



February 2015

# DEFENSE MAJOR AUTOMATED INFORMATION SYSTEMS

## Cost and Schedule Commitments Need to Be Established Earlier

Accessible Version

# GAO Highlights

Highlights of [GAO-15-282](#), a report to congressional committees

## Why GAO Did This Study

The National Defense Authorization Act for Fiscal Year 2012 mandated that GAO select, assess, and report on DOD MAIS programs annually through March 2018. This report discusses the results of GAO's third assessment. GAO's objectives included: (1) determine whether selected MAIS programs are meeting time frames for establishing program baselines and deploying capabilities, (2) assess selected MAIS programs' actions to manage risks, and (3) assess the extent to which selected MAIS programs have used key information technology acquisition best practices.

For its first objective, GAO selected a sample of 20 MAIS programs based on a few factors, such as programs that were designated as first (or only) increments. For the other objectives, GAO identified 4 out of 40 programs based on several factors, such as representation from multiple DOD components (1 from Air Force, 2 from Army, and 1 from Navy), and assessed them against selected acquisition best practices for risk management, requirements development, and project planning.

## What GAO Recommends

GAO recommends, among other things, that DOD require programs to establish a baseline within 2 years of beginning work and direct the Air Force program and the Army logistics program to address weaknesses in their project planning acquisition practices. DOD concurred with all recommendations except one, with which it partially concurred. GAO maintains that establishing baselines within 2 years would improve outcomes and increase accountability.

View [GAO-15-282](#). For more information, contact Carol R. Cha at (202) 512-4456 or [chac@gao.gov](mailto:chac@gao.gov).

February 2015

# DEFENSE MAJOR AUTOMATED INFORMATION SYSTEMS

## Cost and Schedule Commitments Need to Be Established Earlier

### What GAO Found

A majority of the 20 selected Department of Defense (DOD) major automated information systems (MAIS) programs had not established their first baselines (which consist of a life cycle cost estimate, a schedule estimate, and performance targets) within 2 years from program start; over half met or planned to meet a statutorily established time frame for deploying capabilities. While the Defense Science Board supports that programs should establish their baselines within 2 years, 12 programs spent, on average, 5 years and 2 months and about \$452 million prior to establishing baselines. Programs that have not established baselines are subject to less oversight and cannot be measured against cost, schedule, and performance targets. Also, the propensity to carry out MAIS programs for multiple years prior to committing to baselines is inconsistent with incremental and rapid development as called for in federal law, Office of Management and Budget guidance, and a Defense Science Board recommendation. Notably, over half of the 20 programs met or planned to meet the time frame established by a DOD-specific law for deciding to fully deploy system capabilities, in part because they were restructured into smaller, incremental programs. Until programs establish their cost and schedule baselines within 2 years, they may continue to spend hundreds of millions of dollars with limited oversight and accountability.

Of four selected MAIS programs, two had fully defined and managed their key risks, and two were on track to do so. For example, while the Air Force program did not always identify completion targets for its risk mitigation plans, it had a plan in place to correct this by March 2015. The four programs varied in their implementation of the selected acquisition best practices—requirements development and project planning. Specifically, two programs implemented requirements development best practices and the others were on track to do so. Two programs were on track to implement key planning practices, but the other two had not developed schedules that incorporated all best practices. Further, DOD had not fully developed a comprehensive plan for implementing the Army logistics program, including testing to ensure that its financial statements are auditable. Without effective project planning, these programs risk not meeting cost and schedule targets and implementing systems that do not meet needs.

### Selected MAIS Programs' Implementation of Acquisition Best Practices

Program	Risk management	Requirements development	Project planning
Navy's Distributed Common Ground System - Navy Increment 2	Fully Implemented	On track to fully implement	On track to fully implement
Army's Integrated Personnel and Pay System - Army Increment 2	On track to fully implement	On track to fully implement	On track to fully implement
Air Force's Joint Space Operations Center Mission System Increment 2	On track to fully implement	Fully Implemented	Partially implemented
Army's Logistics Modernization Program Increment 2	Fully Implemented	Fully Implemented	Partially implemented

● Fully implemented ○ Partially implemented ◐ On track to fully implement ○ Not implemented

Source: GAO analysis of agency data. | GAO-15-282

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# Contents

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Letter	1
Background	5
Many Programs Spent Years to Establish Cost and Schedule Baselines; Over Half Were Positioned to Meet Time Frames for Deploying Capabilities	14
Selected MAIS Programs Changed Cost and Schedule Estimates, and One Did Not Fully Meet Performance Targets	27
Selected Programs Fully Implemented or Were on Track to Fully Implement Key Risk Management Practices	31
Selected Programs Have Made Mixed Progress in Applying Key IT Acquisition Best Practices	37
Conclusions	55
Recommendations for Executive Action	56
Agency Comments and Our Evaluation	56

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Appendix I: Descriptions of Selected MAIS Programs	61
Appendix II: Profiles of Selected MAIS Programs	65
Appendix III: Objectives, Scope, and Methodology	75
Appendix IV: Comments from the Department of Defense	85
Appendix V: GAO Contact and Staff Acknowledgments	88
GAO Contact	88
Staff Acknowledgments	88

---

Tables	
Table 1: Summary of Selected MAIS Programs' Time Frames for Establishing First Acquisition Program Baselines	17
Table 2: Selected MAIS Programs' Time Frames and Cost for Establishing First Acquisition Program Baselines	19
Table 3: Causes for Delays in Establishing Acquisition Program Baselines for the 12 Selected Programs	21
Table 4: Selected MAIS Programs' Time Frames for Reaching Full Deployment Decision	23
Table 5: Causes for Delays in Reaching Full Deployment Decision for the 5 Selected Programs	25

---

Table 6: Summary of Cost, Schedule, and System Performance Results for the Selected Programs	27
Table 7: Selected MAIS Programs' Schedule Delays Compared with First Approved Baseline Schedules or Initial Estimates	30
Table 8: Selected MAIS Programs' Implementation of Risk Management Best Practices	31
Table 9: Selected MAIS Programs' Implementation of Requirements Development and Project Planning Best Practices	37
Table 10: Selected DOD MAIS Programs	61

