



Testimony
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Reform, House of Representatives

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F-35 SUSTAINMENT

DOD Needs to Address Key Uncertainties as It Re- Designs the Aircraft's Logistics System

Statement of Diana Maurer, Director,
Defense Capabilities and Management

GAO Highlights

Highlights of [GAO-20-665T](#), a testimony to the Committee on Oversight and Reform, House of Representatives

Why GAO Did This Study

The F-35 Lightning II is DOD's most ambitious and costly weapon system in history, with total acquisition and sustainment costs for the three U.S. military services who fly the aircraft estimated at over \$1.6 trillion. Central to F-35 sustainment is ALIS—a complex system that supports operations, mission planning, supply-chain management, maintenance, and other processes. A fully functional ALIS is critical to the more than 3,300 F-35 aircraft that the U.S. military services and foreign nations plan to purchase. Earlier this year, DOD stated that it intends to replace ALIS with a new logistics system.

This statement highlights (1) current user challenges with ALIS and (2) key technical and programmatic uncertainties facing DOD as it re-designs the F-35's logistics system.

This statement is largely based on GAO's March 2020 report on ALIS ([GAO-20-316](#)), as well as previous F-35 sustainment work.

What GAO Recommends

GAO previously recommended that DOD develop a performance-measurement process for ALIS, track how ALIS is affecting F-35 fleet readiness, and develop a strategy for re-designing the F-35's logistics system. GAO also suggested that Congress consider requiring DOD to develop a performance-measurement process for its logistics system. DOD concurred with GAO's recommendations and is taking actions to address them.

View [GAO-20-665T](#). For more information, contact Diana C. Maurer at (202) 512-9627 or maurerd@gao.gov.

July 22, 2020

F-35 SUSTAINMENT

DOD Needs to Address Key Uncertainties as It Re-Designs the Aircraft's Logistics System

What GAO Found

The Autonomic Logistics Information System (ALIS) is integral to supporting F-35 aircraft operations and maintenance. However, F-35 personnel at 5 locations GAO visited for its March 2020 report cited several challenges. For example, users at all 5 locations we visited stated that electronic records of F-35 parts in ALIS are frequently incorrect, corrupt, or missing, resulting in the system signaling that an aircraft should be grounded in cases where personnel know that parts have been correctly installed and are safe for flight. At times, F-35 squadron leaders have decided to fly an aircraft when ALIS has signaled not to, thus assuming operational risk to meet mission requirements. GAO found that DOD had not (1) developed a performance-measurement process for ALIS to define how the system should perform or (2) determined how ALIS issues were affecting overall F-35 fleet readiness, which remains below warfighter requirements.

DOD recognizes that ALIS needs improvement and plans to leverage ongoing re-design efforts to eventually replace ALIS with a new logistics system. However, as DOD embarks on this effort, it faces key technical and programmatic uncertainties (see figure).

Uncertainties about the Future F-35 Logistics Information System



Source: GAO analysis of Department of Defense and Lockheed Martin information; F-35 Joint Program Office (ALIS hardware images). | [GAO-20-665T](#)

These uncertainties are complicated and will require significant planning and coordination with the F-35 program office, military services, international partners, and the prime contractor. For example, GAO reported in March 2020 that DOD had not determined the roles of DOD and the prime contractor in future system development and management. DOD had also not made decisions about the extent to which the new system will be hosted in the cloud as opposed to onsite servers at the squadron level.

More broadly, DOD has experienced significant challenges sustaining a growing F-35 fleet. GAO has made over 20 recommendations to address problems associated with ALIS, spare parts shortages, limited repair capabilities, and inadequate planning. DOD has an opportunity to re-imagine the F-35's logistics system and improve operations, but it must approach this planning deliberately and thoroughly. Continued attention to these challenges will help ensure that DOD can effectively sustain the F-35 and meet warfighter requirements.

