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Report to the Committee on Armed Services, House of Representatives

January 2019

ARMY MODERNIZATION

Steps Needed to Ensure Army Futures Command Fully Applies Leading Practices

Accessible Version

GAO-19-132

GAO Highlights

Highlights of GAO-19-132, a report to the Committee on Armed Services, House of Representatives

January 2019

ARMY MODERNIZATION

Steps Needed to Ensure Army Futures Command Fully Applies Leading Practices

Why GAO Did This Study

In order for the Army to maintain its technological edge over potential adversaries, it plans to invest in near- and long-term modernization efforts. However, the Army has struggled with modernization initiatives in the past. For example, the Future Combat System was canceled after a cost of $21 billion and delivery of few new capabilities.

The National Defense Authorization Act for Fiscal Year 2018 included a provision for GAO to report on the Army's modernization strategy. This report assesses (1) the status of the Army's near- and long-term modernization efforts; and (2) the extent to which the Army has applied leading practices to these efforts. GAO reviewed Army directives, procedures, and policies; and compared the Army's efforts with leading practices for requirements and technology development, effective cross-functional teams, and mergers and organizational transformations.

What GAO Recommends

GAO is making four recommendations, including that the Army follow leading practices for maturing technologies to a higher level than currently planned and develop a plan to capture lessons learned from the cross-functional teams. DOD concurred with all the recommendations.

View GAO-19-132. For more information, contact Jon Ludwigson at (202) 512-4841or ludwigsonj@gao.gov

What GAO Found

Since 2017, when the Army announced its initiative to update its forces and equipment with improved capabilities—known as modernization—it has

- prioritized six broad areas of capability needs as shown in the table below;
- established and assigned eight cross-functional teams to pilot how to address these needs;
- established the Army Futures Command as the focal point for modernization efforts, with a four-star general to oversee it; and
- realigned over $1 billion in science and technology funding to support modernization efforts within the $7.5 billion expected to be spent over the next 5 years.

Description of Army's Six Prioritized Capability Needs

Army priority	Description of priority
Long-Range Precision Fires	Capabilities, including munitions that restore Army dominance in range, lethality, and target acquisition.
Next Generation Combat Vehicle	Manned and unmanned combat vehicles with modern firepower, protection, mobility, and power generation.
Future Vertical Lift	Manned and unmanned platforms capable of attack, lift, and reconnaissance missions on modern and future battlefields.
Army Network	A mobile system of hardware, software, and infrastructure that can be used to fight cohesively in any environment where the electromagnetic spectrum is denied or degraded.
Air and Missile Defense	Capabilities that ensure future combat formations are protected from modern and advanced air and missile threats.
Soldier Lethality	Capabilities, equipment, and training for all fundamentals of combat—shooting, moving, communicating, protecting, and sustaining. This includes an expansion of simulated training.

Source: GAO review of Army documentation. I GAO-19-132

To date, the Army has generally applied leading practices identified by GAO to its modernization efforts. For example, the cross-functional team pilots generally applied leading practices for determining requirements and technology development and for establishing effective teams. Similarly, as the Army began the process of establishing the Army Futures Command, it has started to apply the leading practices for mergers and organizational transformations by establishing a clearly defined mission and providing a clear consistent rationale for the command. However, GAO identified other areas where the Army has not fully applied leading practices to its modernization efforts including the following:

- Under the modernization effort, the Army plans to begin weapon systems development at a lower level of maturity than what is recommended by leading practices. GAO has raised concerns about this type of practice for almost two decades for other Army acquisitions, because proceeding into weapon systems development at earlier stages of technology maturity raises the risk that the resulting systems could experience cost increases, delivery delays, or failure to deliver desired capabilities. Taking this approach for acquisitions under the modernization effort raises similar concerns for the Army's six prioritized capability needs.
- The Army has not developed a plan for capturing the lessons learned from the cross-functional team pilots, and therefore may miss an opportunity to leverage the experience of these teams in applying leading practices.

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Abbreviations

DOD	Department of Defense
GAO	Government Accountability Office
U.S.C.	United States Code

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

January 23, 2019

The Honorable Adam Smith
Chairman
The Honorable Mac Thornberry
Ranking Member
Committee on Armed Services
House of Representatives

The Army has determined that in order for it to maintain its technological edge over potential adversaries, it must update or upgrade multiple weapon systems—a broad-based effort it refers to as modernization. This modernization effort hinges upon the development of new capabilities through the Department of Defense (DOD) acquisition process. GAO has found that this acquisition process includes developing a clear description of the specific capabilities and characteristics of the system—referred to as requirements. Another key component of the acquisition process is the identification of technologies capable of meeting those requirements and developing them to a level of maturity sufficient for integration into a system in a cost-effective and timely way. Our past work has found that a formal weapons system acquisition program—with dedicated funding and specific timelines for completing system development—should be initiated only after requirements are well-defined and technologies are demonstrated as sufficiently mature.

The Army's past efforts at modernization have included several weapon system acquisition programs that were ultimately cancelled—after years of development and billions of dollars spent. The cancellation of these programs was due to, among other things, problems with the development of requirements for these systems and the integration of new technologies into acquisition programs before they reached a sufficiently high-level of maturity. The failure to deliver these new weapon systems resulted in a continued reliance on the aging systems that had been targeted for replacement. Army officials have acknowledged that improvements to the processes used to develop requirements and mature technologies are critical if the Army is to achieve the goals it has set for its new modernization efforts.

Section 1061 of the National Defense Authorization Act for Fiscal Year 2018 included a provision for GAO to report on the Army's modernization strategy.[1] This report is the second that we have issued in response to this mandate and assesses (1) the status of the Army's efforts to establish new acquisition organizations while balancing near- and long-term modernization; and (2) the extent to which the Army has applied leading practices to do so.[2]

To assess the Army's efforts to establish new acquisition organizations and to balance near- and long-term modernization, we reviewed orders and directives the Army used to establish new acquisition organizations—such as the Army Futures Command—geared toward modernization efforts. We also reviewed Army directives, procedures, and policies to understand changes in Army acquisition practices since 2016. We reviewed the Army's 2018 Modernization Strategy report and other documents, such as strategic portfolio reviews and budgets, to identify the steps the Army is taking to balance its modernization efforts in the near- and long-term. We also discussed these topics with relevant Army officials to get their perspectives on Army modernization efforts.

To assess the extent to which Army has applied leading practices, we reviewed our prior work on requirements and technology development, effective cross-functional teams, and mergers and organizational transformations that have identified relevant leading practices that might apply to the Army's modernization efforts. To assess the extent to which the Army has applied these practices as part of its modernization efforts, we analyzed Army documentation and spoke with cognizant Army officials. See appendix I for more information on our objectives, scope and methodology.

We conducted this performance audit from January 2018 to January 2019 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

[1]See Pub. L. No. 115-91, § 1061(e) (2017).

[2]This report fulfills part of GAO's statutory mandate required by subparagraph (C) of section 1061(e)(2) of the National Defense Authorization Act for Fiscal Year 2018. Subparagraphs (A) and (B) of section 1061(e)(2) of the same Act required GAO to assess the Army's near-term modernization efforts, which we addressed in GAO, *Army Modernization: Actions Needed to Measure Progress and to Fully Identify Near-Term Costs*, GAO-18-604SU (Washington, D.C., Sept. 28, 2018) and is for official use only.

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

Senior Army leadership has acknowledged that the service must change how it develops requirements and acquires weapon systems in order to be successful in future wars. However, the Army's history of failed, costly weapon system procurements to replace aging weaponry is due, in part, to requirements that could not be met and the immaturity of key technologies. Many of these programs failed to provide any capability to the warfighter despite the time and funding expended. Some examples of these cancelled programs are listed in table 1 below.

Table 1: Examples of Cancelled Army Modernization Programs

Name of program	Duration of program	Cost as of cancellation (dollars in billions)	Description	Reasons cancelled
Comanche	1988-2004	10.1	Armed reconnaissance helicopter	Cost increases, schedule delays, and performance shortfalls.
Future Combat Systems	2000-2009	21.4	Family of light and mobile manned and unmanned vehicles	Overly ambitious requirements, immaturity of key technologies, cost increases, and schedule delays.
Ground Combat Vehicle	2010-2014	1.5	Replacement for the Bradley Infantry Fighting Vehicle	Infeasible requirements.

Source: GAO review of DOD documentation. | GAO-19-132

Note: All dollars amounts in fiscal year 2019 dollars.

Army Modernization Efforts Since 2017

In the fall of 2017, the Army began a new modernization effort to rapidly develop and field new capabilities. As a part of this effort, the Army's then-Acting Secretary and the Chief of Staff in an October 3, 2017 memorandum identified six priorities to guide Army modernization:

- long-range precision fires,
- next generation combat vehicle,
- future vertical lift,
- network,

- air and missile defense, and
- soldier lethality.

Given that modernization is an ongoing process, and with Army expectations that some capabilities will be delivered sooner than others, we have divided Army modernization into two timeframes for the purposes of this report:

- **Near-term modernization:** from fiscal years 2019 to 2023, including buying existing systems and technologies to fill the Army's urgent needs.
- **Long-term modernization:** fiscal year 2024 and beyond, including the development of new systems and technologies to meet anticipated needs and maintain superiority over major adversaries.

