI (detail design and construction)

Current Status

Costs for the CVN 78 program continue to rise. Specifically, CVN 79 costs have increased by over $1.5 billion since 2021. Further, since last year, CVN 80 and 81 costs increased $500 million and $1.2 billion, respectively. The program began lead ship construction before completing design and implemented design changes on CVN 79 during its construction—out of line with our leading shipbuilding practices. According to officials, changes resulted, in part, from installing immature technologies that required further development. Program officials stated that they anticipate cost savings on future ships by using digital technology such as 3D modeling to enhance construction efficiency. Navy officials estimate the CVN 82 and CVN 83 will be delivered in March 2039 and March 2043, respectively. The program reported that updated cost estimates for CVN 82 and 83 would be included in future budget submissions.

The Navy delayed planned delivery of CVN 79 by almost 2 years, until March 2027, since last year. Program officials attributed this delay to continued challenges with an elevator subsystem and a landing subsystem. Navy officials told us that they plan to use a more efficient construction process, including a revised build sequence, to incorporate the elevators on future ships.

The program released a new acquisition program baseline that updated the program's schedule and added costs of procuring two additional ships. Schedule updates included delaying planned completion of initial operational testing and evaluation from March 2025 until February 2028. This delay will allow the program to complete a key test event demonstrating the ship's ability to rapidly launch and land aircraft, according to program officials. The test period for the lead ship will now end over 10 years after its delivery and risks costly redesign changes and rework on carriers already in operation if issues surface during testing.

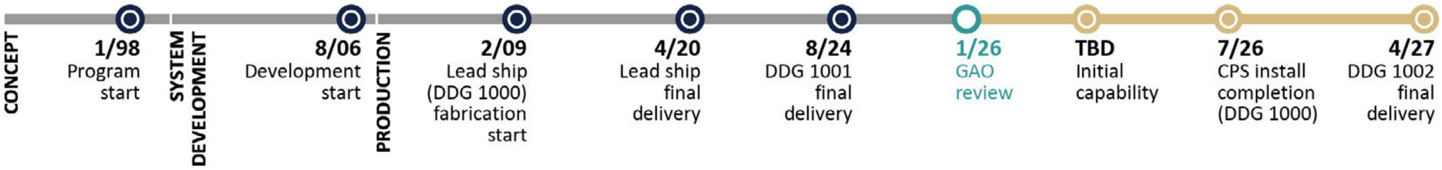
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that CVN 78 began its second deployment in June 2025, demonstrating its capabilities across the U.S. European and Southern Commands. The program also stated that CVN 79 began sea trials in January 2026 and is on schedule for acceptance trials in 2026. The program stated that CVN 80 construction continues and the keel laying for CVN 81 is planned for 2026.

DDG 1000 *Zumwalt* Class Destroyer (DDG 1000)

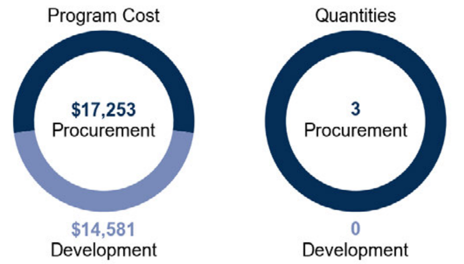
Source: BAE Systems San Diego. | GAO-26-108457

The DDG 1000 was conceived as primarily a land-attack ship, but the Navy changed its primary mission to offensive surface strike. The *Zumwalt* class ships feature a stealth design, an integrated power system, and a total ship computing environment. Among other capabilities added to fulfill the strike mission, the Navy plans to add Conventional Prompt Strike (CPS) hypersonic missile capability. This capability is scheduled to be demonstrated on the lead ship in 2027. We evaluate the CPS program in a separate assessment in this report.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (7/2024)		Current Estimate (1/2025)
Acquisition Cost	$31,834	+0 %	$31,834
Unit Cost	$10,611	+0 %	$10,611
Cycle Time (in months)	325	N/A %	TBD

% Percent change since 2025[a]

[a] GAO-25-107569.

Software Development as of January 2026

Approach: Agile and DevOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

The program does not track procurement of software separate from the overall systems.

Percentage of progress to meet current requirements: 76-99%

The program reported that it does not track software cost elements.

Program Essentials

Prime contractor: General Dynamics Bath Iron Works; Huntington Ingalls Industries; Raytheon

Contract type: FPI/FFP/CPFF (Ingalls CSA); CPFF/CPAF (mission systems equipment)

Current Status

Since last year's assessment, the DDG 1000 program experienced setbacks with its integration of the CPS hypersonic weapon system on the lead ship. According to DDG 1000 program officials, CPS integration on DDG 1000 was delayed roughly 9 months due to unforeseen testing and production challenges. DDG 1000 program officials stated that a live fire demonstration of CPS on DDG 1000 is still expected in 2027—consistent with expectations from our last assessment and about 2 years later than previously planned. DDG 1000 program officials also noted that they expect to use lessons learned from CPS integration on DDG 1000 when integrating the system on DDG 1002 and DDG 1001—planned for fiscal years 2026 and 2028, respectively. Program officials stated that DDG 1002 was dry docked in January 2025 and modifications to support CPS integration began in March 2025. They also noted that CPS integration complexities and delays pushed the ship's planned delivery date by 4 months to April 2027.

DDG 1000 program officials said that they have conducted sufficient physical testing and modeling and simulation necessary to support initial operational capability. The program office also stated that its test and evaluation master plan is undergoing revision to align with operational capability changes for the class and test asset capabilities. The program added that reporting the completion of initial operational capability and initial operational test and evaluation is on hold until an agreement is reached on test plan updates, which may include reevaluating test objectives in follow-on operational test and evaluation.

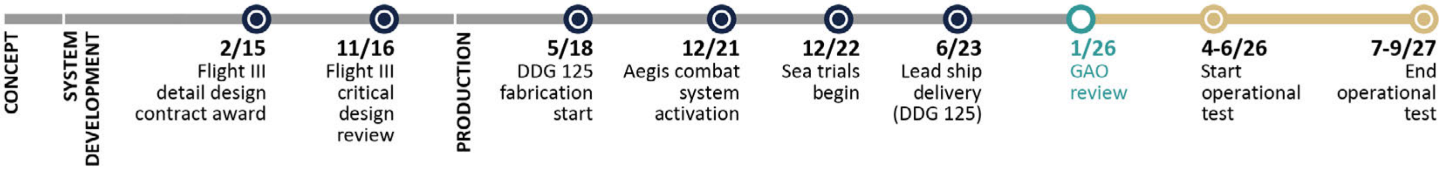
Program Office Comments

We provided a draft of this assessment for program office review and incorporated its comments where appropriate. The program stated that it has made significant testing and modernization progress on DDG 1000 and DDG 1001. The program also stated that, since 2020, DDG 1000 and DDG 1001 have completed significant developmental and operational testing as well as supported fleet exercises and operations. It added that CPS installation on DDG 1000, which began in 2023 as part of a planned modernization period, will conclude in 2026. The program also stated that it is working to complete CPS installation and combat system activation on DDG 1002.

Source: U.S. Navy. | GAO-26-108457

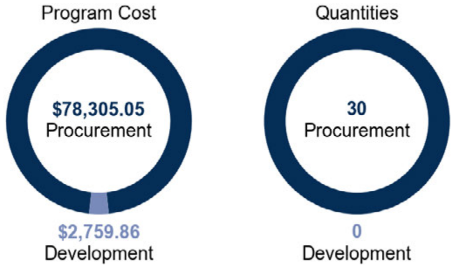
DDG 51 *Arleigh Burke* Class Destroyer, Flight III (DDG 51 Flight III)

The Navy's DDG 51 Flight III destroyers are multi-mission ships designed to operate against air, surface, and underwater threats. Flight III ships will provide the fleet with enhanced ballistic missile and air defense capability. Flight III's changes include replacing the current SPY-1D(V) radar with the Air and Missile Defense Radar program's AN/SPY- 6(V)1 radar and upgrading the destroyer's Aegis combat system. As with prior ships in the class, Flight III ships are being built by two different shipyards—in Bath, Maine, and Pascagoula, Mississippi.



Estimated Cost and Quantities

fiscal year 2025 dollars in millions



Software Development as of January 2026

Approach: Agile, Incremental, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: 76-99%

According to the program, software development and procurement costs are not tracked specifically for Flight III. The relevant data collected by the program are for the entire DDG 51 program.

Program Essentials

Prime contractors: General Dynamics Bath Iron Works; Huntington Ingalls Industries

Contract type: FPI (construction)

Current Status

The Navy continues to experience delays in building the DDG 51 Flight III ships at both shipyards. According to Navy estimates from June 2025, the first 13 follow-on DDG 51 ships are now up to 55 months behind schedule compared with up to 41 months, as we found in our last review. Further, cumulative delays across these ships grew from 323 months to 414 months since last year—a 91-month delay. Contractor officials attribute these delays to the inability to hire a robust workforce at current wages, issues with suppliers, and frequent design changes—issues that are not unique to the DDG 51—among other reasons.

Since the last assessment, program officials said that the program continues to execute testing on the Flight III lead ship—DDG 125—in accordance with the test plans. The program remains on track for an initial operational capability at the end of fiscal year 2027. However, changes to operational test plans previously delayed initial operational capability by about 3 years. The Navy reported continuing to reassess the contractors' schedules and providing schedule and other relief in exchange for concessions beneficial to the Navy while maintaining the agreed-upon prices. Additionally, the DDG 51 program office has invested nearly $1 billion since fiscal year 2021 in infrastructure initiatives at both shipyards. While the Navy reports that these investments helped improve workflow and hiring, the DDG 51 contractors are still not meeting hiring goals or ship delivery dates.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that it has delivered 76 ships as one of the Navy's longest-running production lines, with 24 ships under contract, 12 ships in various stages of production, and the remainder in pre-construction. The program office added that two Flight III ships have been delivered. Additionally, the first Flight III ship, DDG 125, continues to make progress in achieving the Navy's objective to deliver a fully tested and certified integrated air and missile defense-capable ship in fiscal year 2027.

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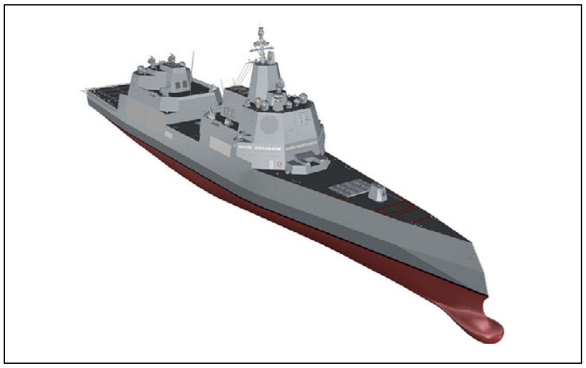


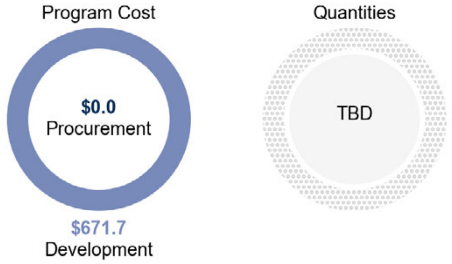
Source: U.S. Navy. | GAO-26-108457

DDG(X) Guided Missile Destroyer (DDG(X))

The Navy's DDG(X) program is developing a new integrated air and missile defense large surface combatant to follow the DDG 51 class destroyers, which the Navy plans to be more fuel efficient and to accommodate future capability growth. The Navy expects DDG(X) to field advanced capabilities such as hypersonic missiles, directed energy weapons, and a more powerful radar system on a new hull. The Navy intends for the design of the DDG(X) to provide sufficient size and power margins to enable greater flexibility to incorporate new systems as they become available. We evaluated DDG 51 in a separate assessment in this report.

Estimated Cost and Quantities

(fiscal year 2025 dollars in millions)



According to the program, costs increased by 28 percent since last year because it included fiscal year 2026 in its reported costs. Since the program does not have an acquisition baseline, it is reporting annual cost changes as they are incurred.

Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: Information not available

The program reported that it has not yet determined whether it will develop or procure software.

Program Essentials

Prime contractors: General Dynamics Bath Iron Works; Huntington Ingalls Industries; Gibbs & Cox

Contract type: CPAF (design)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	...	○
Obtain User Feedback		
Collect end user feedback to inform the product	...	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	...	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	...	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	...	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	...	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	...	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess DDG(X) implementation of leading product development practices at detail design contract award because the program has yet to reach that event.

DDG(X) Program

Program Performance

DDG(X) started preliminary design in June 2025. This review is intended to ensure the design meets performance requirements and accounts for cost and schedule constraints before starting functional design. The program is also conducting land-based test site construction activities and procurement of long-lead time materials.

Although the Navy has yet to commit to a new date to begin construction of the lead ship or deliver an initial capability, it plans to continue building DDG 51 destroyers while starting DDG(X) construction in an effort to facilitate a smoother transition. Officials stated that this is to best position the shipbuilders to retain their skilled trade workforces. Nonetheless, in June 2025, the Navy reported that DDG 51 ship deliveries were behind schedule by up to 55 months due to workforce constraints and other problems at the shipyards. The challenges experienced by DDG 51 ships could affect construction for DDG(X) as they share the same shipbuilders. Officials stated that they plan to begin construction of the DDG(X) by 2032. This would result in delivery of the lead ship in the 2040s at the earliest.

Leading Product Development Practices

Since program start in 2021, the DDG(X) program has yet to develop an acquisition strategy, which is a program document that identifies the acquisition approach and key framing assumptions along with business, technical, and supportability strategies that the program manager plans to employ to meet program objectives. As such, the Navy's business case for the DDG(X) program is not apparent. According to leading practices, programs should establish an initial business case—including a target schedule, estimated costs, and performance goals—and continue to iterate on it throughout development to make sure it remains relevant. Officials stated that they are in the process of developing the acquisition strategy concurrent with their ongoing design efforts. They plan to complete the acquisition strategy by development start, a date that is yet to be determined.

The program's acquisition strategy should also outline its approach for development, including the extent to which it plans to rely on iterative development approaches, which our prior work has found are crucial to timely delivery of relevant capabilities. Program officials were unable to substantiate any use of or plans to employ iterative development in the DDG(X) program. The program is progressing with design efforts without an iterative development approach to guide its efforts. Nonetheless, according to officials, they are working with industry on developing a common design tool and plan to evaluate different potential designs. They are also assessing the benefits and costs of using digital engineering tools, such as a digital twin. We have previously found that these tools are key enablers of rapid, iterative development—and using them to execute a traditional, linear development program does not fully capitalize on their capabilities. Further, for a program with a potential 60- to 100-year life cycle and the likelihood of changes to the threat environment over that time frame, a digital twin could prove a valuable investment. It would provide opportunities to model and simulate different aspects of DDG(X) ship designs and inform design changes and technology updates.

Software and Cybersecurity

Program officials reported that they have yet to determine if the program will be developing or acquiring software, but that the approach will be based on the strategy used by the weapon system integrator. Further, the extent of the software need and the approach for software development is unknown. Similarly, the program does not yet have an approved cybersecurity strategy.

Other Program Issues

The Navy is in the beginning stages of pursuing the *Trump* class battleship (BBG(X)). Navy officials have publicly stated that planned mission requirements for BBG(X) reflect an evolution of those previously developed for DDG(X). Nonetheless, as of January 2026, DDG(X) program officials stated that they were unaware of whether BBG(X) acquisition will affect the Navy's planned investment in DDG(X).

Program Office Comments

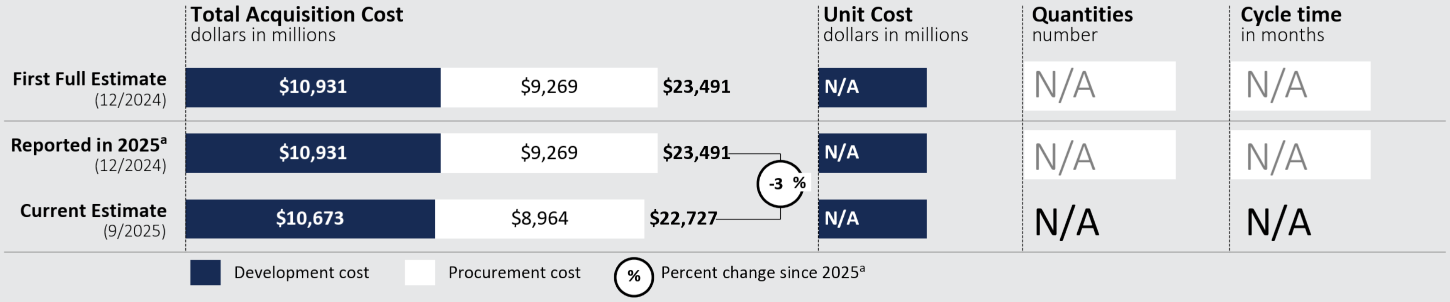
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. According to the program, DDG(X) is being designed to be the next enduring large surface combatant following the DDG 51 class. The program further stated that the Navy plans to pursue an iterative design strategy, and is collaborating with industry to complete preliminary and functional designs. According to the program, while DDG(X) will use the DDG 51 combat system and other mature systems, the design will also accommodate future warfighting capabilities. The program also stated its intention to conduct land-based testing for DDG(X) prior to detail design, but did not specify the planned scope of this testing.

E-130J Take Charge and Move Out Modernization (E-130J)

Source: Northrop Grumman Corporation. | GAO-26-108457

The Navy's E-130J program is intended to perform the Take Charge and Move Out (TACAMO) mission, which provides a survivable, airborne, nuclear command, control, and communications (NC3) link with U.S ballistic missile submarines. E-130J is planned to augment and eventually replace the TACAMO capabilities currently performed by aging E-6B aircraft. The Navy plans to integrate the E-130J mission systems, which include communications through multiple radio frequency bands, onto C-130J-30 aircraft.

Program Performance fiscal year 2025 dollars in millions



Unit cost, quantities, and cycle time were not approved for public release this year by the E-130J program.
[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$688.69 | 3.03%

Percentage of progress to meet current requirements: Information not available

The program reported that the contractor is identifying software for proposed reuse, which will inform software completion.

Program Essentials

Prime contractor: Northrop Grumman Systems Corporation

Contract Type: CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

E-130J Program

Program Performance

The Navy awarded a cost-plus incentive fee (CPIF) contract in December 2024 for E-130J engineering and manufacturing development shortly after approving the program to enter system development. This contract provides for the design, development, and integration of subsystems into the government furnished C-130J-30 air vehicle. The program determined it was appropriate to use a CPIF contract type due to the complexity of the mission systems' integration and their associated risks. Our past work has noted that cost-type contracts shift more risk onto the government and away from the contractor, particularly for complex weapons systems development work.

As we reported in last year's assessment, the Navy awarded its contract despite significant technical risks it acknowledged the E-130J program faced. A September 2024 independent technical risk assessment highlighted the complexity associated with the program's planned integration effort, which officials acknowledged could increase as they integrate additional technologies. Since our 2024 report, the program has delayed its low-rate production decision by approximately a year as these system integration risks have morphed into realities. For example, program officials said that contractors are now focused on modifying already-existing mission systems to reduce their weight, which the independent assessment anticipated would be necessary to accommodate them on the C-130J-30 airframe.

Leading Product Development Practices

The program continues to not pursue a minimum viable product (MVP) and has reduced its efforts to incorporate other leading practices, such as developing a digital thread. Developing an MVP and a digital thread are two practices leading product development companies rely on to ensure users receive essential, relevant capabilities on schedules responsive to their needs and that those capabilities can be rapidly and iteratively updated.

According to Navy officials, the program does not plan to develop an MVP because the program developed highly detailed system capabilities and performance measures prior to the start of the development, and it does not have the flexibility to deliver capabilities that fall short of these requirements. These constraints risk negating any positive effect stemming from the incorporation of user feedback. Instead, they showcase the program's linear, non-iterative approach to acquisition, which our prior work has shown to consistently deliver fewer and less relevant capabilities—on a timeline that is less responsive—than promised at development start.

Program officials also told us that they were overly optimistic about what they had reported last year on the scope of their digital thread efforts. Going forward, program officials stated that they are considering conducting a cost-benefit analysis to inform decisions on what their digital thread will and will not include. Program officials noted that they anticipate using this digital thread only for sustainment purposes rather than to support rapid design iterations—an approach inconsistent with leading practices.

In November 2025, the Secretary of Defense issued an acquisition policy memorandum that, among other things, directs DOD to make tradeoffs during program development to permit iterative enhancement and rapid delivery of capabilities and to maximize the use of a modular open systems approach for development going forward. The E-130J program has yet to identify to us any steps it plans to take to align itself with this memorandum. Nonetheless, the program remains early in development, so opportunities exist to restructure its acquisition strategy to incorporate the memorandum's key tenets—tenets that are consistent with our leading practices.

Software and Cybersecurity

Program officials stated that software development efforts continue to progress, and that the software developer, program office, and fleet operators met to review operator tasks and software to discuss early feedback, which will be integrated into the software development and system design. The program also intends to conduct a cyber survivability risk assessment prior to preliminary design review and another one prior to critical design review, which, according to the program, will be more robust than a cyber tabletop exercise.

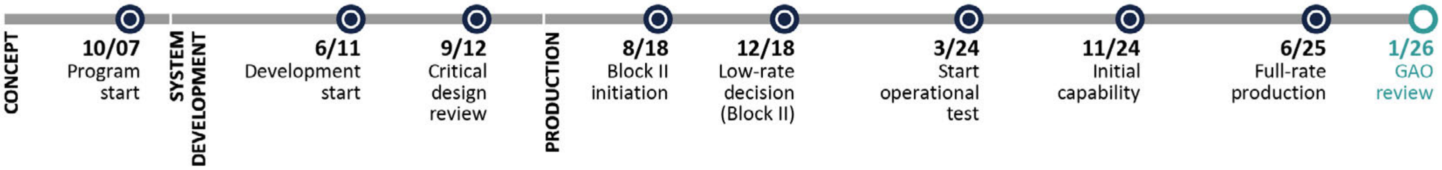
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that the E-130J program remains on track to recapitalize TACAMO capability through developing an MVP, iterating system capabilities through software improvements, and establishing digital frameworks. The program office also stated that it is aligned with Secretary of Defense guidance through an acquisition approach that allows for tradeoffs and implementation of a modular open systems approach. The program office did not provide any documentation to substantiate any of these claims, which run counter to our own analyses of E-130J program documentation.

F/A-18E/F Infrared Search and Track (IRST)

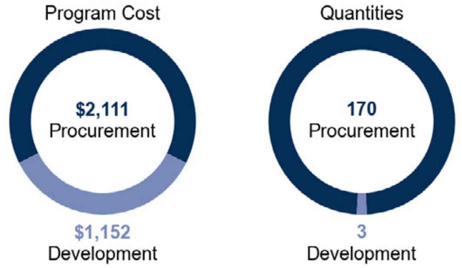
The Navy is integrating new and existing infrared search and track sensors onto the F/A-18 external fuel tank. These sensor pods will enable F/A-18s to detect and track objects from a distance and in environments where radar is ineffective. The Navy is acquiring IRST using an evolutionary acquisition approach, which includes two system configurations referred to as blocks. Block I integrated an existing IRST system onto the F/A-18 external fuel tank. Block II includes an improved sensor, upgraded processor, and additional software. We assessed Block II.

Source: U.S. Navy. | GAO-26-108457



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (7/2024)		Current Estimate (1/2026)
Acquisition Cost	$2,865	+14%	$3,264
Unit Cost	$16.56	+14%	$18.87
Cycle Time (in months)	159	+1%	161

(%) Percent change since 2025[a]

[a] GAO-25-107569.

Software Development as of January 2026

Approach: Agile

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$364.31 | 11.16%

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Boeing (through LRIP 4 procurement); Boeing, Lockheed Martin, and Parker Meggitt (LRIP 5-8, FRP)

Contract type: FPI (LRIP 3, 4); FFP (LRIP 5-8, FRP)

Current Status

The IRST program entered full-rate production in June 2025—5 months later than its baseline schedule—after addressing reliability shortfalls identified during testing. DOD and Navy independent testers assessed that IRST was neither operationally effective nor suitable based on test results, due in part to poor reliability. The program attributed the testers' conclusions about IRST's effectiveness to how they evaluated performance and stated that the system meets all its key performance requirements. Navy testers recommended that IRST continue to be introduced to the fleet, despite their findings. According to the program, IRST also demonstrated improved reliability—exceeding its requirement for a mean time of at least 40 hours between operational mission failures—in deployed units prior to the full-rate production decision.

The IRST program has experienced delays for two software updates that are to improve reliability. According to program officials, these software updates were delayed primarily due to integration challenges with F/A-18E/F aircraft software. The first update was delayed by 3 months and released in January 2026. The second update is delayed by over 1 year until fiscal year 2028, due to the integration issues and a classified change in program plans.

The IRST program continues to deliver pods slower than planned due to production delays for a key component and a labor strike. Estimated procurement costs also increased significantly. Our analysis of program plans found that upcoming pod deliveries are expected to be 23-27 months later than previously planned. According to the program, the production issues were related to the pod's infrared receiver—a key component that the Navy needs before it can integrate the pod. Officials said that the program and contractor reviewed build and test procedures for the receiver and added capacity to increase production rates. Officials also reported that a 4-month labor strike at a Boeing facility in 2025 contributed to delays.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated the software updates it is making will yield reliability improvements and incorporate the full security plan. It also stated that it has recently experienced production yield and delivery improvements for the pod's infrared receiver, which is no longer the limiting factor for overall pod production.

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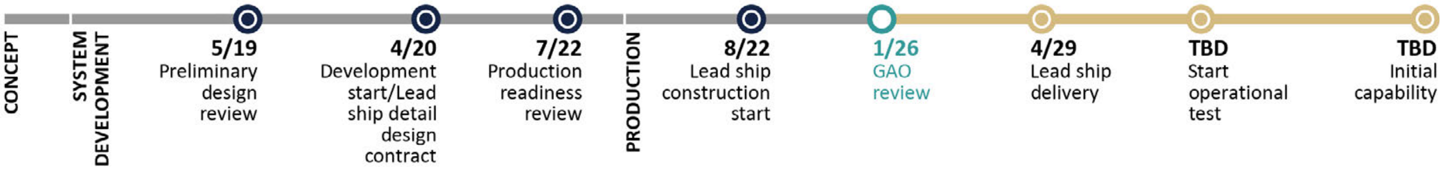
Navy | **Program Type:** MDAP | **Common Name:** FFG 62

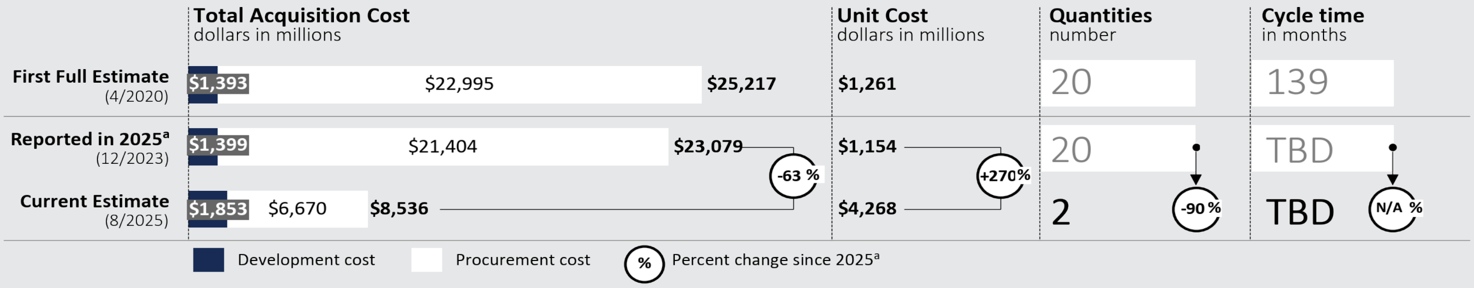
Source: Fincantieri Marinette Marine. | GAO-26-108457

FFG 62 *Constellation* Class Frigate (FFG 62)

The Navy's FFG 62 guided missile frigate program planned to develop and deliver a small surface combatant based on a modified (parent) design of an Italian Navy frigate. The Navy expected the frigates to operate independently and as part of groups to support Navy and joint maritime operations by providing anti-submarine, surface, electromagnetic, and air warfare capabilities. In April 2020, the Navy awarded a detail design and construction contract for the lead ship (FFG 62) with options for up to nine additional ships. However, in November 2025, the Navy reduced planned program quantities from 20 to two ships.



Program Performance fiscal year 2025 dollars in millions



The program's funding remains under review for potential reprogramming by the Navy following its decision to reduce frigate quantities from a planned 20 ships to two ships. Pending completion of the Navy's review, we have chosen to report the total program costs associated with the six ships the Navy had under contract and obligated funds toward prior to its decision to reduce the number of ships.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, DevOps, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: Information not available

According to the program, software costs are not broken out in the cost expenditures and estimates provided by the contractor.

Program Essentials

Prime contractor: Fincantieri Marinette Marine (FMM)

Contract Type: CPFF

Use of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

FFG 62 Program

Program Performance

In November 2025, the Secretary of the Navy reduced the planned frigate program quantities from 20 ships to two ships following years of design instability and construction delays. As part of this reduction, the Navy terminated work on four of the six frigates (FFG 64—FFG 67) that were under contract due to a strategic shift on the part of the Navy. Later, in February 2026, the Navy changed the contract type for the remaining two ships (FFG 62 and FFG 63) from fixed price incentive to cost plus fixed fee (CPFF). Under a CPFF contract, the Navy will generally reimburse the shipbuilder for its allowable costs up to the contract's ceiling price. According to senior Navy officials, these two ships are under review for potential termination. Notwithstanding this review, these officials also told us their anticipated course of action but deemed that information not suitable for public release. These officials further stated that in March 2026, the Navy directed its shipbuilder to pause ordering material for FFG 62 and FFG 63 to evaluate its necessity as those ships remain under review. These officials also stated they plan to use $2 billion in funds to secure alternative workload for FMM and provide workforce training, development, and retention opportunities.

While the Navy attributed the reduction to a strategic shift and a need to deliver ships faster, this decision also represents a predictable outcome to the flawed acquisition strategy upon which it structured the frigate program. As we previously reported, the Navy had obligated over $3.4 billion to construct six ships before completing the frigate's basic and functional design—an approach counter to shipbuilding leading practices. As of September 2025, over 3 years since construction start, the program office reported the functional design remained incomplete (87 percent complete).

The Navy and shipbuilder's persistent design challenges drove instability in the program. Navy officials stated modifying the parent Italian frigate design to meet the Navy's performance and technical requirements was more effort than expected. The extent of design changes exceeded the original expectation of conducting limited design changes on the parent design. Implementing these design changes necessitated hundreds of tons of estimated weight growth within the ship design. In July 2025, the shipbuilder reported weight growth over 1,100 metric tons from initial estimates. The Navy and shipbuilder were considering an increase to the ship displacement limit by 7.5 percent to 8,400 metric tons. However, increasing such displacement would likely affect the ship's speed, range, and buoyance characteristics.

Concurrently, the Navy and shipbuilder have evaluated weight savings opportunities, including removing redundant systems, removing primer from steel plating, and reducing firefighting system capacity, among other things. The Navy determined that process improvements and continued weight reduction will provide a stepped implementation pathway to meet displacement goals through the first three ships. However, implementing all its weight saving opportunities would increase costs and further delay construction schedules.