Chairwoman Maloney, Ranking Member Comer, and Members of the Committee:

Thank you for the opportunity to be here today to discuss the Department of Defense's (DOD) sustainment of the F-35 aircraft and its Autonomic Logistics Information System (ALIS). As you know, the F-35 Lightning II aircraft provides advanced tactical aviation capabilities for DOD and is intended to replace a variety of legacy aircraft in the Air Force, Navy, and Marine Corps. The F-35 is also DOD's most ambitious and costly weapon system in history, with acquisition and sustainment costs for the three U.S. military services estimated at over \$1.6 trillion over a 66-year life cycle. Central to F-35 sustainment is ALIS—a complex system that supports operations, mission planning, supply-chain management, maintenance, and other processes. ALIS is integral to the more than 3,300 F-35 aircraft that the U.S. military services and foreign nations plan to purchase. A fully functional logistics system is critical to the operational success of the F-35.

However, as we have reported over the past 6 years, DOD has faced key risks associated with ALIS that have contributed to challenges sustaining the F-35 fleet. Earlier this year, DOD stated that it intends to leverage ongoing re-design efforts and eventually replace ALIS with a new system that it has named the F-35 Operational Data Integrated Network (ODIN). My statement today highlights (1) current user challenges with ALIS and its effects on the F-35 fleet and (2) key technical and programmatic uncertainties facing DOD as it re-designs the F-35's logistics system.

This statement is largely based on our March 2020 report on ALIS.¹ It is also informed by our body of work issued from 2014 through 2020 addressing F-35 sustainment, affordability, ALIS, operations, and global supply chain. To perform this work, we analyzed DOD plans, program guidance, and F-35 performance; and we interviewed DOD, military service, and contractor officials at the headquarters' level and at many military installations that house F-35 aircraft. Specifically, for our March 2020 report, we conducted site visits to 5 of the 10 U.S. F-35 locations—Luke Air Force Base, Edwards Air Force Base, Nellis Air Force Base, Marine Corps Air Station Yuma, and Naval Air Station Lemoore. We selected these locations to obtain perspectives from ALIS users from all U.S. services participating in the F-35 program, and to include

¹GAO *Weapon System Sustainment: DOD Needs a Strategy for Re-Designing the F-35's Central Logistics System*, [GAO-20-316](#) (Washington, D.C.: Mar. 23, 2020).

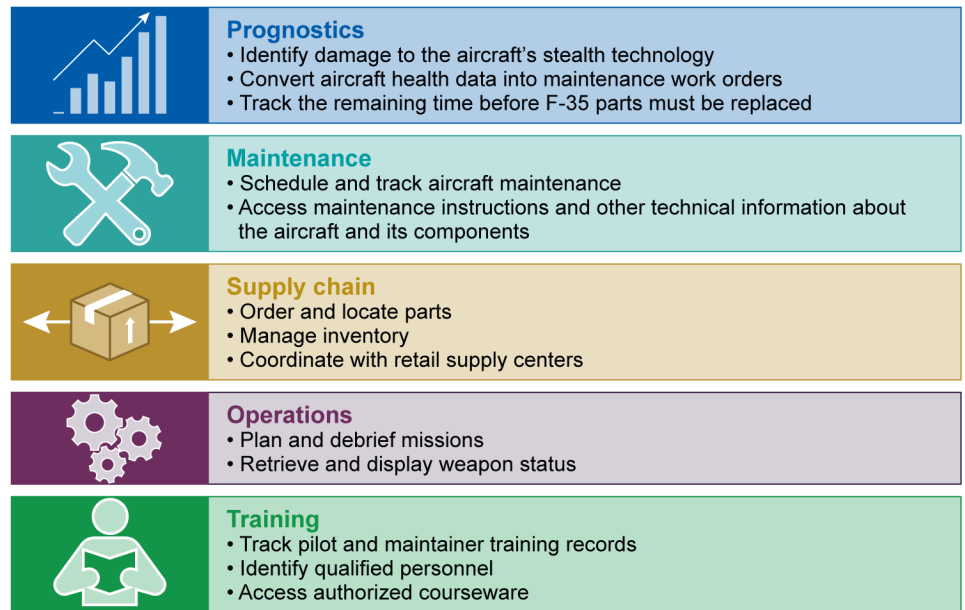
perspectives from a range of operational, training, and testing locations. We developed and used a data collection instrument to collect ALIS-related information from users (i.e. maintainers, pilots, supply personnel, contractors) at all 10 U.S. F-35 locations. Additionally, we met with officials from the F-35 Joint Program Office, MIT Lincoln Labs, Lockheed Martin Rotary and Mission Systems, Air Force Digital Service, Kessel Run (Air Force), and others to discuss ALIS-related improvement efforts. The reports listed on the Related Products Page provide more details on the scope and methodologies we used to carry out our work.