In September 2018, we addressed the Army's efforts for near-term modernization.[3] We found that the Army had set decisively defeating near-peer adversaries as an overarching objective, but had not established processes for evaluating its modernization efforts against this objective. We also found that the Army had not yet completed a cost analysis of its near-term modernization efforts. To address these issues, we recommended that the Army develop a plan to finalize processes for evaluating the contributions of its near-term investments to the ability to decisively defeat a near-peer adversary; and finalize and report to Congress its cost analysis of near-term investments. DOD concurred with both of these recommendations.

As we have previously reported, the Army's long-term modernization efforts as well as those of the other DOD military services will depend upon adequate and effective investments in science and technology.[4] These are investments that focus on increasing fundamental knowledge of new capabilities, applying that knowledge, and demonstrating the technological feasibility of capabilities.

[3]GAO-18-604SU.

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

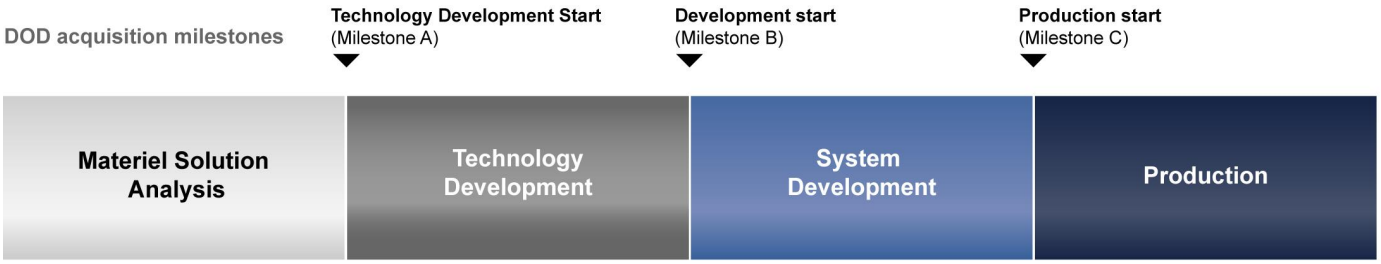
Army Acquisition Process

As with all the military services in DOD, the Army's acquisition process generally includes a number of phases including: (1) the materiel solution analysis phase, (2) the technology maturation and risk reduction phase, (3) the engineering and manufacturing development phase, and (4) the production and deployment phase. In this report we refer to these phases more simply as materiel solution analysis, technology development, system development, and production.

Before these phases begin, the Army must establish requirements to guide the acquisition process. Requirements describe the capability desired to be achieved through the use of operational performance attributes—the testable and measurable characteristics—necessary to the design of a proposed system and for establishing a program's cost, schedule, and performance baselines. These requirements include the key performance parameters and system attributes that guide a program's development, demonstration, and testing. The Army approval authority for all Army warfighting capability requirements is the Army Chief of Staff.

At the end of the initial three phases, the Army holds a milestone review, as shown in figure 1 below, to assess an acquisition program's readiness to proceed to the next phase, consistent with relevant DOD policies and federal statutes.

Figure 1: DOD Acquisition System Process



Source: GAO analysis of Department of Defense (DOD) Instruction 5000.02. | GAO-19-132

The Assistant Secretary of the Army for Acquisition, Logistics, and Technology is generally the Army's milestone decision authority.[5] The process is also subject to intermediate reviews by senior Army staff.

Prior GAO Work

We have issued several reports related to the Army's modernization efforts that assess areas regarding requirements and technology development, effective cross-functional teams, and mergers and organizational transformations:

- **Requirements and Technology Development.** In our extensive work issued over two decades on requirements and technology development, we have emphasized the importance of promoting leading practices such as communication between end-users and requirements developers; prototyping capabilities as part of technology and product development; and maturing technology to a certain threshold before approving product development.[6]
- **Cross-Functional Teams.** In February 2018, we identified eight leading practices that effective cross-functional teams should have:
  - effective communication mechanisms;
  - well-defined goals common to the team, team leader, and management;
  - an inclusive team environment where all team members have collective responsibility and individual accountability for the team's work;

[5]See 10 U.S.C. § 2430(d)(1); Army Regulation 70-1 § 1-4.c(1).

[6]GAO, *Weapon Systems: Prototyping Has Benefited Acquisition Programs, but More Can Be Done to Support Innovation Initiatives,* GAO-17-309 (Washington, D.C.: June 27, 2017); *Army Weapon Systems Requirements: Need to Address Workforce Shortfalls to Make Necessary Improvements*, GAO-17-568 (Washington, D.C.: June 22, 2017); Technology Readiness Assessment Guide: Best Practices for Evaluating the Readiness of Technology for Use in Acquisition Programs and Projects, GAO-16-410G (Washington, D.C.: August 2016), *Best Practices: Stronger Practices Needed to Improve DOD Technology Transition Processes*, GAO-06-883 (Washington, D.C.: Sep. 14, 2006); *Best Practices: Using a Knowledge-Based Approach to Improve Weapon Acquisition*, GAO-04-386SP (Washington, D.C.: Jan. 1, 2004); *Best Practices: Better Matching of Needs and Resources Will Lead to Better Weapon System Outcomes*, GAO-01-288 (Washington, D.C.: March 8, 2001); and *Best Practices: Better Management of Technology Development Can Improve Weapon System Outcomes,* GAO/NSIAD-99-162 (Washington, D.C.: July 30, 1999).

- a well-defined team structure with project-specific rules and procedures;
- autonomy to make decisions rapidly;
- senior managers who view their teams as a priority;
- commitment to the team's goals; and
- leaders empowered to make decisions and provide feedback and developmental opportunities.[7]

- **Mergers and Organizational Transformations.** In July 2003, we found that the key to successful mergers and organizational transformations is to recognize the "people" element and implement strategies to help individuals maximize their full potential while simultaneously managing the risk of reduced productivity and effectiveness that often occurs as a result of changes. We identified nine leading practices new organizations should follow including ensuring top leadership drives the transformation and establishing a communication strategy, among others.[8]

Army Is Establishing New Organizations to Lead Modernization Efforts and Prioritizing Solutions to Address Near-term Capability Gaps while Identifying Long-term Needs

The Army's cross-functional team pilots and early efforts by the Army Futures Command have prioritized closing near-term capability gaps, and have begun planning the transition to long-term capabilities. The cross-functional teams were pilot programs to improve the quality and timeliness of requirements and technology development. These cross-functional teams are transitioning from independent organizations to organizations within the Army Futures Command, which will also subsume other existing Army organizations tasked with modernization. Army Futures Command is in the process of establishing its policies, processes, and functions as well as its relationships with other Army

[7]GAO, *Defense Management: DOD Needs to Take Additional Actions to Promote Department-Wide Collaboration*, GAO-18-194 (Washington, D.C.: February 28, 2018).

[8]GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, GAO-03-669 (Washington, D.C.: July 2, 2003).

organizations. It plans to reach full capability by July 2019. The Army has already identified near-term priorities and realigned over $1 billion in science and technology funding for long-term modernization. Army Futures Command will be responsible for continuing this prioritization.

Army Established Cross-Functional Teams to Pilot Its Modernization Efforts

In an attempt to increase the efficiency of its requirements and technology development efforts, the Army established cross-functional team pilots for modernization. A directive from the then-acting Secretary of the Army on October 6, 2017, established eight multi-disciplinary cross-functional teams on a pilot basis. The eight cross-functional team pilots were assigned to address the six priority areas, as outlined in table 2.

Table 2: Army Modernization Priorities and Assigned Cross-Functional Teams

Army priority	Description of priority	Cross-functional team location
Long-Range Precision Fires	Capabilities, including munitions that restore Army dominance in range, lethality, and target acquisition.	Long-Range Precision Fires – Fort Sill, Okla.
Next Generation Combat Vehicle	Manned and unmanned combat vehicles with modern firepower, protection, mobility, and power generation.	Next Generation Combat Vehicle - Detroit Arsenal, Mich.
Future Vertical Lift	Manned and unmanned platforms capable of attack, lift, and reconnaissance missions on modern and future battlefields.	Future Vertical Lift – Redstone Arsenal, Ala.
Army Network	A mobile system of hardware, software, and infrastructure that can be used to fight cohesively in any environment where the electromagnetic spectrum is denied or degraded.	Network Command, Control, Communication, and Intelligence – Aberdeen Proving Ground, Md.
Army Network	A mobile system of hardware, software, and infrastructure that can be used to fight cohesively in any environment where the electromagnetic spectrum is denied or degraded.	Assured Positioning, Navigation, and Timing – Redstone Arsenal, Ala.
Air and Missile Defense	Capabilities that ensure future combat formations are protected from modern and advanced air and missile threats.	Air and Missile Defense – Fort Sill, Okla.
Soldier Lethality	Capabilities, equipment, and training for all fundamentals of combat—shooting, moving, communicating, protecting, and sustaining. This includes an expansion of simulated training.	Soldier Lethality – Fort Benning, Ga.
Soldier Lethality	Capabilities, equipment, and training for all fundamentals of combat—shooting, moving, communicating, protecting, and sustaining. This includes an expansion of simulated training.	Synthetic Training Environment – Orlando, Fla.