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Figures

Figure 1: Simplified DOD Organizational Structure	5
Figure 2: Generic Acquisition Model from the Defense Acquisition System Framework	7

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## Abbreviations

AFIPPS	Air Force Integrated Personnel and Pay System
APB	acquisition program baseline
BITI	Base Information Transport Infrastructure
CAC2S	Common Aviation Command and Control System
CANES	Consolidated Afloat Networks and Enterprise Services
CMMI-ACQ	Capability Maturity Model® Integration for Acquisition
DAI	Defense Agencies Initiative
DCGS-A	Distributed Common Ground System-Army
DCGS-N	Distributed Common Ground System-Navy
DEAMS	Defense Enterprise Accounting and Management System
DHA	Defense Health Agency
DLA	Defense Logistics Agency
DOD	Department of Defense
ECSS	Expeditionary Combat Support System
FIRST	Financial Information Resource System
GCSS-Army	Global Combat Support System-Army
GCSS-MC	Global Combat Support System-Marine Corps
iEHR	Integrated Electronic Health Record
IPPS-A	Integrated Personnel and Pay System-Army
IT	information technology
IV&V	independent verification and validation
JMS	Joint Space Operations Center Mission System
LMP	Logistics Modernization Program
MAIS	major automated information system
Navy ERP	Navy Enterprise Resource Planning
NGEN	Next Generation Enterprise Network
OASA (FM&C)	Office of the Assistant Secretary of the Army for Financial Management and Comptroller
OMB	Office of Management and Budget
PMBOK®	Project Management Body of Knowledge
TMC	Tactical Mission Command
USD (AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics

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Washington, DC 20548

# Letter

U.S. GOVERNMENT ACCOUNTABILITY OFFICE

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February 26, 2015

## Congressional Committees

The Department of Defense (DOD) is one of the largest and most complex organizations in the world. To meet its mission, it relies heavily on the use of information technology (IT). In this regard, according to DOD's IT investment portfolio for fiscal year 2013, the department reportedly spent approximately \$31.9 billion for its IT investments.<sup>1</sup> Of this amount, DOD officials reported that approximately \$4.4 billion was spent on major automated information system (MAIS) programs, which are intended to help the department sustain its key operations.

DOD IT investments that fall within one of the following categories are designated as MAIS programs: (1) program costs in any single year exceed \$32 million, (2) total program acquisition costs exceed \$126 million, or (3) total life-cycle costs exceed \$378 million.<sup>2</sup> The Secretary of Defense can also use discretion to designate a program as a MAIS.

The National Defense Authorization Act for Fiscal Year 2012 mandated that we select, assess, and report on DOD MAIS programs annually through March 2018.<sup>3</sup> This is the third assessment in our series of annual reviews. Our objectives for this assessment were to (1) determine whether selected MAIS programs are meeting time frames for establishing program baselines and deploying capabilities, (2) describe the extent to which selected MAIS programs have changed their planned cost and schedule estimates and met performance targets, (3) assess selected MAIS programs' actions to manage risks, and (4) assess the extent to which selected MAIS programs have used key IT acquisition best practices.

To accomplish the first objective, we selected a sample of 20 programs from the 29 DOD MAIS programs that were included in our prior MAIS

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<sup>1</sup>DOD's IT investment portfolio identifies its IT investments and associated costs within the department and its components.

<sup>2</sup>10 U.S.C. § 2445a(a). Dollars are in fiscal year 2000 constant dollars.

<sup>3</sup>Pub. L. No. 112-81, § 1078 (Dec. 31, 2011) requires that we report on these assessments no later than March 30 of each year from 2013 through 2018.

reviews plus the 4 MAIS programs included in the other objectives of this review (as discussed later). To narrow the list of programs, we included only those that were designated as first (or only) increments, as opposed to subsequent increments for each program, which resulted in our list of 20 programs. See appendix I for descriptions of each program.

To determine whether these programs met time frames supported by the Defense Science Board for establishing their first acquisition program baselines (APB), we determined the amount of time between when program officials reported beginning work on their programs<sup>4</sup> and the date that each program's first APB was approved and compared it to the 2-year time frame for developing APBs that was supported by the Defense Science Board.<sup>5</sup> To determine whether these programs met or planned to meet the statutorily established time frame for deploying capabilities, we determined for each program the amount of time between the start date of the 5-year period within which the law anticipates that each MAIS program will achieve a full deployment decision (this date is either milestone A in DOD's acquisition process or, if a program did not have milestone A, the date that the program's preferred alternative was selected, which in certain instances can be several years after a program was started) and the date that each program actually achieved or planned to achieve a full deployment decision.<sup>6</sup> We also interviewed officials from the selected programs for information on the time they took to establish the programs' first APBs and reach full deployment decision.

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<sup>4</sup>This date is different than what DOD considers formal program initiation—the date that a program achieves milestone B, which is when a decision is made to allow the program to enter into the engineering and manufacturing development phase and award development contracts.

<sup>5</sup>Defense Science Board, *Report of the Defense Science Board Task Force on Department of Defense Policies and Procedures for the Acquisition of Information Technology* (Washington, D.C.: March 2009). Pursuant to § 1078(a)(2)(C) of Pub. L. No. 112-81 (Dec. 31, 2011), we are required to assess whether the DOD MAIS programs employ best practices for the acquisition of information technology systems as identified by the Defense Science Board along with DOD and GAO.

<sup>6</sup>10 U.S.C. § 2445c. Prior to the December 19, 2014, enactment of the Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015, if it was determined that a program did not reach a full deployment decision within 5 years of reaching the milestone A decision or selecting a preferred alternative, DOD was required to, among other things, report a critical change to Congress.

To address the second, third, and fourth objectives, we first identified programs from the total population of 40 MAIS programs<sup>7</sup> that met several criteria, including those that had planned to obligate funds in fiscal year 2014, represented multiple DOD components, and were not included in our first or second MAIS reviews. Eight of DOD's MAIS programs met all of these criteria. From these eight, we first selected the three programs that had the highest planned spending for fiscal year 2014.<sup>8</sup> For the final program, we selected the Navy's Distributed Common Ground System-Navy (DCGS-N) Increment 2 program—the only Navy program in the list of eight potential programs—to ensure that we had representation from all military departments.