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

Background

ALIS is a system of systems that serves as the primary logistics tool to support F-35 operations, mission planning, and sustainment. ALIS is intended to help maintainers manage tasks including aircraft health and diagnostics, supply-chain management, and other maintenance events. Figure 1 shows some of the key intended capabilities of ALIS. These capabilities reside in multiple software applications within the system that perform specific functions for maintainers, pilots, supply personnel, and data analysts. Lockheed Martin is the prime contractor for ALIS and has been responsible for developing and managing the capabilities of the system, as well as developing training materials for F-35 pilots, maintainers, and supply personnel.

Figure 1: Key Intended Software Capabilities of the F-35's Autonomic Logistics Information System



Source: GAO analysis of Department of Defense documents. | GAO-20-665T

ALIS functionality is intended to support many of the F-35 program's key performance parameters² such as:

- **Increase sortie generation rate:** The number of aircraft sorties launched in a flight day.
- **Increase mission reliability:** The probability that a system will perform mission essential functions for a period of time.
- **Reduce logistics footprint:** The size of in-theater logistics support needed to move and sustain a warfighting force. The footprint includes all the necessary support needed to maintain the force.

²A key performance parameter is a capability or characteristic so significant, that failure to meet the threshold can be the cause for the concept or the system selection to be reevaluated, or the program to be reassessed or terminated. Key performance parameters can be found in the F-35's Operational Requirements Document.

ALIS Users Report Significant Challenges Using the System, Which Could be Affecting F-35 Fleet Performance

F-35 Pilots and Maintainers Reported Several Challenges with ALIS

In March 2020, we reported that ALIS users—pilots, maintainers, and contractor personnel—from 5 F-35 locations we visited stated that ALIS had improved in some aspects over the last 5 years. For example, users stated that data processing, downloading of information, and screen navigation were generally faster than previous years. However, these same users reported significant challenges with ALIS that are affecting the day-to-day operations of the aircraft, as shown in table 1.

Table 1: Autonomic Logistics Information System Challenges, as Reported by Users at 5 F-35 Locations We Visited

User issue	Types of Issues Reported
Inaccurate or Missing Data	Inaccurate or missing data in ALIS has, at times, resulted in the system signaling that an F-35 aircraft should not be flown even though the aircraft has no issues that require it to be grounded and is ready for flight. Military service leadership then decide whether or not to assume risk and fly an F-35 that ALIS tells them to ground.
Challenges Deploying	Taking ALIS on a deployment can be challenging because the required hardware is bulky to transport, internet connectivity is frequently limited, and significant advanced planning is required.
Increasing Personnel Needs ^a	F-35 squadrons are finding that they need more personnel than originally planned to support ALIS operations.
Inefficient Issue Resolution Process	Solutions to overall F-35-related issues, including ALIS-related hardware and software issues, are not shared in ALIS across the fleet, resulting in a reliance on contractor support to address problems that may have already been resolved.
Poor User Experience	ALIS is not very user-friendly or intuitive, can be difficult to navigate, and standard functions can take more time than users expect to complete.
Immature Applications	The Training Management System application within ALIS does not fit the needs of and remains unused by most users, while the Off-board Mission Support application remains difficult to navigate without the help of contractors.
Ineffective Training	Current training for ALIS generally does not prepare users to operate ALIS, and most knowledge about the system is obtained through on-the-job-training.