Leading Product Development Practices

We previously reported multiple times that the frigate program did not follow iterative design approaches that could lead to efficiencies in design, production, and sustainment. Even though we recommended that the Navy evaluate ways to incorporate these leading practices into the frigate acquisition strategy, and the Navy said that it was taking steps to implement them, not incorporating these practices early in the acquisition process likely led to costly design and construction changes.

Other Program Issues

Looking ahead, the Navy now plans to use a different shipbuilder to acquire a new frigate, FF(X), based on the design of the Coast Guard's National Security Cutter (NSC), marking the Navy's third attempt at a viable small surface combatant program. In December 2025, the Navy issued a justification and approval supporting planned sole source contracts to Huntington Ingalls Industries with an estimated value of nearly $1.135 billion for work related to updating the design of and building the new frigates. Officials stated that the ship design will be largely unmodified from the NSC design, noting specifically that the hull and distributed systems will be unchanged. They further noted that these design decisions are made possible by the Navy aligning technical requirements to the intended mission envisioned for the FF(X), which is different from the mission of the predecessor frigate program. In February 2026, Congress appropriated $242 million for the FF(X) program, which the program plans to use to procure long-lead materials.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated comments where appropriate. According to Navy officials, the program validated FFG's design maturity in May 2025 and subsequently validated the readiness to increase production activities through a Production Ramp-up Review in June. Officials stated the program continued to identify and implement weight reduction efforts and was on track to meet reduction goals through a phased implementation across the first three ships. In November 2025, the Navy made a strategic decision to shift away from FFG 62 to a frigate designated FF(X) that will be designed for a focused mission at the low-end part of a high/low fleet force structure. Officials stated the FF(X) will be able to relieve larger, multi-mission capable platforms from lower-priority tasking, thereby enhancing fleet-wide operational flexibility.

Medium Landing Ship (LSM)

Source: Damen Naval. | GAO-26-108457

The Navy's LSM program is pursuing a medium-sized landing ship intended to transport Marines and their associated supplies and fuel from shore to shore in contested environments. The Navy expects LSM to support the operations of the Marine Corps's Marine Littoral Regiments and to provide distributed maneuverability, mobility, and logistics for near-shore operations. The Navy intends to procure LSM in two blocks, with initial plans to procure at least 18 LSMs across the two blocks, and potentially up to 35 ships as operational plans are refined. The Marine Littoral Regiments that LSM is expected to support became operational in 2023, so LSM is late to need. We assessed the Block 1 MTA effort.

- **5/20** Preliminary requirements identified
- **2/23** Analysis of alternatives approval
- **1/25** Block 1 top level requirements approved
- **1/26** GAO review

MTA PATHWAY

- **7-9/26** Block 1 MTA Initiation/Vessel construction manager award
- **FY2029** Lead ship operational assessment and delivery
- **8/30** Expected MTA completion

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions	**Quantities** number
Reported in 2025[a]	**Program not a Middle Tier Acquisition program in GAO's 2025 assessment**	
Current Estimate (1/2026)	**Program has not developed a formal cost estimate**	

In fiscal years 2025 and 2026, Congress appropriated a total of $2.8 billion for LSM, which the program plans to use to procure up to eight ships. Program officials stated that total cost and quantities are being revised due to congressional direction and changes to the program's acquisition strategy; however, they have yet to provide updated estimates.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements:

Information not available

The program reported that it is not developing software and is instead using software that has been fielded on other programs.

Program Essentials

Prime Contractor: TBD

Contract type: FFP (Vessel Construction Manager)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	...	○
Obtain User Feedback		
Collect end user feedback to inform the product	...	◔
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	...	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	...	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	...	○
Test a system-level integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	...	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	...	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess LSM implementation of leading product development practices at MTA initiation because the program has yet to reach that event.

LSM Program

Program Performance

To acquire a ship that fully meets LSM's operational requirements, the program had planned to pursue a developmental design and construction approach using the MCA pathway. However, after years of delays and affordability concerns, the Navy shifted to a two-block acquisition strategy in December 2024 that reduces requirements for the ships in the first block and defers pursuit of a ship that will fully meet requirements to a later block. The program will use Damen Shipbuilding's existing landing ship transport (LST-100) design for Block 1 and follow the MTA pathway to rapidly field ships with some of the program's required capabilities. The program plans for Bollinger Shipyards and Fincantieri Marinette Marine to construct the lead ship and first four follow-on ships, respectively.

As the program prepares to start LSM construction, many uncertainties remain. For example, although the program has started awarding contracts for Block 1, program officials said they are still determining how many ships the Navy can afford within available funding and awaiting final approval to initiate the block as an MTA effort. Additionally, program officials said they have yet to start planning the details of the transition to the second block, such as the timing of the transition or the requirements of the next block.

Leading Product Development Practices

LSM has implemented some elements of leading product development practices that support a minimum viable product. For example, when revising LSM's acquisition approach, the program engaged with shipyards, the Marine Corps, and the fleet to determine how capability requirements for Block 1 could be reduced to enable the use of an existing ship design. This action supports accelerating the delivery of ships that provide warfighters with needed capabilities. Program officials said they intend to reengage users as they refine plans for the second block, for which the design remains uncertain.

Additionally, the program acquired a technical data package that includes 3D modeling for Block 1's Damen design. However, the program does not plan to leverage a full system-level digital twin or establish a digital thread, which are digital engineering tools that provide real-time, authoritative data for decision-making. We found that the use of these digital engineering tools can provide efficiencies and inform future design decisions.

Software and Cybersecurity

The LSM program is not undertaking any software development during Block 1 because program officials said they expect the ship will use commercial systems with non-developmental software. Additionally, officials stated that all government-furnished equipment for LSM, such as navigation systems and gun systems, have been fielded on other ships and do not require additional software development.

LSM's cybersecurity strategy was approved in February 2024, and Block 1 includes a requirement to meet commercial cybersecurity standards, at a minimum. The program has yet to conduct cybersecurity assessments but plans to do so as the program matures.

Other Program Issues

Pursuant to direction provided in the National Defense Authorization Act for Fiscal Year 2026, the program plans to award a contract to a Vessel Construction Manager (VCM) for the construction of up to eight Block 1 ships. The VCM will be the program's prime contractor and will award construction subcontracts to shipyards, oversee construction, and monitor shipyard performance, among other things.

Program officials cited potential benefits to using a VCM, such as shortened execution timelines based on the VCM not having to follow government acquisition regulations. Additionally, the Navy plans for the VCM to award construction subcontracts to multiple shipyards, which officials expect will help speed delivery of ships to the fleet. However, program officials noted that a lack of Navy experience executing a program using a VCM poses potential challenges to program oversight and execution.

Program Office Comments

We provided a draft of this assessment for program office review and incorporated comments where appropriate. The program stated it received preliminary approval in February 2026 through a Navy acquisition decision memorandum for LSM Block 1 to start as an MTA rapid fielding program. The program noted that final approval is expected before awarding the VCM contract. The program also stated that the total number of Block 1 ships remains undetermined, with the National Defense Authorization Act for fiscal year 2026 limiting the contract award to no more than eight ships. The program added that, although the Navy has not used the VCM model to procure a warship, program office personnel worked with the United States Maritime Administration and industry partners during an industry day event, with feedback used to develop the VCM Request for Proposal. According to the program, the VCM contract is intended to be as close as possible to a commercial contract, which is different than the Navy's typical approach to awarding a detail design and construction contract. The program stated that the VCM will oversee the construction and delivery of the vessels, using a non-development design approach to accelerate delivery to the warfighters. The program added that the government maintains oversight and control of program execution.

Medium Unmanned Surface Vehicle (MUSV)

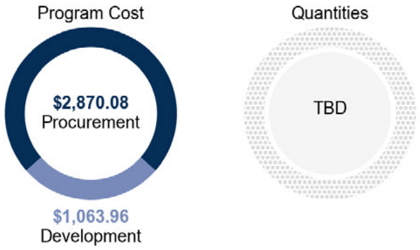
The Navy's MUSV program plans to deliver robotic autonomous surface vessels. The Navy intends for MUSV to be modular vessels designed for various missions including anti-submarine warfare, strike warfare, and information operations, among other things. The MUSV program intends to provide a family of systems that includes some of the capabilities previously planned for the Navy's Large Unmanned Surface Vessel (LUSV) program.

Source: U.S. Navy. | GAO-26-108457

1/26	**3/26**	**TBD**	**Fiscal Year 2027**	**Fiscal Year 2028**
GAO review	MUSV Request For Proposals for prototypes	Awards to qualified contractors	Initial delivery of tranche 1 MUSVs	Final delivery of tranche 1 MUSVs

Estimated Cost and Quantities

(fiscal year 2025 dollars in millions)



Navy officials stated prior year funding includes some funding used for the LUSV effort, which the Navy is no longer pursuing.

Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: Information not available

The program reported that it is not developing software and will rely on commercial solutions. The program also reported that it will consider integrating government systems and software in the future.

Program Essentials

Prime contractors: TBD

Contract type: TBD

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	...	○
Obtain User Feedback		
Collect end user feedback to inform the product	...	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	...	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	...	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	...	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	...	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	...	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess MUSV implementation of leading product development practices at detail design contract award because the program has yet to reach that event.

MUSV Program

Program Performance

The Navy is moving away from the previously structured LUSV program in favor of the MUSV program, which aims to deliver a family of systems to address fleet needs as soon as possible. Lessons learned through early development efforts of the LUSV program and experimentation with other autonomous surface vessel prototypes, among other things, contributed to this decision. Specifically, the Navy, including fleet officials, identified that the MUSV prototypes demonstrated more capability and could be used for more missions than initially expected.

Navy officials reported that they expect the program's initial cost estimate, schedule, and requirements documents will be approved to inform acquisition decisions by June 2026. The Navy's initial estimate for the cost of the MUSV program is over $2.1 billion. Congress provided $2.1 billion for the development and acquisition of MUSVs in July 2025.

Requirements for MUSV reflect a combination of the MUSV and LUSV programs' top-level requirements. Officials stated that the MUSV program plans to leverage some investments previously made through the LUSV program, such as key enabling technologies. In addition, program officials said the Navy plans to use commercial shipbuilding standards, when possible, instead of Navy standards to enable more shipyards to build MUSVs.

The Navy's planned acquisition approach is to establish a competitive MUSV marketplace where commercial companies prove readiness before being selected as a qualified contractor. Potential contractors will be qualified based on business models, design validation, manufacturing readiness, and autonomy and performance testing. The Navy then plans to select among various contracting and operating models to acquire and manage MUSVs based on mission needs. According to officials, this approach allows the Navy to experiment with various vessels before making significant investment decisions while minimizing the Navy's investments in maturing technology.

Leading Product Development Practices

Navy officials said that they plan to implement leading practices for product development, but documentation of these plans is still underway. As of January 2026, the extent to which the Navy's acquisition strategy reflects leading practices is unclear. The MUSV program presents an opportunity for the Navy to adopt leading practices by simplifying requirements to a minimum viable product, fielding that product, and then building more capability into that product iteratively in conjunction with users. Further, leveraging digital engineering tools, such as digital twins and digital threads, can improve efficiencies throughout the life cycle of a program. Navy officials reported that the establishment of the MUSV program is based on feedback from end users and lessons learned from the MUSV prototypes. According to these officials, the structure of the MUSV program will enable more iterative approaches than the structure in the prior LUSV program.

Software and Cybersecurity

The program plans to use commercial software solutions for its initial MUSV efforts. Navy officials stated that plans for future software development will be made based on lessons learned from experimentation with initial MUSVs. Cybersecurity plans are still in draft and officials stated that they expect them to be approved by January 2028.

Other Program Issues

In September 2025, the Secretary of the Navy established a new organizational structure for the Navy's robotic and autonomous systems. As part of this effort, the Secretary of the Navy initiated the development of an implementation plan and directed a pause on all new Navy robotic and autonomous system-related acquisition decisions and contracting actions while analysis is conducted to inform the plan. In January 2026, senior Navy officials stated that the implementation plan is still in development.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. Program officials stated after our January 2026 review cutoff that they have a $4.3 billion spend plan for industry to have a maximum of 65 vessels for lease by fiscal year 2031, among other spend plans.


Source: Alion Science and Technology. | GAO-26-108457

MK 54 MOD 2 Advanced Lightweight Torpedo Increment 1 (MK 54 MOD 2 ALWT INC 1)

The Navy's MK 54 MOD 2 program is developing an advanced lightweight torpedo for use by U.S. surface ships, fixed-wing aircraft, and helicopters in anti-submarine warfare. The program has initiated an MTA rapid prototyping effort for an Increment 1 (INC 1) version that focuses on increased lethality. To accomplish this, the program plans to modify internal components within an existing torpedo forebody and use the propulsion system currently fielded in the MK 54 MOD 1 variant. The Navy plans to develop a second increment to incorporate improvements in propulsion that can achieve higher speeds and maneuverability at greater depths.

3/19 Program start	MTA PATHWAY	**9/25** MTA initiation	**10/25** Preliminary design review	**1/26** GAO review	**10-12/26** First flight test	**7-9/27** Critical design review	**1-3/30** Operational demonstration/ expected MTA completion

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions	**Quantities** number
Reported in 2025[a]	**Program not a Middle Tier Acquisition program in GAO's 2025 assessment**	
Current Estimate (1/2026)	Development cost $438 | Procurement cost $126 | **$564**	40

■ Development cost □ Procurement cost

[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and Other

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$33.1 | 5.86%

Percentage of progress to meet current requirements: 51-75%

The program reported that it is using an iterative development approach where the government tests incremental builds and then incorporates capabilities to address issues found during testing.

Program Essentials

Prime Contractor: Northrop Grumman

Contract type: CPFF (using other transaction authority)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	◐
Obtain User Feedback		
Collect end user feedback to inform the product	◔	◔
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	◐

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

We assessed the program's implementation of leading product development practices for the Increment 1 rapid prototyping effort.

MK 54 MOD 2 ALWT INC 1 Program

Program Performance

Previously, the program planned to reach an initial operational capability in March 2033—a delay of over 5 years since our first review. It now plans to meet requirements for a residual operational capability for INC 1 by early 2031, with future plans for INC 2 requirements to be determined. In August 2025, the Navy revised the program's acquisition strategy to separate the effort into two increments. The revised strategy concentrates immediate development efforts on improving lethality in an initial increment (INC 1) while deferring future improvements, including the integration of an advanced propulsion system to a later increment (INC 2).

To meet the revised schedule, hardware deliveries must be completed in time to initiate in-water testing. Program officials described ongoing challenges in acquiring parts and components, which could result in further schedule delays. Overall, the program's continued delays are consistent with our prior work that identified a recurring pattern in weapon programs: initial optimism in schedule planning followed by necessary adjustments due to technical complexities, testing challenges, and funding constraints. The program has experienced significant schedule delays due to propulsion technology maturing slower than planned, constrained funding, and optimistic planning assumptions. For example, we previously found that within 2 years after the program established a schedule, it experienced an 8-month delay.

In addition, the program now anticipates a multiyear gap between the completion of hardware design and conducting an operational demonstration. Difficulties in securing relevant targets, such as a submarine, to conduct an operational demonstration could further delay testing and limit the data available to validate its operational performance. Should the Navy decide to proceed with follow-on production using limited or outdated test data, it could increase the risk of rework in the design.

Leading Product Development Practices

The program has yet to fully implement many of the iterative development practices that leading companies use to deliver products quickly. The program continues to use requirements originally set in fiscal year 2018 but is revising them to reflect the differences in increments, according to officials. Program officials said INC 1 will define the MVP and INC 2 will address the remaining requirements via successive updates. However, leading practices entail refining requirements based on end user feedback rather than meeting prioritized but fixed requirements that could become obsolete over time.

We previously found that leading companies capture feedback during iterative development cycles to determine if the design meets user needs and reflects an MVP. Program officials said they incorporate some technical updates from active users across the Navy that use the system for other torpedoes, and plan to use some end user feedback from sailors supporting future testing events. We will continue to monitor the extent to which the program plans to incorporate end user feedback into the INC 1 prototype design and use the feedback to inform future iterations.

The program office stated it developed a high-fidelity digital model of the torpedo for use in modeling and simulation testing that will be revised based on test data, though program officials said it does not comprise a full system-level digital twin. Instead, the program plans to use the digital model to test subsystem integration with hardware in a testing environment.

The Navy applies MOSA to torpedoes, including INC 1, which can make it easier to add capabilities and extend relevance by enabling interoperability, reducing reliance on a single vendor, and enabling faster technology insertion. However, program officials noted that budget constraints have limited the use of digital engineering tools, such as digital twins. These tools provide the ability to anticipate potential design flaws, optimize manufacturing, and reduce costs.

Software and Cybersecurity

The program plans for several software releases over the next 5 years and has taken steps to mitigate previous delays in system-level integration and testing due to hardware deliveries, which are needed for these software releases.

Other Program Issues

The program relies on a concurrent development effort upgrading its Guidance Control System, which has experienced some cascading supply chain and broader design-related issues. The program also redesigned the integration of the Guidance Control System to accommodate a larger warhead within the MOD 1 forebody.

Program Office Comments

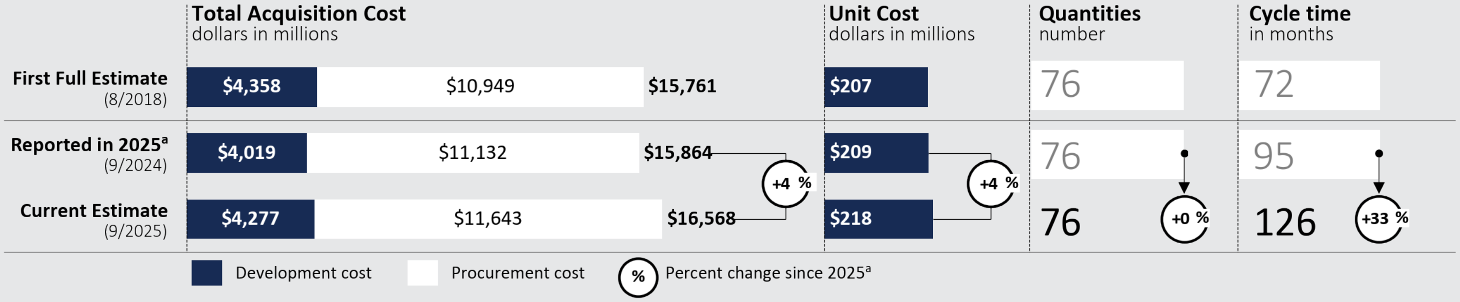
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that it prioritized MK 54 MOD 2 INC 1 as its MVP. According to the program office, its incremental delivery approach is risk-informed to accelerate development. The program office stated there are no gaps in prototype development, with essential operational testing planned after the hardware design is finalized to iteratively finalize operational software. The program office said that testing will incorporate stakeholder feedback into design functionality. It also stated the rapid prototyping effort will conclude with the operational demonstration and delivery of limited hardware to meet initial operating requirements. The program office said it plans for follow-on production through a rapid fielding effort after the hardware design is finalized, to allow for concurrent software development and initial hardware production, reducing the schedule for delivery by 2 years.

MQ-25 Unmanned Aircraft System (MQ-25 Stingray)

Source: U.S. Navy | GAO-26-108457

The Navy's MQ-25 Stingray is a catapult-launched, uncrewed aircraft system designed to operate from aircraft carriers. The Navy plans for the MQ-25 to provide a refueling capability for the carrier air wing. The MQ-25 is also expected to provide the intelligence, surveillance, and reconnaissance capabilities needed to identify and report on surface targets. The system is composed of an aircraft segment, a control station segment, and a carrier modification segment. We evaluated the aircraft segment and related control station segment.

Program Performance fiscal year 2025 dollars in millions



The graphic bars depict only research and development and procurement costs. However, total acquisition costs may also include costs for military construction as well as acquisition operation and maintenance.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Waterfall, and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$193.6 | 1.17%

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Boeing

Contract Type: FPI (development)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	◐	●
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	◔
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	◔
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	◐
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	◔
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

MQ-25 Stingray Program

Program Performance

The program reported a 2½-year delay to initial operational capability and a 26-month delay to the end of initial operational testing. Program officials attributed this to difficulties building its first test units—such as wire testing and vibration monitoring—as well as challenges in qualifying parts, though all had at least an intermediate solution.

MQ-25 Stingray continues to plan for concurrent testing and low-rate initial production (LRIP), which could result in cost increases and further delays if changes are needed based on testing. Program officials told us that they delayed the LRIP decision until after the aircraft's first flight, planned for the second quarter of fiscal year 2026. MQ-25 plans to acquire three LRIP units before it completes developmental testing in the second quarter of fiscal year 2028. This leaves 24 months to resolve key issues before making a full-rate production decision.

Program officials told us that they resolved two of the seven component-level obsolescence issues that we reported on last year. The program continues to address the five remaining issues.

Leading Product Development Practices

The program reported that it identified an MVP and continues to iterate, such as through prioritized software builds. While the program reported a digital twin that represents the full system and key subsystems, as well as a digital thread that provides access to data, the program clarified this year that these tools do not provide access to automated, real-time data. Without this key element, we do not consider these tools as implemented. The program noted that it faced challenges in developing a digital twin, such as technical maturity for the digital twin environment, limited funding, and longer-than-expected development time frames. We previously found that incorporating all elements of digital engineering tools can improve efficiency throughout a program's life cycle.

The program incorporated user feedback and has a user agreement in place, in line with our leading practices. For example, the program includes end users in test events to help inform future operational use. The program also indicated that it plans to incorporate MOSA into the whole system, including a ground control station. Program officials stated that they are procuring the data rights to the air system interface control documents to allow for more competition in future upgrades.

Software and Cybersecurity

The program reported that Boeing is still developing software for the aircraft and that another contractor completed the ground control station software. The program reported that schedule delays for the ground control station software integration resulted in increased costs.

The program has yet to complete key cybersecurity tests that DOD guidance in place at the time of our review recommends to occur during development. The program does not plan to complete cyber testing until October 2028, over 2 years after the first flight. Completing this testing after the start of production increases the risk of cost increases.

Other Program Issues

Program officials told us that they are working to obtain better cost data for MQ-25 as they begin to obtain spare parts. Program officials stated that due to the fixed-price nature of the development contract, they did not previously have access to data showing the actual cost of building the aircraft. The program reported that the increased material costs have increased unit costs, which our analysis found increased by 4 percent compared to last year's assessment.

MQ-25 construction was also affected by a machinists' strike at Boeing's St. Louis facility from August 2025 to November 2025. The program office told us that it is assessing the impact of the strike, and it estimates a 7-month delay to the test aircraft production line, which will delay future testing.

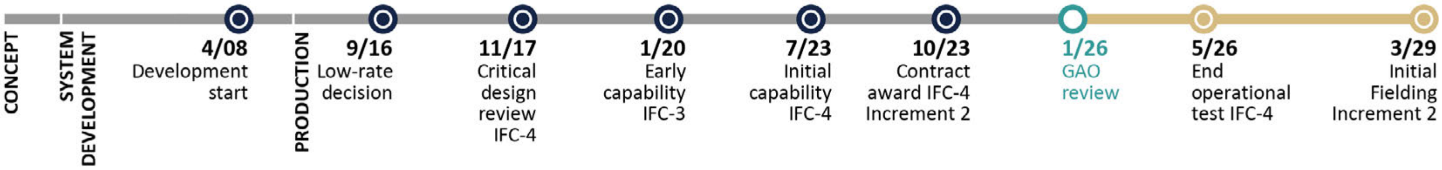
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. After our review, the program reported that it conducted its first flight in April 2026 and that it received approval for production start in May 2026. Additionally, the program reported that it plans to award a contract for the first lot of LRIP aircraft in the summer 2026.

Source: U.S. Navy. | GAO-26-108457

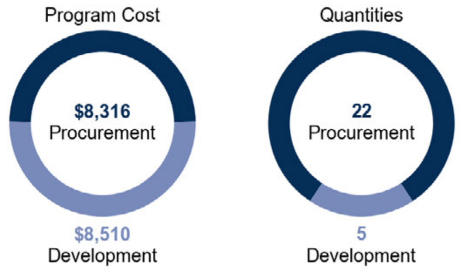
MQ-4C Triton Unmanned Aircraft System (MQ-4C Triton)

The Navy fielded MQ-4C Triton to provide high-altitude, long-endurance, persistent intelligence, surveillance, and reconnaissance, as well as data collection and dissemination. The system includes multiple air vehicles equipped with mission payloads, a communications suite, support by a ground control station, and Navy operational networks. Increment 1 consists of two aircraft configurations—Integrated Functional Capabilities (IFC)-3 and IFC-4. The Navy is retrofitting the IFC-3 aircraft into the IFC-4 configuration, which adds signals intelligence capability. Increment 2 further upgrades IFC-4 capabilities with the addition of subsystems to enhance effectiveness and survivability. We assessed both increments.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (7/2024)		Current Estimate (5/2025)
Acquisition Cost	$17,043	+1 %	$17,288
Unit Cost	$631.23	+1 %	$640.30
Cycle Time (in months)	183	+0 %	183

(%) Percent change since 2025[a]

[a]GAO-25-107569.

Software Development as of January 2026

Approach: Agile and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$1,174.85 | 6.80%

Percentage of progress to meet current requirements: 100%

Program Essentials

Prime contractor: Northrop Grumman

Contract type: Cost-sharing (development); FPI (procurement)

Current Status

The MQ-4C Triton supports operations for multiple combatant commanders. For Increment 1, the Navy deployed 11 IFC-4 aircraft as of early 2026 and had seven IFC-4 aircraft in production. Additionally, the program is retrofitting six IFC-3 aircraft into the IFC 4 configuration and plans to complete this effort by September 2030. Operational testing for Increment 1 IFC-4 is expected to be completed in May 2026—8 months later than we last reported. The program cited the need to correct software deficiencies and gain test range accreditation as key reasons for the delay. In September 2025, the DOD Inspector General found that the Navy deployed aircraft with unresolved technical issues, which could prevent the Navy from accomplishing certain missions. The program stated that it would address remaining significant deficiencies with an upcoming software release—needed for initial operational testing—in May 2026.

In March 2025, the Navy approved an updated Increment 2 acquisition program baseline that reflected a delayed initial fielding—with full Increment 2 capability delivery—to March 2029. This is an 18-month delay. The updated baseline also reflected an increase in the estimated development cost. The program cited receiving less development funding than planned in fiscal year 2024 as the reason it could not meet its earlier cost and schedule plans. The program reported initiating a digital twin in Increment 2, though it does not currently have the capability to change or update the model in real-time as new information becomes available. The program said that it is now using and expanding digital threads, but has yet to incorporate digital twin simulation data.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. It stated that the MQ-4C Triton provides critical operational capabilities, has executed over 15,000 operational flight hours, and has largely met monthly mission requirements for the past year. Further, the program stated that more than 20 software updates have been delivered to correct system deficiencies and improve operational capabilities since reaching initial operational capability in 2023. The program also stated that with the establishment of a second operational squadron in November 2025, it is prepared to achieve full operational capability by fiscal year 2031 and plans to deliver Increment 2 capabilities before that date.

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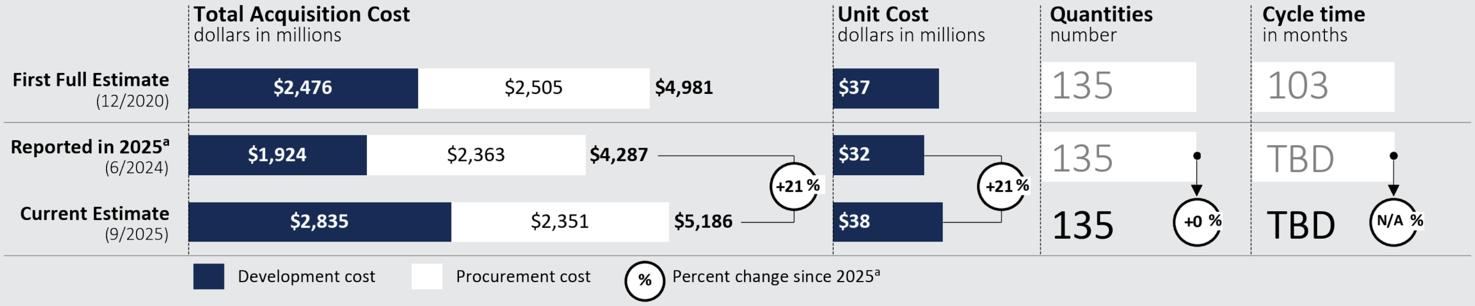
Source: AVIAN CSS. | GAO-26-108457

Next Generation Jammer Low-Band (NGJ LB)

The Navy's NGJ LB will be an external jamming pod system for the EA-18G Growler aircraft. It is expected to replace the ALQ-99 jamming system in the low-band frequency range. The Navy expects the system to provide enhanced airborne electronic attack capabilities to disrupt adversaries' use of the electromagnetic spectrum for radar detection, among other purposes. The Navy also has a mid-band frequency program—assessed separately in this report—and a documented, but unfunded, need for a high-band capability. We assessed the low-band program.

Program Performance fiscal year 2025 dollars in millions



	Total Acquisition Cost dollars in millions				Unit Cost dollars in millions		Quantities number		Cycle time in months	
	Development cost	Procurement cost	Total	%		%		%		%
First Full Estimate (12/2020)	$2,476	$2,505	$4,981		$37		135		103	
Reported in 2025[a] (6/2024)	$1,924	$2,363	$4,287		$32		135		TBD	
Current Estimate (9/2025)	$2,835	$2,351	$5,186	+21 %	$38	+21 %	135	+0 %	TBD	N/A %

[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: Information not available

The program reported that it does not break out software costs. The program also reported that the percentage of software completed is unavailable because the contractor has yet to provide supporting data.

Program Essentials

Prime contractor: L3Harris

Contract Type: CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	◐
Obtain User Feedback		
Collect end user feedback to inform the product	◔	◔
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	◔	◔
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

NGJ LB Program

Program Performance

The NGJ LB program is potentially facing significant delays because the Navy has prioritized funding other programs. The NGJ LB program entered the MCA pathway at development start in August 2024, after spending almost 4 years resolving multiple bid protests at GAO and the United States Court of Federal Claims. The protests resulted in the Navy terminating the original contract, reopening discussions with the two offerers, and awarding a new contract. The program planned to deliver operational prototype pods as an initial capability, but it anticipates delays of up to a decade if it does not receive additional funding. The program stated that the Navy reprogrammed some of its funding for higher priorities and shifted some of its planned funding to other programs during the time the program was resolving the bid protests. The program is awaiting the results of the Navy's fiscal year 2027 budget deliberations and then plans to establish a new program baseline.

The program's estimated development cost increased by nearly 50 percent since our last assessment because prior estimates did not reflect the full scope of the current program and increases in inflation and material costs. According to program officials, there was additional work associated with changing the acquisition strategy from an MTA effort to the MCA pathway that was not captured in the prior cost estimate. The additional work is needed to further mature technologies, improve system reliability, and build production-representative pods, among other things. The program stated it will need to award an additional development contract for this work before it will be ready to start production.