To determine the extent to which each of the four programs had changed their planned cost and schedule estimates, we compared the program's best cost (in then-year dollars) and schedule estimates established in the first APB (where available) to the latest planned total life-cycle cost and schedule estimates.<sup>9</sup> For the programs that had not established APBs, we compared the cost and schedule estimates established in these programs' initial estimates to the latest planned total life-cycle cost estimates (in then-year dollars) and schedule estimates.<sup>10</sup>

Additionally, to determine whether system performance targets were met, we compared each program's system performance targets against actual performance data, and reviewed the results of operational assessments and program evaluations conducted on the systems. We then aggregated and summarized the results of our cost, schedule, and performance

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<sup>7</sup>This was the total number of MAIS programs as of February 2014.

<sup>8</sup>The three programs were: Air Force's Joint Space Operations Center Mission System (JMS) Increment 2; and Army's Integrated Personnel and Pay System – Army (IPPS-A) Increment 2 and Logistics Modernization Program (LMP) Increment 2 programs.

<sup>9</sup>An estimate in then-year dollars includes the effects of economic inflation. The first APB is established after the program has assessed the viability of various technologies and refined user requirements to identify the most appropriate technology solution that demonstrates that it can meet users' needs. The Defense Acquisition Guidebook (which complements and further explains DOD's acquisition policies and process) refers to a program's best cost and schedule estimates as objective estimates.

<sup>10</sup>Prior to establishing an APB, programs establish initial cost and schedule estimates. These estimates are based on limited information about the program's requirements and the viability of technologies available to meet the program's needs.

analyses across the programs, as well as developed individual program profiles, which are presented in appendix II.

To assess each program's actions to manage risks, we identified key risk management practices from the Software Engineering Institute's Capability Maturity Model® Integration for Acquisition (CMMI-ACQ) and the Project Management Institute's Guide to the Project Management Body of Knowledge (PMBOK®), and assessed each of the four programs against these criteria.<sup>11</sup> Specifically, for each of the four selected programs, we analyzed risk management documentation, such as risk logs and mitigation plans, to identify levels of risks and determine the status of each program's key risks and the actions that were taken to manage these risks. Additionally, we interviewed program officials about the risks and risk management practices that they used.

To determine the extent to which the programs were implementing key acquisition best practices, we selected requirements development and project planning best practices. We analyzed each selected program's IT acquisition documentation and compared it to best practices identified in CMMI-ACQ, PMBOK® Guide practices, and best practices identified by GAO.<sup>12</sup> We assessed program planning and systems documentation, such as system requirements, integrated master schedules, life-cycle cost estimates, monthly program management review briefings, and business process reengineering analyses, as appropriate. We interviewed program officials to obtain additional information on each program's IT acquisition processes in these areas.

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<sup>11</sup>Software Engineering Institute, *Capability Maturity Model® Integration for Acquisition* (CMMI-ACQ), Version 1.3 (Pittsburgh, Pa.: November 2010); Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition*, (Newton Square, Pa.: 2013). "PMBOK" is a trademark of the Project Management Institute, Inc.

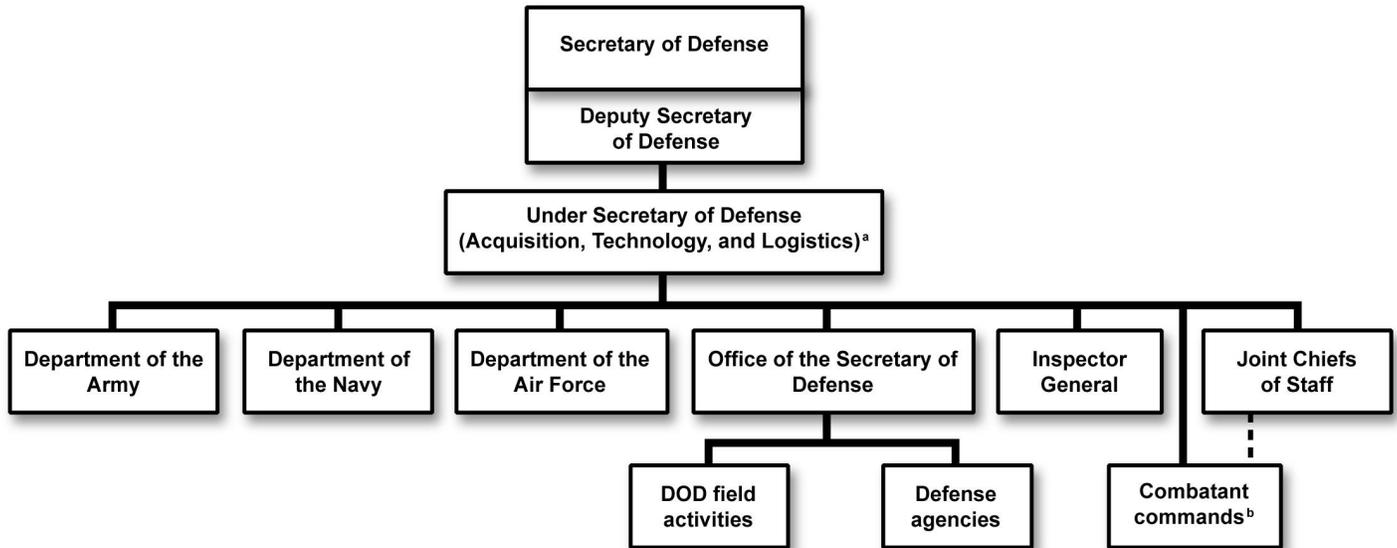
<sup>12</sup>CMMI-ACQ; PMBOK® Guide; and GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: March 2009), *Information Technology: DHS Needs to Improve Its Independent Acquisition Reviews*, [GAO-11-581](#) (Washington, D.C.: July 28, 2011), *Information Technology: Critical Factors Underlying Successful Major Acquisitions*, [GAO-12-7](#) (Washington, D.C., Oct. 21, 2011), and *GAO Schedule Assessment Guide: Best Practices for Project Schedules—Exposure Draft*, [GAO-12-120G](#) (Washington, D.C.: May 2012).