Source: GAO analysis of information obtained from 5 U.S. F-35 locations through documentation and/or discussions with pilots, maintainers, and supply personnel. | GAO-20-665T

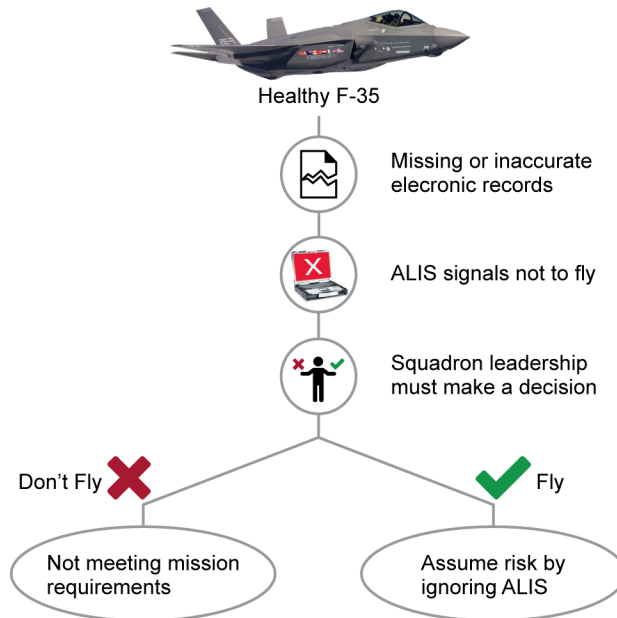
^aOnly four of the five locations cited increased personnel needs because, according to officials, the fifth location is a testing site that does not require the same types of support personnel that training and operational sites require.

While each of these challenges affect ALIS users during flight operations at their squadrons, I will focus today on the persistent issue of inaccurate or missing data—an issue we first reported on back in 2016.³ Certain F-35 parts have an associated electronic record, which is used to track the remaining time before the part must be replaced, among other things.⁴ To be cleared for flight, F-35 policy states that an aircraft must be electronically “complete” in ALIS, meaning that all of the electronic records from each installed F-35 part must be entered into ALIS. However, users at all 5 of the locations we visited told us that electronic records are frequently incorrect, corrupt, or missing, resulting in ALIS signaling that the aircraft should be grounded, often in cases where maintainers know that the parts have been correctly installed and are safe for flight. Users at 1 location said that within a 6-month period in 2019, they experienced up to 400 issues per week related to inaccurate or missing electronic records. These same users said that it is common for their squadron leadership (e.g., DOD personnel designated by maintenance squadron commanders) to elect to allow an aircraft to fly with over 20 inaccurate or missing electronic records that ALIS signals to ground. According to users at all 5 locations we visited, squadron leadership may decide to fly an aircraft with inaccurate or missing electronic records, but we found that this practice varies by location and type of part. Figure 2 provides an example of a recurring scenario faced by squadron leadership.

³GAO *F-35 Sustainment: DOD Needs a Plan to Address Risks Related to Its Central Logistics System*, [GAO-16-439](#) (Washington, D.C.: Apr. 14, 2016).

⁴Electronic Equipment Logbooks are electronic files assigned to certain parts that include information such as part history and remaining life (hours). For the purposes of this statement, Electronic Equipment Logbooks are referred to as “electronic records.”

Figure 2: Example of an F-35 Squadron Leadership Decision Scenario



Source: GAO analysis of Department of Defense information; Lockheed Martin (photo). | GAO-20-665T

Due in part to the unreliability of the data in ALIS, users at all 5 F-35 locations we visited had been collecting and tracking information outside of the system that should be automatically captured in ALIS. Although not a requirement, users said they needed to track information outside of the system because they did not always trust the data that reside in ALIS. Users provided examples of critical aircraft data that they are tracking outside of ALIS—such as aircraft performance data and maintenance inspection deadlines—and said that manually tracking this information is a time-intensive process that pulls maintainers away from completing other aircraft maintenance-related responsibilities. For example, users at 1 location estimated that they collectively spent an average of 5,000 to 10,000 hours per year manually tracking information that should be automatically and accurately captured within ALIS.

In addition, there may be risks associated with using information tracked outside of the system of record to make decisions about the safety and operational health of aircraft. For example, users at 1 location said that there is a danger of overlooking a critical piece of information when key aircraft data used to determine an aircraft's status must be tracked manually using Excel spreadsheets. Users also said that by continuously

ignoring alerts in ALIS caused by missing or inaccurate data, squadrons could be at risk of ignoring an alert for a legitimate aircraft issue. Finally, one commander we spoke with said that while his policy is to generally require maintainers to resolve data issues before releasing an aircraft for flight, in a wartime scenario, his squadron will carry out missions with inaccurate or missing ALIS data and assume the subsequent risk that this may entail.