Source: GAO review of Army documentation. | GAO-19-132

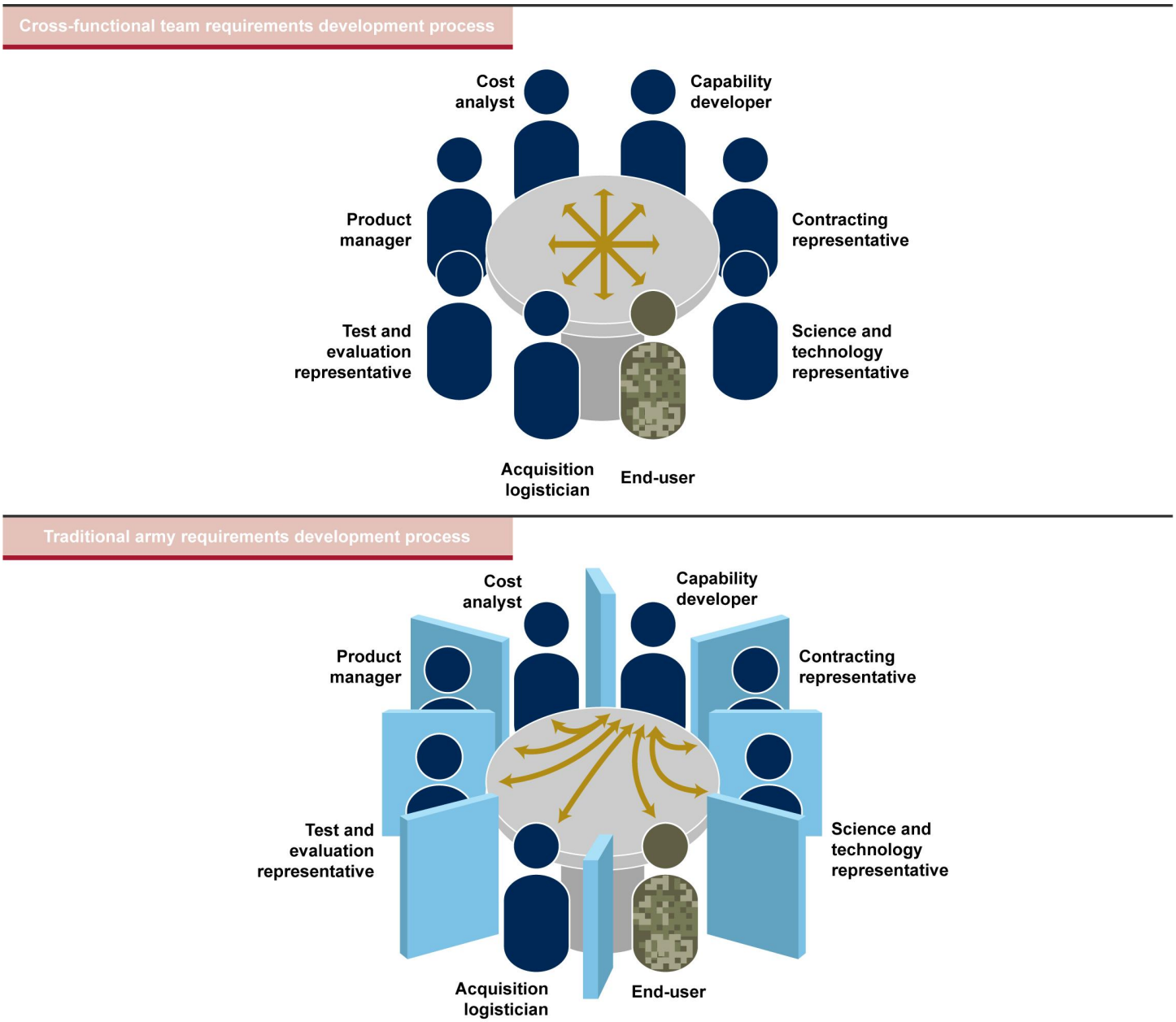
Note: Two of the modernization priorities—Army Network and Soldier Lethality—were subdivided into two cross-functional teams while the other four priorities each were assigned one cross-functional team.

These cross-functional team pilots were intended to:

- take steps toward achieving the six modernization priorities;
- leverage expertise from industry and academia;
- identify ways to use experimentation, prototyping, and demonstrations; and
- identify opportunities to improve the efficiency of requirements development and the overall defense systems acquisition process.

Cross-functional team pilots were structured to help achieve these goals. Each cross-functional team pilot consisted of core staff and subject matter experts from across the Army. To facilitate the rapid approval of requirements, each cross-functional team pilot was led by a general officer or a senior civilian official who could communicate directly with the highest levels of the Army. The goal of staffing these teams was to ensure that each team had individuals who specialized in acquisition, requirements, science and technology, test and evaluation, resourcing, contracting, cost analysis, sustainment, and military operations. The goal of bringing different experts together was to facilitate collaboration and immediate opportunities for stakeholders to provide input as opposed to the more traditional requirements development process, in which input has typically been provided separately. Officials told us that, while all of these subject matter experts may have provided input on the requirements development process in the past, placing them on a single team offered the promise of streamlining those efforts and could eliminate the need for multiple reviews. Figure 2 below compares the requirements development process under cross-functional teams to how the Army has traditionally developed requirements.

Figure 2: Comparison of Army Requirements Development Processes



Source: GAO interpretation of Army information. | GAO-19-132

The cross-functional team locations chosen by senior Army leadership coincide with the locations of related Army organizations or industry hubs, which could help to facilitate this exchange of ideas among technical

experts, and inform prototyping and experimentation. For example, the cross-functional team pilot for the Future Vertical Lift was stationed at Redstone Arsenal where the Army's existing research, development, and engineering center for aviation is located.

In congressional testimony, the Commander of Army Futures Command stated that in order to achieve their near- and long-term modernization objectives, they will have to reduce their requirements development timelines from 3 to 5 years to less than 1 year. According to cross-functional team members we spoke with, the cross-functional team pilots were able to demonstrate progress toward achieving the goals set out for them.[9] Specifically, cross-functional team pilots

- completed requirements documentation for one of the Mounted Assured Positioning, Navigation and Timing System's capabilities in less than a year;
- replaced small airborne radio with completion of directed requirement for the Integrated Tactical Network in less than 60 days; and
- completed requirements documentation for a soldier lethality capability in 15 days as opposed to the expected 4 months.

Army Futures Command Scheduled to Become Fully Operational by July 2019

The Army has taken initial steps to consolidate all its modernization efforts under one authority, in addition to its initiation of the cross-functional team pilots. In particular, the Secretary of the Army established the Army Futures Command through the issuance of a general order on June 4, 2018. According to Army documentation, the intent of the new command is to provide unity of command, accountability, and modernization at the speed and scale required to prevail in future conflicts. This organization is led by a four-star general like its organizational peers: Army Materiel Command, Training and Doctrine Command, and Forces Command. Establishing Army Futures Command is the most significant institutional change to the Army since it reorganized in 1973 in the wake of the Vietnam War.

[9]Army officials stated that these tasks were completed, but officials were not able to provide documentary evidence to support it.

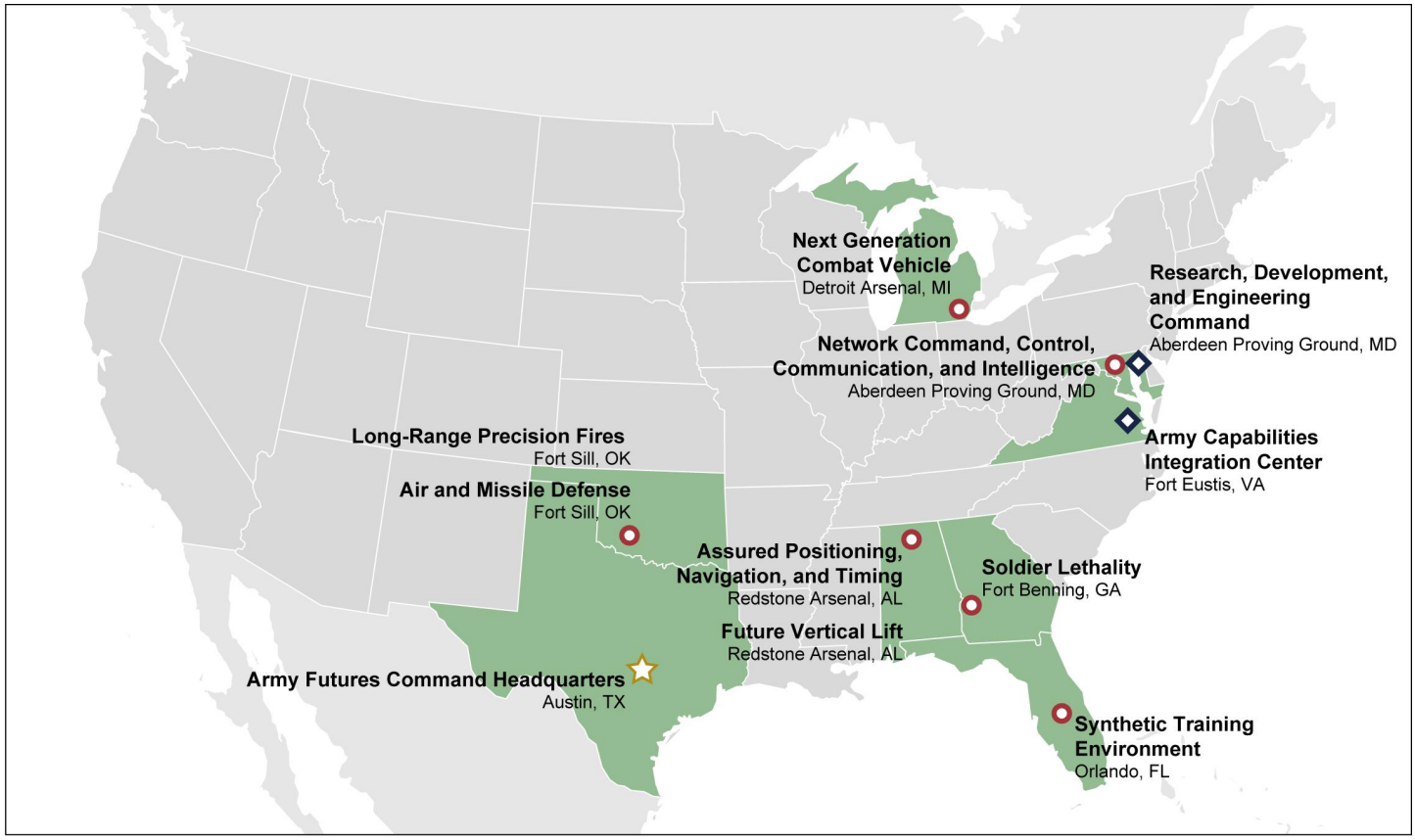
The Army is in the process of establishing the new command, but has just begun to define its organizational structures. According to the 2018 Army general order, Army Futures Command reached initial operating capability in July 2018. According to Army Futures Command officials and documentation, the new organization is charged with integrating several existing requirements and technology development organizations—such as Army Capabilities Integration Center in Fort Eustis, Virginia and Research, Development, and Engineering Command headquartered in Aberdeen, Maryland—as well as the cross-functional team pilots. The cross-functional team pilots are in the process of being integrated into the new command and, according to Army officials, will continue to be responsible for managing the Army's six modernization priorities. In addition, Army Futures Command will be supported by a number of operational and administrative offices to assist the components with executing their missions. According to Army officials and documentation, the new command will be organized around three major components:

- **Futures and Concepts:** responsible for identifying and prioritizing capability and development needs and opportunities. This organization subsumed the Army Capabilities Integration Center on December 7, 2018—formerly part of Army Training and Doctrine Command, which focuses primarily on the education and training of soldiers.
- **Combat Development:** responsible for conceptualizing and developing solutions for identified needs and opportunities. This organization will subsume Research, Development and Engineering Command—currently a part of Army Materiel Command, which focuses primarily on sustainment.
- **Combat Systems:** responsible for refining, engineering, and producing new capabilities. The acquisition program offices will communicate with the new command through this organization to ensure integration of acquisition functions. However, the program offices will continue to report to the Assistant Secretary of the Army for Acquisition, Logistics and Technology.

Army Futures Command will be headquartered in Austin, Texas, and existing organizations are not expected to change their locations. According to Army officials and documentation, the Army chose Austin because of its proximity to science, technology, engineering, and mathematics talent, as well as private sector innovators that officials believe will assist the command in achieving its modernization goals. According to senior Army leadership we spoke with, the new command headquarters will have around 300 staff in place by July 2019, a

workforce that may grow to 500 employees—100 military and 400 civilians. Our analysis of Army's plans for initial staffing at the Army Futures Command headquarters, based on data from July 1, 2018, found that about one-third of headquarters staff would be involved directly in modernization efforts, such as engineers and operations specialists, and the remainder would consist of support staff, including legal counsel and contracting professionals. Figure 3 shows the locations of the known major Army Futures Command components, the 8 cross-functional teams being integrated under Army Futures Command, and its new headquarters.

Figure 3: Locations of Army Futures Command Components



Headquarters

Major components

Cross-functional team

Source: GAO review of Army documentation; MapResources (map). | GAO-19-132

Although initial steps have been taken to establish the new command, key steps have not yet been completed. The Army stated in the executive order establishing the command that it will consider Army Futures Command fully operational once it is sufficiently staffed with operational facilities, secure funding, and the ability to execute its assigned mission, roles, and responsibilities. At full operating capability, officials told us Army Futures Command will also have finalized the organizational structure and the reporting responsibilities of its various components. However, Army Futures Command has not yet established policies and procedures detailing how it will execute its assigned mission, roles, and responsibilities. For example, we found that it is not yet clear how Army Futures Command will coordinate its responsibilities with existing acquisition organizations within the Army that do not directly report to it. One such organization is the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology—the civilian authority responsible for the overall supervision of acquisition matters for the Army—and the acquisition offices it oversees. To mitigate concerns about coordination, in August 2018, the Army issued a directive signed by the Secretary of the Army designating the military deputy of this office as an advisor to Army Futures Command, a designation aimed at establishing a means of coordination. Army Futures Command officials have also stated that the Assistant Secretary of the Army for Acquisition, Logistics and Technology will retain full acquisition authorities as required by law. Army documentation shows that further policies and procedures are expected to be issued in 2019.

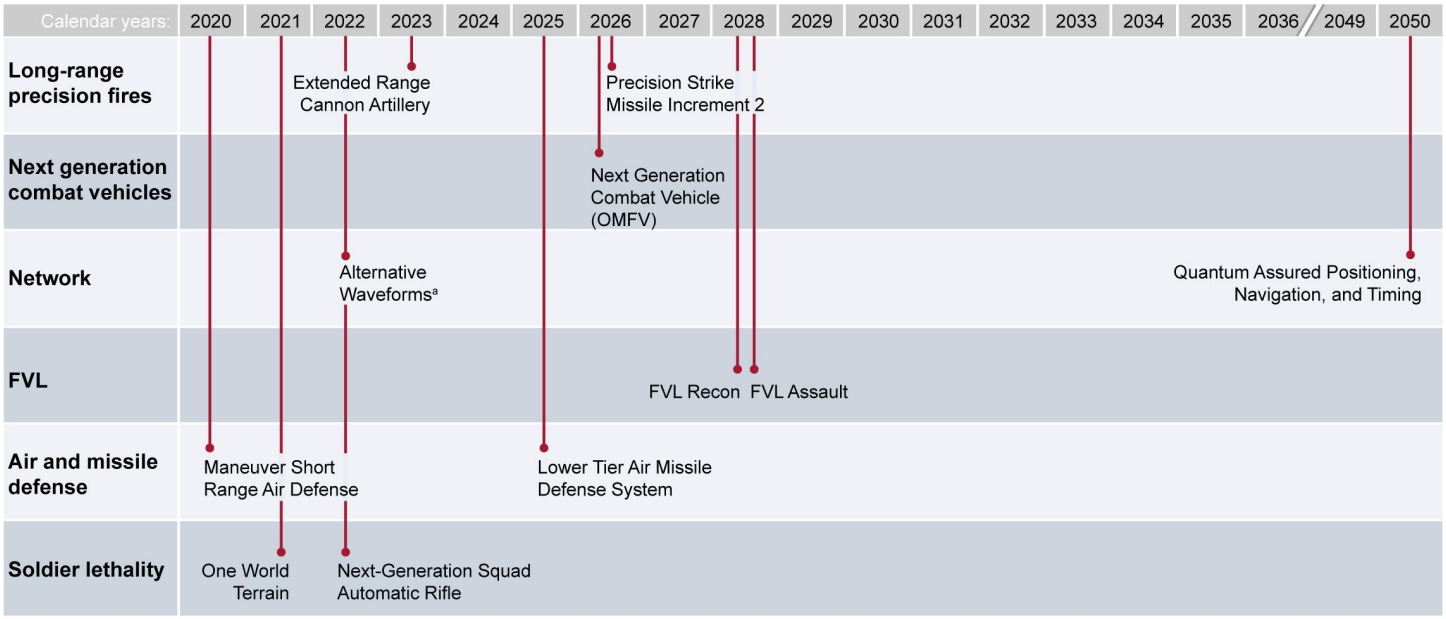
The Army's Efforts Have Balanced Modernization by Prioritizing Mitigation of Near-term Capability Gaps while Identifying Long-term Needs

The Army recognizes the need to balance near-term and long-term modernization over time. To do so, the Army has balanced its modernization efforts by funding the closure of near-term capability gaps, and identifying long-term needs to be funded. Since announcing the modernization efforts in 2017, the Army has directed more funding toward closing near-term capability gaps. For example, as part of the planning for the fiscal year 2019 budget process, the Army identified 67 high-priority programs, such as the M-1 Abrams tank and the AH-64 Apache helicopter, with capability gaps in need of further investment. To support these priorities, the Army identified a need for $16 billion in increased funding in fiscal years 2019 through 2023. The 2018 Army Modernization Strategy report identified the need for additional resources for near-term

efforts, including plans to spend billions of dollars for acquisition of maneuverable short range air defense capabilities in fiscal years 2020 through 2024. The same report described plans to spend hundreds of millions of dollars over the same period for prototyping technologies for the Next-Generation Combat Vehicle, a longer-term capability.