We conducted this performance audit from April 2014 to February 2015 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. See appendix III for a more detailed discussion of our objectives, scope, and methodology.

## Background

DOD is a massive and complex organization. It includes the Office of the Secretary of Defense, the Joint Chiefs of Staff, the military departments, numerous defense agencies and field activities, and various unified combatant commands that contribute to the oversight of DOD's acquisition programs. Figure 1 presents a simplified depiction of DOD's organizational structure.

Figure 1: Simplified DOD Organizational Structure



Source: GAO analysis based on Department of Defense (DOD) data. | GAO-15-282

<sup>a</sup>For acquisition matters, the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)) generally takes precedence in DOD, including over the secretaries of the military departments, after the Secretary of Defense and Deputy Secretary of Defense.

<sup>b</sup>The Chairman of the Joint Chiefs of Staff serves as the spokesperson for the commanders of the combatant commands, particularly for the operational requirements of the commands.

Of the approximately \$31.9 billion that DOD reported spending on its IT investments for fiscal year 2013, approximately \$4.4 billion was for MAIS programs, according to DOD officials. The MAIS programs include a range of systems, such as communications systems, business systems (e.g., logistics management and financial management systems), and command and control systems, which are intended to provide department and component officials with easy access to information to effectively organize, plan, direct, and monitor mission operations.

The Under Secretary of Defense for Acquisition, Technology, and Logistics (USD (AT&L)) serves as the Defense Acquisition Executive and is the official responsible for supervising the acquisition of MAIS programs. The USD (AT&L) has policy and procedural authority for the defense acquisition system, which establishes the steps that DOD programs generally take as DOD plans, designs, acquires, deploys, operates, and maintains its IT systems (discussed in more detail below). Additionally, the USD (AT&L) is the principal acquisition official of the department, and is the acquisition advisor to the Secretary of Defense. The USD (AT&L)'s authority includes directing the military services and defense agencies on acquisition matters and making milestone decisions for MAIS programs.

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## DOD's Acquisition Guidance for MAIS Programs

Prior to January 2015, MAIS programs were required to comply with DOD's interim instruction that outlined operation of the defense acquisition system framework.<sup>13</sup> This framework consisted of six models for acquiring and deploying a program, including four basic models that each describe how a program may be structured based on the type of product being acquired (e.g., software-intensive programs and hardware-intensive programs), and two hybrid models that each combine strategies from various basic models.<sup>14</sup> A generic acquisition model that shows all of

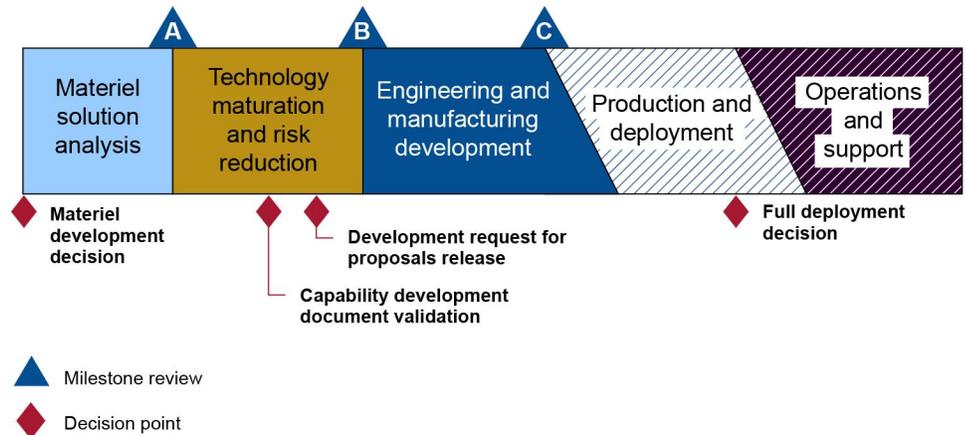
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<sup>13</sup>Department of Defense, *Operation of the Defense Acquisition System*, Interim Instruction 5000.02 (Nov. 26, 2013). DOD recently updated and finalized this guidance in January 2015. This updated framework was not used during this review. Department of Defense, *Operation of the Defense Acquisition System*, Instruction 5000.02 (Jan. 7, 2015).

<sup>14</sup>This DOD interim guidance noted that milestone decision authorities have full latitude to tailor programs in the most effective and efficient structure possible, to include eliminating phases and combining or eliminating milestones and decision points, unless constrained by statute. See Department of Defense, *Operation of the Defense Acquisition System*, Interim Instruction 5000.02, para. 5.c(2)(b)(5) (Nov. 26, 2013).

the program life-cycle phases and related decision points is shown in figure 2 and described following the figure.

**Figure 2: Generic Acquisition Model from the Defense Acquisition System Framework**



Source: GAO analysis based on Department of Defense data. | GAO-15-282

- Materiel solution analysis:** Refine the initial system solution (concept) and create a strategy for acquiring the solution. A decision—referred to as milestone A—is made at the end of this phase to authorize entry into the technology maturation and risk reduction phase.
- Technology maturation and risk reduction:** Determine the preferred technology solution and validate that it is affordable, satisfies program requirements, and has acceptable technical risk. A decision—referred to as milestone B—is made at the end of this phase to authorize entry of the program into the engineering and manufacturing development phase and award development contracts. An APB is first established at the milestone B decision point. A program’s first APB contains the original life-cycle cost estimate (which includes acquisition and operations and maintenance costs), the schedule estimate (which consists of major milestones and decision points for the program), and performance parameters that were approved for that program by the milestone decision authority. The first APB is established after the program has refined user requirements and identified the most appropriate technology solution that demonstrates that it can meet users’ needs.

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- **Engineering and manufacturing development:** Develop a system and demonstrate through testing that the system meets all program requirements. A decision—referred to as milestone C—is made during this phase to authorize entry of the system into the production and deployment phase or into limited deployment in support of operational testing.
  - **Production and deployment:** Achieve an operational capability that meets program requirements, as verified through independent operational tests and evaluation, and implement the system at all applicable locations.
  - **Operations and support:** Operationally sustain the system in the most cost-effective manner over its life cycle.