DOD Has Not Assessed the Performance of ALIS or How the System is Affecting F-35 Fleet Readiness

Although DOD and F-35 program officials agreed that ALIS continues to provide challenges for users and is generally not performing well, at the time of our March 2020 report, DOD still had not determined how it wanted the system to perform. For example, officials from the Joint Strike Fighter Integrated Test Force⁵ told us that testing for individual ALIS software version releases focuses primarily on whether the new version is performing “better” than the previous version. Specifically, ALIS testers have developed criteria to determine if the newest version of ALIS is functioning more efficiently than the previous version by comparing such tasks as screen download times. However, according to these officials, these tests are not determining if the ALIS system is performing to a specified standard because DOD has not defined this standard.

In September 2014, we recommended that DOD develop a performance measurement process for ALIS that includes, but is not limited to, performance metrics and targets that (1) are based on the intended behavior of the system in actual operations and (2) tie system performance to user requirements.⁶ The DOD Systems Engineering Guide for Systems of Systems states that to fully understand performance of systems of systems (such as ALIS), it is important to have a set of metrics that assess the system’s performance and trace back to user requirements because the system will likely evolve based on incremental changes—similar to ALIS’s incremental fielding. These metrics should measure the intended behavior and performance of the system in actual operations versus the progress of the development of the system,

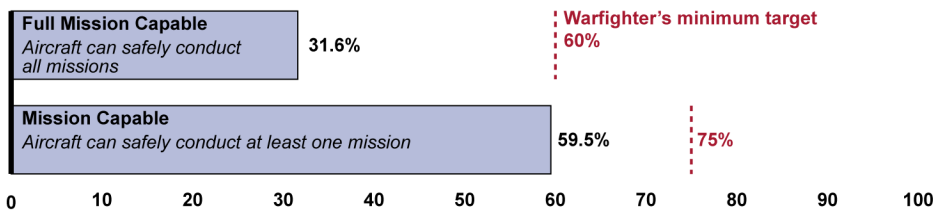
⁵According to officials, the only DOD testing for ALIS prior to operational release is developmental testing. Developmental testing for ALIS is conducted by the Joint Strike Fighter Integrated Test Force located at both Naval Air Station Patuxent River and Edwards Air Force Base. The purpose of developmental testing is to catch problems before ALIS software is actually fielded. ALIS users from the services assist with the testing and provide the user perspective. Officials also stated that the Air Force conducts an “operational checkout” of ALIS software at Nellis Air Force Base after the developmental test is complete and before authorizing its release to other field units.

⁶[GAO-14-778](#)

allowing an assessment of system capabilities based on user requirements. With an expanding fleet size and DOD's intention to replace ALIS with a new logistics system, a performance-measurement process will be critical to ensuring DOD has an accurate and objective measure of the system's performance and effects on F-35 sustainment. In March 2020, we stated that Congress should consider requiring DOD to develop a performance-measurement process for ALIS. In its response to our draft report, DOD stated that it planned to develop explicit performance requirements for its new ODIN system, which we believe is an important early step in the system re-design process.

In addition to not fully understanding ALIS's performance, problems with ALIS could be affecting overall F-35 fleet readiness. At the time of our March 2020 report, users at all 5 F-35 locations we visited stated that problems with ALIS were affecting the overall readiness of the F-35 fleet; however, they were unable to tell us the degree to which this was the case. Overall F-35 fleet-wide performance has been falling short of warfighter requirements—that is, aircraft cannot perform as many missions or fly as often as required. Figure 3 shows F-35 fleet aircraft performance in fiscal year 2019.