Leading Product Development Practices

The NGJ LB program is implementing some leading practices for product development and is considering whether to incorporate others. For example, the program reported that it is in the process of identifying a minimum viable product. However, it also reported that development is focused on meeting highly detailed system requirements, which could limit its ability to refine capabilities as user needs evolve. We previously found that leading companies use iterative design and testing to identify a minimum viable product, in turn ensuring that they deliver essential product capabilities to users with speed.

However, it is evaluating only whether to develop a digital twin at the subsystem level, rather than for the whole system. The program has also yet to document whether it will develop a digital thread consistent with leading product development practices. According to the program office, it is creating, in effect, a digital thread with model-based system engineering for end-to-end system views that will evolve over the life cycle of the system to incorporate real-time system data. We previously found that these digital design tools are useful in the design and validation process as they can enable more rapid iterative design cycles and facilitate stakeholder and user feedback at earlier stages.

Software and Cybersecurity

The NGJ LB program is employing several modern software development practices, such as Agile and DevSecOps approaches. The program reported that it plans to implement other recommended practices, including delivering a minimum viable product for software, using continuous iterative software development, providing iterative development training for program management and staff, and having the contractor provide software documentation at each production milestone. We will continue to monitor these efforts.

The NGJ LB cybersecurity strategy was approved in July 2019, and the program plans to complete further cybersecurity assessments in the future.

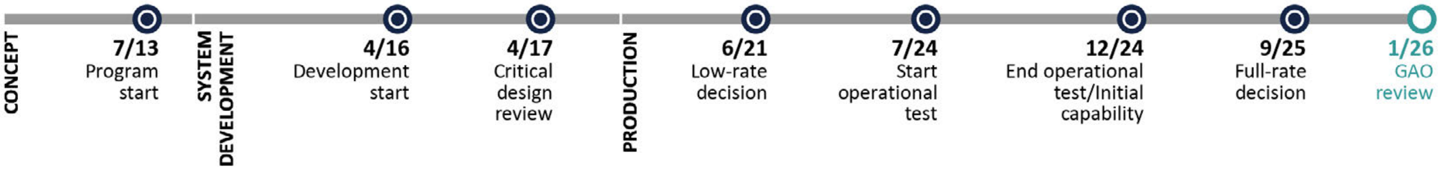
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that the NGJ LB airborne electronic attack system will provide the fleet with a substantial leap in capability over legacy systems. It added that the NGJ LB is a critical element in offensive electronic warfare and is necessary to counter adversaries today and in the future. According to the program, it is positioned to meet the fleet's requirements.

Source: U.S. Navy. | GAO-26-108457

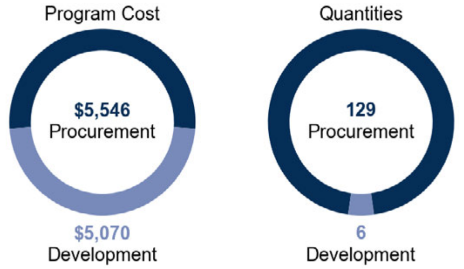
Next Generation Jammer Mid-Band (NGJ MB)

The Navy's NGJ MB is an external jamming pod system for EA-18G Growler aircraft. It will augment, then replace, the ALQ-99 jamming system in the mid-band frequency range. The Navy expects the system to provide enhanced airborne electronic attack capabilities to disrupt adversaries' use of the electromagnetic spectrum for radar detection, among other purposes. The Navy also has a low-band frequency program—assessed separately in this report—and a documented, but unfunded, need for a high-band capability. This assessment is of the mid-band program.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (7/2024)		Current Estimate (9/2025)
Acquisition Cost	$10,541	+1 %	$10,625
Unit Cost	$78.08	+1 %	$78.71
Cycle Time (in months)	137	+0 %	137

% Percent change since 2025[a]

[a]GAO-25-107569

Software Development as of January 2026

Approach: Agile

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 100%

According to the program, software costs were not available because software was not broken out in amounts paid to the contractor.

Program Essentials

Prime contractor: Raytheon (development); Boeing (integration)

Contract type: CPIF (development); FPI (low-rate initial production)

Current Status

The Navy delayed the full-rate production decision for the NGJ MB to September 2025—4 months later than we reported last year. According to program officials, closing out operational testing took longer than expected, which was the primary reason for the delay. Officials said the delay had little impact on the program. To avoid a gap in production, the Navy previously approved the program to increase its low-rate production quantity, some of which are intended for a cooperative partner. The Navy awarded a contract in May 2025 for additional shipsets; each shipset consists of two pods.

According to NGJ MB officials, the prime contractor is delivering pods on time, but several risks could delay production or increase costs, such as building enough of certain key subcomponents. According to officials, the prime contractor is increasing its test capacity and exploring other ways to improve production efficiency for those subcomponents. NGJ MB officials stated that the program office and prime contractor are also monitoring potential parts obsolescence issues that could affect production as the pods age. The NGJ MB program also faces cost pressures due to inflation and increases in material and labor costs. The program plans to include multiple lots of shipsets in its next contract with the goal of negotiating better prices.

The NGJ MB program used some leading practices for product development to facilitate capability improvements in pods with its May 2025 contract. For example, according to officials, regular user feedback shaped the capabilities the program pursued, and a modular open system approach made those capabilities easier to incorporate. The program has yet to determine whether it will develop a digital twin or digital thread in the future.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. According to program officials, the NGJ-MB airborne electronic attack system provides the fleet with a substantial leap in capability over legacy systems. NGJ-MB is a critical element in offensive electronic warfare and is necessary to counter adversaries today and in the future. Officials stated that the program continues to deliver to meet fleet requirements.

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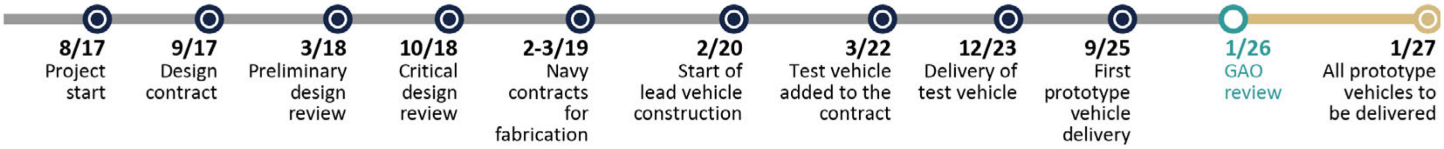
Source: Boeing. | GAO-26-108457

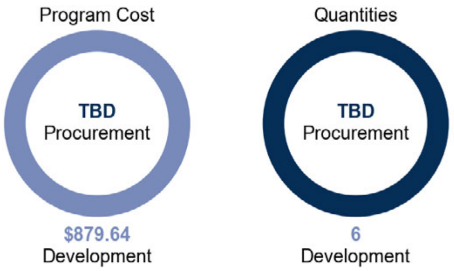
ORCA Extra Large Unmanned Undersea Vehicle (XLUUV)

ORCA is the Navy's initial XLUUV effort. The Navy began developing the ORCA XLUUV prototype effort in fiscal year 2017 to address an emerging operational need for laying undersea mines. The ORCA XLUUV prototype is a research and development effort intended to result in a floodable, modular undersea vehicle that is about the size of a railroad car.



Estimated Cost and Quantities

(fiscal year 2025 dollars in millions)



The Navy received the ORCA XLUUV test asset in December 2023. In addition, the Navy received an ORCA XLUUV prototype in September 2025; the Navy expects to receive four more prototypes by fiscal year 2027.

Software Development as of January 2026

Approach: Agile and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Total software cost is not available.

Percentage of progress to meet current requirements: 76-99%

The program reported software costs are not known as software is developed through the contractor's internal research and development funding.

Program Essentials

Prime contractors: Lockheed Martin (design); Boeing (design and fabrication)

Contract type: CPFF, FPIF (prototype fabrication) FFP, CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated*)	○	●
Obtain User Feedback		
Collect end user feedback to inform the product	...	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

XLUUV Program

Program Performance

The Navy continues to plan the transition of ORCA prototypes to the fleet as they are delivered. The ORCA prototype experienced approximately 5 years of delays due to challenges with sourcing the materials and building pressure vessels, which help keep critical equipment intact at depth. Navy officials reported the program received a test asset in December 2023 and took delivery of the first prototype in September 2025 before all contract deliverables were ready so that testing could occur without additional delay. According to officials, conducting at-sea testing of the first prototype vehicle while awaiting the final components to be delivered and integrated was more beneficial to the Navy.

The Navy expects the four remaining prototypes to be delivered by January 2027—more than a 1-year delay from what we reported last year. To complete the ORCA research and development effort, the Navy plans to demonstrate at sea and train on the prototypes after they are delivered and then field them. As ORCA prototypes field, the Navy will continue rapidly prototyping Large/XLUUVs as part of a separate project, named the Combat Autonomous Maritime Platform (CAMP). The Navy established CAMP to meet emerging fleet needs in response to the Servicemember Quality of Life improvement and National Defense Authorization Act for Fiscal Year 2025. CAMP is the Navy's effort to assess, acquire, and deploy commercially available undersea autonomous systems in coordination with the Defense Innovation Unit. As of January 2026, CAMP requirements are still in development.

Based on lessons learned from ORCA and Defense Advanced Research Projects Agency efforts, the Navy is evaluating plans to design and build other payloads for XLUUV systems, which may include ORCA. The new payloads would expand the ORCA mission set to other capabilities in response to operational demands.

Leading Product Development Practices

The XLUUV effort did not follow leading product development practices. For example, the program did not adopt an iterative development approach or the use of digital engineering tools such as a digital twin for ORCA prototyping. The Navy reported that the ORCA research and development effort began before the Navy's digital engineering strategy was released. Further, end user feedback has been limited because of fabrication and software development delays, according to Navy officials. Navy officials reported that adding a digital twin effort would have required a contract modification and additional costs. However, program officials stated that the program uses the same mission planning software that is installed on the ORCA prototypes in testing simulations. Program officials said that this enables the Navy to identify challenges in a digital environment and make adjustments before in-water testing occurs.

Should the Navy initiate any follow-on XLUUV efforts, opportunities exist for adopting an iterative development approach, using digital engineering tools, such as a digital twin or thread, and soliciting end user feedback. For example, soliciting user feedback helps to ensure the Navy purchases vehicles that meet stated warfighter needs. Further, iterative development and digital engineering tools would better position the Navy to quickly develop and deliver needed capability to the warfighter and improve system production and sustainment.

Software and Cybersecurity

At the onset of the program, to reduce development time, the program decided to leverage proprietary software Boeing had already developed for the Echo Voyager vehicle. ORCA software development predated the Navy's attempts to implement autonomy standards, which were intended to allow the Navy to better integrate with proprietary software. As such, the Navy has reported that it did not have any licenses for data rights or visibility into the ORCA software and was reliant on the contractor to make changes to the software. Going forward, program officials said the Navy is planning to purchase additional data rights from Boeing to have increased government control of future development efforts.

Other Program Issues

In September 2025, the Secretary of the Navy established a Program Acquisition Executive for Robotic Autonomous Systems as a new organizational structure. As part of this effort, the Secretary of the Navy initiated the development of an implementation plan and directed a pause on all new Navy robotic and autonomous system-related acquisition decisions and contracting actions while analysis is conducted to inform the plan. In January 2026, senior Navy officials stated that the implementation plan is still in development.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate.

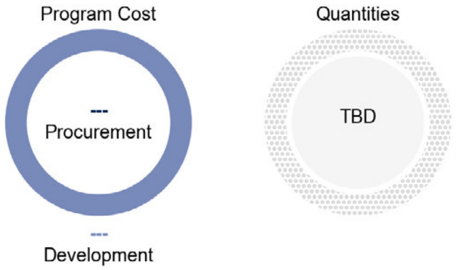
Sea-Launched Cruise Missile Nuclear (SLCM-N)

The Navy plans for the SLCM-N program to develop a cruise missile with a nuclear warhead to provide a regional, sea-based presence without dependence on allied host nations. SLCM-N is intended to expand the President's options for responding to limited nuclear use and strategic non-nuclear attacks. The Navy plans to field the missile on *Virginia* class submarines and the *Trump* class battleship. The Navy is developing the complete weapon system, while the National Nuclear Security Administration (NNSA) is developing the warhead. The Navy's Strategic Systems Programs office is the weapon system integrator.

Source: U.S. Navy Strategic Systems Programs | GAO-26-108457

Estimated Cost and Quantities

(fiscal year 2025 dollars in millions)



Notes: Not approved for public release by the Navy.

Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: Information not available

The program reported that it has not yet begun software development.

Program Essentials

Prime contractors: Lockheed Martin, Leidos, Raytheon (flight system); Northrop Grumman (flight system and launcher); Pacific Engineering Inc. (launcher); Florida Turbine Technologies (missile technologies)

Contract type: Using other transaction authority

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	...	○
Obtain User Feedback		
Collect end user feedback to inform the product	...	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	...	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	...	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	...	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	...	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	...	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess SLCM-N implementation of leading product development practices at development start because the program has yet to reach that event.

SLCM-N Program

Program Performance

The National Defense Authorization Act for Fiscal Year 2024 directed DOD to establish SLCM-N as a major defense acquisition program and to work with NNSA to develop the SLCM-N warhead. It further directed that these efforts achieve initial operational capability for SLCM-N by September 2034. Program officials are developing plans to achieve this initial operational capability date as directed but stated that the schedule is aggressive. The program reported that it completed and approved the acquisition strategy, early cost estimate, schedule, and requirements documents and entered the technology maturation and risk reduction phase in December 2025.

DOD is using $125.5 million in fiscal year 2024 and $126 million in fiscal year 2025 appropriations for the SLCM-N program. To assist with program acceleration, Congress provided the SLCM-N program with an additional $2 billion and provided NNSA with $400 million for the development of the warhead in July 2025. According to officials, the program’s total acquisition cost will range between $15 and $20 billion. NNSA’s early cost estimates for just the warhead suggest it could cost nearly $5 billion. Both estimates represent early cost figures that will likely change.

The program office plans to acquire SLCM-N as a set of subsystems, including the missile, launcher, platform integration, infrastructure, and fire control system. The program has initiated efforts to develop these subsystems. In September 2025, program officials stated that they are working to identify critical technologies and plan to leverage mature technologies for these systems when possible. Program officials said they sought solutions in May 2025 to develop the missile prototype designs and technologies and subsequently awarded agreements to five companies using other transaction authority. Officials also said that in September 2025 the program used other transaction authority to award agreements to two companies for the development of the launcher.

To meet the statutory requirement for deployment by September 2034, NNSA officials said they plan to modify the W80 family of warheads for use on SLCM-N. NNSA noted contractor-operated sites are managing the warhead modification using an established DOD-Department of Energy process. The scope of the modification will be limited. According to officials, NNSA is also establishing requirements for the interface between the warhead and the missile.

Leading Product Development Practices

Program officials stated they plan to implement several leading practices for product development and that documentation of these plans is underway. The program reported it is already incorporating feedback from end users. For example, the program has conducted tabletop exercises at the weapons facilities where the SLCM-N missile will be stored, but it is in the process of developing its digital engineering plans that may include a digital twin. Our prior work found that adopting an iterative development approach with a minimum viable product and a digital twin and thread provides real-time data to inform design decisions and provide efficiencies throughout development, operations, and sustainment.

Software and Cybersecurity

The program reported that no software development or acquisition is planned until the technology maturation and risk reduction phase.

The program is developing cybersecurity and zero trust strategies and expects to complete these efforts in March 2026. The program also plans to conduct cybersecurity assessments starting in June 2029.

Other Program Issues

Neither *Virginia* class submarines nor surface ships currently operate with nuclear weapons, which presents operational and maintenance challenges. In addition, fielding SLCM-N will likely require investments in infrastructure though the Navy plans to use current weapons facilities and homeports. According to program officials, the program’s concept of operations is currently being updated and key decisions, such as specific deployment details, have yet to be made. The Navy stated that it plans to leverage a combination of existing, modified, and new infrastructure to support SLCM-N and the *Virginia* class submarines that will carry them.

Program Office Comments

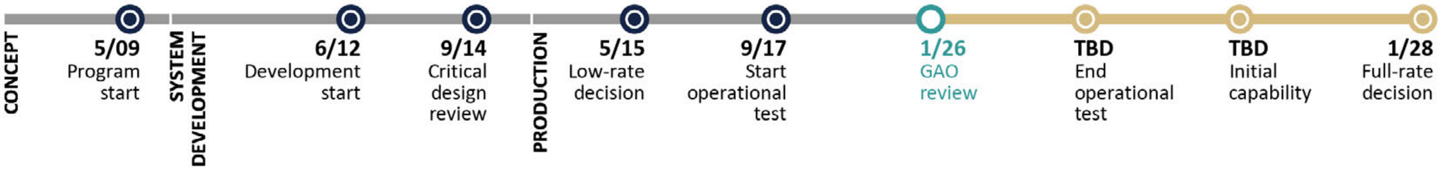
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. Program officials stated the SLCM-N program remains on track to meet its initial operational capability date of September 2034 and to provide a limited operational capability by September 2032. The program achieved program start in December 2025, 4 months ahead of the anticipated date for this event. As the program moves into the technology maturation phase, its focus is on flight system prototyping, platform integration and fire control development, system integration across identified gaps, and use of a cruise missile test bed to accelerate risk reduction.

Navy | **Program Type:** MDAP | **Common Name:** SSC

Source: U.S. Navy. | GAO-26-108457

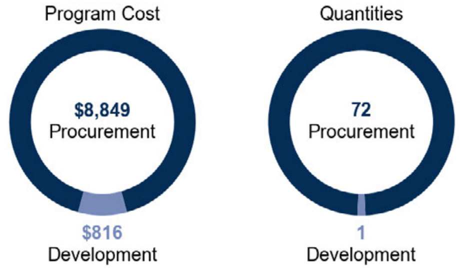
Ship to Shore Connector Amphibious Craft (SSC)

The Navy's SSC is an air-cushioned landing craft intended to transport personnel, weapon systems, equipment, and cargo from amphibious vessels to shore. It is the replacement for the legacy Landing Craft, Air Cushion (LCAC – a designation that SSCs will share once in service), which is approaching the end of its service life. The SSC is designed to deploy in and from Navy amphibious ships that have well decks, such as the LPD 17 class, and will support operations.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (8/2024)	%	Current Estimate (8/2025)
Acquisition Cost	$6,937	+40%	$9,684
Unit Cost	$95.02	+40%	$132.66
Cycle Time (in months)	199	N/A%	TBD

% Percent change since 2025[a]

[a]GAO-25-107569

Software Development as of January 2026

Approach: Modified Agile, Iterative, and Waterfall

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 100%

Program officials stated that they do not track software in their cost reporting system. Software development is complete and is currently in the maintenance phase according to the program.

Program Essentials

Prime contractor: Textron, Inc.

Contract type: FPI (detail design and construction)

Current Status

Since our last assessment, the program's total acquisition cost increased by over $2 billion, largely due to unit cost increase. Unit cost increase drivers include the rising costs of labor, material, and overhead costs. This resulted in breaching a critical unit cost growth threshold—known as a Nunn-McCurdy breach—in April 2025, the program's second breach in 5 years. According to program officials, the initial program cost estimate, created in 2012, vastly underestimated costs because the estimate was based on the design of the SSC's predecessor, the LCAC. However, the SSC design differed from the LCAC more than expected. The program is developing new cost and schedule baselines as part of restructuring efforts, but requirements will stay the same.

As of August 2025, the program delivered 15 of the 73 craft it plans to procure, but it further delayed initial operational capability until initial operational test and evaluation is finished. Completion of this phase hinges on fully installing new electrical power generation system improvements and completing 19 mission trials with deployment representative craft, which is underway. Officials told us that the simplified power generator resolves a power inverter unit issue, provides lower technical risk, and can be developed more quickly and at lower cost.

Program officials reported using few leading practices for product development. For example, program officials stated they incorporated user feedback to inform requirements and provide design input and are developing digital twins for some subsystems. However, the program is not planning to develop a digital thread because the program did not incorporate it into the system engineering plan. Our prior work found that digital twins and threads provide real-time data to inform design decisions and provide efficiencies, including in production and sustainment.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that SSC was successfully reassessed and certified to continue in October 2025 following its Nunn-McCurdy breach. The program stated that consistent congressional support sustained the production line and enabled the contractor to deliver four craft per year. The program also noted it will now provide fleet capability and operational readiness for certain deployment operations.

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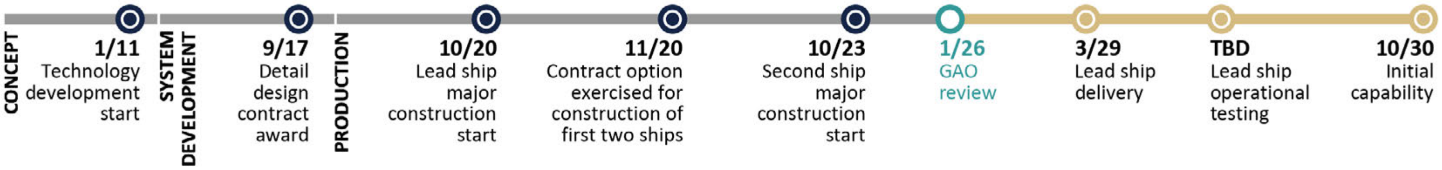
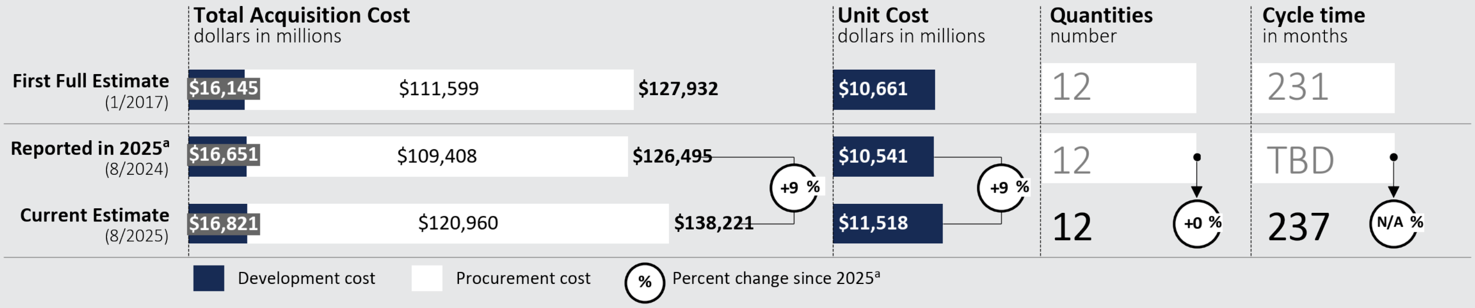
Source: General Dynamics Electric Boat. | GAO-26-108457

SSBN 826 *Columbia* Class Ballistic Missile Submarine (SSBN 826)

The Navy's *Columbia* class submarine (SSBN 826) and future hulls of the class will replace the *Ohio* class ballistic missile submarines, which the Navy plans to start retiring in 2027. SSBN 826 will serve as the sea-based, strategic nuclear deterrent that is expected to remain in service through 2084. General Dynamics Electric Boat is the lead contractor, with Huntington Ingalls Industries Newport News Shipbuilding serving as its major subcontractor.



Program Performance fiscal year 2025 dollars in millions



	Total Acquisition Cost (dollars in millions): Development cost	Procurement cost	Total	Unit Cost (dollars in millions)	Quantities (number)	Cycle time (in months)
First Full Estimate (1/2017)	$16,145	$111,599	$127,932	$10,661	12	231
Reported in 2025[a] (8/2024)	$16,651	$109,408	$126,495	$10,541	12	TBD
Current Estimate (8/2025)	$16,821	$120,960	$138,221	$11,518	12	237
Percent change since 2025[a]			+9 %	+9 %	+0 %	N/A %

Total quantities comprise zero development quantities and 12 procurement quantities. The graphic bars depict only research and development and procurement costs. However, total acquisition costs may also include costs for military construction as well as acquisition operation and maintenance. In 2025, the program office told us it was revisiting its schedule and that initial operating capability was to be determined. In 2026, the program told us that it continues to plan for initial operating capability in October 2030, as we reported in our 2024 report.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 76-99%

The program reported that software was based on software developed for previous Navy programs. The program also reported that it is developing software for the shipboard control system.

Program Essentials

Prime contractor: General Dynamics Electric Boat

Contract Type: CPIF (development and construction)

Use of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

SSBN 826 Program

Program Performance

In 2025, the program continued to face significant construction delays with the first two submarines in the class. The program estimated that SSBN 826, the lead ship, is at least 18 months behind its contracted delivery date as of July 2025. SSBN 827, the second submarine, is 8 percent behind its schedule as of November 2025.

To address these delays and help SSBN 826 achieve its planned initial operating capability date, the program implemented a schedule acceleration plan in partnership with the shipbuilders. Specifically, Electric Boat and Newport News Shipbuilding delivered all major SSBN 826 components ahead of schedule to a central location—Electric Boat's Groton, Connecticut shipyard—by November 2025. According to the program, this location has an underused workforce compared with other shipbuilder locations. Following delivery of the components, the shipbuilder still must complete construction of those components, work that was not planned to be done at Groton, and assemble the submarine. The acceleration plan is also expected to free up shipyard space at the shipbuilders for construction of SSBNs 827 and 828 while workers at the central location focus on completing SSBN 826's construction.

The shipbuilder estimates that the acceleration plan will result in delivery of SSBN 826 over a year before the program's current estimated delivery date of March 2029. While the shipbuilders have met some initial milestones under this plan, the program will not adjust its estimated delivery date until the shipbuilders demonstrate consistent construction improvement, which they have yet to do.

There are potential risks associated with this plan. For example, to accomplish the planned schedule recovery, the shipbuilders will have to significantly improve construction performance. It also may require out-of-sequence work to complete SSBN 826 components that are delivered ahead of schedule. Completing submarine construction out of sequence can cause significant delays because there is limited room for workers to maneuver as a submarine hull is completed and filled with equipment. Additionally, the accelerated plan will introduce risks associated with SSBN 826's testing. For example, the program reports significant portions of testing are in flux due to high amount of work offloaded to the Groton shipyard. Furthermore, staffing to accommodate testing needs under the accelerated schedule is a concern. The Navy and shipbuilder are assessing and developing mitigation plans for these risks.

The program reported that it is now nearing its cost affordability cap. The program's affordability cap is a threshold for unit procurement costs that cannot be exceeded without approval from the Under Secretary of Defense for Acquisition and Sustainment. Program officials stated that cost increases reported this year are primarily driven by shipbuilder performance and test planning factors.

Leading Product Development Practices

The program reported implementing some elements of leading product development practices. For example, based on newly provided information, the program reported incorporating MOSA. However, as previously reported, while the program has a 3D model of some systems, it has no plans for a digital twin of key subsystems or a digital thread. Our prior work found that these tools are key to anticipating potential design flaws and incorporating changes as well as improving a program's ability to modernize and maintain systems.

Software and Cybersecurity

The program reported using an incremental approach to software development. This approach reuses software from another program—the *Virginia* class submarine—and the software is further refined for SSBN 826. The program reported that it has conducted almost 60 cybersecurity tests to identify vulnerabilities and threats and continues to conduct assessments.

Other Program Issues

In November 2025, the program issued General Dynamics Electric Boat a $2.3 billion contract modification to procure materials in advance of construction for submarines SSBN 828–832. As of January 2026, the government and shipbuilders were negotiating a contract to build those five submarines. Additionally, the program continues to work with DOD stakeholders to address submarine industrial base challenges.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. According to the program, it remains positioned to provide capability needed to meet strategic requirements. The program stated that to reduce execution risk, it ensured stable requirements, executed manufacturing readiness and supplier base efforts, and continued cost reduction efforts. Additionally, to address an aggressive construction schedule, the Navy is working with shipbuilders to address immediate challenges and implement long-lasting changes. For example, the program said it is implementing actions to address the atrophy in design and engineering workforce, refine acquisition and contract strategies, assess Navy workforce posture, and budget for investments to improve performance. Further, the Navy is working to minimize and mitigate the impact of late delivery on initial operational capability. Lastly, it said the Navy is driving incorporation of lessons learned and first-time quality for subsequent ships.

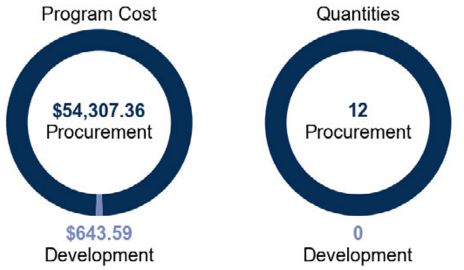
Source: U.S. Navy photo courtesy of Huntington Ingalls Industries. | GAO-26-108457

SSN 774 *Virginia* Class Submarine (VCS) Block V

The Navy's VCS is a class of multirole nuclear-powered submarines. Block V is the most recent version to enter production and includes enhanced undersea acoustic capabilities. The Navy also plans for 10 of the Block V submarines to include the Virginia Payload Module (VPM), a new midbody section that makes the submarines 30 percent larger and adds capacity for more cruise missiles. Block V starts with SSN 802, which includes acoustic improvements but not the VPM. The Navy is negotiating a contract for the next block—VI—in fiscal year 2026, originally planned for November 2024. Block VI plans include the VPM and very few design changes from Block V, such as safety enhancements.

Estimated Cost and Quantities

fiscal year 2025 dollars in millions



Software Development as of January 2026

Approach: Waterfall

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: 100%

The program reported that in addition to Waterfall, it is using a tech refresh cycle for modernization upgrades. The program also reported that it does not track software costs separately.

Program Essentials

Prime contractors: General Dynamics Electric Boat

Contract type: FPIF for procurement of the first 10 submarines, CPIF for the last two submarines

Current Status

The VCS construction rate has generally stabilized, with shipbuilders working at a one-per-year pace as of June 2025—half the rate of the Navy's two per year goal. While the Navy received delivery of two Block IV submarines in 2025, both were over 3 years late. The projected delivery dates for the first 10 Block V submarines continue to worsen, slipping by an average of almost 3 years since original contract award.

Late material deliveries from suppliers and limited availability of experienced workers due to competition in the labor market drive these trends. The Navy plans to improve performance by investing billions of dollars in the supply chain and shipbuilder wages, among other mitigation efforts.

In April 2025, the Navy issued a modification to the Block V contract to add two submarines. The Navy used cost-reimbursement terms for these two submarines, placing additional cost risk on the government compared to fixed-price terms. The Navy expects these two submarines will take longer to build than the four preceding Block V submarines.

Recovery plans are not progressing as intended. The program developed a report to track its progress towards building submarines at a rate of two per year. However, the report's construction progress metrics indicate the program is already underperforming its recovery plans.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that *Virginia* class submarines deliver unrivaled warfighting capability to the fleet and that while stabilizing, new construction performance needs to continue to increase. It added that Navy and industry partners are addressing industrial base challenges decades in the making and additional improvement is ongoing. Working closely with industry and Congress, the Navy is investing heavily in facilities, workforce development, modernizing shipyards, increasing wages, and strengthening the supplier network to increase capacity and ensure return on investment, according to the program office.