In addition to the three milestone decision points included in this framework (milestones A, B, and C), the framework also included four other decision points: (1) materiel development decision, which initiated the materiel solution analysis phase and authorized officials to conduct analyses to assess the potential solutions that can satisfy the program's requirements; (2) capability development document validation, which committed the program to the set of requirements that were to be used for preliminary design activities, development, and production; (3) development request for proposals release, which authorized the release of a request for proposals to industry for product development; and (4) full deployment decision, which authorized the system to be deployed to all remaining locations beyond limited fielding locations.<sup>15</sup>

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## Statutory Reporting Requirements for MAIS Programs

MAIS programs must also comply with annual and quarterly reporting requirements identified in statute.<sup>16</sup> In this regard, each calendar year, DOD must submit to Congress budget justification documents on each MAIS program, including information on its cost, schedule, and performance. Specifically, these programs must report, among other things, development and implementation schedules and total acquisition and full life-cycle cost estimates and provide a summary of the key

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<sup>15</sup>Limited fielding is the deployment of a capability to a limited number of users to test the capability in an operational environment.

<sup>16</sup>10 U.S.C. §§ 2445b and 2445c.

performance parameters for each program. DOD must also provide a summary of any significant changes to information previously provided for each MAIS program.

Moreover, on a quarterly basis, the program manager for each MAIS program is required to provide the senior DOD official responsible for the program a written report that identifies any variance in the program's cost, schedule, or performance. Depending on the determination after reviewing the variances identified in the quarterly report, the senior DOD official must notify the congressional defense committees of any programs that have experienced either a significant or critical change. During our review, MAIS programs were required to comply with the following reporting requirements:

- **Significant change.** A significant change must be declared if a program has experienced a schedule delay of more than 6 months but less than a year; estimated total acquisition or full life-cycle cost for the program has increased by at least 15 percent but less than 25 percent; or there has been a significant adverse change in the expected performance of the system. If such an event occurs, the senior DOD official must notify the congressional defense committees in writing no later than 45 days after receiving the quarterly report from the program manager.
- **Critical change.** A critical change must be declared if a program failed to achieve a full deployment decision within 5 years after the milestone A decision or, if there was no milestone A decision, the date when the preferred alternative was selected for the program; experienced a schedule delay of 1 year or more; experienced an estimated total acquisition or full life-cycle cost increase of 25 percent or more over the original estimate; or experienced a change in the expected performance of the system that will undermine the ability of the system to perform as intended. If such an event occurs, the senior DOD official must carry out an evaluation of the program and submit a report to the congressional defense committees no later than 60 days after receiving the quarterly report from the program manager.<sup>17</sup>

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<sup>17</sup>In certain cases, DOD does not need to carry out an evaluation and submit a report. Specifically, if the senior DOD official with milestone decision authority determines that a critical change is primarily due to an extension of a program and involves minimal developmental risk, the official may instead submit to the congressional defense committees a certification that the official has made those determinations. This certification must be submitted within 45 days after receiving the quarterly report.

For programs that declare a critical change, the evaluation must assess the projected cost and schedule for completing the program if current requirements are not modified; assess the projected cost and schedule for completing the program based on a reasonable modification of requirements; and assess the rough order of magnitude of the cost and schedule for any reasonable alternative system or capability.

Since the December 19, 2014, enactment of the Carl Levin and Howard P. “Buck” McKeon National Defense Authorization Act for Fiscal Year 2015, MAIS programs are now required to declare a significant change—instead of a critical change—if they fail to achieve a full deployment decision within 5 years after the milestone A decision or, if there was no milestone A decision, the date when the preferred alternative was selected for the program (excluding any time during which program activity is delayed as a result of a bid protest).

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## Best Practices for Managing IT Acquisition Programs

Entities such as the Project Management Institute, the Software Engineering Institute at Carnegie Mellon University, and GAO have developed and identified best practices to help guide organizations to effectively plan and manage their acquisitions of major IT systems, such as the MAIS programs.<sup>18</sup> Our prior reviews have shown that proper implementation of such practices can significantly increase the likelihood of delivering promised system capabilities on time and within budget.<sup>19</sup> These practices include, but are not limited to:

- **Risk management:** A process for anticipating problems and taking appropriate steps to mitigate risks and minimize their impact on program commitments. It involves identifying and documenting risks, categorizing them based on their estimated impact, prioritizing them, developing risk mitigation strategies, and tracking progress in executing the strategies.

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<sup>18</sup>PMBOK® Guide; CMMI-ACQ; and GAO, *Executive Guide: Information Technology Investment Management, A Framework for Assessing and Improving Process Maturity*, [GAO-04-394G](#) (Washington, D.C.: March 2004).

<sup>19</sup>See, for example, GAO, *Information Technology: Foundational Steps Being Taken to Make Needed FBI Systems Modernization Management Improvements*, [GAO-04-842](#) (Washington, D.C.: Sept. 10, 2004) and *Information Technology: FBI Is Implementing Key Acquisition Methods on Its New Case Management System, but Related Agencywide Guidance Needs to Be Improved*, [GAO-08-1014](#) (Washington, D.C.: Sept. 23, 2008).

- **Requirements development:** Requirements establish what the system is to do, how well it is to do it, and how it is to interact with other systems. Appropriate requirements development involves eliciting and developing customer and stakeholder requirements, and analyzing them to ensure that they will meet users' needs and expectations. It also consists of validating requirements as the system is being developed to ensure that the final system to be deployed will perform as intended in an operational environment.
- **Project planning:** Establishes project objectives and outlines the course of action required to attain those objectives. It also provides a means to track, review, and report progress and performance of the project by defining project activities and developing cost and schedule estimates, among other things. It also includes business process reengineering efforts, which is an approach to redesigning the way work is done to better support the organization's mission and reduce costs; including identifying; analyzing; and redesigning an organization's core business processes. This practice also includes planning for the use of an independent verification and validation (IV&V) agent—a process whereby organizations can reduce risks by having a knowledgeable, independent party determine that the system or product fulfills its intended purpose.