The Army has also begun to plan research and development efforts for its long-term modernization needs. The Army identified long-term capabilities for all of the modernization priorities, as well as dates that science and technology efforts should transition to programs of record. Army officials stated that, ultimately, multiple programs of record may be considered for each capability area. For example, the Army identified science and technology efforts to develop an advanced powertrain for the Next Generation Combat Vehicle and identified planned transition dates to the program in fiscal years 2020 and 2023. The 2018 Army Modernization Strategy report provides additional details on long-term modernization efforts for three of its six priorities: Future Vertical Lift, Soldier Lethality, and Next-Generation Combat Vehicle. Figure 4 below presents a timeline for some of the proposed capabilities within each of the six priorities.

Figure 4: Timeline of Proposed Army Modernization Capabilities



FVL = Future Vertical Lift
OMFV = Optionally Manned Fighting Vehicle

Source: GAO review of Army documentation. | GAO-19-132

Note: These represent the latest planned initial operations.

[a]The Army did not provide documentation of the date for its Alternative Waveforms.

The Army has realigned some resources to support its long-term modernization priorities. In identifying long-term capabilities, we found that the Army has evaluated its science and technology portfolio to determine alignment with the six modernization priorities. For example, as part of an October 2017 review for the office of the Deputy Under Secretary of the Army, the eight cross-functional team pilots examined science and technology investments to identify which efforts contributed to the priorities and which efforts did not contribute to them. According to this review and Army officials, the Army realigned over $1 billion in funding toward the priorities for fiscal years 2019 through 2023, for a total of $7.5 billion directed at these priorities. The review preserved $2.3 billion in funding for basic research for the same time period. According to Army officials, similar science and technology reviews will be conducted annually to help cross-functional teams manage their respective programs' progress and identify further opportunities for investment.

To fund future modernization efforts, both the science and technology review and the review for the fiscal year 2020 budget process also identified opportunities to reduce funding for, or eliminate, some existing programs. For example, plans for the air and missile defense portfolio include an option to divest from legacy short range air defense programs in fiscal year 2029 if its Indirect Fires Protection Capability program becomes fully operational. This aligns with statements from Army officials that program decisions will be driven not by specific schedules but by the maturity of replacement capabilities.

New Organizations Have Generally Applied Leading Practices but the Army Futures Command Has Taken Limited Steps to Fully Apply These Practices

The Army has generally applied leading practices for technology development and establishing effective cross-functional teams, and has begun to apply leading practices for mergers and organizational transformations for the Army Futures Command. During the Army's pilot phase for its eight cross-functional teams, the teams took actions consistent with leading practices for technology development, such as bringing together requirements developers and warfighters, planning prototype demonstrations, and maturing technology prior to beginning an

acquisition program. The Army's pilot teams also applied eight leading practices we have identified for establishing effective cross-functional teams to varying degrees. In addition, senior Army leadership has been clear in its support for the new command and has clearly outlined a timeframe for its establishment, actions that are in line with the leading practices for mergers and organizational transformations we have identified in prior work. Whether further application of these leading practices will continue under the new command is unclear as the role of the cross-functional teams has not yet been formalized and Army Futures Command has not yet taken all the steps needed to reach full operational capability.

Cross-Functional Team Pilots Generally Applied Leading Practices for Technology Development, but Plan to Move into System Development Early

We found that the Army's eight cross-functional team pilots generally applied leading practices identified in our prior work when it came to their requirements and technology development efforts. As we found in April 2018, positive outcomes result from taking a knowledge-based approach to product development that demonstrates high levels of knowledge before making significant resource commitments. Our review of the Army's cross-functional team pilots found that they have generally applied leading practices to the following two areas:

- **Promoted communication between end-users and requirements developers.** The Army directive that established the cross-functional team pilots as well as these teams' charters state that teams will follow a methodology of collaboration between warfighters and developers to prepare capability documents. An official from the Synthetic Training Environment cross-functional team told us that involving industry representatives and warfighters helps the cross-functional team get "closer to what 'right' looks like" early in the requirements development process. By promoting communication between industry representatives and warfighters, the cross-functional teams helped ensure that developer resources better matched end-user needs.
- **Planned to prototype capabilities as part of technology and product development.** The Army directive establishing the cross-functional team pilots states that cross-functional teams should incorporate iterative experimentation and technical demonstrations to inform capability requirements. As an illustration of this practice,

officials from the Future Vertical Lift cross-functional team told us that they will hold a “fly off” between two competitive prototypes of the Future Attack Reconnaissance Aircraft in fiscal year 2023 before choosing a design for follow-on testing and integration in fiscal year 2024.

However, we are concerned that the Army has plans to mature technology to a level lower than the threshold recommended by leading practices before beginning system development. Specifically, we found that the Army’s October 2017 science and technology review identified a goal of demonstrating new technologies in a relevant environment, such as a highly realistic laboratory setting, before transitioning them to specific platforms or programs. As an example, the Soldier Lethality cross-functional team began maturing technology for the next generation squad automatic rifle to this level of maturity to prepare it for the transition to product development, scheduled for the end of fiscal year 2019. Under leading practices that we identified, prototypes should be demonstrated in an operational or realistic environment—not simply in a relevant environment—prior to starting system development to ensure that they work as intended for the end-user.

The Army’s choice to start a formal acquisition program at lower levels of technology maturity raises concerns that are consistent with those we have raised in the past. Our past work indicates that by demonstrating technologies only in a relevant rather than an operational environment, the Army increases the risk that new capabilities will not perform as intended and require further technological maturation while in system development. This could raise costs and extend timelines for delivery of equipment to the warfighter. For example, almost two decades ago in a 1999 report, we recommended demonstrating technologies in an operational environment prior to system development and DOD concurred with that recommendation. We have also reported the importance of achieving this level of maturity on an annual basis since 2003, most recently in 2018, in our assessment of DOD’s major weapon system acquisition programs. In addition, we again reiterated this leading practice in 2016 in our technology readiness assessment guide.

While DOD has a policy, based in statute, that generally requires major defense acquisition programs to, at a minimum, demonstrate technologies in a relevant environment before system development, that policy does not preclude the cross-functional teams from pursuing a higher level of maturity. Such an approach would be consistent with leading practices that recommend maturing technologies to a higher

level.[10] By applying these leading practices, the cross-functional teams could better ensure that prototypes are demonstrated in an operational or realistic environment prior to starting system development to ensure that they work as intended for the end-user.

Cross-Functional Team Pilots Demonstrated Some Leading Practices for Effective Teams, but Few Steps Taken to Incorporate these Practices in New Command

Our prior work has identified eight leading practices that organizations should use for establishing effective cross-functional teams.[11] In reviewing the Army's eight cross-functional team pilots, we found that they have applied these practices to varying degrees. Table 3 describes these leading practices.

Table 3: Leading Practices for Establishing Effective Cross-Functional Teams

Leading practice	Description	Selected Key characteristics
Open and regular communication	Efficient cross-functional teams have effective communication mechanisms.	• Team members should openly share information within the team. • Teams should proactively seek feedback and information from stakeholders. • Teams should have open and regular communication with team members, team leaders, and management.

[10]Technology readiness levels are a tool, developed by National Aeronautics and Space Administration, to determine the readiness of technologies to be incorporated into a weapon or another type of system. Readiness levels are measured along a scale of one to nine, starting with paper studies of the basic concept, proceeding with laboratory demonstrations, and ending with a technology that has proven itself on the intended product. GAO's leading practices work has shown that a Technology Readiness Level 7—which corresponds to demonstrating all critical technologies in form, fit, and function within a realistic environment—is the level of technology maturity that constitutes a low risk for starting development. DOD's policy, however, permits development to start at a lower technology maturity level—Technology Readiness Level 6, which corresponds to demonstrating technology in a relevant environment. DOD's policy is based on a statute that generally prohibits a major defense acquisition program from receiving approval for development start until the milestone decision authority certifies—based on an independent review and technical risk assessment—that the technology in the program has been demonstrated in a relevant environment. 10 U.S.C. § 2366b(a)(2). Under certain circumstances, this requirement may be waived. Id. § 2366b(d).

[11]GAO, *Defense Management: DOD Needs to Take Additional Actions to Promote Department-Wide Collaboration*, GAO-18-194 (Washington, D.C.: Feb. 28, 2018).

Leading practice	Description	Selected Key characteristics
Well-defined team goals	Effective cross-functional teams have clear, updated, and well-defined goals common to the team, team leader, and management.	• Team goals should be clear, well defined, linked, updated, and commonly shared with team members, team leaders and senior leaders (management). • Team objectives should have linkages to the organization's goals.
Inclusive team Environment	Effective cross-functional teams invest in a supportive and inclusive team environment where all team members have collective responsibility and individual accountability for the team's work.	• Teams should invest in a team culture with shared values of inclusiveness and collective responsibility. • Individual team members should participate and be accountable for the team's work.
Well-defined team structure	Effective cross-functional teams have well-defined team operations with project-specific rules and procedures established for each team.	• Teams should have a well-defined structure, project-specific rules, and procedures. • Teams should have appropriate training and learning environments.
Autonomy	Effective cross-functional teams are independent and have the ability to make decisions independently and rapidly.	• Teams should be empowered to make decisions. • Teams should be able to creatively solve problems.
Senior management support	Effective cross-functional teams have senior managers who view the teams as a priority within the organization and provide these teams with resources and rewards to recognize their work.	• Senior management should support cross-functional teams as a priority and provide access to resources and rewards. • Senior management should provide career advancement opportunities.
Committed cross-functional team members	Effective cross-functional teams have members committed to the team's goals.	• Team members should have a wide diversity of knowledge and expertise. • Team members should be committed to working toward achieving the team's goals.
Empowered cross-functional team leader	The selected cross-functional team leader should provide clear guidance for team members, be proactive and empowered to make decisions, and provide feedback and developmental opportunities to team members.	• Team leaders should be empowered to provide clear guidance and be proactive in decision making. • Team leaders should provide feedback and developmental opportunities to team members. • Team leaders should regularly interact with senior management.