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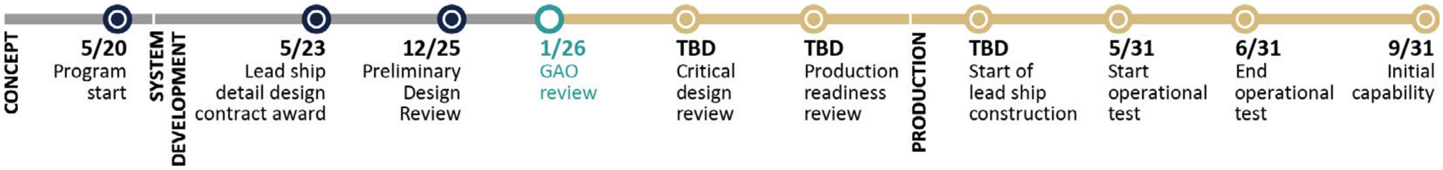
Navy | **Program Type:** MDAP | **Common Name:** T-AGOS 25

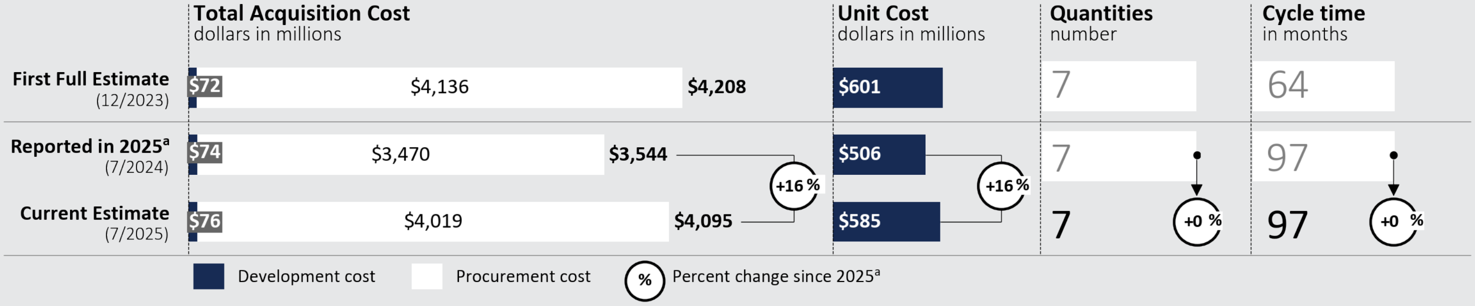
Source: U.S. Navy. | GAO-26-108457

T-AGOS 25 *Explorer* Class Ocean Surveillance Ship (T-AGOS 25)

T-AGOS 25 *Explorer* class is intended to replace the Navy's existing five ocean surveillance ships that are approaching the end of their service lives. T-AGOS 25 *Explorer* class ships will be larger and faster than the current in-service *Victorious* and *Impeccable* class surveillance ships. Like the in-service ships, the new class will use the Surveillance Towed-Array Sensor System equipment to gather undersea acoustic data.



Program Performance fiscal year 2025 dollars in millions



	Total Acquisition Cost dollars in millions: Development cost	Procurement cost	Total	Unit Cost dollars in millions	Quantities number	Cycle time in months
First Full Estimate (12/2023)	$72	$4,136	$4,208	$601	7	64
Reported in 2025[a] (7/2024)	$74	$3,470	$3,544	$506	7	97
Current Estimate (7/2025)	$76	$4,019	$4,095	$585	7	97
Percent change since 2025[a]			+16 %	+16 %	+0 %	+0 %

Total acquisition costs do not include any potential costs for military construction as well as operation and maintenance. The program has yet to finalize its updated schedule, which will likely increase cycle time.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements:

Information not available

The program reported that it will rely on commercial technologies and government-furnished equipment. It is not developing software or tracking specific software costs.

Program Essentials

Prime contractor: Austal USA, LLC

Contract Type: FFP; FPI (detail design and construction)

Use of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

T-AGOS 25 Program

Program Performance

Since our last assessment, the T-AGOS 25 shipbuilder expressed concern with the feasibility of the Navy's ship specifications and contractual schedule and cost expectations. The program's budget request for fiscal year 2026 stated that delivery of the lead ship was expected in July 2031—4 years later than the plan outlined in the previous budget request. The fiscal year 2026 request also indicated that the estimated cycle time from construction start to delivery increased to 48 months—a 60 percent increase from the prior year's estimate.

The program office stated that it expected a revised schedule to be approved following a spring 2026 integrated baseline review. This planned review has been delayed almost a year since our last assessment, which the program said was due to ongoing challenges with obtaining needed engineering resources. The program's delays have undermined the Navy's ability to achieve its goal for *Explorer* Class ships to begin replacing the legacy ocean surveillance ships in 2027.

Design maturity shortfalls have created uncertainty for when the program will be ready to begin construction of the lead ship. The T-AGOS 25 contract requires 100 percent completion of functional design before starting construction. However, program officials stated that the functional design—which includes the ship structure and routing and positioning of major distributive systems, such as electricity or water—was only about 20 percent complete as of January 2026. Program officials previously said that the ship's twin hull design presents challenges because small changes in weight or displacement affect how the ship sits in the water. They noted that keeping the weight in an acceptable margin imposes risk to schedule and cost. Related to the T-AGOS 25 design challenges, the National Defense Authorization Act for Fiscal Year 2026 restricts the Navy from obligating or expending certain T-AGOS 25 funds until the Navy submits a report to congressional defense committees. Among other things, the report is expected to discuss design progress and the ability of the design to meet program requirements.

Leading Product Development Practices

The program is employing some elements of leading commercial ship design practices, but it falls short of the leading practice of completing 3D modeling of basic and functional design to demonstrate design stability prior to beginning construction. Instead, the Navy requires the shipbuilder to complete functional design in 2D drawings and 70 percent of 3D modeling. Our previous work has shown that setting design expectations below leading practices contributes to significant cost and schedule risk.

The program reported regularly incorporating feedback from stakeholders, including end users and testers, consistent with leading product development practices. For example, the program told us that program stakeholders, including end users from the Military Sealift Command, actively participate in bi-monthly design reviews at the shipyard.

Though not yet implemented as of January 2026, the program stated plans to incorporate a modular open systems approach for the ship's integrated bridge and navigation and maneuvering control systems. The program also indicated that it is not pursuing a digital twin or digital thread for the ship due to cost and the lack of requirement for such tools. Use of these digital tools can ensure different systems and subsystems work together to maximize the effectiveness of a modular open system approach and the efficiency of design and construction of follow-on ships.

Software and Cybersecurity

As reported in our last assessment, the program is procuring, rather than developing, software for the ship class. The program approved a cybersecurity strategy in May 2023.

Other Program Issues

Since 2021, the number of different ship classes being constructed at Austal USA's shipyard has increased significantly. Any associated workforce constraints from this increase could pose challenges for meeting the program's construction expectations. Specifically, the program estimates that the shipbuilder's workforce levels will need to grow by over 50 percent by 2028 to support T-AGOS 25 production. The program could incur significant additional cost and schedule risk if the shipbuilder is unable to meet needed workforce levels by the start of production.

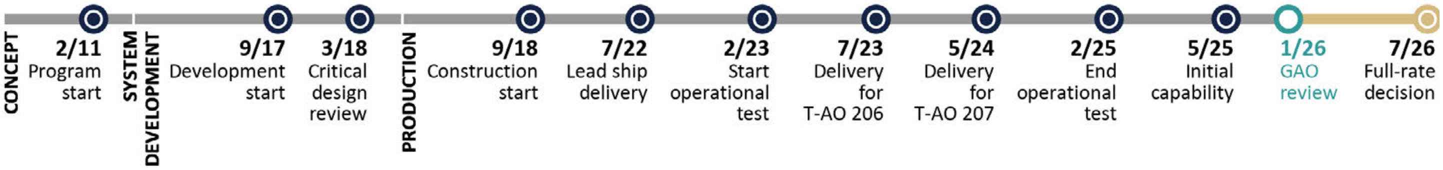
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that while the shipbuilder is running behind schedule per the contract, its performance has improved by resolving critical design issues and filling key technical positions. The program also stated that, in May 2025, the Navy completed a formal affordability review for the program that focused on the ship design's weight growth, which was identified as the most significant issue affecting design progress. Further, it stated that basic and functional design progressed over the past year to support completion of the preliminary design review in December 2025. According to the program, this review established that the shipbuilder sufficiently demonstrated that its baseline ship design could meet all requirements to minimize risk as the program moves toward its critical design and production readiness reviews.

Source: U.S. Navy. | GAO-26-108457

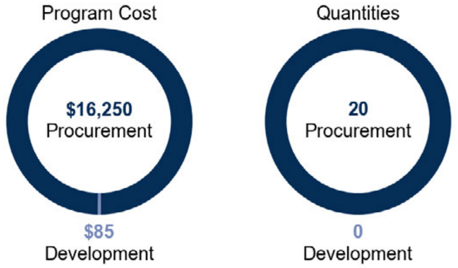
T-AO 205 *John Lewis* Class Fleet Replenishment Oiler (T-AO 205)

T-AO 205 class ships will replace the Navy's 15 existing *Henry J. Kaiser* class fleet oilers (T-AO 187), which are nearing the end of their service lives. The primary mission of the oilers is to replenish other vessels at sea with petroleum products, dry stores, packaged cargo, fleet freight, mail, and personnel.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (9/2024)		Current Estimate (8/2025)
Acquisition Cost	$16,190	+1 %	$16,335
Unit Cost	$809.48	+1 %	$816.76
Cycle Time (in months)	90	+2 %	92

(%) Percent change since 2025[a]

[a] GAO-25-107569.

Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: Information not available

The program reported that it is using off-the-shelf software systems and does not collect information on software delivery time frames or cost.

Program Essentials

Prime contractor: General Dynamics National Steel and Shipbuilding Company (NASSCO)

Contract type: FPI (detail design and construction)

Current Status

Since our last assessment, the program delivered T-AO 208—the fourth ship in the class, and planned deliveries for the next five ships continue to generally align with the program's October 2022 revised schedule.

As we previously reported, the program awarded a detail design and construction contract for eight additional ships (T-AOs 214-221) in September 2024 using specific authority granted by Congress. As of November 2025, the program received funding for the first three ships. The program expects to receive funding for the five remaining ships in the contract in fiscal years 2027 through 2030.

Program officials stated that it expects increased overhead costs at the shipyard due to reduced overall work demand will result in cost increases for remaining vessels under construction. However, they also noted that use of cost information from the first contract for hull, mechanical, and electrical systems should support more predictable costs for future ships.

Since our last assessment, the program completed initial operational test and evaluation in February 2025, with the Office of Director, Operational Test and Evaluation finding that the ship's operational performance supports its introduction into the fleet. Based on the test results, the Navy declared initial operational capability for the class in May 2025.

The program does not plan to create or use a digital twin or digital thread. We found that the use of these digital engineering tools can help ship buyers and builders refine, store, and communicate information that informs decisions throughout a ship's life cycle.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that it continues to deliver capable ships to the fleet, including the delivery of T-AO 209 in December 2025—within 1 month of the Navy's planned November 2025 delivery. The program also stated that delivery dates for subsequent ships remain stable as the program ramps up production. The program further stated that it continues to assess cost performance and monitor cost growth challenges, including materials, labor, and overhead costs.

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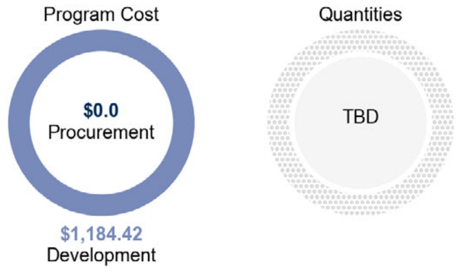
Source: U.S. Navy. | GAO-26-108457

The New Attack Submarine (SSN(X))

The Navy's New Attack Submarine (SSN(X)) is planned to provide high-end threat capability to complement the *Virginia* class attack submarine, which will continue to provide general purpose missions. The Navy expects SSN(X) to provide greater speed, increased payload capacity, improved signatures, and higher operational availability to defeat the growing threat posed by near-peer adversaries in undersea warfare. SSN(X) will be the first nuclear-powered attack submarine design in over 25 years. The program is in the early design phases and currently planning for lead ship authorization and procurement to begin as early as 2040.

Estimated Cost and Quantities

(fiscal year 2025 dollars in millions)



Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: Information not available

The program reported that information on its software approach, cost, and progress is unavailable because it has not yet identified a proposed material solution.

Program Essentials

Prime contractors: TBD

Contract type: TBD

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Detail Design Contract Award	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	...	○
Obtain User Feedback		
Collect end user feedback to inform the product	...	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	...	◔
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	...	◔
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	...	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	...	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	...	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess SSN(X) implementation of leading product development practices at detail design contract award because the program has yet to reach that event.

SSN(X)

Program Performance

SSN(X) is focused on early design efforts as of January 2026. The program, in coordination with the Office of the Secretary of Defense, Cost Assessment and Program Evaluation, originally planned to issue its Analysis of Alternatives (AoA) in the third quarter of fiscal year 2025 but extended it by a quarter to consider additional alternatives and incorporate changes to the drive system. The program stated that the analysis showed that a newly designed attack submarine provides increased warfighting capability in a more cost-effective manner than existing platforms. The program is also performing post-AoA analysis and developing its capabilities development document, which will be informed by the AoA, and researching and developing long-lead technologies.

The design timeline for the SSN(X) is comparable to previous submarine classes and sufficient to attain technology maturity, according to program officials. Program officials also stated that the program will use ongoing acquisition reform efforts to streamline the requirements approval process, and then SSN(X) can pivot to coordinating earlier with shipbuilders on ship specifications and developing more mature technology to reduce risk. However, officials stated that the timeline for lead ship authorization will be determined by the budget.

SSN(X) plans to reduce the risks related to newer technologies with fit-for-purpose physical (including large-scale) and digital prototyping and targeted technology insertion into existing submarine classes. Program officials told us that they expect these steps—along with early development of requirements and investment in research and development—to help the program maintain the needed design workforce and move design efforts forward.

The Navy originally planned to begin buying SSN(X)s in 2035. However, the Navy’s fiscal year 2025 budget submission pushed out procurement of the first SSN(X) to fiscal year 2040 due to budget limitations.

Leading Product Development Practices

SSN(X) intends to use some leading product development practices, but it is too early to assess how well the program has incorporated such practices in the design phase. According to program officials, SSN(X) will engage with and receive feeback from stakeholders. For example, during the design phase, the program plans to coordinate with Naval Reactors, design contractors, the *Virginia* class program, and the fleet about new technologies. In addition, SSN(X) plans to solicit lessons learned from ongoing submarine acquisition programs.

The program told us that it will not develop a minimal viable product for the entire submarine. Instead, when possible, SSN(X) plans to develop prototypes of technologies that they will test on other submarine classes where necessary. Program officials also noted that SSN(X) is considering the potential for a lead block of submarines and incorporating technologies into later blocks.

SSN(X) developed a digital engineering strategy. This strategy contains several key goals, including use of digital twins and digital threads to reduce reliance on physical prototypes and accelerate development timelines. SSN(X) plans to use digital model libraries in collaboration with other Navy organizations and shipbuilders to develop research and development initiatives and to execute concept design activities and systems engineering efforts.

Software and Cybersecurity

The SSN(X) program has written an initial cybersecurity policy definition memorandum but has not yet begun implementation of cybersecurity controls. The program reported that it remains to be determined whether it will create a zero trust strategy.

Other Program Issues

A key issue for SSN(X) is the Navy’s broader submarine design industrial base challenge, namely a knowledge and skills gap within the Navy’s design engineering workforce. Program officials stated that, due to the approximately 25-year gap in significant attack submarine design work, submarine programs face significant challenges maintaining a design and engineering workforce with the necessary expertise and critical skills. According to program officials, the two submarine shipbuilders will do a majority of the design work for SSN(X) and the internal Navy engineering workforce is working with them to meet workforce demands and develop new design experience to maintain production efficiency.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that as a new attack submarine, SSN(X) must begin development to deliver the capability needed to deter and prevail in a future conflict. The program stated that SSN(X) will be designed to enter, fight, and deny within heavily defended areas from the sea to the seabed. The program also stated that SSN(X) will deliver increased speed, larger payload volume, improved lethality and survivability, and organic hosting of robotic and autonomous systems. The program further stated that the technology development for these capabilities will maintain and sustain critical design workforce skills. The program also stated that the SSN(X) program plans to leverage new authorities and acquisition reform efforts to build the proficiency, capability, and capacity to deliver submarine technologies that will ensure the nation's undersea advantage in the future.

SPACE FORCE

Program Assessments

▲ Deep Space Advanced Radar Capability (DARC)

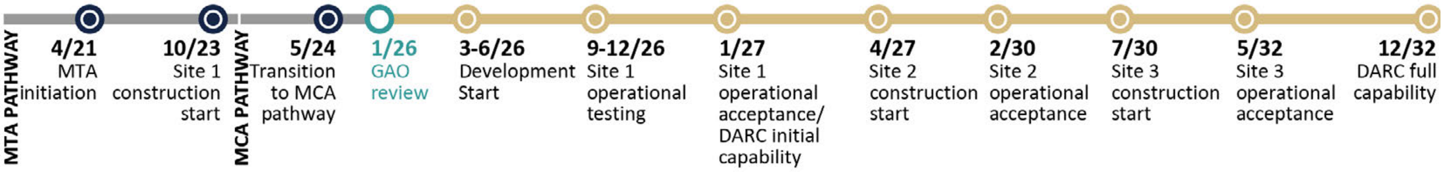
Program name	Assessment type	Page
Deep Space Advanced Radar Capability (DARC)	MDAP	177
GPS III Follow-On (GPS IIIF)	MDAP	179
Military GPS User Equipment (MGUE Increment 1)	MDAP	181
National Security Space Launch (NSSL)	MDAP	182
Next Generation Operational Control Systems (OCX)	MDAP	183
Next Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites (Next Gen OPIR GEO)	MDAP	185
Next Generation Overhead Persistent Infrared Polar (Next Gen OPIR Polar)	MDAP	187
Protected Tactical SATCOM-Global (PTS-G)	Future Major Weapon Acquisition	189
Protected Tactical SATCOM-Resilient (PTS-R)	MTA	191
Resilient Missile Warning and Tracking Medium Earth Orbit (Resilient MWT MEO) – Epoch 1	MTA	193
Tranche 1, 2 and 3 Tracking Layer (T1 TRK, T2 TRK and T3 TRK)	MTA	195
Tranche 1, 2 and 3 Transport Layer (T1 TRK, T2 TRK and T3 TRK)	MTA	197
Weather System Follow-On – Microwave (WSF-M)	MDAP	199

Source (previous page image): Northrop Grumman on behalf of USSF/SSC/BCBG/DARC PMO. | GAO-26-108457

Source: Northrop Grumman on behalf of USSF/SSC/BCBG/DARC PMO. | GAO-26-108457

Deep Space Advanced Radar Capability (DARC)

The Space Force's DARC program seeks to develop three ground-based radar sites that will track objects in the geosynchronous satellite belt. Sites 1, 2, and 3 will be in Australia, the United Kingdom, and the United States, respectively. DARC plans to leverage defense science and technology efforts to mature radar concepts and technologies that can demonstrate increased sensitivity, capacity, search rates, and scalability to detect and track objects in deep space orbit. The Air Force initiated the DARC MTA effort to develop Site 1 and a command and control center. The Air Force then later restructured all three sites into one program that transitioned to the major capability acquisition (MCA) pathway.



Program Performance fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions	Unit Cost dollars in millions	Quantities number	Cycle time in months
First Full Estimate (1/2026)	**Program has not developed formal cost or schedule estimates**			
Reported in 2025[a]	**Program had not developed formal cost or schedule estimates for GAO's 2025 assessment**			
Current Estimate (1/2026)	**Program has not developed formal cost or schedule estimates**			

■ Development cost ▢ Procurement cost

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$87.23 | Information not available

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Northrop Grumman Systems Corporation

Contract Type: CPIF (using other transaction authority) (Site 1); CPIF, FFP (Site 2)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	...	◐
Obtain User Feedback		
Collect end user feedback to inform the product	...	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	...	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	...	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	...	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	...	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	...	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess DARC implementation of leading product development practices at development start because the program has yet to reach that event.

DARC Program

Program Performance

In November 2025, Site 1 successfully demonstrated a developmental capability milestone, according to the program. The program office required successful demonstration before the decision could be made to enter development on the MCA pathway, which is planned for second quarter of fiscal year 2026. We reported last year that the program had tentatively scheduled entering production on the MCA pathway in May 2025. However, officials said that the program is tailoring its acquisition process and no longer plans to enter production since each site is unique due to differing regulations and requirements for each location.

We reported last year that the Site 2 contract was limited to only working on preliminary design and software development until approval for the program to enter the next MCA pathway phase. To maintain schedule, in October 2025 the Air Force approved the program to procure hardware with lengthy delivery times and initiate preconstruction activities for Site 2. However, completion of Site 2 design will be on hold until the program enters development on the MCA pathway.

The program reported that it has been focused on funding unanticipated cost growth for Site 1 due to modifications for various issues, including foreign country requirements. This has resulted in additional schedule slip for Site 3, delaying Site 3's construction start by 10 months and operational acceptance by 4 months.

Leading Product Development Practices

The DARC program reported implementing a leading practice for product development—the collection of end user feedback to inform the product. For example, weekly feedback is used to develop the system's graphical user interface. In addition to feedback from end users, feedback from stakeholders and organizational users was incorporated, according to the program office.

We adjusted the current status score for the digital thread from last year's assessment based on additional detail that we obtained this year. Specifically, the program stated that CAMEO, its systems engineering modeling tool, does not capture the elements of a digital thread as defined by leading product development practices. Those elements include: capturing data from iterative cycles in real-time; providing access to program staff, stakeholders, and end users; and including digital twin simulation data fed into the digital thread. Our previous work has shown that digital tools, such as threads, can improve efficiencies throughout the life cycle of a program, including sustainment.

As we reported last year, the program identified Site 1 as its MVP, but stated that requirements for Site 2 cannot be currently changed. As a result, the program is not taking the important step of fully demonstrating the MVP for the first iteration before moving on to the next.

Software and Cybersecurity

The program reported some progress in maturing the radar software—a critical technology—but it remains immature. The program reported issues with system integration and stated that the contractor underestimated the amount of work to complete integration. In recognition of this reality, program officials stated that the contractor is hiring and training additional staff.

The program reported completion of its cybersecurity cooperative vulnerability identification assessment in June 2025, and it planned to conduct a follow-on adversarial cybersecurity development test in February 2026. According to the program, DARC does not plan to implement zero trust cybersecurity principles.

Other Program Issues

Last year we reported that the program planned to complete efforts to resolve DARC's system interoperability with a space situational awareness data repository as well as a missile defense system program by June 2025. The program reported that the connection to the space situational awareness data repository was completed in November 2025. According to officials, the delay was due to challenges in connecting to a classified network and delays by the program responsible for the space situational awareness data repository in implementing the connection. The program reported that the connection to a missile defense system program has been delayed to June 2026, based on revised Missile Defense Agency implementation timelines.

Program Office Comments

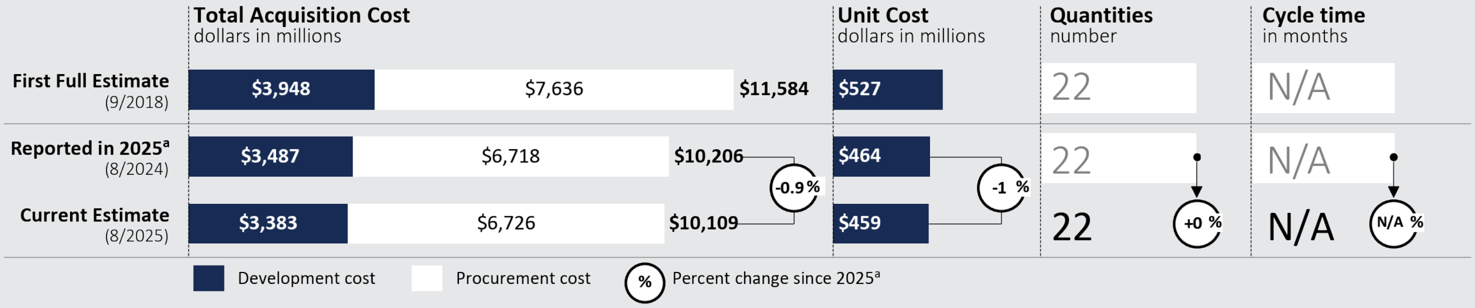
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office had no comments.

Source: Lockheed Martin Corporation. | GAO-26-108457

GPS III Follow-On (GPS IIIF)

The Space Force's GPS IIIF program is intended to build upon the efforts of the GPS III program to develop and field next-generation satellites to modernize and replenish the GPS satellite constellation. In addition to the capabilities built into the original GPS III design, GPS IIIF is expected to provide new capabilities. These capabilities include a steerable, high-power military code (M-code) signal—known as Regional Military Protection—to provide warfighters with greater jamming resistance in contested environments.

Program Performance fiscal year 2025 dollars in millions



Notes: Total quantities comprise two development quantities and 20 procurement quantities. The graphic bars depict only research and development and procurement costs. However, total acquisition costs may also include costs for military construction as well as acquisition operation and maintenance. We could not calculate cycle time because the initial capability depends on the availability of complementary systems.

ªGAO-25-107569.

Software Development

as of January 2026

Approach: Waterfall and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 76-99%

According to the program, it is not tracking total acquisition cost for software development and procurement as not all contract options for the space vehicle have been exercised.

Program Essentials

Prime contractor: Lockheed Martin

Contract Type: FPIF; FPAF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	NA	NA
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess the test of a system-level integrated physical prototype in an operational environment due to the difficulty of conducting tests in the operational environment—space.

GPS IIIF Program

Program Performance

In 2025, the program began accepting flight versions of the satellite's mission data unit (MDU)—the brain of the satellite's navigation mission. The program reported accepting the MDU designated for installation into the first GPS IIIF satellite in September 2025, following the successful completion of required testing. Program officials said a second MDU was delivered in December and were anticipating a third in April 2026.

According to program officials, the prime contractor has subcontracted additional Linearized Traveling Wave Tube Amplifier (LTWTA) work, resulting in an average 6-month delay for two satellites due to technical changes required by moving the work to the subcontractor. The prime contractor encountered technical issues in the vibration testing of LTWTAs it had built. According to program officials, correcting the issue would require new design work and qualification testing. Consequently, program officials reported, the contractor pivoted to a subcontractor to build the LTWTAs for the first two GPS IIIF satellites placed on contract. As result, that subcontractor, which in September 2025 delivered the complement of LTWTAs for the third GPS IIIF satellite placed on contract, is now responsible for LTWTAs for all GPS IIIF satellites.

Component delays and test resource constraints are among the reasons driving additional delays to projected delivery dates. The first 10 satellites under contract cumulatively incurred projected delivery delays averaging 7 months since December 2024. According to program officials, the third contracted GPS IIIF satellite will be the first to deliver, with an April 2027 delivery date.

Leading Product Development Practices

The program reported that it is not implementing leading product development practices, such as incorporating user feedback to prioritize capabilities or using digital twins and digital threads to verify design performance. Officials said that this is because development is focused on compliance with the program's defined baseline, which does not allow for an iterative development approach. As we previously reported, using an iterative approach could help the Space Force develop a system that delivers the most critical capabilities in the near term. It could also inform innovations for the next system to address less urgent needs.

Software and Cybersecurity

The program updated its cybersecurity strategy in August 2024 but has yet to develop a "zero trust" security strategy the DOD-required approach that assumes an attacker is present in the environment. The program plans to adopt such a strategy in the future.

The program reported completion of a cyber vulnerability identification test in May 2024 and a cyber vulnerability and penetration assessment in August 2024. The program reported that the testing has not identified any repeated vulnerabilities. Additional adversarial cybersecurity testing was scheduled for March 2026.

Other Program Issues

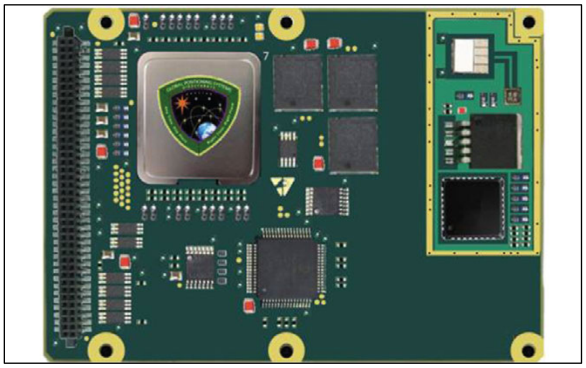
The Air Force forecasts that full operational capability for the GPS IIIF's Regional Military Protection will be late to warfighter need and directed Space Force to investigate alternative acquisition approaches in a March 2025 memorandum. The memorandum pointed to a potential hybrid GPS satellite architecture that might be augmented by both GPS IIIF satellites and lower-cost satellites.

The launch and operation of GPS IIIF satellites might be affected by the potential cancelation of OCX Blocks 1 and 2, assessed separately in this report. A cancellation of OCX would alter plans to deliver GPS IIIF launch and operational control capabilities through OCX Block 3F. Space Force officials stated that their projections indicate ground control readiness to support GPS IIIF launch and operational control by 2028-29, regardless of the course of action pursued.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that it has overcome its three main technical challenges with hardware deliveries for the first two satellites. The first satellite in the production flow has started initial system-level performance testing and is scheduled to start thermal vacuum testing in 2026. The program stated that user feedback is an inherent element of GPS satellite development; however, it said that since the development phase of the program is essentially over, its focus is on production and launch and there is minimal opportunity for change. Additionally, the program stated that GPS IIIF satellites must be fully compatible with all existing operational GPS satellites. Consequently, there are no capability trades or prioritization opportunities to consider for the GPS IIIF satellites.

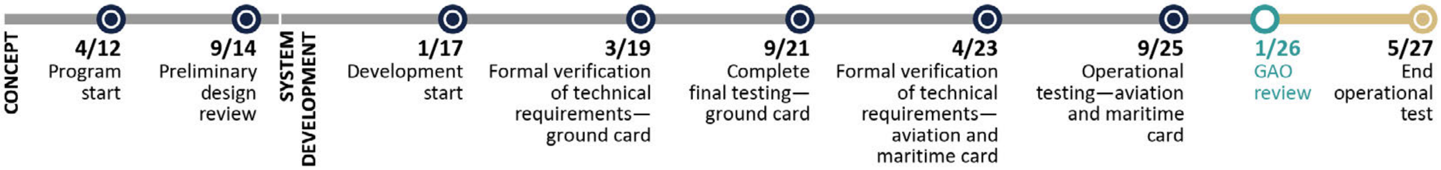
Space Force **Program Type:** MDAP **Common Name:** MGUE Increment 1



Source: U.S. Air Force. | GAO-26-108457

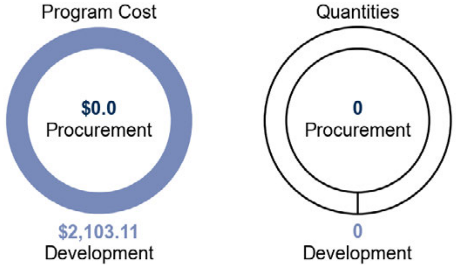
Military GPS User Equipment (MGUE Increment 1)

The Air Force's MGUE Increment 1 program is developing the first-generation GPS cards capable of receiving a modernized GPS signal known as military code (M-code). The receiver cards provide the military departments with robust threat-resistant positioning, navigation, and timing capabilities. The program is developing one card for ground and one card for aviation and maritime applications. The MGUE program is integrating and testing cards on four lead platforms across the military departments. The cards will then be available for procurement.