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GAO Previously Reported  
on DOD's Challenges in  
Implementing MAIS  
Programs

We have previously reported and made recommendations on DOD's efforts to implement MAIS programs.

- In May 2011, we found that the Air Force's Joint Space Operations Center Mission System (JMS) faced development challenges and risks, such as the use of immature technologies and planning to deliver all capabilities in a single, large increment, versus smaller and more manageable increments.<sup>20</sup> We recommended, among other things, that DOD ensure that key program risks are fully assessed to help ensure cost, schedule, and performance goals are met. We also noted in the report that implementing this recommendation may require dividing the program into separate increments, which the Air Force later did in December 2011. DOD agreed with this recommendation and took actions to implement it.

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<sup>20</sup>GAO, *Space Acquisitions: Development and Oversight Challenges in Delivering Improved Space Situational Awareness Capabilities*, [GAO-11-545](#) (Washington, D.C.: May 27, 2011).

- We reported in March 2013 that large variations existed in the extent to which 14 selected programs stayed within planned cost and schedule estimates and met system performance targets.<sup>21</sup> We also noted that three selected programs—Air Force’s Defense Enterprise Accounting and Management System, Army’s Global Combat Support System-Army, and Navy’s Consolidated Afloat Networks and Enterprise Services—demonstrated mixed results in effectively defining and managing risks of various levels, and in implementing key requirements management and project monitoring and control best practices. We made recommendations to the Army program to address weaknesses in its risk management and IV&V practices. DOD concurred with these recommendations and has since taken actions to address the risk management-related recommendation.
- Two months later, in May 2013, we reported that the Army’s Integrated Personnel and Pay System–Army program had generally complied with DOD’s business process reengineering guidance for asserting compliance with the business system modernization requirements in the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005. This act requires that, prior to the obligation of funds, DOD certify that any defense business system program with a total cost of more than \$1 million has, among other things, taken appropriate business process reengineering efforts. However, the program provided limited documentation of root cause analyses that would trace symptoms back to the underlying factors that required the program to reengineer its business processes.<sup>22</sup> We recommended, among other things, that DOD ensure that complete documentation be provided as part of the fiscal year 2014 certification and approval process for the program. DOD agreed with this recommendation. Since our report was issued, the Integrated Personnel and Pay System–Army program was restructured in response to findings of an independent program assessment in 2013. As a result, the Army did not request funds to be certified for the program in fiscal year 2014. Program officials stated that, subsequently, the program’s fiscal year 2014 and 2015 funds were certified based, in part, on the program’s “problem statement”

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<sup>21</sup>GAO, *Major Automated Information Systems: Selected Defense Programs Need to Implement Key Acquisition Practices*, [GAO-13-311](#) (Washington, D.C.: Mar. 28, 2013).

<sup>22</sup>GAO, *DOD Business Systems Modernization: Further Actions Needed to Address Challenges and Improve Accountability*, [GAO-13-557](#) (Washington, D.C.: May 17, 2013).

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document, which, according to officials, addressed business process reengineering. Officials also added that the program plans to submit a business process reengineering assessment for certification for its fiscal year 2016 funds.

- Additionally, we determined in November 2013 that the Army had made progress using the Logistics Modernization Program (LMP) to support its industrial operations.<sup>23</sup> However, because the Army had not established a process for tracking LMP's financial benefits, it was not in a position to determine whether it was realizing a return on its sizeable investment in this program. As a result, we recommended that DOD develop and implement a process to track the extent of financial benefits realized from the use of LMP during the remaining course of its life cycle. Further, this process should be linked with the LMP performance baseline. The Army concurred with our recommendation; however, as of November 2014, the Army had yet to finalize its plans for measuring financial benefits.
- Moreover, about a year ago—in March 2014—we reported that there were large variations in the extent to which programs had changed their planned cost and schedule estimates and met system performance targets.<sup>24</sup> We also noted that three selected programs—Defense Health Agency's Theater Medical Information Program-Joint Increment 2, Navy's Global Combat Support System-Marine Corps program, and the Defense Logistics Agency's Defense Agencies Initiative program—had demonstrated mixed progress in effectively defining and managing risks and in implementing key requirements management and project monitoring and control best practices. We made recommendations to the three programs to address respective weaknesses in their risk management, requirements management, and project monitoring and control practices. The department concurred with six of our eight recommendations and partially

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<sup>23</sup>GAO, *Defense Logistics: Army Should Track Financial Benefits Realized from its Logistics Modernization Program*, [GAO-14-51](#) (Washington, D.C.: Nov. 13, 2013).

<sup>24</sup>GAO, *Major Automated Information Systems: Selected Defense Programs Need to Implement Key Acquisition Practices*, [GAO-14-309](#) (Washington, D.C., Mar. 27, 2014).

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concluded with the other two.<sup>25</sup> Program officials have recently taken steps aimed at addressing several recommendations.

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## Many Programs Spent Years to Establish Cost and Schedule Baselines; Over Half Were Positioned to Meet Time Frames for Deploying Capabilities

A majority of the 20 programs selected for our review had not established their baselines within 2 years from starting work on their programs. Specifically, 8 programs established an APB within 2 years, while 12 did not. While a recommendation by the Defense Science Board<sup>26</sup> encouraged programs to be delivered in smaller increments and the Board supported programs establishing their cost and schedule baselines within 2 years, these 12 programs took, on average, 5 years and 2 months and spent about \$452 million on their programs prior to establishing their baselines. The delays in establishing baselines have resulted in multiple negative implications, including limited oversight and accountability. For example, programs that have not established APBs are subject to less DOD executive-level and congressional oversight compared to MAIS programs that have established APBs. These programs are also able to proceed without being measurable against cost, schedule, and performance targets. Until programs establish their cost and schedule baselines within 2 years, they may continue to spend hundreds of millions of dollars with limited oversight and accountability.