Source: GAO. | GAO-19-132

All eight Army cross-functional team pilots fully applied four of these leading practices.

- **Well-defined team goals.** We found that each cross-functional team pilot charter clearly defined its team's goals. For example, the Long-Range Precision Fires cross-functional team charter states that it will rapidly integrate and synchronize the requirements development process to deliver cutting edge capabilities to the operating force as the best possible return on investment for warfighters. In addition, senior Army leadership approved the charters containing each team's

goals, ensuring that the goals defined for the teams were linked to the Army's larger goal of modernization.

- **Open and regular communication.** Members of all eight cross-functional team pilots shared information with each other, sought feedback, and communicated with team leaders and senior Army leadership. For example, officials from the Next Generation Combat Vehicle cross-functional team told us that ongoing dialogue with senior Army leadership resulted in numerous rounds of refined guidance. The cross-functional team took that guidance, reconvened, assessed options, and then presented another round of updates to Army senior leadership. Moreover, the directive establishing the cross-functional team pilots requires that they develop capability documents, informed by experimentation and technical demonstrations, to ensure that planned capabilities are technologically feasible, affordable, and therefore can eventually be provided to soldiers. According to Army officials, developing such documents requires open and regular communication between team members who have expertise in diverse fields such as contracting, cost analysis, and testing.
- **Autonomy.** The eight cross-functional team pilots' charters show, and interviews with members confirm, that teams are granted substantial autonomy by senior Army leadership. The cross-functional team charters give teams the authority to solve internal problems through market research, prototyping, technical demonstrations, and user assessments. For example, the Synthetic Training Environment cross-functional team and senior Army leadership stressed to us the importance of experimentation as an opportunity to "fail early and fail cheap." According to cross-functional team members, this allows cross-functional teams to move on and avoid expensive and time-consuming failures later in the acquisition process, as has happened with Army in the past. Furthermore, cross-functional teams can reach out to subject matter experts needed to develop requirements without having to obtain permission from senior Army leadership.
- **Committed team members.** All eight cross-functional team pilots include members with expertise in diverse fields who are committed to achieving team goals. For example, the Network cross-functional team charter states that the team should consist of experienced and committed subject matter experts executing disciplined initiatives and willing to take prudent risks. In addition, the directive establishing the cross-functional teams states that they should leverage industry and academia where appropriate to increase knowledge and expertise. Staffing information provided by multiple cross-functional teams

demonstrates the diversity of expertise the Army has applied to these efforts. Cross-functional team members also provided us with multiple examples of how their teams have leveraged outreach with industry and academia to improve their understanding of requirements and technology.

Additionally, we found that the eight cross-functional team pilots have at least partially applied the following four leading practices.

- **Senior management support.** Senior Army leaders, including the Secretary and the Chief of Staff, have championed the cross-functional team pilots in public statements. Although an Army official told us that he was aware of a member of a cross-functional team (who left the team) receiving a civilian achievement award, we did not find any documentary evidence of senior Army leaders providing incentives or recognition to members of the eight cross-functional team pilots. Because many members of cross-functional teams, including some leaders of these teams, work in a number of different roles, they do not have a consistent chain of command that can provide incentives or recognition across all of their activities. The "dual-hatted" nature of team members—in which they work for their parent organization as well as the cross-functional team pilot—may further complicate full application of this leading practice.
- **Empowered team leaders.** The team leaders of all eight cross-functional team pilots are empowered to make decisions and regularly interact with senior Army leaders. While an Army official stated that team leaders and Army leadership provide guidance to cross-functional team members, we did not find any documentary evidence of these leaders providing feedback to members of those teams. However, many members of the cross-functional teams, including directors, are only temporarily assigned to cross-functional team pilots because they work in other functions simultaneously.
- **Well-defined team structure.** While most cross-functional team pilots have established operating procedures and organizational structures, we found that some have not provided training to their members on the operations of cross-functional teams and how they relate to other organizations. Our previous work identified appropriate training as a key characteristic of a well-defined team structure. Most cross-functional team charters do not address the issue of training. Through our discussions with the cross-functional teams, we found the following with respect to training:

- An official from the Soldier Lethality cross-functional team told us that team members received training and planned to attend further training to enhance creative and “outside-the-box” thinking.
- The director of the Network cross-functional team told us that, even though he did not receive training, he was able to leverage his previous experience leading matrixed organizations.
- The Long-Range Precision Fires cross-functional team told us that members started their work without any training and this posed a challenge as they were unfamiliar with each other’s roles and work.

- **Inclusive team environment.** The founding documents for the cross-functional team pilots themselves generally did not address attributes of this leading practice, such as having team members that support and trust one another. However, discussions with team members indicate some teams have invested in creating such an environment. The Soldier Lethality cross-functional team members stated that working in a cross-functional team as opposed to working as separate individuals in disparate offices, allowed them write requirements faster. It also created an atmosphere in which members got to know each other’s experiences and trust each other’s views. Officials from the Synthetic Training Environment cross-functional team told us they spent their first week gaining an understanding of each team member’s role on the team to foster such inclusivity.

As previously described, the cross-functional team pilots were an effort to achieve several goals including to identify ways the Army could increase efficiency in requirements and technology development. According to Army officials, the teams have shown initial progress in doing so, delivering requirements—and in some cases developing capabilities for delivery in the next two years—to the warfighter in shorter than anticipated timeframes. However, the Army has not yet definitively established the cross-functional teams’ roles, responsibilities, and how they will operate within Army Futures Command. As a result, it is unclear if the Army will benefit from the experience and expertise of these teams applying leading practices as they transition into Army Futures Command. Until the Army takes formal steps to institutionalize the beneficial practices used by the cross-functional teams during the pilot phase such as autonomy, proactive decision making, and access to senior leadership it will be missing a valuable opportunity to integrate these practices into the new command.

Army Futures Command Does Not Have a Formal Plan to Identify and Share Lessons Learned from Cross-Functional Team Pilots

The Army directive that established the cross-functional teams directed each team pilot to capture best practices and lessons learned and report them to the Army office that oversaw their efforts.[12] Officials from the cross-functional teams described to us lessons they learned and planned to pass on to their oversight office for the benefit of Army Futures Command. For example, officials from the Air and Missile Defense cross-functional team stated that having direct access to the Under Secretary and the Vice Chief of Staff of the Army is important for obtaining quick decisions, which save time and money in getting capabilities to the warfighter.

While officials from Army Futures Command told us that they intend to collect lessons learned from the cross-functional team pilots, they do not yet have a formal plan to identify and incorporate lessons learned. Since the cross-functional team pilots were established to experiment with new approaches, it is important that they take steps to capture the lessons they have learned—positive and negative—so they can be shared as these teams are integrated into Army Futures Command. If the Army fails to institutionalize these lessons learned in the new command, it risks losing the benefits from the experiences of these pilots thereby either repeating past mistakes or failing to benefit from past practices that worked well. If it can capture the lessons learned, it has an opportunity to accelerate the progress these teams made during their pilot phase and spread the benefits across all the cross-functional teams and across a wider range of specific military capabilities they are pursuing. In our discussions with Army Futures Command officials they agreed that formalizing and implementing a plan to collect and incorporate lessons learned would be beneficial.

[12]Department of the Army, *Cross-Functional Team Pilot In Support of Materiel Development*, Army Directive 2017-24, 8.j.(4), (Washington, D.C.: Oct. 6, 2017).

Incorporating Leading Practices for Organizational Transformations Could Benefit Army Futures Command

Army officials told us that the establishment of Army Futures Command represents a dramatic organizational transformation in how the Army will develop weapon systems and platforms. In our previous work on mergers and organizational transformations in federal agencies, we have identified several leading practices, as shown in table 4 below, that can help agencies undertaking such transformational efforts.[13]

Table 4: Leading Practices for Mergers and Organizational Transformations

Leading practice	Implementation step
Ensure top leadership drives the transformation.	• Define and articulate a succinct and compelling reason for change. • Balance continued delivery of services with merger and transformation activities.
Establish a coherent mission and integrated strategic goals to guide the transformation.	• Adopt leading practices for results-oriented strategic planning and reporting.
Focus on a key set of principles and priorities at the outset of the transformation.	• Embed core values in every aspect of the organization to reinforce the new culture.
Set implementation goals and a timeline to build momentum and show progress from day one.	• Make public implementation goals and timeline. • Seek and monitor employee attitudes and take appropriate follow-up actions. • Identify cultural features of merging organizations to increase understanding of former work environments. • Attract and retain key talent. • Establish an organization-wide knowledge and skills inventory to exchange knowledge among merging organizations.
Dedicate an implementation team to manage the transformation process.	• Establish networks to support the implementation team. • Select high-performing team members.
Use the performance management system to define responsibility and assure accountability for change.	• Adopt leading practices to implement effective performance management systems with adequate safeguards.
Establish a communication strategy to create shared expectations and report related progress.	• Communicate early and often to build trust. • Ensure consistency of message. • Encourage two-way communication. • Provide information to meet specific needs of employees.