Estimated Cost and Quantities

fiscal year 2025 dollars in millions



Software Development as of January 2026

Approach: Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): Information not available

Percentage of progress to meet current requirements: 76-99%

The program reported that it does not track software costs.

Program Essentials

Prime contractors: L3Harris; Raytheon Technologies; BAE Systems

Contract type: CPIF/CPFF/FFP (development)

Current Status

In April 2025, the Space Force and the Air Force agreed to transfer MGUE Increment 1 efforts from the Space Force to the Air Force's M-Code Aviation Receiver Enterprise (MARE) program. According to program officials, the full transition of program responsibility will be completed by May 2026. The Air Force M-Code Aviation Receivers Joint Program Office manages and oversees the MARE program.

The program office considers ground card development to be complete and in production, but there are remaining technical issues for the aviation and maritime card that are being addressed by the contractors. In June 2025, we reported that the program discovered a deficiency in the aviation and maritime card during integration testing. Program officials stated that the contractors, with assistance from the Navy and the Space Force, have identified a path forward to address the deficiency in the card, with further testing planned in April to June 2026. Operational maritime testing is now scheduled to begin in May 2027 on a Navy *Arleigh Burke* destroyer.

While the aviation and maritime card meets maritime accuracy requirements, it does not meet joint aviation accuracy requirements, program officials reported. They noted the Army's Gray Eagle achieved card-level certification in August 2025 and completed operational testing in September 2025, with a request to update the Capability Development Document (CDD) vertical and horizontal accuracy requirements. The program intends to update those requirements to match the Selective Availability and Anti-Spoofing Module (SAASM) requirements, pending Joint Requirements Oversight Council approval. Program officials stated the current SAASM requirements are sufficient for mission success, with no operational need for the tighter current CDD requirements.

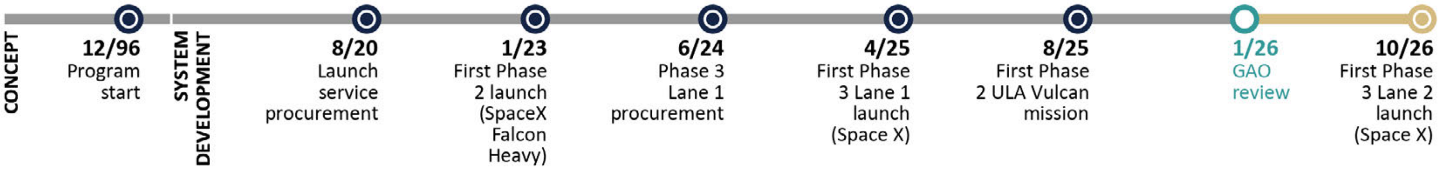
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that it is on track to address the previously identified deficiency in the forthcoming integration testing in April-June 2026 and expects to complete operational testing in May 2027.

National Security Space Launch (NSSL)

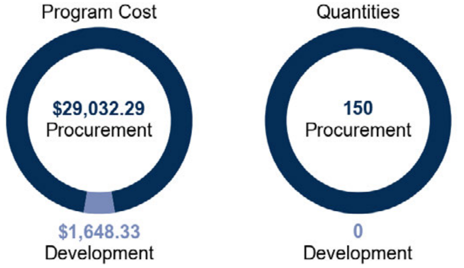
Source: Blue Origin, Rocket Lab, SpaceX, Stoke Space, and United Launch Alliance. | GAO-26-108457

The Space Force's NSSL program provides space lift support for national security and other government missions. Since 2013, DOD has used a phased approach to awarding launch contracts. NSSL procures launch services from United Launch Alliance (ULA), Space Exploration Technologies (SpaceX), Blue Origin, Rocket Lab, and Stoke Space. These procurements are intended to ensure that the U.S. has the capabilities necessary to deliver national security payloads into space. We focused our review on NSSL's investment in new launch systems from U.S. providers.



Estimated Cost and Quantities

fiscal year 2025 dollars in millions



Procurement amounts represent all funding for Phase 2 and Phase 3 contracts for fiscal years 2020–2030.

Software Development as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost:

Information not available

Percentage of progress to meet current requirements:

Information not available

The program reported that it only procures the launch services and does not take any ownership of hardware or software.

Program Essentials

Prime contractors: Blue Origin, Rocket Lab, Space Exploration Technologies Corporation, Stoke Space, United Launch Alliance

Contract type: IDIQ (Phase 3 Lane 1); Indefinite Delivery Requirements (Phase 3 Lane 2)

Current Status

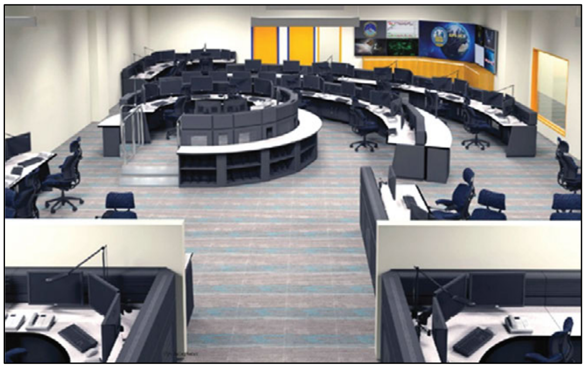
The NSSL program plans to significantly increase the number of launches over the coming years, at a time when the program faces workforce reductions. Approximately 50 Phase 2 launches are expected to take place through fiscal year 2028. The program plans to acquire services for approximately 85 launches during Phase 3—a significant increase from Phase 2. This is due in part to DOD's plans for constellations of large numbers of satellites in low-Earth orbit. Phase 3 of NSSL's acquisition strategy uses a "dual lane" approach to meet demand, on-ramp new providers, and ensure DOD access to space. Lane 1 consists of approximately 30 launches to less challenging orbits over a 5-year period. Lane 2 consists of approximately 54 launches to more challenging orbits.

In 2025, NSSL increased the number of providers eligible for Phase 3 launches. NSSL on-ramped two additional launch service providers—Rocket Lab and Stoke Space—for Lane 1. In April 2025, NSSL reported awarding Lane 2 contracts to Blue Origin, SpaceX, and ULA, for missions starting in fiscal year 2027. Currently, only SpaceX and ULA launch vehicles are certified to conduct national security space launches. After nearly 3 years of delays, ULA completed its first Phase 2 launch of its Vulcan vehicle in August 2025. The program continues to work with Blue Origin to complete the certification process for its New Glenn vehicle, which completed two certification flights. Program officials said it has experienced recent staff losses from the deferred resignation program and voluntary early retirements, along with a hiring freeze. This may have long-term detrimental effects on the program. These vacancies may prevent the program from onboarding additional launch service providers to meet DOD's needs in a timely manner.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that NSSL is leveraging innovative acquisition strategies and workforce ingenuity to accelerate delivering space capability to the warfighter. The program stated that these efforts include simplifying solicitations based on mission risk, compressing integration timelines, changing launch vehicles for urgent needs, and rapidly reassigning payloads.

Space Force | **Program Type:** MDAP | **Common Name:** OCX

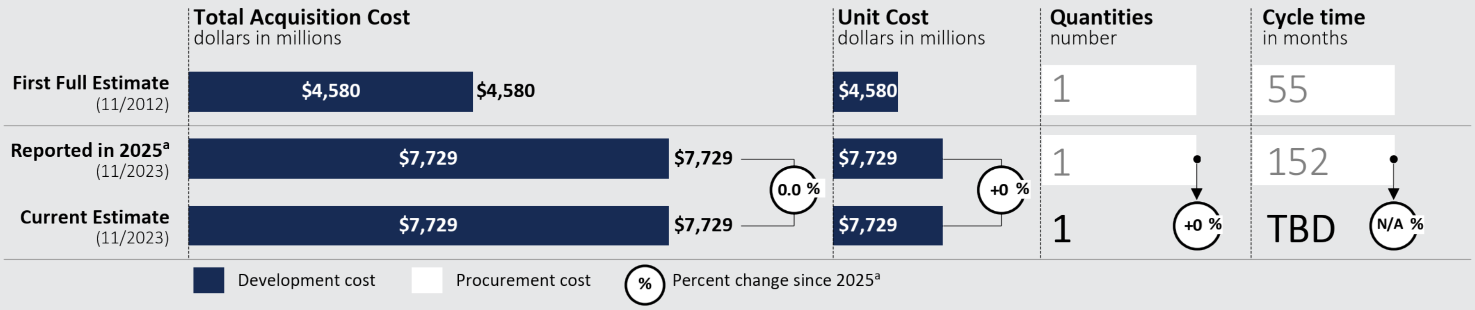


Source: U.S. Air Force. | GAO-26-108457

Next Generation Operational Control System (OCX)

The Space Force's OCX program is developing a new software-centric system to replace the existing GPS ground control system. The Space Force intends for OCX to ensure reliable, secure delivery of position, navigation, and timing information. The Space Force is developing OCX in a series of blocks. The first, called Block 0, is for launch and limited testing of GPS III satellites and was delivered in 2017. The second, called Blocks 1 and 2, includes satellite control, among other functions. OCX Block 3F is a separate follow-on program for the GPS IIIF satellites. We assessed OCX Blocks 1 and 2. We assess GPS IIIF separately in this report.

Program Performance fiscal year 2025 dollars in millions



Total quantities comprise one development quantity and zero procurement quantities. The OCX program is over 90 percent expended and no longer is required to produce Defense Acquisition Executive Summary (DAES) reports. The current estimate reflects the data reported in 2025, which is the last DAES report the program submitted.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$3,189.94 | 41.27%

Percentage of progress to meet current requirements: Information not available

The program reported meeting requirements to accept software delivery but stated this does not include meeting system-level requirements that have yet to complete testing.

Program Essentials

Prime contractor: Raytheon
Contract Type: CPIF/CPAF (development)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	NA	NA
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	●	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess the test of a system-level integrated physical prototype because OCX is primarily a software program.

OCX Program

Program Performance

According to Space Force officials, in late 2025, the Air Force acquisition executive recommended that the OCX program be canceled and that Space Force pursue modernization of the existing GPS Operational Control Segment (OCS) to meet the requirements that were to be delivered by OCX. As of January 2026, the Department's decision on the recommendation was still pending, and the program was continuing its efforts, according to Space Force officials.

Multiple development challenges contributed to this recommendation. In May 2025, the OCX program adopted a new acquisition program baseline schedule, and 2 months later, the Space Operations Command accepted the contractor's delivery of OCX Blocks 1 and 2. However, due to various reasons, including a subset of technical challenges, DOD officials reported the program office processed multiple deviations and waivers to permit the acceptance of OCX. According to officials with DOD's Office of Developmental Test, Evaluation and Assessment (DTE&A), the system met its key performance parameters and key system attributes, with one exception—an unmet GPS time-steering requirement pertaining to OCX's ability to assure accurate timing. According to these officials, Space Force's interim work-around plan would entail using OCS to conduct time-steering through the upcoming test events and operational rehearsals. However, OCX would still have to address the underlying deficiencies in correcting satellite clock drift to satisfy the requirement before operational control of the GPS constellation could be transferred to OCX.

DTE&A officials also reported that developmental testing of previously untested aspects of the system—such as orbital maneuver and scheduling capabilities—resulted in an increased backlog of deficiencies that require correction. This high number of deficiencies includes defects that undermine reliability and usability, exposing vulnerabilities in mission-critical functions like M-Code handling, constellation management, and cybersecurity.

According to Space Force officials, between September and November 2025, Space Force conducted a study to develop a high-fidelity schedule and a cost estimate on the remaining work to complete OCX. Simultaneously, Space Force conducted a parallel study to assess the cost and schedule requirements to modify the existing OCS to meet the requirements expected of OCX—to include OCX Block 3F requirements for operating GPS IIIF satellites. According to Space Force officials, these studies were completed in November 2025 and resulted in the recommendation to cancel OCX. This is because the OCX schedule was assessed to have much more risk than the alternative approach of modifying OCS.

Leading Product Development Practices

The OCX program reported that it is using aspects of iterative development but it is not fully iterative because it is working to meet fixed program requirements. According to program officials, investing time and effort to determine an MVP would be going backwards, given the maturity of the OCX development effort. However, we previously found that using an iterative approach could help the Space Force develop a system that identifies and delivers the most critical capabilities in the near term.

The OCX program reported collecting end user feedback continuously through developmental testing on usability and functionality. The program also reported that it is implementing a modular open systems approach on components such as the standard racks in its master control station. The program reported that it does not plan to develop a digital twin or digital thread. Officials stated that they have developed a partial digital twin of the GPS satellite constellation with the satellite system simulator, which is used for testing purposes.

Software and Cybersecurity

DTE&A officials stated that, while they supported Space Force's acceptance of OCX, they assessed cyber survivability as a high risk area, requiring continued mitigation and focused investment. DTE&A recommended that the program 1) develop testable, measurable mission-based cyber requirements and 2) implement fixes or mitigations for the identified deficiencies and retest to verify the corrections. As of September 2025, DTE&A officials noted that the program was working on a cyber vulnerability and penetration assessment, but stated that much work remained in ensuring that OCX is secure.

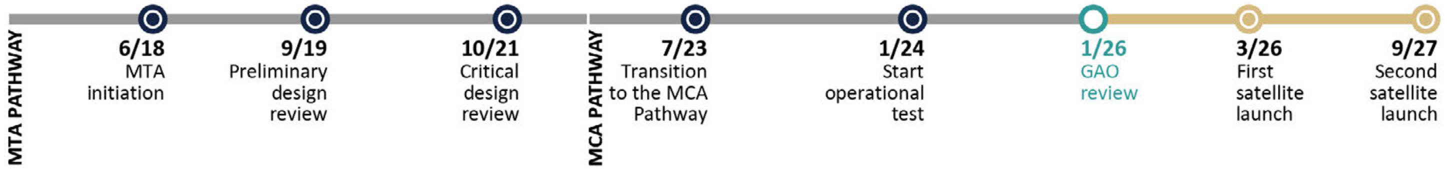
Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. Program officials stated that OCX was intended to update command and control of the GPS satellite constellation, replacing the current OCS, as well as replacing the Launch, Anomaly and Disposal Operations system. Officials also stated that following contractual acceptance of OCX from Raytheon in July 2025, extensive system issues arose during the integrated testing phase of OCX with the broader GPS enterprise. Officials stated the OCX program has long been plagued by technical challenges, inadequate systems engineering processes, and contractor underperformance that resulted in schedule slips and cost growth. These officials stated these issues drive significant risk into the ability to deliver OCX capability in the needed time frame. After our review, the Space Force terminated OCX in April 2026. Officials note the current OCS will be enhanced to meet OCX requirements.

Next Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites (Next Gen OPIR GEO)

The Space Force's Next Gen OPIR GEO is a missile warning follow-on program to the Space Based Infrared System and will consist of two geosynchronous Earth orbit satellites. These satellites are intended to provide initial missile warning of a ballistic missile attack on the U.S., deployed forces, and allies. Additional ongoing efforts are expected to deliver two Next Generation Overhead Persistent Infrared Space Polar Satellites (Next Gen OPIR Polar), which is reviewed separately in this report, and modernize the ground segment.

Source: U.S. Space Force. | GAO-26-108457



Program Performance fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions		Unit Cost dollars in millions	Quantities number	Cycle time in months
First Full Estimate (6/2024)	$9,549	$9,549	$4,774	2	86
Reported in 2025[a] (6/2024)	$9,549	$9,549	$4,774	2	89
Current Estimate (1/2026)	Program has not updated formal cost or schedule estimates				

■ Development cost ☐ Procurement cost

Recent program documents indicate cost growth but the program has yet to provide an updated baseline or submit a formal acquisition report.
[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Incremental, DevOps and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):
$318.01 | 5.33%

Percentage of progress to meet current requirements: 76-99%

Program Essentials

Prime contractor: Lockheed Martin
Contract Type: CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated*)	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	◔	●
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	NA	NA
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess the test of a system-level integrated physical prototype in an operational environment due to the difficulty of conducting tests in the operational environment—space.

Next Gen OPIR GEO Program

Program Performance

The Next Gen OPIR GEO program continues to progress but has experienced significant cost growth. The mission payload subcontractor reports a cost overrun of about $340 million and attributes it to software development complexity and engineering challenges.

The first Next Gen OPIR GEO satellite was completed in January 2026, 4 months later than planned. However, due to a crowded launch manifest, the satellite will be launched no earlier than October 2026, 7 months later than we reported last year. Additionally, as we previously reported, the program retains no schedule buffer for the first or second satellite's launch dates; any integration delays will likely result in launch delays and additional program cost increases.

The program office has identified 18 critical technologies, all of which were mature as of July 2025. The program reported increased maturity across several technologies ahead of launch, reducing technical risk for on-orbit performance.

Leading Product Development Practices

The Next Gen GEO OPIR program reported implementing some aspects of leading practices. We previously reported that the program identified a minimum viable product as part of its approach, but we found that it falls short of leading practices. In particular, the program does not prioritize capabilities that can be fielded to meet user needs, a critical element of a minimum viable product.

The program reported that it regularly requests and incorporates feedback from stakeholders, organizational users and end users to inform the Next Gen GEO OPIR program design. For example, program officials said that maintainers participated in the order and coloring of critical alarms as part of the graphical user interface development. Officials said this will help the user determine actions required to troubleshoot hardware issues during operations. Additionally, program officials said that end user feedback is solicited at major milestone reviews as well as quarterly program reviews and major integration test events.

The program reported that it developed a digital thread but dropped plans to develop a digital twin. We previously reported that the program completed a digital thread that will support decision makers through multiple life-cycle activities, including requirements analysis, design evaluation, integration, testing, and support and sustainment. The program further told us that, around 2021, it dropped plans to develop a digital twin from its baseline due to cost and schedule considerations. The program reported it uses an array of digital simulations to model the mission payload and spacecraft. These include all digital satellite simulations, hardware-in-the-loop simulation of the space vehicle with a flight-like processor, and a functional test of the space vehicle test assembly.

The program did not incorporate a modular open systems architecture (MOSA) because, while elements of MOSA exist in the program, no formal MOSA architecture was introduced into the heritage design the satellites are based on.

Software and Cybersecurity

Flight software for the first mission payload experienced delays due to many anomalies identified during software testing. The payload subcontractor, in an effort to avoid further schedule slips, increased its testing staff and implemented a 24 hour/7 day work week. This increase is intended to ensure that the flight software is qualified in time to support final space vehicle testing.

The program completed several cybersecurity assessments in 2025, including a cyber tabletop exercise, and four developmental cybersecurity tests. The program office told us that this testing resulted in no significant findings. The program office reported that it received space vehicle authorization to operate in October 2025. According to program officials, this represents a significant milestone for the program.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that it is delivering two satellites designed to counter advanced missile threats and ensure operational dominance in contested environments. It stated that it continuously collaborates with the user community and that this partnership ensures the program delivers the right technology on relevant timelines.

According to the program, the completion of the first satellite in January 2026 validated the maturity of its critical technology and reduced technical risk for the program. It noted that due to external launch delays, the first satellite will launch no earlier than the fourth quarter of calendar year 2026. However, despite these delays, the program said it continues to perform within its cost and schedule guardrails to deliver this critical capability to the warfighter. The program added that it received its space vehicle authorization to operate in October 2025 due to its robust security posture, ahead of the projected end-of-year schedule.

Space Force | **Program Type:** MDAP | **Common Name:** Next Gen OPIR Polar

Next Generation Overhead Persistent Infrared Polar (Next Gen OPIR Polar)

Source: LAAFB Arts and Graphics Department, USG. | GAO-26-108457

The Space Force's Next Gen OPIR Polar is a missile warning program intended to detect intercontinental- and submarine-launched missiles as well as tactical ballistic missile launches. Two polar-orbiting satellites will consist of new payloads on a highly resilient space vehicle. Initiated as part of an MTA rapid prototyping effort in 2018, the program transitioned to the major capability acquisition pathway in 2023. We assess a related effort separately in this report: Next Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites (Next Gen OPIR GEO).

Program Performance fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions	Unit Cost dollars in millions	Quantities number	Cycle time in months
First Full Estimate (6/2024)	$5,971	$2,985	2	119
Reported in 2025[a] (6/2024)	$5,971	$2,985	2	119
Current Estimate (6/2024)	$5,971	$2,985	2	137
Percent change since 2025[a]	0.0 %	+0 %	+0 %	+15 %

■ Development cost ☐ Procurement cost % Percent change since 2025[a]

Total acquisition cost, unit cost, and quantities reflect NGP's most recent cost estimate that we reported last year. Acquisition cycle time has increased due to an updated initial operational capability date; the new date follows the operational acceptance timeline of 18 months after the first satellite launch event.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Incremental, DevOps, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements: 51-75%

In our last assessment, the program provided an estimate of its software cost. For this assessment, the program reported that software costs represent 8-10 percent of the total cost of Phase 1 development efforts.

Program Essentials

Prime contractor: Northrop Grumman

Contract Type: CPIF

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	NA	NA
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess the test of a system-level integrated physical prototype in an operational environment due to the difficulty of conducting tests in the operational environment—space.

Next Gen OPIR Polar Program

Program Performance

The Next Gen Polar OPIR program reported that it continues to meet performance and schedule goals in Phase 2 of its contract strategy. Phase 2—which spans from 2024 to 2031—encompasses manufacturing and assembly; system integration and test; and space vehicle delivery, launch, and on-orbit testing. Phase 1—which spanned from 2020 through 2024—included design, development, hardware procurement, and design reviews. Phases 1 and 2 are valued at $2.2 billion and $1.89 billion, respectively.

The program completed thermal vacuum testing for the sensor sub-assembly in January 2026 and delivered it for mission payload integration in February 2026. Program officials expect thermal vacuum testing for the mission payload to complete in August 2026.

Following an integrated baseline review in April 2025, program schedules continue to reflect on-time launches for both space vehicles. The first space vehicle is expected to launch in September 2028 and the second in September 2030, with initial and full operational capabilities expected in 2030 and 2032, respectively.

Leading Product Development Practices

The Next Gen OPIR Polar program did not report implementing leading practices for product development. The program reported incorporating end user feedback prior to space vehicle development. The program reported that it regularly requests and incorporates feedback from stakeholders, organizational users, and end users to inform the Next Gen OPIR Polar program design. Additionally, program officials said end user feedback is solicited at major milestone reviews as well as quarterly program reviews and major integration test events. However, it noted that changing the design after development as a result of feedback would be costly due to rework and would potentially result in significant schedule delays. We have found that leading companies solicit and implement feedback from customers early and often throughout development to inform the initial product and subsequent deliveries.

Last year we reported that the program told us it had initiated development of a digital thread and planned to further develop the thread in the future. This year, the program office told us that it developed portions of the digital thread, such as model-based systems engineering models and external interface control documents, and that it has digitally stitched these software products together. However, these tools are not connected to one another and are outside a centralized digital thread. The program told us that it encountered technical challenges connecting data models, resulting in complications in reviewing data architectures. This led to the decision not to pursue a digital thread. Our previous work has shown that digital tools, such as digital threads, can improve efficiencies throughout the life cycle of a program, including sustainment.

Software and Cybersecurity

Next Gen OPIR Polar has two cybersecurity assessments planned for 2026: one to identify any known vulnerabilities, and one to evaluate the system's cybersecurity in a mission context using realistic threat exploitation techniques. These test activities align with developmental test and evaluation to identify issues early to reduce the effect on cost, schedule, and performance.

The program reported it does not plan to implement zero trust. The program baselined requirements prior to the establishment of the zero trust standard. Additionally, the program stated its information technology systems would be properly configured and maintained to be sufficient to protect the program in a similar fashion to zero trust by enforcing strict access controls, continuous monitoring, and segmentation of resources. Further, the program stated these systems can implement identity verification among other core tenets of zero trust without requiring a full zero trust architecture.

Other Program Issues

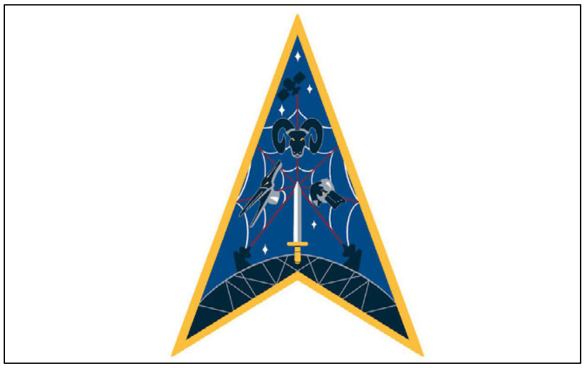
The program is tracking risks related to parts delays, production complexities, and facility constraints, among other things that could affect integration of the propulsion module with the space vehicle. If delivery of the module is late, for example, the program's critical path could be affected. The program is implementing some risk mitigation for this in the form of establishing alternate suppliers should the need arise.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated it is delivering two satellites designed to counter advanced missile threats in the northern hemisphere and ensure coverage in contested environments. Additionally, the program office noted it collaborates with the acquisition and operational user community to ensure timely capability delivery.

Program officials noted that the risk management and acquisition approach successfully reduced schedule risks associated with the propulsion module, following the on-time delivery and successful testing of its key components. Further, the program stated that it is managing cost, schedule, and technical performance. Program officials said the program officially started assembly, integration, and test for the first satellite after the delivery of the key components in December 2025. The program stated it continues to perform within its cost and schedule timelines.

Protected Tactical SATCOM - Global (PTS-G)

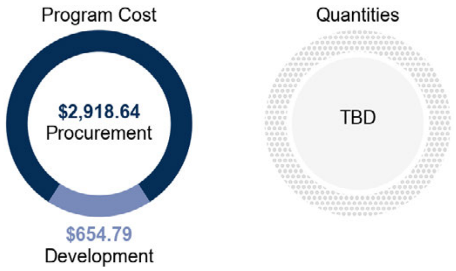


Source: U.S. Air Force. | GAO-26-108457

The Space Force's PTS-G is planned to be primarily a commercially designed, space-based system that processes protected tactical and other waveforms to provide satellite communications to the warfighter. PTS-G is intended to fill the gap between PTS-Resilient (PTS-R) and those provided by military SATCOM and commercial services. PTS-G plans to enter the major capability acquisition pathway in April 2026. PTS-G is part of the Space Force's broader Protected Anti-Jam Tactical SATCOM family of systems to provide robust, worldwide, beyond line-of-sight communications to warfighters in benign and contested environments. We evaluate the PTS-R program in a separate assessment in this report.

Estimated Cost and Quantities

(fiscal year 2025 dollars in millions)



Software Development as of January 2026

Approach: Agile and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): $66.11 | 1.85%

Percentage of progress to meet current requirements:

Information not available

The program reported that software development has not started.

Program Essentials

Prime contractor: Viasat, Inc.; Northrop Grumman; Astranis Space Technologies; Intelsat General Communications; Boeing

Contract Type: IDIQ/FFP

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated*)	...	○
Obtain User Feedback		
Collect end user feedback to inform the product	...	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems (*a dynamic virtual representation of a physical product or system*)	...	○
Develop a digital thread (*an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle*)	...	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	...	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	...	NA
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	...	◔

● Practice implemented ◑ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess PTS-G implementation of leading product development practices at development start because the program has yet to reach that event. We did not assess the test of a system-level integrated physical prototype in an operational environment due to the difficulty of conducting tests in the operational environment—space.

PTS-G Program

Program Performance

PTS-G seeks to deliver new satellites that leverage existing commercial technologies integrated on commercially designed spacecraft to improve cost and delivery time. However, PTS-G may face component integration or interface development issues that could lead to cost and schedule increases.

In July 2025, the USSF Space Systems Command reported awarding an indefinite delivery, indefinite quantity contract and initial firm-fixed-price orders to five contractors for $37.5 million in total. The contractors will develop upgraded designs of their existing technology solutions and demonstrate how they can deliver the planned capability. The contractors will not deliver payloads, but contractor performance will inform subsequent competition for the production contract to build payloads. The initial design activities will include designing four space vehicles and their associated space and ground hardware, which will begin in fiscal year 2026.

The program plans to use technically mature payload components. Though PTS-G has identified five mature critical technologies that have been demonstrated on other satellites in space, the program still faces some risk in integrating these components together and onto the satellite. Further, PTS-G may encounter issues in developing the interface between the satellites and the enterprise ground control system, based on the top risks the program is tracking.

The program planned to award a firm-fixed-price production contract in April 2026 to begin building the first four space vehicles, with the initial launch date in the third quarter of 2028. Once the program has demonstrated these satellites' capabilities on orbit, it plans to award contracts to build an additional 20 satellites, with plans to deliver 24 in total.

Leading Product Development Practices

The PTS-G program reported that it is implementing some elements of leading product development practices, but it does not plan to implement others that we found lead to efficiencies. For example, the program said that it is incorporating feedback from users to inform requirements and using future delivery orders to increase performance. In addition, the orders require contractors to use modular open systems in their designs so that improved components can be swapped out for older ones.

PTS-G does not have a documented plan on its MVP, but the plan is represented in its schedule to deliver swarms with the flexibility of adding more capabilities every 2 years or so. The program also reported that it does not plan to develop a digital twin or use a digital thread. Program officials stated that these practices are not needed because they plan to deploy commercially available technology instead of developing a new product and due to the program's short delivery schedule. We found that digital engineering practices, such as the use of digital twins and threads, can help speed delivery by efficiently identifying issues and improvements to ensure integrated systems meet user needs.

Software and Cybersecurity

PTS-G has not identified any software development risks. The program reported that the contractors have technically mature software solutions that have been integrated with hardware previously and that aspects of the software are in use commercially. Despite the lack of software risks, PTS-G reported that software development costs—currently estimated at $67.5 million—are increasing due to additional development to address requirements changes and cybersecurity requirements.

PTS-G has not identified any cybersecurity risks to date, but the program stated it is requiring that the satellites have an authority to operate, to ensure that certain cybersecurity requirements are met. The PTS-G program reported that it does not anticipate any challenges with the contractors implementing recommended security controls. However, the program reported that the contractors may experience challenges obtaining cybersecurity certification, which could lead to schedule delays or cost increases.

Other Program Issues

The program has yet to complete any supply chain risk management activities, though it plans to do so in July 2026. Given the program's plans to rely on existing commercial technologies and spacecraft, early identification of potential issues will be crucial.

Program Office Comments

We provided a draft of this assessment to the program office for review and comment. In commenting on the draft of this assessment, the program office stated that it has reduced the likelihood of key cybersecurity, requirements, and DOD interface risks ahead of the first swarm award. It stated that cybersecurity requirements are clearly defined for the space vehicle in line with DOD's Risk Management Framework. It also stated that each contractor uses internal digital engineering practices including models, simulators, and prototypes for design development and risk reduction. In addition, it stated that it is addressing potential integration issues early, and that the contractors' final supply chain risk management plans are due at the Critical Design Review. Going forward, the program office noted that future technology refreshes will be incorporated in each swarm, guided by continuous stakeholder input from across DOD to meet evolving warfighter needs.