Figure 3: F-35 Fleet Aircraft Performance, October 2018-September 2019



Source: GAO analysis of Department of Defense and Lockheed Martin information. | GAO-20-665T

Two F-35 locations had started tracking information on how ALIS is affecting F-35 aircraft performance at their locations. Officials from 1 location told us that from October 2018 through September 2019, F-35 aircraft were grounded and thus non-mission capable for 16,221 hours, or 2 percent of possible flight hours, as a direct result of issues with ALIS—such as inaccurate or missing electronic records. However, according to officials at this location, that number does not capture all scenarios in which ALIS is affecting aircraft performance because sometimes squadron commanders make decisions to fly an aircraft when ALIS

signals that they should not, in order to fulfill mission requirements.⁷ Officials from another location reported that in fiscal year 2018, ALIS-related issues caused the F-35 aircraft to be non-mission capable for 3,264 hours, or 0.5 percent of possible flight hours; however, as was the case with the previous location, officials said that this number also did not capture all scenarios in which ALIS is affecting aircraft performance.

These limited efforts represent squadron-specific initiatives, as no other F-35 location has tracked similar ALIS-related data. Further, the data collected by the two locations only capture non-mission capability rates when ALIS signals to ground the aircraft and makes the aircraft incapable of completing a mission. The data do not account for the workarounds users said they are routinely performing to circumvent a non-functioning aspect of ALIS in order to get an aircraft ready to fly, or the times when squadron leadership decides to fly the aircraft when ALIS signals otherwise.

Additional factors can play a role in reducing F-35 aircraft readiness. For example, in April 2019, we reported that reduced aircraft performance was due largely to spare parts shortages.⁸ This conclusion was drawn from data that had been collected and tracked by both the contractor and DOD across the entire fleet to determine non-mission capability rates due to supply issues. Further, the F-35 program collects data on the degree to which maintenance issues are affecting F-35 mission capability. Additionally, there are ongoing efforts to improve F-35 fleet readiness that are specifically targeted at supply and maintenance issues that are causing the significant mission-capability degradation. However, users and program officials stated that recurring issues with ALIS could also be affecting aircraft performance and noted that data on these issues are not being collected by the contractor or DOD. Although users reported multiple instances when ALIS-related issues grounded aircraft, these issues are being captured and categorized as either supply or maintenance-related issues, thus masking ALIS's effect on fleet-wide readiness.

As a result, we recommended that DOD develop a program-wide process for measuring, collecting, and tracking information on how ALIS is affecting the performance of the F-35 fleet to include, but not be limited

⁷The non-mission capable hours also do not reflect the time needed to resolve any F-35 or ALIS-related issues through the issue resolution process.

⁸[GAO-19-321](#)

to, its effects on mission capability rates. DOD concurred with the recommendation and stated that it is taking actions to address it.

DOD Should Address Key Technical and Programmatic Uncertainties as It Re-Designs ALIS

Limited DOD attention on ALIS over the years has resulted in a troubled history with the system. DOD officials have acknowledged the ongoing challenges with ALIS and know that the system, as it stands today, cannot be sustained into the future. Thus, DOD plans to leverage ongoing re-design efforts and replace ALIS with a new logistics system (ODIN).⁹ While this is an encouraging step, in March 2020 we reported that DOD faced several technical and programmatic uncertainties about a future logistics system, as shown in figure 4.

Figure 4: Technical and Programmatic Uncertainties about the Future F-35 Logistics Information System



Source: GAO analysis of Department of Defense and Lockheed Martin information; F-35 Joint Program Office (ALIS hardware images). | GAO-20-665T

These uncertainties are complicated and will require significant planning and coordination with program stakeholders. For example, we reported in March 2020 that DOD had not determined the roles of DOD and the prime contractor in future system development and management. DOD officials stressed that historically, the department has relied heavily on the prime contractor to develop and manage ALIS. Officials also said that

⁹In March 2020, we reported that DOD had several ongoing initiatives studying how to improve ALIS. One initiative involved developing new requirements and exploring design options to modernize ALIS software and hardware for the F-35 fleet. Another initiative involved testing an Agile software development approach for ALIS. Agile is a software development approach that calls for the delivery of software in small, short increments rather than in the typically long, sequential phases of a traditional software development approach. See [GAO-20-316](#).

moving forward, DOD will need to play a more active role in the management of the logistics system.