A majority of the 20 selected programs met or planned to meet the 5-year statutorily established time frame to decide to fully deploy system

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<sup>25</sup>DOD partially concurred with our recommendations to update the Defense Health Agency program's capabilities baseline to reflect program scope changes and trace all capabilities to their associated requirements in the requirements traceability matrix. In its partial concurrence, the department stated that the program office will update that program's capabilities baseline to reflect program scope changes and will ensure that all future program capabilities are traced to their associated requirements in the appropriate requirements traceability matrices. However, DOD also stated that there is no benefit in updating the requirements documentation for capabilities that have already been built, tested, and deployed. We disagree with that assertion. Without updating its requirements documentation to reflect all program capabilities and how each capability will be addressed, key agency governing boards and congressional committees will not have a clear picture of what capabilities were originally planned to be delivered and how, and whether there are any gaps between what was planned and actually delivered.

<sup>26</sup>The Defense Science Board is made up of experts that advise DOD on a variety of topics, including acquisition best practices. Pursuant to § 1078(a)(2)(C) of Pub. L. No. 112-81 (Dec. 31, 2011), we are required to assess whether the DOD MAIS programs employ best practices for the acquisition of IT systems as identified by the Defense Science Board along with DOD and GAO.

capabilities.<sup>27</sup> About half of the programs that met or planned to meet this condition had been positioned to do so because they had been restructured and split into smaller, incremental programs, which is consistent with a Defense Science Board recommendation, Office of Management and Budget (OMB) guidance, and a statutory requirement to use incremental contracting to the maximum extent practicable for major IT acquisitions.<sup>28</sup> Four of the five programs that were unable to meet the time frame, however, satisfied their statutory reporting obligations to notify Congress of the delay. Continued submissions of such reports to Congress, along with the subsequent oversight provided by DOD and key congressional committees, will help to ensure that programs are held accountable for delivering the intended functionality to users within agreed-upon costs and time frames.

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### Over Half of Selected MAIS Programs Had Not Established Baselines within 2 Years of Starting Work

In March 2009, the Defense Science Board reported on the need for the department to establish a new acquisition process that could accommodate the rapid evolution of IT.<sup>29</sup> Specifically, the board found that DOD's acquisition process was too long and cumbersome to fit the needs of the many IT systems that require continuous changes and upgrades. Accordingly, the board proposed a new acquisition model that was intended to encourage programs to be delivered incrementally, in smaller subsets of capabilities. As part of this model, the board supported an acquisition cycle that allowed a program to have up to 2 years to establish a cost and schedule baseline.

A USD (AT&L) Senior Acquisition Analyst and Primary Action Officer for our review stated that DOD did not incorporate this suggested 2-year time

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<sup>27</sup>As specified by law, the start date of the 5-year period is milestone A or the date that the preferred alternative is selected. This date may be the same as the start of a program or it may occur at some point after program start, which can be several years later. It generally occurs before a program establishes its APB.

<sup>28</sup>41 U.S.C. § 2308 and the FAR implementing regulation, 48 C.F.R. § 39.103; OMB, Management of Federal Information Resources, Circular No. A-130 Revised.

<sup>29</sup>Defense Science Board, *Report of the Defense Science Board Task Force on Department of Defense Policies and Procedures for the Acquisition of Information Technology* (Washington, D.C.: March 2009).

frame in the department's interim defense acquisition system framework<sup>30</sup> because the department did not want to force programs to commit to cost and schedule parameters that were not yet understood well enough to baseline. However, as we previously reported, the Defense Science Board's recommendation to break up large and complex programs into smaller increments enables programs to reduce risk and increases the likelihood that each program will achieve its cost, schedule, and performance goals.<sup>31</sup> Thus a program that requires more than 2 years to commit to a cost and schedule baseline is likely too large and complex and could benefit from being divided into smaller increments.

Moreover, we have previously concluded that prior IT projects too often have produced failed results—that is, projects with multimillion dollar cost overruns and schedule delays measured in years, with questionable mission-related achievements.<sup>32</sup> To help resolve these issues, federal statute and OMB guidance have called for agencies to deliver investments in smaller increments, in order to reduce investment risk, deliver capabilities more quickly, and facilitate the adoption of emerging technologies.<sup>33</sup> In 2010, OMB placed a renewed emphasis on incremental IT development by calling for major IT investments to deliver functionality at least every 12 months. Subsequently, OMB made this directive more stringent, and annual budget guidance now states that each project associated with major IT investments is to deliver functionality every 6 months.<sup>34</sup>

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<sup>30</sup>As discussed in footnote 13, DOD recently updated and finalized this guidance in January 2015. This updated framework was not used during this review. Department of Defense, *Operation of the Defense Acquisition System*, Instruction 5000.02 (Jan. 7, 2015).

<sup>31</sup>GAO, *Information Technology: Agencies Need to Establish and Implement Incremental Development Policies*, [GAO-14-361](#) (Washington, D.C., May 1, 2014).

<sup>32</sup>GAO, *OMB and Agencies Need to More Effectively Implement Major Initiatives to Save Billions of Dollars*, [GAO-13-796T](#) (Washington, D.C.: July 25, 2013).

<sup>33</sup>41 U.S.C. § 2308 and the FAR implementing regulation, 48 C.F.R. § 39.103; OMB, *Management of Federal Information Resources*, Circular No. A-130 Revised.

<sup>34</sup>OMB, *Guidance on Exhibits 53 and 300—Information Technology and E-Government* (2013); *Guidance on Exhibits 53 and 300—Information Technology and E-Government* (2012); *Guidance on Exhibit 300—Planning, Budgeting, Acquisition, and Management of Information Technology Capital Assets* (2011).

Of the 20 selected MAIS programs in our review, 8 programs had established an APB within 2 years of starting the program, while 12 did not.<sup>35</sup> Table 1 provides a summary of the selected programs' time frames for establishing their first APBs.