Space Force | **Program Type:** MTA | **Common Name:** PTS-R

Protected Tactical SATCOM - Resilient (PTS-R)

The Space Force's PTS-R is a space-based system that processes the protected tactical waveform to secure satellite communications to the warfighter. PTS-R includes an MCA effort intended to deliver operational satellites that were developed under the PTS-Prototype (PTS-P) program for early operational use, as well as an MTA effort to deliver one enhanced prototype satellite. PTS-R is part of the Space Force's broader Protected Anti-Jam Tactical SATCOM (satellite communications) mission area. After transitioning its first MTA effort to the MCA pathway in June 2024, PTS-R initiated a second MTA effort in January 2026.

Source: U.S. Air Force. | GAO-26-108457

MTA PATHWAY	11/18	MTA 1 initiation
	6/19	MTA 1 funds obligated
	10-12/21	Critical design review
MCA PATHWAY	6/24	MTA 1 Transition to the MCA Pathway
MTA PATHWAY	1/26	MTA 2 initation
	1/26	GAO review
	10/26 - 3/27	Planned launch date for PTS prototypes
	9/29	Enhanced PTS-P on-orbit demo
	1/31	MTA 2 completion

Program Performance fiscal year 2025 dollars in millions

	Total Acquisition Cost dollars in millions	Unit Cost dollars in millions	Quantities number	Cycle time in months
First Full Estimate (1/2026)	**Program has not developed formal cost or schedule estimates**			
Reported in 2025[a]	**Program had not developed formal cost or schedule estimates for GAO's 2025 assessment**			
Current Estimate (1/2026)	**Program has not developed formal cost or schedule estimates**			

■ Development cost □ Procurement cost

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Information not available

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

Information not available

Percentage of progress to meet current requirements:

Information not available

The program reported that software development has not started.

Program Essentials

Prime contractor: Boeing, Northrop Grumman (PTS-P)
Contract Type: FFP (PTS-P)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	Development Start	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated*)	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	NA	NA
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

We did not assess the test of a system-level integrated physical prototype in an operational environment due to the difficulty of conducting tests in the operational environment—space.

PTS-R Program

Program Performance

In June 2025, the Department of the Air Force directed the PTS-R program to cancel its planned contract award, originally scheduled for the second quarter of 2025. In addition, the Air Force directed the program to pivot a portion of its PTS-R effort from the major capability acquisition pathway to the MTA rapid prototyping pathway to pursue an additional PTS-P satellite with enhancements. The program planned to award a contract for the enhanced PTS-P satellite in May 2026. The program will continue on the major capability acquisition pathway to deliver operationalized PTS-P satellites, with launch dates in the first and second quarters of fiscal year 2027, a delay of about 1 year from prior estimates.

In its acquisition decision memorandum, the Department of the Air Force emphasized the need for controlling costs and delivering capabilities faster as the rationale behind its decision. The Air Force established a PTS Family of Systems approach to synchronize PTS programs, including PTS-R and PTS-Global—which we assess in a separate assessment. In January 2026, the program received approval for an updated acquisition strategy that reflects the June 2025 changes. The Air Force also directed the program to conduct an interim program review in September 2025, and the program received approval to release the request for proposals for the enhanced PTS prototype, according to program officials.

We previously reported that the Space Force matured all critical technologies and performed risk reduction efforts for the PTS-P prototypes under the first MTA rapid prototyping effort. Program officials noted that they achieved final certification of the program’s cryptographic unit, a critical technology, in April 2025, meeting the certification completion goal prior to the previously scheduled November 2025 launch of the first prototype. Program officials told us that they planned to demonstrate and test the capabilities of the prototypes on orbit—rather than conduct testing in a digital environment—to ensure they could operate as expected and could communicate with ground terminals. Program officials stated that, if the prototype demonstrations were successful, they could pivot the prototypes into on-orbit capabilities. Program officials said that the prototypes will continue to have a 5-year design life and will be used to conduct residual operations. Program officials expect on-orbit testing to begin in fiscal year 2027.

Leading Product Development Practices

We previously reported that the preceding PTS-P program incorporated some leading product development practices. For example, the PTS-P program reported that it obtained user feedback during quarterly test team meetings and during PTS-P prototype demonstrations, preliminary design review, and critical design review. The program stated, however, that the PTS-P prototype effort was not intended to deliver a minimum viable product but was structured to mature its five critical technologies and reduce risk. The PTS-R program reported no plans to incorporate user feedback.

The program also does not expect to use a digital twin and has yet to determine whether it will develop a digital thread. According to the program, PTS-P contractors used limited digital twins for the ground and payload segments, but the program office does not expect the PTS-R effort to involve a digital twin for component-level development and testing because of cost concerns. We previously found that the use of digital twins and digital threads can lead to efficiencies by incorporating real-time data from test results and facilitating decision-making on system updates.

The PTS-R program reported that it has a documented plan to incorporate a modular systems approach (MOSA). Specifically, it said that a MOSA will be incorporated into the space and ground segments with separate modules for the spacecraft bus, payload, controls, and user terminals.

Software and Cybersecurity

According to PTS-R program officials, the prototypes have undergone cybersecurity assessments and are scheduled to achieve interim authority to test by the fourth quarter of fiscal year 2026. The effort to deliver an enhanced PTS-P prototype is expected to leverage lessons learned from the original prototypes to scale anti-jam performance and expedite the cybersecurity processes.

Program Office Comments

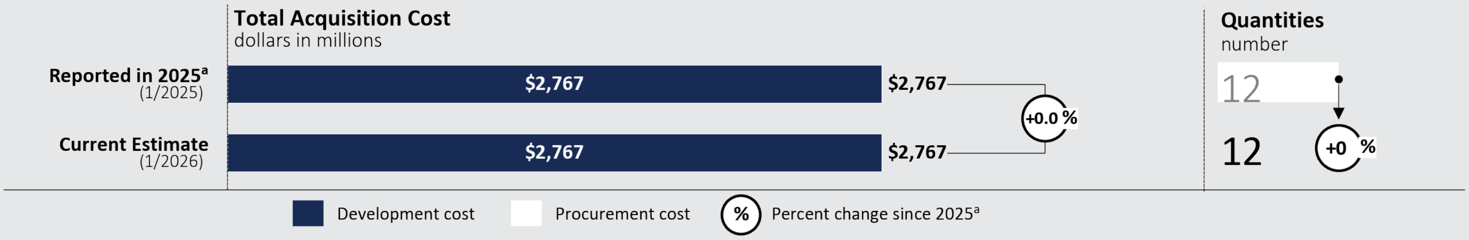
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that, in June 2025, the Space Force directed a change from the full PTS-R program to rapid, incremental, cost-controlled delivery of the PTS-R capability. According to the program office, the Enhanced PTS-P effort—with an expected contract award in May 2026 and launch in 2030—will deliver an improved PTS prototype, providing capabilities before future PTS-R capabilities are available. The program office noted that the two original PTS-P prototypes will launch on Vulcan vehicles in 2027 and will provide the first space-processed anti-jam SATCOM capability. The program office also stated that it did not procure digital twins due to cost constraints, and that the program has continuously solicited and incorporated user feedback throughout the development life cycle and will continue to do so during design reviews, demonstrations, and test events.

Source: U.S. Space Force. | GAO-26-108457

Resilient Missile Warning and Tracking Medium-Earth Orbit (Resilient MWT MEO) – Epoch 1

Resilient MWT MEO is a satellite system being developed by the Space Force's Space Systems Command to provide missile warning, tracking, and defense data to legacy and future missile warning and tracking space systems. Epoch 1 is the first of at least four increments focused on delivering the latest Overhead Persistent Infrared sensing technology into medium-Earth orbit. The Epochs will work with Space-Based Infrared Systems and the Space Development Agency's (SDA) Tracking and Transport Layer satellites, the latter of which we assessed separately.

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



[a]GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, Waterfall, Incremental, and DevSecOps

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$126.6 |4.58%

Percentage of progress to meet current requirements: 26-50%

The program reported that the costs above are for Epoch 1 software development only. The program also reported that the software costs are for both ground and space vehicle software.

Program Essentials

Prime Contractor: Millenium Space Systems Parsons; Northrop Grumman

Contract type: CPIF (for first space vehicle and support systems) and FFP (for remaining space vehicles) (using other transaction authority)

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	MTA Initiation	Current Status
Refine high-level operational needs into an MVP (*the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated*)	◔	◐
Obtain User Feedback		
Collect end user feedback to inform the product	●	●
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	◔	◐
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	◔	●
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	◔
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	NA	NA
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	◔	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA - Not applicable

We did not assess the test of a system-level integrated physical prototype in an operational environment for Epoch 1 due to the difficulty of conducting tests in the operational environment—space.

Resilient MWT MEO Program

Program Performance

The Resilient MWT MEO program's estimated first launch date for Epoch 1 has been delayed 8 months since last year's review—from September 2026 to May 2027. Epoch 1 includes two separate launches of six satellites each on different orbital planes. Program officials cited component integration challenges, extended procurement lead times, and parts shortages as the primary drivers for the delay. For example, according to program officials, the program is experiencing delays in getting printed circuit boards assembled. The program noted that it requires a minimum 9-month interval between the two plane launches, which extends the second launch date to February 2028. According to program officials, this revised Epoch 1 schedule does not affect the critical path for Epoch 2 development.

In addition, the program identified one of its two critical technologies, the optical crosslink terminals, as a medium risk that could affect the program performance. The program is designing the technology to enable space-to-space laser communication between satellites. According to program documents, the technology's elevated risk is due to early test failures and environmental requirements compliance. Program officials added that the elevated risk to schedule is also due to the optical crosslink terminal's standards—the technical specifications and interface requirements that allow different platforms to exchange data—which the SDA manages for multiple systems and are outside the program's control.

In 2025, the Resilient MWT MEO program changed its approach to managing Epoch acquisitions. Previously, the program planned to use the rapid prototyping MTA pathway for Epoch 1, then transition to an MCA for Epoch 2. However, the Space Force approved use of the rapid prototyping MTA pathway for the development of Epoch 2 in April 2025. According to program officials, the Space Force will likely use the MTA pathway for Epoch 3 as well. Program officials said that they expect use of the MTA pathway will reduce bureaucratic barriers and increase flexibility for working with another DOD office.

Leading Product Development Practices

The program reported that it is implementing some elements of leading product development practices. For example, the program reported that it is incorporating both stakeholder and user feedback into the development of Epoch 1, such as holding regular summits in which users provide input on how Resilient MWT MEO will integrate with other systems. In addition, the program reported that it has identified an MVP in the form of Epoch 1. However, as we reported last year, the program is not fully demonstrating the MVP, nor is it collecting user feedback on the MVP in an operational environment, before starting significant development work on the next space vehicle. Space Systems Command reported awarding another transaction agreement in May 2025 to develop Epoch 2—2 years before the planned first launch of Epoch 1. This approach is inconsistent with iterative development and impedes the program from identifying and incorporating needed improvements for Epoch 2.

According to program documentation, the program has started developing a digital twin. In addition, the program reported that it is using its digital software engineering system to provide real-time information about the status of program development for contractors and other stakeholders, which is consistent with a digital thread.

The program reported that it has documented its planned modular open systems approach (MOSA), which is contractually enforced through government-owned interfaces, common data formats, and the common ground framework. The program stated that, while the hardware cannot be updated after the space vehicles are launched, the contracts provide for a modular approach to vary the on-board telescope based on the specific mission of the vehicle.

Software and Cybersecurity

The program uses a combination of modern and legacy software approaches. According to the program office, this variation is due to working with six different contractors responsible for different components of the program, whose approaches are largely influenced by legacy software and processes. The program updated its cybersecurity plan in April 2025. The program completed a cyber tabletop exercise for the ground segment in January 2026 and plans to complete tests to identify known cybersecurity vulnerabilities for the ground segment and Epoch 1 in April and June 2026, respectively.

Program Office Comments

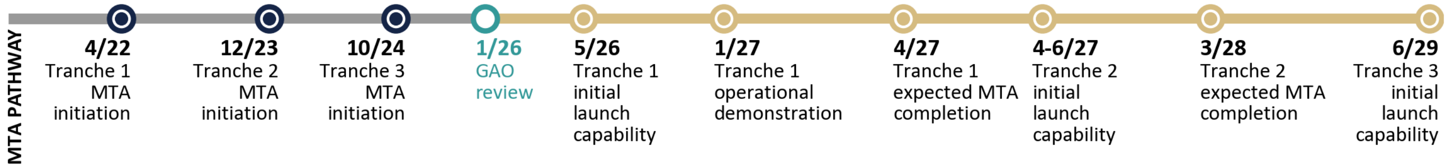
We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program office stated that the Epoch 1 system is being delivered with Optical Communications Terminals that meet design specifications and that this system was not required to adhere to SDA standards, which were levied on Epoch 2 as an optional demonstration. No technical requirement exists for cross-communication between Epoch 1 and other SDA-compliant satellites, according to the program office. It also stated that lessons from SDA informed plans for a longer 42-month schedule and making earlier payments to secure long-lead parts. The program office stated that feedback from Epoch 1 directly shaped the architecture for future acquisitions. In addition, the program office said it mandates the use of digital engineering for continuous requirements validation, consistent with modern acquisition reforms.

Space Force | **Program Type:** MTA | **Common Name:** T1 TRK, T2 TRK, and T3 TRK

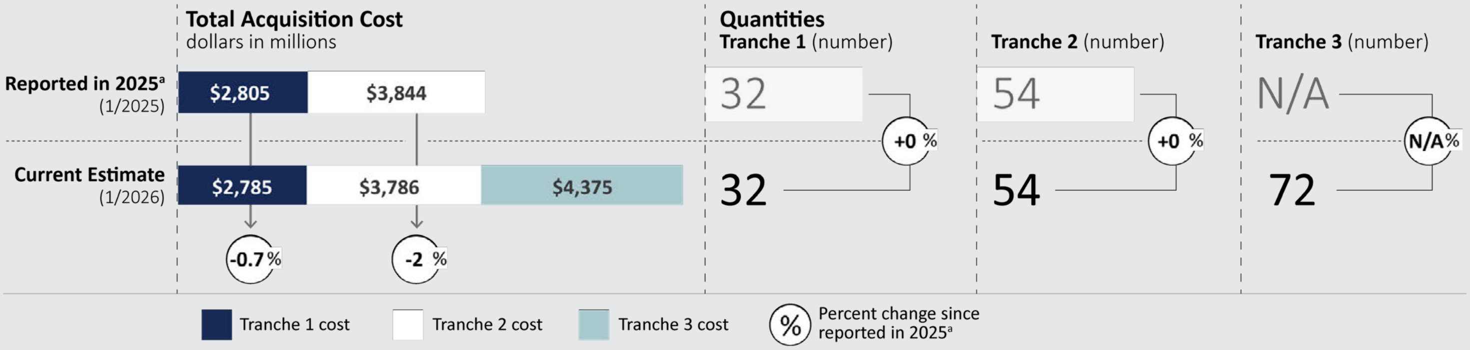
Tranche 1, 2, and 3 Tracking Layers (T1 TRK, T2 TRK, and T3 TRK)

Source: Qinetiq for Space Development Agency. | GAO-26-108457

T1 TRK, T2 TRK, and T3 TRK are MTA rapid prototyping efforts by the Space Force's Space Development Agency (SDA). The Tracking Layer is one of several layers in SDA's planned Proliferated Warfighter Space Architecture satellite constellation, to include data communications and missile warning satellites. T1 TRK is the first tranche of low-Earth orbit satellites equipped with infrared sensors that will provide initial missile warning and missile tracking capabilities. T2 TRK and T3 TRK are the next tranches and will deliver full warfighting capability. These three tranches will interoperate with SDA's Transport Layer, which we assessed separately.



Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, DevOps, and DevSecOps (T1, T2, and T3 TRK)

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): $92.88 | 3.33% (T1 TRK); Information not available (T2 and T3 TRK)

Percentage of progress to meet current requirements: 51-75% (T1 TRK); 26-50% (T2 TRK); Information not available (T3 TRK)

The program reported that T2 TRK software costs cannot be reported because contractors are not required to report software costs, and T3 TRK software costs are incorporated into the overall costs because the contracts are firm-fixed price and the effort has not started software development.

Program Essentials

Prime Contractor: L3Harris; Lockheed Martin; Northrop Grumman; Rocket Lab; Sierra Space

Contract type: FFP (using other transaction authority)

Implementation of Leading Product Development Practices as of January 2026

	Current Status		
Iteratively Develop a Minimum Viable Product (MVP)	Tranche 1	Tranche 2	Tranche 3
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○	○
Obtain User Feedback			
Collect end user feedback to inform the product	◐	◐	◐
Use Digital Engineering to Connect Stakeholders and End Users to System Data			
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment			
Test a system-level integrated fully digital prototype in a digital operational environment	○	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○	○
Prepare for Modularity to Support Production and Updates to the MVP			
Incorporate a modular open systems approach (MOSA)	●	●	●

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

Because of SDA's stated approach of using predecessor tranches—which are expected to be operational—to inform subsequent tranches, we assessed Tranches 1, 2, and 3 for the test of a system-level integrated physical prototype in an operational environment.

T1 TRK, T2 TRK, and T3 TRK Programs

Program Performance

SDA reported that it plans to begin launching T1 TRK space satellites no earlier than May 2026—13 months later than originally planned. Officials attributed schedule delays to supply chain challenges affecting optical communications terminals and mission payloads, as well as integration complexities. In September and December 2025, T1 TRK satellite contractors completed testing of networking and encryption interoperability, according to SDA officials. Other transaction agreement documents show that SDA had planned to complete this testing in December 2023.

SDA still plans to launch T2 TRK satellites starting in the third quarter of fiscal year 2027. Officials said that one satellite contractor has yet to complete critical design review, while the other two completed this review and are advancing toward system-level satellite functional and environmental testing.

In December 2025, SDA reported that it awarded four other transaction agreements for T3 TRK satellites with initial target launch dates beginning in the third quarter of fiscal year 2029. SDA officials said they increased the number of T3 TRK satellites by 18 to 72, from their initial plan of 54, in response to warfighter demand.

Leading Product Development Practices

SDA reported that it is implementing some elements of leading product development practices. For example, SDA documented a process by which SDA and users determine requirements for a future tranche minimum viable product (MVP) and refine the requirements through ongoing feedback. However, SDA did not incorporate user feedback to inform the MVP's design—a key element of MVP development. We previously reported that end users told us they lack insight into how SDA defines and prioritizes tranche requirements. Further, SDA has begun development on the next two tranches before testing or delivering the first tranche in an operational environment, which runs counter to leading practices. SDA estimates that the first T1 TRK operational demonstration will occur in January 2027, less than 6 months ahead of the first T2 TRK launch and 13 months after T3 TRK awards, limiting the time to incorporate lessons learned into the next iterations.

Program officials stated that they documented a plan that used elements of a modular open systems approach, including published laser communications and networking standards. While the standards are designed to support interoperability, we previously reported that SDA has yet to demonstrate laser communications in space between two optical communications terminals from different developers. We found that leading companies gain efficiencies and flexibilities by employing modular design and manufacturing.

Software and Cybersecurity

SDA officials identified software development as medium risk for T1-T3 TRK due to the complexity of the testing environment. They explained that, for each satellite contractor, SDA observes a subset of contractor-led flight and ground software tests and decides to accept or reject the results based on verification and validation. Officials said that while software challenges have contributed to the T1 TRK schedule delays, software is not currently central to determine the launch date.

For T1 TRK, SDA officials said that they conducted a vulnerability cybersecurity assessment in August 2025 and plan to conduct additional testing, including an adversarial cybersecurity development test in April 2026 and post-launch testing. According to SDA, it plans to mitigate any resulting vulnerabilities through software updates or layered cybersecurity approaches known as defense-in-depth.

For T2 TRK, SDA conducted two cyber tabletop exercises and a vulnerability cybersecurity assessment in 2025. SDA plans for additional cybersecurity tests in late 2026 and early 2027.

Other Program Issues

SDA established an MTA effort for a Tranche 3 Custody Layer in May 2025. This layer, when integrated with the other layers in the Proliferated Warfighter Space Architecture, is intended to provide the warfighter with the capability to detect, track, and place into custody time-sensitive and time-critical targets. SDA officials were unable to offer information on how or when the program will proceed because it has not been funded. We will continue to monitor the status of this program.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. The program stated that the tracking layer will provide global stereo coverage—meaning more than one satellite will be capable of viewing any location on Earth at any given time—for missile warning, missile tracking, and missile defense to support DOD's ability to observe, decide, and act against adversary weapon systems in a timely manner. It also said SDA employs a capability-focused, commercial development business model prioritizing speed and lowering costs to achieve proliferation and enhance resilience of the architecture. Additionally, the program stated that T3 TRK will expand on T1 TRK and T2 TRK capabilities by accelerating the proliferation of missile defense capability.

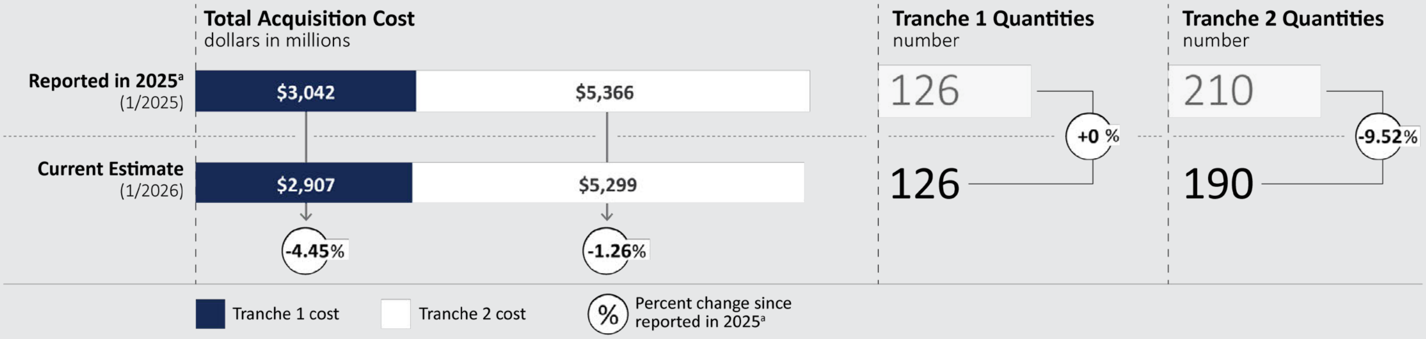
Space Force | **Program Type:** MTA | **Common Name:** T1TL, T2TL, and T3TL

Source: Qinetiq for Space Development Agency. | GAO-26-108457

Tranche 1, 2, and 3 Transport Layers (T1TL, T2TL, and T3TL)

T1TL, T2TL and T3TL are MTA rapid prototyping efforts by the Space Force's Space Development Agency (SDA). The transport layer is one of several low-Earth orbit satellite constellation layers in SDA's planned Proliferated Warfighter Space Architecture (PWSA). This layer will transmit data throughout the satellite constellation. PWSA is developed in tranches, starting with demonstration satellites launched in Tranche 0 (T0) in 2023. According to SDA, T1TL is intended to provide initial warfighting capability, and the T2TL and T3TL increments will deliver enhanced warfighting capability. We evaluated PWSA's tracking layer in a separate assessment.

Estimated Middle Tier of Acquisition Cost and Quantities fiscal year 2025 dollars in millions



SDA has yet to establish costs and quantities for Tranche 3.

[a] GAO-25-107569.

Software Development

as of January 2026

Approach: Agile, DevOps, and DevSecOps (T1TL, T2TL, and T3TL)

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions): $125.94 | 4.33% (T1TL); Information not available (T2TL and T3TL)

Percentage of progress to meet current requirements: 76-99% (T1TL); 51-75% (T2TL); Information not available (T3TL)

The program reported that software development costs are not broken out or tracked separately for T2TL. The program also reported that it has yet to start software development or award contracts for T3TL.

Program Essentials

Prime Contractor: Lockheed Martin; Northrop Grumman; York Space Systems; Rocket Lab

Contract type: FFP (using other transaction authority)

Implementation of Leading Product Development Practices as of January 2026

	Current Status		
Iteratively Develop a Minimum Viable Product (MVP)	Tranche 1	Tranche 2	Tranche 3
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○	○
Obtain User Feedback			
Collect end user feedback to inform the product	◐	◐	◐
Use Digital Engineering to Connect Stakeholders and End Users to System Data			
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment			
Test a system-level integrated fully digital prototype in a digital operational environment	○	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○	○
Prepare for Modularity to Support Production and Updates to the MVP			
Incorporate a modular open systems approach (MOSA)	●	●	◔

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA - Not applicable

Because of SDA's stated approach of using predecessor tranches—which are expected to be operational—to inform subsequent tranches, we assessed Tranches 1, 2, and 3 for the test of a system-level integrated physical prototype in an operational environment.

T1TL, T2TL, and T3TL Programs

Program Performance

In September and October 2025, SDA launched the first 42 T1TL satellites—1 year later than originally planned—and plans to provide operational capability for T1TL in early 2027. SDA reduced the overall planned number of T2TL satellites from 210 to 190 due in part to a bid protest at the United States Court of Federal Claims on one of the other transaction agreements and the decision not to pursue the agreement. Both T1TL and T2TL include satellites with 5-year lifespans, and each tranche is on a different timeline. SDA reports that this incremental development approach allows for rapid technology insertion in response to changing threats and each MTA effort will culminate in a fieldable prototype.

SDA continues to report that it does not conduct formal technology risk assessments and schedule risk assessments for the tranches. Instead, those assessments are conducted informally by contractors, according to SDA, though program schedules continue to slip. Last year, SDA reported plans to conduct operational testing for T1TL in August 2025. However, because the satellites were not launched until September and October 2025, operational test dates shifted to March 2026. SDA reports plans to conduct operational testing for T2TL in February 2027, 2 months later than previously planned. Finally, SDA has established an MTA for T3TL, although the program has reported it has not yet received funding.

Leading Product Development Practices

SDA reported incorporating some elements of leading practices for product development; however, it is not fully implementing the practices. For example, the program stated that, in place of a digital twin, it is employing a cyber-physical replica on the ground, which SDA officials describe as a “flat satellite” that is representative of the satellites launched as part of the constellation—for testing and evaluation. Specifically, officials said that these cyber-physical replicas can be used to test new software updates. However, the replicas do not process real-time, automated data. We previously found that developing a digital twin to incorporate real-time data to inform design changes can lead to efficiencies across the life cycle of a product.

Additionally, SDA reported that it identified a minimum viable product (MVP) for T0 and demonstrated some key capabilities, and incorporated lessons learned into T1 and T2. SDA considers the MVP to be complete; however, SDA did not fully demonstrate the planned MVP in the T0 demonstration satellites. Without collecting user feedback on the MVP’s complete set of capabilities as demonstrated in an operational environment, SDA cannot meaningfully incorporate the necessary improvements in future tranches. SDA officials said that the performance outcomes of the MVP in one tranche will not affect the schedule of the other tranches. This approach does not fully align with iterative development and the practices leading companies follow to ensure that their delivered products meet user needs and that subsequent iterations incorporate needed improvements.

Software and Cybersecurity

Software development for T1TL, T2TL, and T3TL is part of an enterprise effort that includes the three Tracking Layer tranches. SDA officials said that, because of the complexity of the testing environment required to complete validation and verification of the software, SDA has classified software as a medium risk to the success of the program. However, SDA officials said that the program is not conducting annual software assessment reviews because it does not plan to use the software acquisition pathway for its software development.

SDA updated its PWSA cybersecurity strategy in July 2024. The strategy takes a zero trust approach required by DOD. For T1TL, SDA conducted multiple cybersecurity assessments including a cybersecurity development test and another test recommended for operations.

For T2TL, SDA conducted two cyber tabletop exercises to explore the effects of cyber offensive operations on overall mission capability, as well as its own cybersecurity development test. SDA reports no plans for additional cybersecurity testing for T1TL, T2TL, or T3TL. This may increase cyber security risk if further changes to software are required in future tranches.

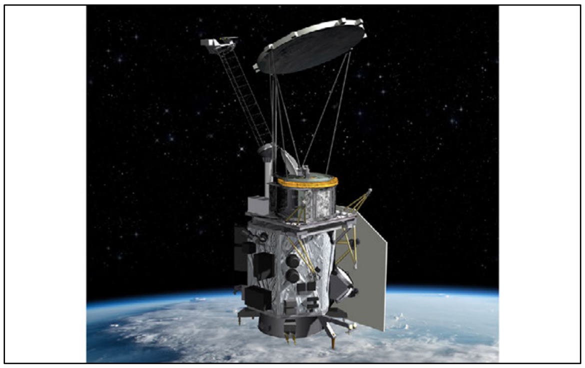
Other Program Issues

Although SDA has established an MTA effort for T3TL, the program reported it has not yet awarded any contracts due to waiting to receive funding. We will continue to monitor the status of this program.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate. Program officials stated the SDA Transport Layer will continue to deliver global tactical communications capabilities, including in-space connectivity to enable low-latency detection, tracking, and warning of missile threats. SDA reported that it operates under a capability-focused, commercial development business model using spiral development to ensure capabilities are maintained and supplemented with each new tranche. The program reported that T3TL will also provide beyond line-of-sight targeting and will field new technologies to include long-range optical communications, protected radio frequency communications, and advanced waveforms.

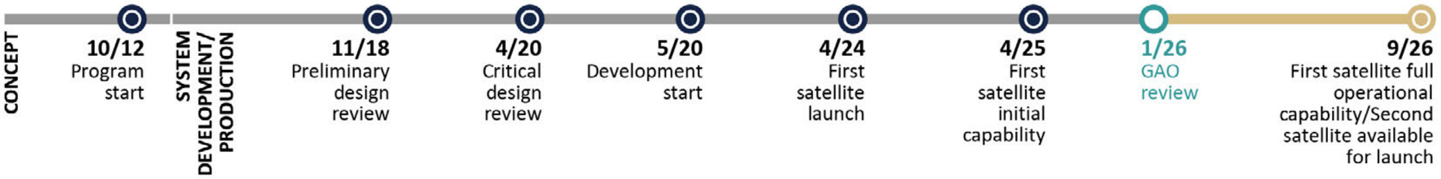
Space Force | **Program Type:** MDAP | **Common Name:** WSF-M



Source: © 2024 by BAE Systems, Inc. All rights reserved. | GAO-26-108457

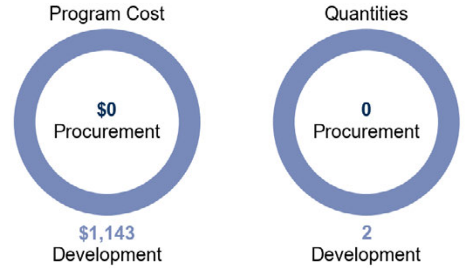
Weather System Follow-On – Microwave (WSF-M)

The two polar-orbiting WSF-M satellites will contribute to a family of space-based environmental monitoring systems by providing six of 12 mission critical capabilities in support of military operations. WSF-M will conduct remote sensing of weather conditions, such as wind speed and direction at the ocean's surface, and provide real-time data for use in mission planning and weather forecasting models. The WSF-M satellites and other capabilities will fulfill the microwave imaging coverage requirements that the Defense Meteorological Satellite Program, which is part of the greater space-based environmental monitoring family of systems, currently supports.



Program Performance

fiscal year 2025 dollars in millions



	Reported in 2025[a] (12/2023)		Current Estimate (8/2025)
Acquisition Cost	$1,140	+0%	$1,143
Unit Cost	$570.18	+0%	$571.67
Cycle Time (in months)	59	+0%	59

(%) Percent change since 2025[a]

[a] GAO-25-107569.