As the original ALIS developer, prime contractor representatives stated that their company is in the best position to modernize ALIS. F-35 program office officials acknowledged that because the prime contractor plays such a critical role in the development and sustainment of the F-35, it will be necessary for DOD to work closely with the contractor, regardless of the direction DOD decides to take. For example, DOD officials said they have faced challenges obtaining key technical data from the prime contractor that would be required by DOD to lead software development, such as the underlying source code for current ALIS software, and that they were uncertain about the extent to which they would be able to obtain these data in the future.¹⁰ At a November 2019 congressional hearing, the Under Secretary of Defense for Acquisition and Sustainment stressed that many of the challenges with ALIS stem from the fact that ALIS data are fed back through prime contractor computers, and there is resulting ambiguity over the ownership of that data.¹¹

We also reported that at the time of our March 2020 report, DOD had not made a decision about the extent to which the future logistics system would be hosted in the cloud as opposed to onsite servers at the squadron level. For example, Air Force, Office of the Secretary of Defense, and some F-35 program office officials stressed that for day-to-day maintenance at U.S. bases, F-35 squadrons should be able to access the logistics system using Wi-Fi, and that the reliance on onsite servers should therefore be minimal and limited to deployed scenarios. According to these officials, DOD can achieve significant cost savings by moving the system to the cloud. These officials also indicated that DOD's hesitation about moving from onsite servers to the cloud is mostly cultural and the result of a lack of understanding about what the cloud is. One senior Office of the Secretary of Defense official with software expertise stated that warfighters should be able to deploy with a minimal amount of

¹⁰Technical data include the blueprints, drawings, photographs, plans, instructions, and other documentation required to adequately produce, operate, and sustain weapon systems. Technical data are critical for weapon systems such as F-35 aircraft, as they provide DOD with the information necessary to support the fleet.

¹¹*F-35 Program Update: Sustainment, Production, and Affordability Challenges: Joint Hearing Before the Subcomms. on Readiness and Tactical Air and Land Forces of the H.R. Comm. on Armed Services, 116th Cong. (2019) (testimony of Lieutenant General Eric Fick, Program Executive Officer, F-35 Lightning II Joint Program Office)*

logistics system hardware (for example, only a high-powered laptop). In contrast, other F-35 program office officials told us that the F-35 program office is restricted in the extent to which it can migrate to cloud-based servers due to connectivity and security restrictions. Further, at a logistic system conference, some partner country representatives expressed concerns about hosting the system in the cloud, stating that stringent security requirements would likely prevent their governments from accepting a cloud-based solution for a re-designed system.

Additionally, DOD officials we spoke with for our March 2020 report had expressed differing views on the extent to which DOD should adopt an Agile software delivery model for the F-35 logistics system. Agile is a software development approach that calls for the delivery of software in small, short increments rather than in the typically long, sequential phases of a traditional software development approach. Air Force, Office of the Secretary of Defense, and some F-35 program office officials stated that modernizing the F-35's logistics system will require DOD to adopt industry best practices by making decisions quickly, delivering usable products early and often, and revising plans to reflect experience from completed software iterations. In contrast, Marine Corps and some F-35 program office officials indicated that DOD should carefully consider different commercially available software tools, as well as DOD-specific constraints, before delivering new system capabilities. Officials stated that some tools make software development easier in the short-term, but it is more difficult to switch toolsets or contractors in the long-term.

Other uncertainties, such as determining what capabilities will be included in the F-35's new logistics system, how to incorporate user feedback early and often in the development of new software, and how much of ALIS's current software to maintain in ODIN are also complex questions that will require thorough analysis and tradeoffs. Given these key technical and programmatic uncertainties, in March 2020, we recommended that DOD develop and implement a strategy for the re-design of the F-35's logistics system. The strategy should be detailed enough to clearly identify and assess the goals, key risks or uncertainties, and costs of re-designing the system. DOD concurred with the recommendation and stated that it would do so in developing ODIN.