[13]GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations,* GAO-03-669 (Washington, D.C.: (July 2, 2003).

Leading practice	Implementation step
Involve employees to obtain their ideas and gain their ownership for the transformation.	• Use employee teams. • Involve employees in planning and sharing performance information. • Incorporate employee feedback into new policies and procedures. • Delegate authority to appropriate organizational levels.
Build a world-class organization.	• Adopt leading practices to build a world-class organization.

Source: GAO. | GAO-19-132

As the Army is standing up Army Futures Command, it has begun to apply some of the leading practices for mergers and organizational transformations. For example, senior Army officials have provided a clear and consistent rationale for establishing the new command in official directives and in public appearances. They have also clearly described the mission of the Army Futures Command and established a timeline for its implementation. However, the command has not yet formalized and institutionalized its authorities, responsibilities, policies and procedures nor taken steps to apply these or other leading practices.

While we observed a strong organizational unity of purpose and collaboration from the current senior leadership in the Army for the Army Futures Command, this could change as the Army's leadership changes. For example, according to law, the tenure of the Chief of Staff of the Army is generally limited to 4 years and the current Chief of Staff has already served 3 years.[14] Furthermore, the Secretary of the Army is appointed by the President, subject to the advice and consent of the Senate, and therefore may change with new presidential administrations and during administrations.[15] For example, the past 6 people, prior to the current secretary, confirmed as the Secretary of the Army served an average of 959 days—about 2 and one-half years. The current secretary has already served about 1 year. Further, senior Army officials told us that they expect changes at both top and mid-tier leadership within the new command will periodically occur as a result of the Army's normal system of rotations for officers. For example, a senior military official in Army Futures Command told us that they expect commanders of components will rotate every 4 years. Therefore, because this modernization effort is expected to span a decade or longer, continued support from current and future senior Army officials, such as the Chief of Staff and the Secretary of the Army, will be essential to ensure the success of the new command into the future.

[14]10 U.S.C. § 3033(a)(1).

[15]10 U.S.C. § 3013.

We have previously reported in our work on internal controls that it is important to establish the organizational structure necessary to enable an entity to plan, execute, control, and assess the organization in achieving its objectives as well as respond to potential changes in, among other things, personnel.[16] By fully applying key principles of major mergers and organizational transformations as the Army completes the process of establishing the Army Futures Command, the Army can better ensure the new command realizes its goals for modernization through development of well-defined requirements, incorporation of mature technologies, and development of systems that provide the warfighter with the capabilities needed for future conflicts.

Conclusions

The Army has made substantial changes to how it intends to coordinate and oversee modernization efforts, due at least in part to the lost years and billions of dollars from past efforts to modernize. The Army has taken positive steps to improve its current modernization efforts and has already seen some initial successes. The creation of the new command, the integration of the cross-functional teams to better refine requirements and cultivate technologies, the realignment of several existing organizations, and the shifting of personnel gives the Army a unique opportunity to take advantage of leading practices and its own lessons learned.

The Army, however, faces some key challenges. In particular, the Army's intent to transition technologies to weapon systems before technologies are matured is inconsistent with leading practices, risks delays in equipping the warfighter, and can potentially lead to cost overruns. In addition, the cross-functional team pilots have demonstrated some initial successes in shortening the requirements development process—and, more generally, in collaborating across the Army—but it is not clear what steps the Army Futures Command plans to take to incorporate the experience and expertise of these teams in applying leading practices and thereby sustain these benefits. Further, the Army lacks a formal plan to identify and incorporate lessons learned from the cross-functional teams as Army Futures Command becomes fully operational and could thereby miss an opportunity to leverage the experience of these teams on past practices that worked well and those that did not. Finally, as the

[16]GAO, *Standards of Control for the Federal Government*, GAO-14-704G (Washington, D.C.: September 2014).

Army finalizes the roles, authorities, and responsibilities for the Army Futures Command it can benefit from applying leading practices related to mergers and organizational transformations. This can help ensure that Army Futures Command realizes its goals for modernization including unity of command, accountability, and modernization at the speed and scale required to prevail in future conflicts.

Recommendations for Executive Action

We are making four recommendations to the Secretary of the Army:

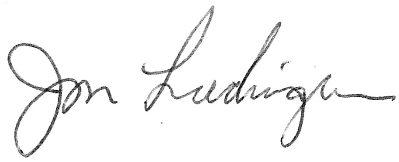
- The Secretary of the Army should ensure that the Commanding General of Army Futures Command applies leading practices as they relate to technology development, particularly that of demonstrating technology in an operational environment prior to starting system development. (Recommendation 1)
- The Secretary of the Army should ensure that the Commanding General of Army Futures Command takes steps to incorporate the experiences of the cross-functional teams in applying leading practices for effective cross-functional teams. (Recommendation 2)
- The Secretary of the Army should ensure that the Commanding General of Army Futures Command executes a process for identifying and incorporating lessons learned from cross-functional team pilots into the new command. (Recommendation 3)
- The Secretary of the Army should ensure that the Commanding General of Army Futures Command fully applies leading practices for mergers and organizational transformations as roles, responsibilities, policies and procedures are finalized for the new command. (Recommendation 4)

Agency Comments and Our Evaluation

We provided a draft of this report to the Department of Defense for review and comment. In its written comments, reproduced in appendix II, the Department concurred with all four of our recommendations and made certain technical comments which we incorporated as appropriate.
In concurring with our recommendation on demonstrating technology in an operational environment, the Department of Defense requested that we reword the recommendation to reflect that technology maturity be considered with other factors, such as risk assessment and troop

availability. We understand the Department's desire for flexibility, but continue to believe that reaching higher levels of technological maturity, through demonstrating technologies in an operational environment prior to beginning system development adds significant value by reducing risk; something that could help the Army deliver capabilities it believes are urgently needed. As such, we made no change to the recommendation. We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense, the Secretary of the Army, the Commander of Army Futures Command, and other interested parties. In addition, the report is available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-4841 or ludwigsonj@gao.gov. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff that made significant contributions to this report are listed in appendix III.



Jon Ludwigson
Acting Director
Contracting and National Security Acquisitions

Appendix I: Objectives, Scope and Methodology

Section 1061 of the National Defense Authorization Act for Fiscal Year 2018 included a provision for GAO to report on the Army's modernization strategy.[1] This report assesses (1) the status of the Army's efforts to establish new acquisition organizations while balancing near- and long-term modernization; and (2) the extent to which the Army has applied leading practices to do so.[2]

To assess the status of the Army's efforts to establish new acquisition organizations we reviewed the Army general orders and directives that established these organizations. This review included documentation such as:

- Army General Order 2018-10 that established the Army Futures Command, as well as reassigned existing organizations, such as the Army Capabilities Integration Center from the Training and Doctrine Command and the eight cross-functional team pilots to the new command.
- Army Directive 2017-24 that established the cross-functional team pilots and provided guidance on how they should operate to improve the quality and speed of materiel development activities.
- Army Directive 2017-22 that provided guidance for implementation of acquisition reform policy/initiatives to reflect modernization such as directive 2017-29 to improve the integration of science and technology into concept, capability, and materiel development.
- Army Regulation 73-1 (Test and Evaluation Policy)
- Army Regulation 70-1 (Army Acquisition Policy)

[1]See Pub. L. No. 115-91, § 1061(e) (2017).

[2]This report fulfills part of GAO's statutory mandate required by subparagraph (C) of section 1061(e)(2) of the National Defense Authorization Act for Fiscal Year 2018. Subparagraphs (A) and (B) of section 1061(e)(2) of the same Act required GAO to assess the Army's near-term modernization efforts, which we addressed in GAO, *Army Modernization: Actions Needed to Measure Progress and to Fully Identify Near-Term Costs*, GAO-18-604SU, (Washington, D.C.: Sept. 28, 2018) and is for official use only.

- Army Regulation 71-9 (Warfighting Capabilities Determination)
- Training and Doctrine Command Regulation 71-20 (Concept Development, Capabilities Determination, and Capabilities Integration)
- Headquarters, Department of the Army Executive Order 176-18 (Establishment of Army Futures Command)

We also interviewed the Under Secretary of the Army, officials from Army Futures Command and related organizations like the Office of Process Innovation and Integration, members of the eight cross-functional teams, the Army Capabilities Integration Center, and the Army Research, Development, and Engineering Command.

To assess the balance of modernization priorities between near-term and long-term, we reviewed documentation related to those lines of effort including:

- the 2018 Army Modernization Strategy report—which describes the rationale behind modernization and the efforts for each priority,
- the Strategic Portfolio Analysis Review for Fiscal Year 2020—which is a part of the budget process to determine priorities, align science and technology efforts to capabilities, and plan milestones,
- the Deputy Under Secretary of the Army and Research and Development Command Science and Technology Review of October 2017—which describes the science and technology priorities for each cross-functional team and realigns funding through identifying opportunities to divest, and
- Strategic Capability Roadmaps—which provide a timeline for the development and fielding of the capabilities being developed by some of the cross-functional teams.