Software Development as of January 2026

Approach: Agile, Waterfall, and Incremental

Software cost and percentage of total acquisition cost (fiscal year 2025 dollars in millions):

$93.04 | 8.14%

Percentage of progress to meet current requirements: 100%

Program Essentials

Prime contractor: BAE Systems, Space and Mission Systems, Inc.

Contract type: FFP

Current Status

The WSF-M program declared initial operational capability in April 2025 after successfully launching the first of two planned low-Earth orbit satellites a year earlier and conducting on-orbit testing. The program office plans to reach full operational capability for the first satellite by September 2026, a delay of 1 year from our prior reporting, due to architectural dependencies managed by external stakeholders—such as end user connectivity/readiness, ground-based command and control, and contingency operations capability—needed to test the entire system architecture. Despite this delay, program officials stated that the first satellite is already delivering operational data and the schedule change will not affect continued delivery of that data. The program refers to September 2026 as the second satellite's available-for-launch date. However, the actual launch could be delayed to December 2026 due to a firmware update, the schedule of a payload planned to share the launch vehicle, and an ongoing system integration of Air Force cloud networks and NASA weather system data.

The program reported that it did not have user agreements in place during development. Yet, program officials subsequently told us that they have incorporated user feedback from operational testing of the first satellite, which resulted in an on-orbit improvement to that satellite, as well as implementing a firmware update to the second satellite for improved performance. Our prior work has shown that incorporating user feedback early in the acquisition process, as well as throughout a product's life cycle, can help ensure the system meets user needs. Though program officials do not plan to make further changes to the second satellite's design or manufacturing processes, they said that they will continue to incorporate any lessons learned should the first satellite encounter any system issues.

Program Office Comments

We provided a draft of this assessment to the program office for review and incorporated its comments where appropriate.

Appendix II: Objectives, Scope, and Methodology

This report responds to title 10, section 3072 of the U.S. Code.[1] Specifically, this report assesses (1) how the Department of Defense's (DOD) portfolio of its costliest weapon programs and selected programs have performed over time; (2) the extent to which opportunities exist to improve program outcomes through the use of leading product development practices; and (3) the extent to which programs are implementing modern software development approaches and recommended cybersecurity practices.

This report also presents assessments of 68 major defense acquisition programs (MDAP), future major weapon acquisitions, and middle tier of acquisition (MTA) programs (see app. I for assessments).

Program Selection

To identify DOD's costliest weapon programs, we took the following steps.

- **MDAPs.** We retrieved DOD's list of MDAPs from the Defense Acquisition Visibility Environment (DAVE) system as of April 2025 to identify the scope of DOD's MDAP portfolio for our review. To identify MDAPs for individual assessments, using the Defense Acquisition Executive Summary (DAES) data obtained from DAVE, we narrowed our list to those that were between the start of development and the early stages of production. We also identified MDAPs that were well into production but introducing new increments of capability or

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[1] Title 10, section 3072 of the U.S. Code was enacted by section 833 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019. See Pub. L. No. 115-232, § 833 (2018). This statute was later amended by section 813 of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 and section 812 of the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, and section 813 of the Servicemember Quality of Life Improvement and National Defense Authorization Act for Fiscal Year 2025. See Pub. L. No. 116-283, § 813 (2021), Pub. L. No. 117-263, § 812 (2022), and Pub. L. No. 118-159, § 813 (2024). This statute includes a provision for us to submit to the congressional defense committees an annual assessment of selected DOD acquisition programs and initiatives by March 30 of each year from 2020 through 2029. Our assessment of the performance of DOD's IT programs is included in a separate report, which we also prepared in response to title 10, section 3072 of the U.S. Code. We plan to issue that report later this year.

significant changes expected to exceed the threshold for designation as an MDAP.[2]

- **Future major weapon acquisitions**. We retrieved the list of programs from DOD's DAVE system that were identified by DOD as pre-MDAPs—programs planning to develop their systems on the major capability acquisition (MCA) pathway—as of April 2025. We also reviewed budget documentation to identify other programs that had yet to be formally initiated on an Adaptive Acquisition Framework (AAF) pathway, but with costs that are expected to exceed thresholds for designation as an MDAP.
- **MTA programs**. We obtained a list of programs using the MTA rapid prototyping or rapid fielding path from DAVE that were reported by the military departments, as of April 2025. We identified current MTA efforts that have estimated costs above the equivalent threshold cost for designation as an MDAP or were included in our scope last year.[3] In some instances, current MTA efforts represent one of multiple planned efforts that are planned as part of a program's overall acquisition strategy. Our assessment focused on the current MTA effort.

We excluded the Missile Defense Agency's Missile Defense System and its elements from all analyses due to the lack of long-term cost and schedule baselines, which we could use to measure progress.[4] We also excluded classified programs and selected programs for which significant amounts of programmatic information were considered sensitive from our analyses to be able to issue a public report.

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[2] MDAPs generally include programs that are not a highly sensitive classified program and that are either (1) designated by the Secretary of Defense as an MDAP; or that are (2) estimated to require an eventual total expenditure for research, development, test, and evaluation, including all planned increments or spirals, of more than $1 billion in fiscal year 2024 constant dollars or, for procurement, including all planned increments, of more than $4.5 billion in fiscal year 2024 constant dollars. See 10 U.S.C. § 4201(a); Department of Defense, *Major Capability Acquisition*, DOD Instruction 5000.85 (Aug. 6, 2020) (incorporating change 1, Nov. 4, 2021) (reflecting statutory MDAP cost thresholds in fiscal year 2024 constant dollars).

[3] We selected 23 MTA efforts for review, of which 14 met the cost threshold for designation as an MDAP. Tranche 3 Transport Layer was included in the program selection of 24 MTA efforts but was subsequently excluded from the final 23 MTA programs we assessed for cost and schedule because the Space Development Agency has yet to establish cost and quantities for Tranche 3.

[4] For recent reporting related to the Missile Defense System, see GAO, *Missile Defense: Next Generation Interceptor Program Should Take Steps to Reduce Risk and Improve Efficiency,* GAO-24-106315 (Washington, D.C: June 26, 2024).

Standardization of Terminology and Cost Comparisons

To make DOD's acquisition terminology consistent across programs we reviewed, we standardized the terminology for key program events.

- For most MDAPs and future major weapon acquisitions in our assessment, "development start" refers to the initiation of an acquisition program as well as the start of either engineering and manufacturing development or system development. This date generally coincides with DOD's milestone B on the MCA pathway.

  A few MDAPs and future major weapon acquisitions in our assessment have a separate program start date, which begins a pre-system development phase for program definition and risk-reduction activities. These programs' start dates generally coincide with DOD's milestone A on the MCA pathway, which denotes the start of technology maturation and risk reduction.

  The production decision generally refers to the decision to enter the production and deployment phase, typically with low-rate initial production. This decision generally coincides with milestone C for non-shipbuilding programs on the MCA pathway. The initial capability refers to the initial operational capability, which some programs refer to as their first unit equipped or required asset availability.
- For shipbuilding programs, the schedule of key program events in relation to acquisition milestones varies for each program. Our work on shipbuilding leading practices has identified the detail design contract award and the start of lead ship fabrication as the points in the acquisition process roughly equivalent to development start and design review for other programs.[5]
- For programs using the MTA pathway, the start date for programs designated on or after December 30, 2019, is generally the date that an acquisition decision memorandum was signed, initiating the effort as an MTA rapid prototyping or rapid fielding program. MTA programs designated before December 30, 2019, generally maintain their MTA program start date as the date funds were first obligated.[6] For the purposes of this report, we refer to the initiation date as the date that a program was designated. We used the phrase initial capability to refer to the envisioned initial operational capability, initial warfighting capability, or its equivalent, including any anticipated efforts on other

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[5] GAO, *Best Practices: High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding*, GAO-09-322 (Washington, D.C.: May 13, 2009).

[6] Two MTA programs in our review—Conventional Prompt Strike and XM30 Mechanized Infantry Combat Vehicle—use the funds first obligated date to calculate the 5-year time frame for the MTA pathway.

pathways. For MTA efforts that plan to transition to the MCA pathway, this generally refers to the initial operational capability, following any subsequent development or production on the MCA pathway.

- According to DOD policy, programs using the MTA pathway also develop transition plans. Transition refers to the point at which the program begins another effort, using the MTA pathway or another acquisition pathway. For each MTA program that uses the rapid prototyping path, DOD policy directs DOD components to develop a process for transitioning successful prototypes to new or existing acquisition programs for production, fielding, and operations and sustainment.[7] For each MTA program using the rapid fielding pathway, DOD components are required to develop a process for transitioning successful programs to operations and sustainment. These processes will result in a transition plan that programs must provide to the Office of the Under Secretary of Defense for Acquisition and Sustainment.

For programs we reviewed, we converted all cost information to fiscal year 2025 dollars, using conversion factors from DOD Comptroller's National Defense Budget Estimates for Fiscal Year 2025.[8]

Data Sources and Reliability

To obtain information about current costs and changes in costs of the MDAPs and MTA programs that we reviewed, we took steps to collect and assess the reliability of this year's data.

- For MDAPs, we generally obtained and analyzed cost data from each program's September 2025 DAES. In cases where DAES data were not available or we found these data to be incomplete, we instead analyzed data from an acquisition program baseline issued in 2025 or

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[7] Department of Defense, *Operation of the Middle Tier of Acquisition,* DOD Instruction 5000.80 (December 30, 2019).

[8] Department of Defense, Office of the Under Secretary of Defense (Comptroller), *National Defense Budget Estimates for Fiscal Year 2025* (April 2024), 76-77. According to officials, Comptroller leadership made the decision not to publish an FY 2026 Green Book.

a December 2023 Modernized Selected Acquisition Report.[9] For four programs that did not submit a September 2025 DAES— DDG 1000 *Zumwalt* Class Destroyer, Next Generation Operational Control System, MQ-4C Triton Unmanned Aircraft System and LGM-35A Sentinel—we used cost data presented in each of these program's most recent DAES submissions. We compared these cost data with each program's previously reported costs from our most recent report to determine changes in cost over the past year.[10] We also relied on these sources for our assessment of cost changes within the portfolio of MDAPs for which we produced assessments.

- For future major weapon acquisitions, MDAPs introducing new increments, and MTA programs, we obtained cost and funding information through a cost and quantity spreadsheet submitted by program offices. We received responses from July 2025 through February 2026. For MTA programs, we also obtained and analyzed cost and quantity data from each MTA effort's program identification documents submitted to the Office of the Secretary of Defense (OSD) during fiscal year 2025.

We also distributed a questionnaire to the following selected programs:

- 34 MDAPs in development or production;
- 4 MDAPs that are well into production but introducing new increments of capability or significant changes;
- 2 programs that transitioned to the Software Acquisition Pathway;
- 2 canceled programs;
- 6 future weapon acquisitions; and

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[9] Modernized Selected Acquisition Report refers to the new acquisition reporting system that replaced the historical Selected Acquisition Report. December 2023 Modernized Selected Acquisition Reports were the most recent available since DOD did not issue comprehensive Modernized Selected Acquisition Reports for fiscal year 2024. Officials stated this was due to the fact that DOD did not include a Future Years Defense Program as a part of its fiscal year 2025 President's Budget Request. Section 805 of the NDAA for Fiscal Year 2022 directed USD(A&S) to submit DOD's plan for a new reporting system to report to the congressional defense committees and effectively share information related to covered programs. Section 809 of the James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 required DOD to institute a defense acquisition reporting system that would replace the requirements of the Selected Acquisition Report statute, which terminated after the final submission covering fiscal year 2023.

[10] GAO, *Weapon Systems Annual Assessment: DOD Leaders Should Ensure That Newer Programs Are Structured for Speed and Innovation*, GAO-25-107569 (Washington, D.C.: June 11, 2025).

- 23 MTA programs.

We used the questionnaire to obtain information on programs' schedules, selected software and cybersecurity practices, and use of leading product development practices, among other things.

To help ensure the reliability of the data collected through our questionnaire, we took steps that included:

- conducting pretests of new questions prior to distribution to ensure our questions were clear, unbiased, and consistently interpreted; and
- collecting and analyzing supplemental program information, such as budget submissions; acquisition decision memorandums; acquisition strategies; transition plans for MTA programs; program cost and schedule estimates; service cost positions or independent cost estimates; risk assessments; and documents relating to leading product development practices, software development, and cybersecurity. We also interviewed or received written responses from program officials to supplement and clarify this information.

To assess the reliability of the DAES data and the DAVE system that houses the data, we sent questions to DOD related to DAVE, the DAES data in DAVE, and the custodians of the data in February 2026. Specifically, we asked how DOD monitors and updates DAVE, how the data are updated over time, and quality assurance steps taken to ensure data accuracy, among other topics.

To assess the reliability of MTA cost data, we compared the information received from MTA programs in their supplemental cost and quantity spreadsheets with program identification data submitted to OSD for the fiscal year 2026 President's Budget.

Based on these efforts, we determined that the September 2025 DAES data retrieved from DAVE, December 2023 Modernized Selected Acquisition Report data, and MTA program cost data provided by programs in cost and quantity spreadsheets were sufficiently reliable for the purposes of reporting cost and schedule information.

Assessment of MDAP Cost and Schedule Performance

Our analysis of the MDAP portfolio in this report includes comparisons of total cost and schedule changes and the number of programs as compared with the portfolio that we reviewed in last year's report. To analyze cost changes, we generally compared the individual and combined procurement; research, development, test, and evaluation (RDT&E); military construction; and operations and maintenance costs from the September 2025 DAES with those individual and combined costs reported in September 2024 DAES. In cases where DAES data were unavailable or incomplete, we used acquisition program baselines or Modernized Selected Acquisition Reports. We also calculated the total cost changes from programs that were included in both our current and last assessment that were both attributable and not attributable to quantity changes (increases or decreases in the total quantity of units a program plans to order).

We analyzed the factors affecting costs across the 32 MDAPs for which we produced one- and two-page assessments in both this report and our most recent report.[11] We examined the programs reporting the largest cost increases and decreases by total program cost and analyzed the factors that programs reported drove these cost changes. We identified these factors from program documentation, meetings with program officials, and program questionnaire responses. We also analyzed the extent to which changes in planned quantities affected total costs for these programs.

To analyze factors affecting MDAP schedule performance, we also focused on MDAPs for which we produced one- and two-page assessments in this and our most recent report. We identified 24 MDAPs that had yet to declare initial operational capability as of September 2025. We compared the average cycle time of these programs, defined as the number of months between program start and the achievement of initial operational capability or an equivalent fielding date, with the average cycle time reported in our most recent report.[12] For programs with a cycle time change, we compared the extent of the cycle time change with the program's previous cycle time and identified the driving factors. The data for this analysis were drawn primarily from DAES reporting and program offices' questionnaire responses.

Assessment of MTA Program Cost and Schedule and Critical Technologies

To determine the planned costs for current MTA efforts, we generally reviewed the individual and combined procurement; RDT&E; military construction; and operations and maintenance costs from cost and quantity spreadsheets filled out by the program offices. We also used these spreadsheets to analyze current quantity estimates. In cases where program offices did not provide quantity data, we used program identification documents that the military departments submitted to the OSD for the fiscal year 2026 President's Budget request. To determine 1-

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[11] GAO-25-107569.

[12] GAO-25-107569.

year MTA cost changes, we compared costs reported for our prior assessment in June 2025 against costs reported for this assessment.[13]

We reviewed schedule data from program identification data and program questionnaires, including program start and planned end dates, operational demonstrations, and planned transitions to another effort. We identified changes to these dates since our last report. We also asked MTA programs to provide the current estimated date for initial operational capability—which may occur on a subsequent AAF pathway—to calculate the amount of time the program plans to take from MTA program start.

To collect data on the maturity of MTA programs' critical technologies, in our questionnaire we asked MTA programs to identify their critical technology elements, the current technology readiness level (TRL) for each critical technology, and projections for the technologies' TRLs at completion of the current MTA effort. We assessed the extent to which programs that reported having immature technologies last year increased their TRLs over the past year. We identified the critical technologies and associated TRLs reported to us for our prior report and determined whether the MTA programs reported a different TRL for these technologies for this report. We also identified the lowest current TRL and lowest projected TRL at MTA completion for each MTA effort to understand the amount of expected maturation work that remains before the end of the current effort. Additionally, we reviewed former MTA programs that were included in our previous reports to determine the TRLs of their critical technologies at program start and the subsequent outcome of those MTA efforts.

Leading Practices for Product Development

To assess the extent to which the programs in our review are using approaches aligned with leading practices for product development, we asked questions related to activities associated with an iterative approach identified in our prior work.[14] These questions focused on (1) iterative development of a minimum viable product (MVP) that refines high-level operational needs into an initial set of capabilities, prioritizes capabilities that can be fielded most quickly to meet user needs, incorporates both stakeholder and end user feedback to inform the MVP and to inform future iterations, and accommodates successive updates through modular open systems; (2) collaboration with end users prior to development start, MTA initiation, or Detail Design and Construction

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[13] GAO-25-107569.

[14] GAO, *Leading Practices: Iterative Cycles Enable Rapid Delivery of Complex, Innovative Products*, GAO-23-106222 (Washington, D.C.: July 27, 2023).

Contract Award, and as of current status (July 2025); (3) use of digital engineering to connect stakeholder and end users with system data; (4) validation of integrated hardware and software functionality in the operational environment; and (5) preparation for production through industrial base assessments, feedback from manufacturers and suppliers to inform the MVP, and incorporation of a modular open systems approach (MOSA).

For the purposes of this report, we further asked programs whether the digital twin includes three elements based on our prior work in this area: (1) data incorporated into the digital twin are accurate and similar to the real-world model; (2) the digital twin is continuously tested and correlated to the physical model in a real-world environment; and (3) the digital twin changes and updates in real time as new information becomes available without requiring the manual input of new data.[15] We also asked programs whether the digital thread includes three elements based on our prior work in this area: (1) captures data from iterative cycles in real time, including design, validation, and/or production, (2) provides access to real-time data to program staff, stakeholders, and end users, and (3) includes digital twin simulation data fed into the digital thread.[16]

Additionally, we asked programs whether the MOSA includes three elements based on our prior work in this area: (1) employs a modular design that uses modular system interfaces between major systems, major system components, and modular systems; (2) is subject to verification to ensure that relevant modular system interfaces comply with, if available and suitable, widely supported and consensus-based standards, or the program has obtained government purpose rights to the interface specifications; and (3) uses a system architecture that allows several major system components and modular systems at the appropriate level to be incrementally added, removed, or replaced throughout the major system platform’s life cycle.[17]

We analyzed this information to determine the extent to which the programs plan to implement or have implemented leading product development practices. We also clarified the programs’ reported status through meetings with program officials or in program documents in

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[15] GAO-23-106222.

[16] GAO-23-106222.

[17] GAO, *Weapon Systems Acquisition: DOD Needs Better Planning to Attain Benefits of Modular Open Systems*, GAO-25-106931 (Washington, D.C.: Jan. 22, 2025).

cases where the programs provided information that was unclear. For our individual assessment tables assessing the programs' use of the practices, we determined whether the practice had been implemented; initiated; documented but not initiated; neither documented nor initiated; or if the leading practice was not applicable or information was not available.

To assess the extent to which the programs in our review are using innovation organizations to develop new capabilities, we asked questions related to activities associated with using innovation organizations to identify, develop, and fund critical technology. To assess the status of programs' acquisition workforce, we asked questions on program's number of staff and hiring and retention efforts, including: (1) what changes, if any, there have been to the number of military, civilian, and contracting staff for the program; and (2) what challenges, if any, the program had with hiring and retention.

Implementation of Software Development Approaches and Cybersecurity Practices

To report on MDAP, future major weapon acquisitions, and MTA programs' software development approaches, we included related questions in our questionnaire. We identified programs that reported the use of a modern software development approach—which we define for this assessment as Agile, DevOps, or DevSecOps approach.

To assess the extent to which selected programs tracked software development performance, we asked programs using a modern software development approach to identify whether they used Agile metrics and tools to help track progress and support decision-making. Specifically, we asked programs whether they used eight Agile metrics and six Agile tools, which were derived from GAO's *Agile Assessment Guide* and are generally consistent with metrics and tools required in DOD's guidance.[18]

To assess the extent to which selected programs were soliciting regular feedback on software from the intended end users of their systems, we asked programs whether they obtained any end user feedback and the frequency with which they solicited and received feedback. We then aggregated program responses on the frequency of this feedback.

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[18] GAO, *Agile Assessment Guide: Best Practices for Adoption and Implementation [Reissued with revisions on Dec. 15, 2023],* GAO-24-105506 (Washington, D.C.: Nov. 28, 2023).

To report on modular contracting, we reviewed related DOD policy and guidance, and our *Agile Assessment Guide*.[19] We used our questionnaire data to assess the extent selected programs reported that they had implemented this acquisition strategy.

To assess selected programs' progress in implementing software development and acquisitions practices recommended in a 2018 Defense Science Board report, we included a question on the practices used.[20] We compared the portion of our assessed programs that reported they were implementing these practices with the portion of programs that reported implementing them in our 2025 report.[21] We analyzed these trends and reported whether the implementation of these practices improved or declined from 2025.

To report on selected programs use of the software acquisition pathway, we asked programs about current and future plans to use the pathway for their software efforts, as well as rationales for their plans.

To determine the extent to which selected programs' cybersecurity practices generally aligned with DOD's established cybersecurity policy and guidance, we identified specific DOD policy and guidance pertaining to cybersecurity in weapon systems, including DOD Instruction 5000.89, *Test and Evaluation*, effective November 2020, and DOD's *Cybersecurity Test and Evaluation Guidebook*, issued in July 2015 and last updated in February 2020.[22] We included a number of cybersecurity-related

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[19] Department of Defense, *Operation of the Software Acquisition Pathway*, DOD Instruction 5000.87 (Oct. 2, 2020); and Office of the Under Secretary of Defense for Acquisition and Sustainment, *Contracting Considerations for Agile Solutions, Key Agile Concepts and Sample Work Statement Language*, Version 1.0 (Nov. 18, 2019). See also GAO-24-105506.

[20] Defense Science Board, *Design and Acquisition of Software for Defense Systems* (Washington, D.C.: Feb. 14, 2018).

[21] GAO, *Weapon Systems Annual Assessment: DOD Leaders Should Ensure That Newer Programs Are Structured for Speed and Innovation,* GAO-25-107569 (Washington, D.C.: June 11, 2025).

[22] Department of Defense, *Cybersecurity Test and Evaluation Guidebook 2.0, Change 1* (Feb. 2020). DOD issued an updated guidebook, *Cyber Developmental Test and Evaluation Guidebook 3.0,* for developmental cybersecurity test and evaluation in June 2025. This aligned with DOW Manual 5000.103 *Cyber Developmental Test and Evaluation* which published in February 2026. Substantive work for this year's report took place prior to these releases, and, therefore, we used the February 2020 guidance.

questions in our questionnaire and compared them with the DOD policy or guidance as appropriate.

We assessed whether MDAPs had completed specific cybersecurity assessments in time to inform key program events as recommended in the *Cybersecurity Test and Evaluation Guidebook*. We included questions in our questionnaire on the first completed date for each of the assessment types described in the guidebook, then compared these dates with the program schedule events that we collected data on as part of the questionnaire's schedule section.[23] We then separated these responses based on whether the relevant key program schedule event had passed or was in the future.

We assessed whether MTA programs completed or planned to complete specific cybersecurity assessments before their planned transition date. We included questions in our questionnaire on the program's transition plan and transition date. We assessed transition plans and determined the recommended cybersecurity assessments that should be completed before transition. We then compared planned transition dates with the completed date or planned completion date for the relevant assessments. We then separated these responses based on whether the completed or planned assessment date was before or after the planned transition date.

To determine the extent to which MDAPs and MTA programs have a zero trust strategy, we asked programs whether they currently have a strategy or plan to in the future.

Individual Assessments of Weapon Programs

Appendix I of this report presents 62 assessments of 68 weapon programs.[24] Of the assessments:

- Nineteen assess MDAPs in development in a two-page format discussing cost and schedule performance, leading product

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[23] For example, we compared a program's reported completion or planned date for their Cooperative Vulnerability Identification assessment with the program's production start date (Milestone C) to determine if the assessment was completed or planned before the production start date, as recommended by DOD guidance. Our analysis excluded program events that occurred before the Department of Defense originally published its *Cybersecurity Test and Evaluation Guidebook* on July 1, 2015.

[24] We reviewed 68 total programs. The Space Force's Tranche 1, Tranche 2, and Tranche 3 Tracking Layer efforts, Tranche 1, Tranche 2, and Tranche 3 Transport Layer efforts, the Army's Integrated Visual Augmentation System efforts, and the Navy's Conventional Prompt Strike efforts were each reviewed together in one assessment.

development practices, software and cybersecurity efforts, and other program issues.

- Fifteen assess MDAPs that achieved milestone C and entered production in a one-page format discussing the program's cost and schedule performance as well as the current status of the program.
- Four assess MDAPs that are well into production but introducing new increments of capability.
- Eighteen assess MTA programs (three assessments provide combined information on two programs and two assessments provide combined information on three programs—thus, we assessed a total of 24 MTA programs) in a two-page format discussing cost and schedule performance, leading product development practices, software and cybersecurity efforts, and other program issues.
- Six assess future major weapon acquisitions—programs planning to develop their systems on the major capability acquisition pathway or another pathway whose costs are expected to exceed the threshold designation as an MDAP—in a two-page format discussing cost and schedule and the program status.

For all assessments, we obtained information from sources such as DOD's DAES reports, program office documents, questionnaires, and cost and quantity spreadsheets. This information is presented in the Program Essentials section as well as the Cost and Quantities sections (MDAP Program Performance; and MTA, MDAP Increment, and Future MDAP Cost and Quantities), and Software Development information in each one- and two-page assessment. For some data fields in the Program Essentials section, like contract type, we provided information from previous years to the programs to update or confirm, as applicable. We generally did not review individual contract documents to verify information in the Program Essentials section.

We obtained the information in the Software and Cybersecurity section of the assessments from program office responses to questionnaires, program office documents, and communications with program officials. In their questionnaire responses, program offices self-identified the software development approach used by the program, the software cost to the program, and the percentage of progress to meet current requirements. In instances where information was available, we computed the percentage of software cost to total acquisition cost, using software costs provided by the program and total acquisition cost obtained from the September 2025 DAES.

The paragraphs below provide supplemental information on how we identified and assessed cost and schedule for MDAPs and future major weapon acquisitions, as well as how we assessed attainment of leading product development knowledge for MDAPs. For MTA programs, we used the approach described earlier to summarize cost and quantity data for 23 MTA programs. For these programs, we reported costs for the current MTA effort only, as reported by the programs. For the 16 MTA programs included in both our current and prior assessment, we determined the change in cost since our June 2025 report.[25]

Cost and Schedule Data for MDAPs and Future Major Weapon Acquisitions

For each MDAP we assessed in a two-page format, we present cost, schedule, and quantity data at the program's first full estimate. The first full estimate is generally the cost estimate established at milestone B—development start. However, for a few programs that did not have such an estimate, we used the estimate at milestone C—production start—instead. For shipbuilding programs, we used their planning estimates when available. For programs that have passed a key decision point and have since been restructured, we continue to assess them against their original cost and schedule estimates. Additionally, for both one-page and two-page MDAP programs, we present cost, schedule, and quantity data, primarily from the September 2025 DAES reporting, compared with that reported in our 2025 report to show the 1-year cost change.[26]

We took the following steps to present program performance data on each two-page MDAP assessment:

- We depicted only the program's main elements of acquisition cost—RDT&E and procurement. However, the total program cost also includes military construction and acquisition-related operation and maintenance costs.[27] Because of rounding and these additional costs, in some situations, the total cost may not match the exact sum of the research and development and procurement costs.
- We deflated cost data for all programs to fiscal year 2025 constant dollars using conversion factors as described above. DOD did not make available a fiscal year 2026, National Defense Budget

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[25] GAO-25-107569.

[26] GAO-25-107569.

[27] We use the phrase "acquisition operation and maintenance" in assessments to refer to operation and maintenance costs that are part of the acquisition cycle and to exclude operation and maintenance costs budgeted for after production.

Estimates (Green Book). The 2025 Green Book is the latest available version.

- We calculated program unit costs by dividing the total program cost by the total quantities planned. These costs are often referred to as program acquisition unit costs.
- The quantities listed refer to total quantities, which includes both procurement and development quantities.
- Cycle time is defined as the number of months between program start and the planned or actual achievement of initial operational capability or an equivalent fielding date. For MDAPs that began on the MTA pathway, program start is when the MTA effort began.[28] In some instances, cycle time is not applicable and we annotate this by using the term NA. In some instances, planned initial operational capability dates have been delayed, but a new planned date had yet to be determined. We annotate this by using the term “to be determined” (TBD).

Cost and quantity information presented in the MDAP increment and future major weapon acquisitions “Estimated Cost and Quantities” figures is from cost and quantity information provided by the program office.

We conducted this performance audit from April 2025 to July 2026, 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.

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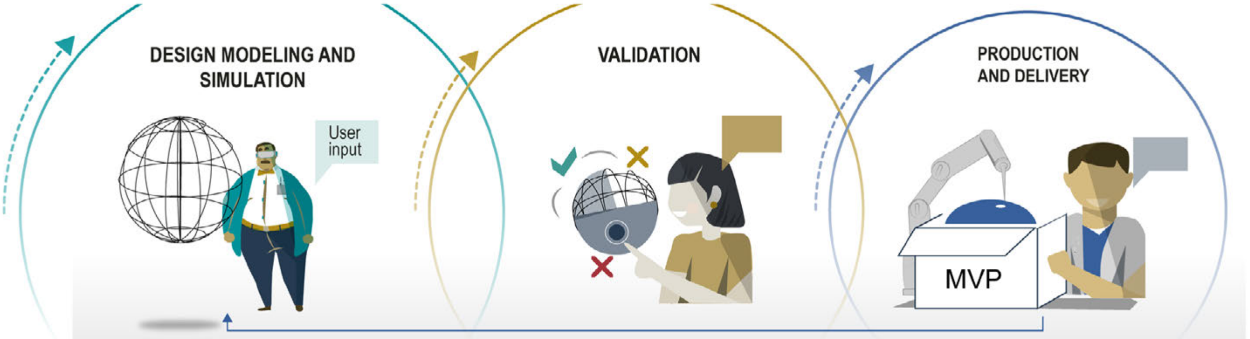
[28] The program start date for MTA programs designated on or after December 30, 2019, is generally the date that an acquisition decision memorandum was signed initiating the effort as an MTA rapid prototyping or rapid fielding program. MTA programs designated before December 30, 2019, generally maintain their MTA program start date as the date funds were first obligated.

Appendix III: Leading Practices for Product Development Throughout Iterative Cycles

Leading companies use an iterative development approach to gain early and continuous knowledge about complex systems through iterative cycles of design, validation, and production (see fig. 46).