Addressing these key technical and programmatic uncertainties will be vital to ensuring the success of DOD's future logistics system and overall F-35 sustainment. We have previously reported that DOD has struggled in sustaining a growing fleet. Challenges related to spare parts shortages, limited repair capabilities at the military depots, and inadequate planning

in several areas of sustainment have negatively affected fleet readiness. We have made over 20 recommendations since 2014 related to addressing key F-35 sustainment challenges. DOD has taken actions, and we recently closed recommendations related to improvements in F-35 sustainment planning, cost transparency, and procedures for prioritizing scarce F-35 spare parts. DOD also has planned actions underway to address many of our other recommendations. Deliberate and thorough planning in designing its future logistics system and addressing these other challenges is critical to ensuring that DOD can effectively sustain the F-35 and meet warfighter requirements over the long term. We will continue to follow up with DOD on the status of implementing our recommendations and have ongoing audit work on F-35 sustainment, including DOD's efforts to enhance the F-35's logistics system.

Chairwoman Maloney, Ranking Member Comer, and Members of the Committee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

GAO Contact and Staff Acknowledgements

If you or your staff have questions about this statement, please contact Diana Maurer, Director, Defense Capabilities and Management, at (202) 512-9627 or maurerd@gao.gov.

Contact points for our offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Alissa Czyz (Assistant Director) and Jeff Hubbard (Analyst-in-Charge); Mathew Bader, Vincent Buquicchio, Tracy Burney, Martin De Alteriis, Kasea Hamar, Michael Holland, Ethan Kennedy, William Lamping, Austin Lyke, and Elisa Yoshiara.

Related GAO Products

F-35 Joint Strike Fighter: Actions Needed to Address Manufacturing and Modernization Risks. [GAO-20-339](#). Washington, D.C.: May 12, 2020.

Weapon System Sustainment: DOD Needs a Strategy for Re-Designing the F-35's Central Logistics System. [GAO-20-316](#). Washington, D.C.: March 6, 2020.

F-35 Aircraft Sustainment: DOD Faces Challenges in Sustaining a Growing Fleet. [GAO-20-234T](#). Washington, D.C.: November 13, 2019.

F-35 Joint Strike Fighter: Action Needed to Improve Reliability and Prepare for Modernization Efforts. [GAO-19-341](#). Washington, D.C.: April 29, 2019.

F-35 Aircraft Sustainment: DOD Needs to Address Substantial Supply Chain Challenges. [GAO-19-321](#). Washington, D.C.: April 25, 2019.

F-35 Joint Strike Fighter: Development Is Nearly Complete, but Deficiencies Found in Testing Need to Be Resolved. [GAO-18-321](#). Washington, D.C.: June 5, 2018.

Warfighter Support: DOD Needs to Share F-35 Operational Lessons Across the Military Services. [GAO-18-464R](#). Washington, D.C.: April 25, 2018.

Military Aircraft: F-35 Brings Increased Capabilities, but the Marine Corps Needs to Assess Challenges Associated with Operating in the Pacific. [GAO-18-79C](#). Washington, D.C.: March 28, 2018.

F-35 Aircraft Sustainment: DOD Needs to Address Challenges Affecting Readiness and Cost Transparency. [GAO-18-75](#). Washington, D.C.: October 26, 2017.

F-35 Joint Strike Fighter: DOD's Proposed Follow-on Modernization Acquisition Strategy Reflects an Incremental Approach Although Plans Are Not Yet Finalized. [GAO-17-690R](#). Washington, D.C.: August 8, 2017.

F-35 Joint Strike Fighter: DOD Needs to Complete Developmental Testing Before Making Significant New Investments. [GAO-17-351](#). Washington, D.C.: April 24, 2017.

Related GAO Products

F-35 Joint Strike Fighter: Continued Oversight Needed as Program Plans to Begin Development of New Capabilities. [GAO-16-390](#). Washington, D.C.: April 14, 2016.

F-35 Sustainment: DOD Needs a Plan to Address Risks Related to Its Central Logistics System. [GAO-16-439](#). Washington, D.C.: April 14, 2016.

F-35 Joint Strike Fighter: Preliminary Observations on Program Progress. [GAO-16-489T](#). Washington, D.C.: March 23, 2016.

F-35 Joint Strike Fighter: Assessment Needed to Address Affordability Challenges. [GAO-15-364](#). Washington, D.C.: April 14, 2015.

F-35 Sustainment: Need for Affordable Strategy, Greater Attention to Risks, and Improved Cost Estimates. [GAO-14-778](#). Washington, D.C.: September 23, 2014.

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