To review these documents, we created a data collection instrument to capture the efforts as they related to each of the eight cross-functional teams and consolidate the different sources of information. We first collected information about the capabilities in which cross-functional team officials indicated their involvement. For these capabilities, we recorded planned milestones and the date that the capability would first be operational. We also recorded whether or not the capability was new or an incremental upgrade, the science and technology efforts to develop that capability, and whether or not those efforts contributed to other capabilities. We then collected data related to the general efforts of the cross-functional teams. These efforts included divestment opportunities,

and the amounts of funding aligned to the associated modernization priority. We also interviewed officials from the cross-functional teams, the office of Army G-8, and other Army offices.

To address the extent to which the Army's cross-functional team pilots applied leading practices for technology development, we

- Reviewed cross-functional team charters, the 2018 Army Modernization Strategy report, Fiscal Years 2019 and 2020 Strategic Portfolio Analysis, the Army's Fiscal Year 2019 President's Budget, and the Army's October 2017 Science and Technology Review to identify actions related to the development of near- and long-term capabilities for the Army's six modernization priorities that align with the eight cross-functional teams.
- Interviewed cross-functional team officials to learn about technology development activities they conducted or planned to conduct regarding these priorities.
- Selected leading practices from our body of work on weapons systems acquisitions based on which ones are most relevant to where the cross-functional teams' activities fit within the broader weapons systems acquisition process.
- Consolidated relevant data from Army documentation and statements from Army officials regarding their technology development efforts in a record of analysis containing a description of leading practices for technology development identified in our prior work.
- Compared Army documentation and cross-functional team officials' statements against leading practices for technology development identified in our prior work, specifically promoting communication between requirement developers' and end-users, prototyping technologies, and maturing technology to a specific threshold.[3]

To address the extent to which cross-functional team pilots applied leading practices for establishing effective cross-functional teams, we

[3]GAO, *Weapons Systems Annual Assessment: Knowledge Gaps Pose Risks to Sustaining Recent Positive Trends,* GAO-18-360SP (Washington, D.C.: Apr. 25, 2018); *Weapons Systems: Prototyping Has Benefitted Acquisition Programs, but More Can Be Done to Support Innovation Initiatives*, GAO-17-309 (Washington, D.C.: June 27, 2017); and *Best Practices: Using a Knowledge-Based Approach to Improving Weapon Acquisition*, GAO-04-386SP (Washington D.C.: Jan. 1, 2004).

- Reviewed Army Directive 2017-24, which established the cross-functional teams, as well as each team's charter.
- Interviewed officials from each cross-functional team and other Army offices regarding the collaborative, communicative, and technology development efforts of these teams.
- Consolidated and analyzed data from Army documentation and statements from Army officials related to leading practices for establishing effective cross-functional teams, identified in our prior work.
- Compared the content of the Army documents and statements from cross-functional team officials against leading practices identified in our prior work to determine whether cross-functional teams had demonstrated actions consistent with these practices.[4] We then had a second analyst check the same documents and statements to verify our initial result.

To address the extent to which Army Futures Command applied leading practices for mergers and organizational transformations and incorporated lessons learned from the cross-functional team pilots, we

- Reviewed Headquarters Department of the Army Executive Order 176-18, which established the Army Futures Command, and Army Directive 2017-33, which established the Modernization Task Force.[5]
- Interviewed senior Army officials involved in the establishment of the new command and cross-functional team officials.
- We selected leading practices identified by GAO for mergers and organizational transformations in our prior work because the establishment of Army Futures Command represents the largest organizational transformation the Army has undertaken since 1973 and includes merging existing Army organizations into a new command.
- Although Army Futures Command is not yet fully operational, we analyzed Army documentation and officials' statements regarding the new command against leading practices identified in our prior work

[4]GAO, *Defense Management: DOD Needs to Take Additional Actions to Promote Department-Wide Collaboration*, GAO-18-194 (Washington, D.C.: Feb. 28, 2018).

[5]Department of the Army, *Enabling Modernization Task Force*, Army Directive 2017-33 (Washington, D.C.: Nov. 7, 2017).

and the lessons learned from the cross-functional teams to assess whether it had applied these leading practices.[6]

[6]GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, GAO-03-669 (Washington, D.C.: July 23, 2003).

Appendix II: Comments from the Department of Defense

OFFICE OF THE UNDER SECRETARY OF DEFENSE
3030 DEFENSE PENTAGON
WASHINGTON, DC 20301-3030

RESEARCH
AND ENGINEERING

JAN 0 8 2019

Mr. Jon Ludwigson
Director, Acquisition and Sourcing Management
U.S. Government Accountability Office
441 G Street, NW
Washington DC 20548

Dear Mr. Ludwigson,

This is the Department of Defense (DoD) response to the GAO Draft Report GAO-19-132, "ARMY MODERNATION: Steps Needed to Ensure Army Futures Command Fully Applies Leading Practices," dated November 9, 2018 (GAO Code 102574)

Attached is DoD's proposed response to the subject report. My point of contact is COL Bryan Phillips who can be reached at bryan.k.phillips.mil@mail.mil and 703-695-9712.

Sincerely,

James A. Faist
Director of Defense Research and Engineering
for Advanced Capabilities

GAO DRAFT REPORT DATED NOVEMBER 9, 2018
GAO-19-132 (GAO CODE 102574)

"ARMY MODERNIZATION: STEPS NEEDED TO ENSURE ARMY FUTURES COMMAND FULLY APPLIES LEADING PRACTICES"

DEPARTMENT OF DEFENSE COMMENTS TO THE GAO RECOMMENDATION

RECOMMENDATION 1: The Government Accountability Office (GAO) recommends that the Secretary of the Army should ensure that the Commanding General of Army Futures Command (AFC) applies leading practices as they relate to technology development, particularly that of demonstrating technology in an operational environment prior to starting system development.

DoD RESPONSE: Concur.

a. Recommend rewording to focus on risk assessment and mitigation, taking into account technology readiness level, time and troops available, and value to be added by an operational demonstration. As written, Recommendation 1 makes operational demonstration of a technology the preeminent priority for any system development. The AFC and the Army, at the behest of Congress, are trying to break the linearity of the modernization process. As is, this same linearity is implied in Recommendation 1.

b. Implementation actions: The AFC is executing a new, command-wide, top-down development process to understand and solve military and enterprise problems in an integrated fashion with appropriate stakeholders and expertise. This will include operational technology demonstrations as described in the subject GAO report.

c. Estimated implementation date: Pilot processes are beginning in 3Q FY19.

RECOMMENDATION 2: The GAO recommends that the Secretary of the Army should ensure that the Commanding General of Army Futures Command takes steps to incorporate the experiences of the Cross-Functional Teams (CFT) in applying leading practices for effective cross-functional teams.

DoD RESPONSE: Concur.

a. Recommend the reference to Army Directive (AD) 2017-24 Cross--Functional Team Pilots (specifically para 8.j. (4)) be incorporated. The referenced AD paragraph already directs capturing and institutionalization of CFT best practices.

b. Implementation actions: Familiarization with best practices is part of AFC onboarding protocol. RDECOM is exploring a train the trainer program with the AFC HQ training lead.

c. Estimated implementation date: The AFC will capture CFT best practices and apply them to AFC processes currently under development for implementation in their initial form NLT 1Q FY20.

RECOMMENDATION 3: The GAO recommends that the Secretary of the Army should ensure that the Commanding General of Army Futures Command executes a process for identifying and incorporating lessons learned from cross-functional team pilots into the new command.

DoD RESPONSE: Concur.

a. Recommend the reference to AD 2017-24 Cross-Functional Team Pilots (specifically para 8.j. (4)) be incorporated. The referenced AD paragraph already directs capturing and institutionalization of CFT best practices.

b. Implementation actions: See AFC response to GAO recommendation 1.

c. Estimated implementation date: See AFC response to GAO recommendation 1.

RECOMMENDATION 4: The GAO recommends that the Secretary of the Army should ensure that the Commanding General of Army Futures Command fully applies leading practices for mergers and organizational transformations as roles, responsibilities, policies, and procedures are finalized for the new command.

DoD RESPONSE: Concur.

a. Implementation actions: The AFC is utilizing best practices to ensure new processes are sufficient to develop effective and efficient delivery of Army capabilities. Based on these practices, AFC is developing trusted relationships and understanding of all elements of the command while making decisive changes.

b. Estimated implementation date: New processes to be piloted during the remainder of FY19 and follow in FY20.

The point of contact for this action is COL Bryan Phillips at (703) 695-9712 or bryan.k.phillips.mil@mail.mil.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Jon Ludwigson, (202) 512-4841 or Ludwigsonj@gao.gov

Staff Acknowledgments

In addition to the contact named above, J. Kristopher Keener (Assistant Director), Joe E. Hunter (Analyst-in-Charge), Jenna Blair, Emily Bond, Matthew T. Crosby, Cale Jones, Kevin O'Neill, John Pendleton, John Rastler, A. Maurice Robinson, and Roxanna Sun made significant contributions to this review.

Appendix IV: Accessible Data

Agency Comment Letter

Accessible Text for Appendix II Comments from the Department of Defense

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JAN 08 2019

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