Figure 46: Iterative Cycles of Design, Validation, and Production Used for Product Development



	DESIGN MODELING AND SIMULATION	VALIDATION	PRODUCTION AND DELIVERY
Knowledge gained during iterative cycle	**Specifications that ensure the design meets most essential user needs**	**Integrated prototype that is tested in multiple environments to verify performance and can be manufactured as the minimum viable product (MVP)**	**Optimized manufacturing tools and processes and insight into efficiencies for future iterations**
Principle 1: Attain a Sound Business Case That Is Informed by Research Along with Collaboration with Users	Early user feedback during design provides confidence that the design specifications can be developed to meet schedule and cost parameters identified in the project's business case.	Validation includes integrated tests with users in the expected operating environment. As a part of this process, product teams revisit the business case, assessing whether the MVP remains within cost and schedule parameters and still meets user needs.	Leading companies do not view delivery as the finish line, but a springboard for establishing a new business case for the next iteration of the product. Leading companies will structure this business case around improvements to the already delivered MVP.
Principle 2: Use an Iterative Design Approach That Results in Minimum Viable Products	Product teams use digital engineering and 3D printing, along with augmented and virtual realities to aid in rapid design, modeling and simulation cycles. Stakeholders and users access design information using digital twins that contribute information to real-time digital threads.	Product teams conduct systems-integrated tests on a digital twin, or on a physical prototype connected to the digital twin. Each test data input and design update becomes a part of the digital thread. Validation data is available to outside stakeholders to collaborate on design strategies and decisions.	Throughout production, product teams capture manufacturing data. The digital thread documents all the steps in the process, from the design of the machinery and toolset to the processes for manufacturing and assuring the product meets the company's quality standards.
Principle 3: Prioritize Schedule by Off-ramping Capabilities When Necessary	Product teams refine specifications with user feedback, which may result in starting over with new design solutions. Product teams vigilantly monitor product technologies and will not hesitate to defer any to future design iterations if they prove incompatible with schedule and cost parameters.	Product teams make off-ramping decisions for a given MVP largely based on user needs, with the knowledge that some of the capabilities can be added in subsequent product iterations. Because the iterative process provides such opportunities, leading companies more frequently delay capabilities that are not ready until the next release, rather than decide not to provide them at all.	Product teams include manufacturing and supply team stakeholders throughout product design and validation to ensure the manufacturing process can accommodate the design of the product, and recommend design changes if it cannot.
Principle 4: Collect User Feedback to Inform Improvements to the Minimum Viable Product	Product teams obtain user feedback during design simulation and modeling and make changes to the design based on that feedback.	Product teams incorporate user feedback and results from integrated prototype testing—including decisions about the minimum set of capabilities—into the product's hardware and software design, modifying it as needed to prepare the MVP for production.	After product delivery, product teams collect user feedback to inform the next iteration of the product or the design of a new product. Leading companies obtain feedback from a variety of sources, including surveys, customer clinics, showcases, and social media.

Source: GAO analysis of company information; GAO (icons). | GAO-26-108457

These efficiencies are enabled by key principles that, when implemented in product development, position leading companies to satisfy their customers' needs (see fig. 47).

Figure 47: Key Principles Applied During Iterative Cycles Used to Refine Knowledge

Leading principle	Associated sub-principles
Principle 1: Attain a Sound Business Case That Is Informed by Research Along with Collaboration with Users	1. Conduct market research to analyze whether customer and user demand exists or will exist for the product 2. Solicit input from anticipated customers and users of the product to identify the most important capabilities that the product will need to provide 3. Plan to allocate funding over time to the product development based on demonstrated progress, including achievement of phased schedule and performance goals 4. Preserve and rely on institutional memory and corporate knowledge to develop product cost and schedule estimates, avoid repeating earlier mistakes, and build on previous successes 5. Commit to product delivery and release dates only after collecting sufficient cost, schedule, and performance data needed to instill a high level of confidence that the product iteration can be developed and produced within budget 6. Employ and empower rightsized teams of multidisciplined stakeholders that leadership has assessed as having the expertise and experience needed to develop the product 7. Terminate product development promptly if the product no longer has a sound business case
Principle 2: Use an Iterative Design Approach That Results in Minimum Viable Products	1. Use modern, digital design tools capable of integrating development of hardware and software 2. Apply Agile development methodologies to both hardware and software development 3. Implement iterative design and testing processes to generate a minimum viable product that can be continuously updated and improved after delivery
Principle 3: Prioritize Schedule by Off-ramping Capabilities When Necessary	1. Implement periodic reviews with senior leadership to keep all stakeholders informed on the product development's progress 2. Maintain a realistic assessment of product development progress, with a willingness to make difficult decisions about capabilities 3. Off-ramp capabilities that present a risk to delivering the product on schedule
Principle 4: Collect User Feedback to Inform Improvements to the Minimum Viable Product	1. Establish a process to facilitate active engagement with customers and users throughout the iterative development process and following product release 2. Use feedback from customers and users to identify desired improvements to the minimum viable product and inform plans for addressing those in the current and future product releases

Source: GAO analysis and illustration of company information. | GAO-26-108457

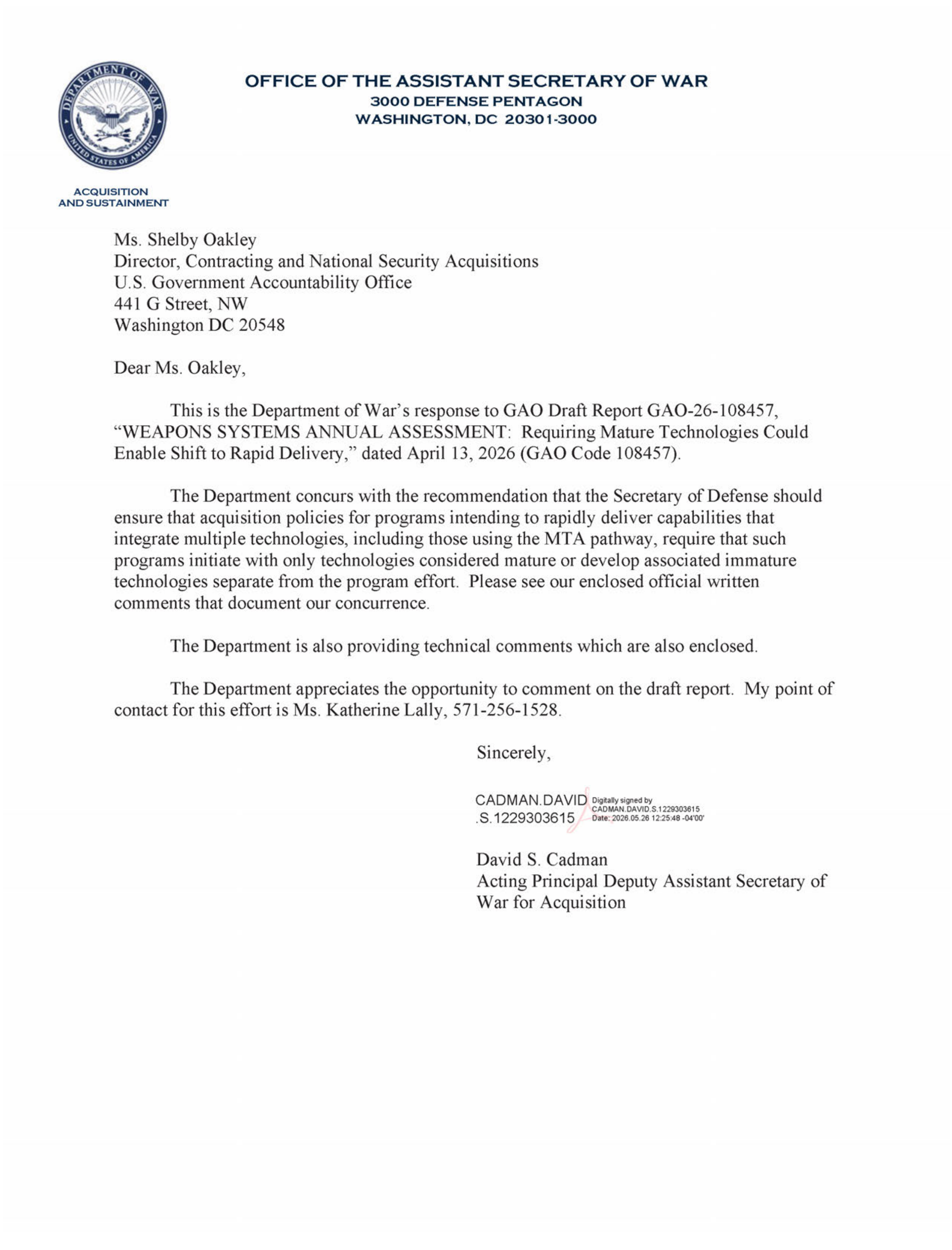
Appendix IV: Technology Readiness Levels

Table 4: Technology Readiness Levels (TRL)

TRL	Definition	Description
1.	Basic principles observed and reported	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology’s basic properties.
2.	Technology concept and/or application formulated	Invention begins. Once basic principles are observed, practical applications can be invented. The application is speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are still limited to analytical studies.
3.	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate the analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.
4.	Component and/or breadboard validation in a laboratory environment	Basic technological components are integrated to establish that they will work together. This is relatively low fidelity compared to the eventual system. Examples include integration of ad hoc hardware in a laboratory.
5.	Component and/or breadboard validation in a relevant environment	Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements, so that they can be tested in a simulated environment. Examples include high-fidelity laboratory integration of components.
6.	System/subsystem model or prototype demonstration in a relevant environment	Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step-up in a technology’s demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in a simulated operational environment.
7.	System prototype demonstration in an operational environment	Prototype near or at planned operational system. Represents a major step-up from TRL 6 by requiring the demonstration of an actual system prototype in an operational environment (e.g., in an aircraft, in a vehicle, or in space).
8.	Actual system completed and qualified through test and demonstration	Technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental test and evaluation of the system in its intended weapon system to determine if it meets design specifications.
9.	Actual system proven through successful mission operations	Actual application of the technology in its final form and under mission conditions, such as those encountered in operational test and evaluation. Examples include using the system under operational mission conditions.

Source: GAO analysis of Department of Defense information. | GAO-26-108457

Appendix V: Comments from the Department of Defense



OFFICE OF THE ASSISTANT SECRETARY OF WAR
3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

ACQUISITION
AND SUSTAINMENT

Ms. Shelby Oakley
Director, Contracting and National Security Acquisitions
U.S. Government Accountability Office
441 G Street, NW
Washington DC 20548

Dear Ms. Oakley,

This is the Department of War's response to GAO Draft Report GAO-26-108457, "WEAPONS SYSTEMS ANNUAL ASSESSMENT: Requiring Mature Technologies Could Enable Shift to Rapid Delivery," dated April 13, 2026 (GAO Code 108457).

The Department concurs with the recommendation that the Secretary of Defense should ensure that acquisition policies for programs intending to rapidly deliver capabilities that integrate multiple technologies, including those using the MTA pathway, require that such programs initiate with only technologies considered mature or develop associated immature technologies separate from the program effort. Please see our enclosed official written comments that document our concurrence.

The Department is also providing technical comments which are also enclosed.

The Department appreciates the opportunity to comment on the draft report. My point of contact for this effort is Ms. Katherine Lally, 571-256-1528.

Sincerely,

CADMAN.DAVID.S.1229303615
Digitally signed by CADMAN.DAVID.S.1229303615
Date: 2026.05.26 12:25:48 -04'00'

David S. Cadman
Acting Principal Deputy Assistant Secretary of War for Acquisition

Appendix VI: GAO Contact and Staff Acknowledgments

GAO Contact

Shelby S. Oakley, oakleys@gao.gov

Staff Acknowledgments

Principal contributors to this report were Erin Carson, Assistant Director; Brenna Derritt, Assistant Director; Ethan Kennedy, Portfolio Analysis Analyst-in-Charge; Matthew L. McKnight, Program Assessments Analyst-in-Charge; Vinayak K. Balasubramanian, Brandon Booth, Rose Brister, Daniel Chandler, Tana Davis, Laura Durbin, Lori Fields, Dinah Girma, Scott W. Hepler, Claire R. Saint-Rossy, Wendy Smythe, Ian T. Toller-Clark, and Nicole Warder. Other key contributors included Cheryl K. Andrew, Joshua Bolanos Cruz, Robert Bullock, Raj Chitikila, Julie Clark, Sadaf Dastan, Koffi Dogbevi, Christopher R. Durbin, Brian Fersch, Aryn Ehlow, Marcus Ferguson, Laurier R. Fish, Laura Hook, Justin M. Jaynes, Jessica Karnis, J. Kristopher Keener, James Madar, Elana Maloul, Anne McDonough, Sean D. Merrill, Michael Moran, Joseph Oudin, John Rastler-Cross, Ronald E. Schwenn, Megan Setser, Steven Stern, Eli Stiefel, James P. Tallon, J. Andrew Walker, and Alyssa B. Weir. This report is dedicated to Tana Davis and Wendy P. Smythe for their tireless work on the weapon systems annual assessment from its inception in 2003 until their retirements in 2025.

Table 5 lists the staff responsible for individual program assessments.

Table 5: GAO Staff Responsible for Individual Program Assessments

Program name	Assistant Directors and Primary Staff
Air Force Programs	
B-52 Commercial Engine Replacement Program (B-52 CERP)	Megan Setser, Andrea C. Evans, Matthew J. Ambrose
B-52 Radar Modernization Program (B-52 RMP)	Megan Setser, Sarah L. Goubeaux, Leigh Ann Haydon
E-7A Rapid Prototyping (E-7A RP)	Brian Fersch, James S. Kim, Cassandra L. Ardern
F-22 Sensor Enhancements (F-22 SeE)	Megan Setser, Dennis A. Antonio, Sean C. Seales
Hypersonic Attack Cruise Missile (HACM)	Ronald E. Schwenn, Matthew J. Ambrose, Helena Johnson
KC-46A Tanker Modernization Program (KC-46A)	Justin M. Jaynes, Jenny Shinn, Amanda B. Parker
LGM-35A Sentinel (Sentinel)	James Madar, Hans J. Eggers, Ryan D. Stott
Long Range Standoff (LRSO)	Megan Setser, Matthew T. Drerup, Riley R. Knight
MH-139A Helicopter (MH-139A)	Megan Setser, Amanda B. Parker, Holly Williams, Jennifer Baker
Small Diameter Bomb Increment II (SDB II)	Justin M. Jaynes, Leigh Ann Haydon, Alejandro Coste Sanchez
T-7A Red Hawk (T-7A)	Megan Setser, Holly Williams, Megan S. Graves
VC-25B Presidential Aircraft Recapitalization (VC-25B)	Cheryl K. Andrew, Leanna M. Parkey, Macie Benincasa
Army Programs	
CH-47F Block II Modernized Cargo Helicopter (CH-47F Block II)	Robert Bullock, Julie K. Kirby, Anh Nguyen
Future Long Range Assault Aircraft (FLRAA)	J. Kristopher Keener, Stephen V. Marchesani, Joseph A. Shir

Program name	Assistant Directors and Primary Staff
High Accuracy Detection and Exploitation System (HADES)	Brian Fersch, Andrew N. Powell, Christina Marie Cota Robles
Indirect Fire Protection Capability Increment 2 (IFPC Inc 2)	J. Kristopher Keener, Brian T. Smith, Brian A. Tittle
Improved Turbine Engine Program (ITEP)	J. Kristopher Keener, Cale D. Jones, Meghan C. Kubit
Integrated Visual Augmentation System (IVAS)	Julie Clark, Christine M. Stenglein, Hans J. Eggers
Long Range Hypersonic Weapon System (LRHW)	Ronald E. Schwenn, Jacob Wu, Gary N. George
Lower Tier Air and Missile Defense Sensor (LTAMDS)	J. Kristopher Keener, John M. Rastler-Cross, Sophia Sanchez
Maneuver Short Range Air Defense Increment 3 (M-SHORAD Inc 3)	J. Kristopher Keener, Aliza Y. Brown, Gioia Chaouch
Mid-Range Capability (MRC)	J. Kristopher Keener, Steven B. Stern, Michael H. Moran
Precision Strike Missile (PrSM)	J. Kristopher Keener, Meghan C. Kubit, Abbie M. Sanders
XM30 Mechanized Infantry Combat Vehicle (XM30)	J. Kristopher Keener, Jennifer Anne Dougherty, Cale D. Jones
Navy Programs	
Advanced Anti-Radiation Guided Missile - Extended Range (AARGM-ER)	Ronald E. Schwenn, Joshua A. Bolanos-Cruz
Air and Missile Defense Radar (AMDR)	Laurier R. Fish, Sameena Ismailjee, Luke W. Hagemann
Conventional Prompt Strike (CPS)	Ronald E. Schwenn, Adrianne C. Lewis, Rohan Krishnamoorthy
CVN 78 Gerald R. Ford Class Nuclear Aircraft Carrier (CVN 78)	Anne McDonough, Abby C. Volk, Burns Eckert, Jessica Karnis
DDG 1000 Zumwalt Class Destroyer (DDG 1000)	Sean D. Merrill, Timothy T. Moss, Koffi Dogbevi
DDG 51 Arleigh Burke Class Destroyer, Flight III (DDG 51 Flight III)	Laurier R. Fish, Andrew H. Redd, Sarah Bailey Tempel
DDG(X) Guided Missile Destroyer (DDG(X))	Christopher R. Durbin, Anh Nguyen, Lindsey Cross
E-130J Take Charge and Move Out Modernization (E-130J)	Christopher R. Durbin, Maura G. Sullivan, Jeffery L. Hartnett
F/A-18E/F Infrared Search and Track (IRST)	Ronald E. Schwenn, Zachary J. Sivo, Emily C. Wentworth
FFG 62 Constellation Class Frigate (FFG 62)	Christopher R. Durbin, Nathan Foster, Macie Benincasa
Medium Landing Ship (LSM)	Sean D. Merrill, Jillian Schofield, Sarah Goubeaux
Medium Unmanned Surface Vessel (MUSV)	Laurier R. Fish, Alexis Olson, Sadaf Dastan
MK 54 MOD 2 Advanced Lightweight Torpedo Increment 1 (MK 54 MOD 2 ALWT INC 1)	Laurier R. Fish, Nicholaus R. Heun, Sandra Mansour
MQ-25 Unmanned Aircraft System (MQ-25 Stingray)	Cheryl K. Andrew, Gioia Chaouch, Charlie Shivers
MQ-4C Triton Unmanned Aircraft System (MQ-4C Triton)	Cheryl K. Andrew, Charlie Shivers, Victor Elliot
Next Generation Jammer Low-Band (NGJ LB)	Ronald E. Schwenn, Daniel Glickstein, Carmen Yeung
Next Generation Jammer Mid-Band (NGJ MB)	Ronald E. Schwenn, Carmen Yeung, Daniel Glickstein
Orca Extra Large Unmanned Undersea Vehicle (XLUUV)	Laurier R. Fish, Joseph Neumeier, Thomas Twambly
Sea-Launched Cruise Missile Nuclear (SLCM-N)	Laurier R. Fish, Riley Knight, Alexis Olson
Ship to Shore Connector Amphibious Craft (SSC)	Laurier R. Fish, Jillena Stevens, Robert C. Jones
SSBN 826 Columbia Class Ballistic Missile Submarine (SSBN 826)	Anne McDonough, Jeffrey A. Carr, Lindsey Cross
SSN 774 Virginia Class Submarine (VCS) Block V (VCS Block V)	Anne McDonough, Nathaniel Vaught, Matthew Whalen

Program name	Assistant Directors and Primary Staff
T-AGOS 25 Explorer Class Ocean Surveillance Ship (T-AGOS 25)	Sean D. Merrill, Kathryn C. Long, Nathan Foster
T-AO 205 John Lewis Class Fleet Replenishment Oiler (T-AO 205)	Sean D. Merrill, Kya Palomaki, Miranda J. Wickham
The New Attack Submarine (SSN(X))	Anne McDonough, Ian Toller-Clark, Nathaniel Vaught
Space Force Programs	
Deep Space Advanced Radar Capability (DARC)	Christopher R. Durbin, Jaeyung Kim, Heather Barker Miller
GPS III Follow-On (GPS IIIF)	J. Andrew Walker, Jonathan Mulcare, Matthew Shaffer
Military GPS User Equipment (MGUE) Increment 1 (MGUE Increment 1)	J. Andrew Walker, Albirio Madrid, Leslie Ashton
National Security Space Launch (NSSL)	Laura Hook, Erin Roosa, Amelia Lowe
Next Generation Operational Control System (OCX)	J. Andrew Walker, Eli DeVan, Jonathan Mulcare
Next Generation Overhead Persistent Infrared Geosynchronous Earth Orbit Satellites (Next Gen OPIR GEO)	Raj Chitikila, Alexandra Schutz, Claire Buck
Next Generation Overhead Persistent Infrared Polar (Next Gen OPIR Polar)	Raj Chitikila, Claire Buck, Alexandra Schutz
Protected Tactical SATCOM - Global (PTS-G)	James P. Tallon, Desiree Cunningham, Andrew Burton
Protected Tactical SATCOM - Resilient (PTS-R)	James P. Tallon, Andrew Burton, Desiree Cunningham
Resilient Missile Warning and Tracking Medium Earth Orbit (Resilient MWT MEO) – Epoch 1	Raj Chitikila, Matthew Shaffer, Erin Roosa
Tranche 1, 2, and 3 Tracking Layers (T1 TRK, T2 TRK, and T3 TRK)	Raj Chitikila, Mary Anne S. Sparks, Mary Diop
Tranche 1, 2, and 3 Transport Layers (T1TL, T2TL, and T3TL)	Raj Chitikila, Mary Diop, Mary Anne S. Sparks
Weather System Follow-On (WSF)	Laura Hook, Eli Stiefel, Natalie Logan

Source: GAO. | GAO-26-108457

Appendix VII: Additional Source Information for Images and Figures

This appendix contains credit, copyright, and other source information for images, tables, or figures included in this product when that information was not listed adjacent to the image, table, or figure.

Front Cover and Highlights Banner:

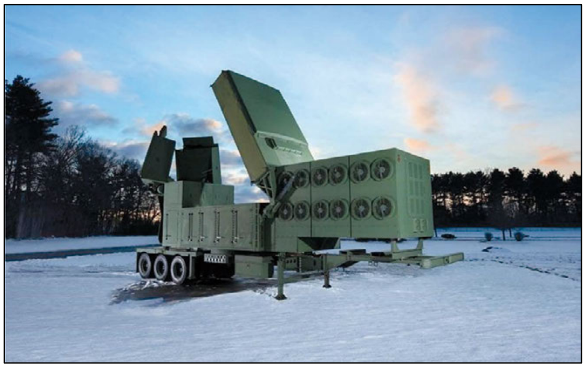
MH-139A Helicopter (MH-139A)

Source: U.S. Air Force photo/ Samuel King Jr.

CVN 78 Gerald R. Ford Nuclear Aircraft Carrier (CVN 78)

Source: U.S. Navy

Appendix VII: Additional Source Information for Images and Figures



Lower-Tier Air and Missile Defense Sensor (LTAMDS)

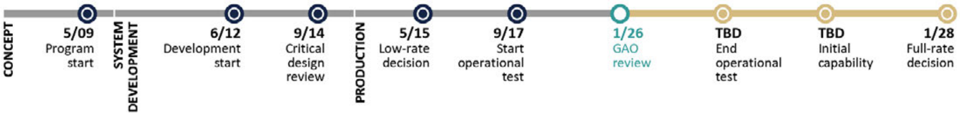
Source: Copyright 2020 Raytheon Company

National Security Space Launch (NSSL)

Source: Blue Origin, Rocket Lab, SpaceX, Stoke Space, and United Launch Alliance

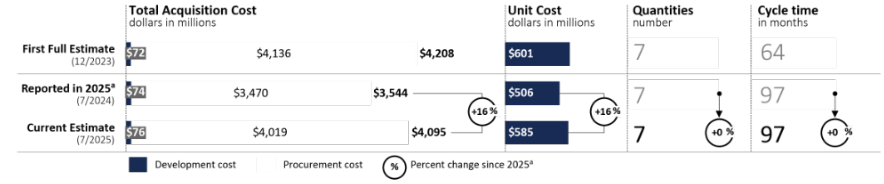
Assessments Graphics:

Timeline:



Source: GAO analysis of Department of Defense data.

Program Performance (Major Defense Acquisition Programs):

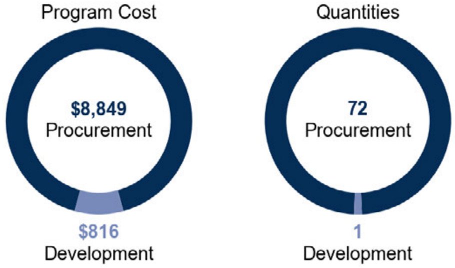


Source: GAO analysis of Department of Defense data.

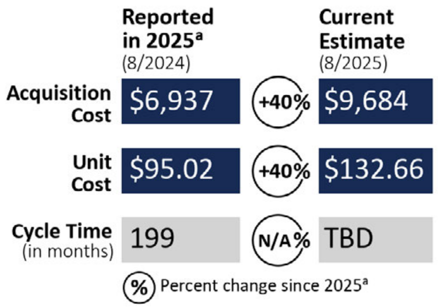
Estimated Middle Tier of Acquisition Cost and Quantities (Middle Tier of Acquisition Programs):

Source: GAO analysis of Department of Defense data.

Estimated Cost and Quantities (One-Page Assessments):



Source: GAO analysis of Department of Defense data.



	Reported in 2025ᵃ (8/2024)		Current Estimate (8/2025)
Acquisition Cost	$6,937	+40%	$9,684
Unit Cost	$95.02	+40%	$132.66
Cycle Time (in months)	199	N/A%	TBD

% Percent change since 2025ᵃ

Source: GAO analysis of Department of Defense data.

Software Development:
Approach: Spiral
Software percentage of total program cost (fiscal year 2025 dollars in millions): $26.87 | 0.6%
Percentage of progress to meet current requirements: 76-99%

Source: GAO analysis of Department of Defense data.

Program Essentials:
Prime contractor: Austal USA, LLC
Contract Type: FFP; FPI (detail design and construction)

Source: GAO analysis of Department of Defense data.

Implementation of Leading Product Development Practices (Two-page Assessments):

Non-shipbuilding program

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	**Development Start**	**Current Status**
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA- Not applicable

Shipbuilding program

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	**Detail Design Contract Award**	**Current Status**
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a digital twin of key subsystems *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test an integrated physical prototype of key subsystems in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated ... Information not available NA- Not applicable

Source: GAO analysis of DOD data. | GAO-26-108457

MTA program

Implementation of Leading Product Development Practices as of January 2026

Iteratively Develop a Minimum Viable Product (MVP)	**MTA Initiation**	**Current Status**
Refine high-level operational needs into an MVP *(the initial set of capabilities that meets end user needs, can be fielded most quickly, and can be successively updated)*	○	○
Obtain User Feedback		
Collect end user feedback to inform the product	○	○
Use Digital Engineering to Connect Stakeholders and End Users to System Data		
Develop a full system-level digital twin *(a dynamic virtual representation of a physical product or system)*	○	○
Develop a digital thread *(an analytical framework that connects stakeholders and end users with dynamic data across a system's life cycle)*	○	○
Validate Integrated Hardware and Software Functionality in the Operating Environment		
Test a system-level integrated fully digital prototype in a digital operational environment	○	○
Test a system-level integrated physical prototype in an operational environment, with data from the testing connected to a digital twin or digital thread	○	○
Prepare for Modularity to Support Production and Updates to the MVP		
Incorporate a modular open systems approach (MOSA)	○	○

● Practice implemented ◐ Practice initiated ◔ Practice documented but not initiated
○ Practice neither documented nor initiated … Information not available NA- Not applicable

Source: GAO analysis of DOD data. | GAO-26-108457

Related GAO Products

Annual Weapon Systems Assessments

Weapon Systems Annual Assessment: DOD Leaders Should Ensure that Newer Programs Are Structured for Speed and Innovation. GAO-25-107569. Washington, D.C.: June 11, 2025.

Weapon Systems Annual Assessment: DOD Is Not Yet Well-Positioned to Field Systems with Speed [Reissued with revisions on July 18, 2026]. GAO-24-106831. Washington, D.C.: June 17, 2024.

Weapon Systems Annual Assessment: Programs Are Not Consistently Implementing Practices That Can Help Accelerate Acquisitions. GAO-23-106059. Washington, D.C.: June 8, 2023.

Weapon Systems Annual Assessment: Challenges to Fielding Capabilities Faster Persist. GAO-22-105230. Washington, D.C.: June 8, 2022.

Weapon Systems Annual Assessment: Updated Program Oversight Approach Needed. GAO-21-222. Washington, D.C.: June 8, 2021.

In-Depth Assessment of Selected Weapon Programs or Portfolios

Missile Warning Satellites: Space Development Agency Should Be More Realistic and Transparent About Risks to Capability Delivery [Reissued with revisions on Feb. 2, 2026]. GAO-26-107085. Washington, D.C.: January 28, 2026.

Navy Shipbuilding: Improving Warfighter Engagement and Tools for Operational Testing Could Increase Timeliness and Usefulness. GAO-26-108781. Washington, D.C.: January 15, 2026.

F-35 Joint Strike Fighter: Actions Needed to Address Late Deliveries and Improve Future Development. GAO-25-107632. Washington, D.C.: September 3, 2025.

National Security Space Launch: Increased Commercial Use of Ranges Underscores Need for Improve Cost Recovery. GAO-25-107228. Washington, D.C.: June 30, 2025.

Army Modernization: Air and Missile Defense Efforts Would Benefit from Applying Leading Practices [Reissued with revisions on June 18, 2025]. GAO-25-107491. Washington, D.C.: June 17, 2025.

Army Modernization: Leading Practices Could Better Support Delivery of Artillery and Missiles. GAO-25-107263. Washington, D.C.: June 5, 2025.

DOD Satellite Communications: Reporting on Progress Needed to Provide Insight on New Approach. GAO-25-107034. Washington, D.C.: March 4, 2025.

Shipbuilding and Repair: Navy Needs a Strategic Approach for Private Sector Industrial Base Investments. GAO-25-106286. Washington, D.C.: February 27, 2025.

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Navy Ship Modernization: Poor Cruiser Outcomes Demonstrate Need for Better Planning and Quality Oversight in Future Efforts. GAO-25-106749. Washington, D.C.: December 17, 2024.

Amphibious Warfare Fleet: Navy Needs to Complete Key Efforts to Better Ensure Ships Are Available for Marines. GAO-25-106728. Washington, D.C.: December 3, 2024.

Columbia Class Submarine: Overcoming Persistent Challenges Requires Yet Undemonstrated Performance and Better-Informed Supplier Investments. GAO-24-107732. Washington, D.C.: September 30, 2024.

GPS Modernization: Delays Continue in Delivering More Secure Capability for the Warfighter. GAO-24-106841. Washington, D.C.: September 9, 2024.

Hypersonic Weapons: DOD Could Reduce Cost and Schedule Risks by Following Leading Practices. GAO-24-106792. Washington, D.C.: July 29, 2024.

Missile Defense: Next Generation Interceptor Program Should Take Steps to Reduce Risk and Improve Efficiency. GAO-24-106315. Washington, D.C.: June 26, 2024.

F-22 Aircraft: Air Force Needs to Better Document Options Before Making Critical Decisions. GAO-24-106639. Washington, D.C.: June 18, 2024.

Navy Frigate: Unstable Design Has Stalled Construction and Compromised Delivery Schedules. GAO-24-106546. Washington, D.C.: May 29, 2024.

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