**Table 1: Summary of Selected MAIS Programs' Time Frames for Establishing First Acquisition Program Baselines**

Component	Program	Established an acquisition program baseline within 2 years of program start	Did not establish an acquisition program baseline within 2 years of program start
Air Force	Air Force Integrated Personnel and Pay System (AFIPPS)		✓
	Base Information Transport Infrastructure (BITI) Wired	✓	
	BITI Wireless	✓	
	Defense Enterprise Accounting and Management System (DEAMS) Increment 1		✓
	Expeditionary Combat Support System (ECSS) Increment 1 <sup>a</sup>		✓
	Financial Information Resource System (FIRST)	✓	
	Joint Space Operations Center Mission System (JMS) Increment 1		✓
Army	Distributed Common Ground System – Army (DCGS-A) Increment 1		✓
	Global Combat Support System – Army (GCSS-Army)		✓
	Integrated Personnel and Pay System – Army (IPPS-A) Increment 1		✓
	Tactical Mission Command (TMC)	✓	
Defense Health Agency (DHA)	Integrated Electronic Health Record (iEHR) Increment 1	✓	
Defense Logistics Agency (DLA)	Defense Agencies Initiative (DAI) Increment 1		✓

<sup>35</sup>The time to establish an APB was based on the time from when program officials reported starting work on their programs until the APB was approved by the milestone decision authority. See app. I for descriptions of each program.

Component	Program	Established an acquisition program baseline within 2 years of program start	Did not establish an acquisition program baseline within 2 years of program start
	EProcurement		✓
Navy	Common Aviation Command and Control System (CAC2S) Increment 1		✓
	Consolidated Afloat Networks and Enterprise Services (CANES)	✓	
	Distributed Common Ground System – Navy (DCGS-N) Increment 1	✓	
	Global Combat Support System-Marine Corps (GCSS-MC) Increment 1		✓
	Navy Enterprise Resource Planning (ERP)	✓	
	Next Generation Enterprise Network (NGEN) Increment 1		✓
<b>Total</b>		<b>8</b>	<b>12</b>

Source: GAO analysis of agency data. | GAO-15-282

Note: See app. I for descriptions of each program.

<sup>a</sup>Air Force’s Expeditionary Combat Support System was canceled in December 2012, about 9 years after the program began. It never established an acquisition program baseline.

The eight programs that had established an APB within 2 years took, on average, 1 year and 2 months and spent about \$33.9 million to do so. For example,

- Navy’s DCGS-N Increment 1 program took 1 year, 11 months, and spent approximately \$51 million before establishing its first APB;
- Air Force’s BITI Wired program took 5 months and expended about \$4 million before establishing its first APB; and
- Defense Health Agency’s iEHR Increment 1 program took 1 year, 11 months, and spent about \$96 million before establishing its first APB.

In comparison, the 12 programs that did not establish APBs within 2 years took, on average, 5 years, 2 months, and spent about \$452 million. For instance,

- Navy’s NGEN Increment 1 program took 6 years, 5 months, and expended approximately \$2.82 billion prior to establishing its first APB;<sup>36</sup>
- Army’s GCSS-Army program took 4 years, 9 months, and spent approximately \$398 million prior to establishing its first APB; and
- Air Force’s ECSS Increment 1 program took about 9 years, 2 months, and expended about \$1.03 billion before it was canceled and program shutdown activities (e.g., contract closeout activities) were complete; it never established an APB.

Table 2 provides a summary of the time it took the 20 selected MAIS programs to establish their first APBs and the amount each program spent prior to establishing those APBs.

**Table 2: Selected MAIS Programs’ Time Frames and Cost for Establishing First Acquisition Program Baselines**

Component	Program	Time to establish first acquisition program baseline	Amount spent prior to establishing first acquisition program baseline (\$ in millions)
Air Force	DEAMS Increment 1	8 years, 6 months	\$313
	AFIPPS	6 years, 3 months <sup>a</sup>	102 <sup>b</sup>
	JMS Increment 1	4 years	141
	BITI Wireless	10 months	1
	FIRST	6 months	4
	BITI Wired	5 months	4
	ECSS Increment 1	9 years, 2 months <sup>c</sup>	1,030 <sup>c</sup>
Army	DCGS-A Increment 1	5 years, 6 months	153
	GCSS-Army	4 years, 9 months	398
	IPPS-A Increment 1	2 years, 6 months	85
	TMC	6 months	1
DHA	iEHR Increment 1	1 year, 11 months	96
DLA	EProcurement	4 years, 5 months	221
	DAI Increment 1	3 years, 7 months	88

<sup>36</sup>In June 2013, about 6 years after NGEN was initiated, USD (AT&L) decided that the program’s cost estimate in the December 2013 MAIS Annual Report would serve as the APB for the program.

Component	Program	Time to establish first acquisition program baseline	Amount spent prior to establishing first acquisition program baseline (\$ in millions)
Navy	NGEN Increment 1	6 years, 5 months	2,818
	GCSS-MC Increment 1	3 years, 8 months	69
	CAC2S Increment 1	3 years	8
	CANES	2 years	73
	DCGS-N Increment 1	1 year, 11 months	51
	Navy ERP	1 year, 1 month	42

Source: GAO analysis based on agency data and data reported by program officials. | GAO-15-282

<sup>a</sup>As of November 2014, the Air Force’s AFIPPS had not yet established its first APB; it planned to do so in December 2015, about 6 years and 3 months after the program was initiated.

<sup>b</sup>According to program officials, as of October 2014, the Air Force’s AFIPPS had spent approximately \$102 million since the program began; the program had not yet established its first APB, which it planned to do in December 2015.

<sup>c</sup>Air Force’s ECSS Increment 1 was canceled before establishing an APB—thus these figures represent the time and money it spent prior to being canceled and completing shutdown activities.

Of the eight programs that established their first APBs within 2 years, two were positioned to meet the 2-year time frame due, in part, to the fact that they were being developed incrementally. Specifically, the BITI Wired and BITI Wireless programs were started after a prior MAIS program—the Combat Information Transport System<sup>37</sup>—was restructured and split into multiple smaller programs, including these two BITI MAIS programs and seven non-MAIS programs. This is to the credit of these programs since, as previously mentioned, faster development of smaller increments of IT programs has been advocated by OMB and the Defense Science Board. Additionally, the recently passed Federal Information Technology Acquisition Reform provisions of the Carl Levin and Howard P. “Buck” McKeon National Defense Authorization Act for Fiscal Year 2015 require agency chief information officers to certify that IT investments are appropriately implementing incremental development.<sup>38</sup>

Program officials from the 12 programs that did not establish APBs in 2 years attributed the delay to multiple reasons, including, among others,

<sup>37</sup>The Combat Information Transport System program portfolio was intended to provide the information infrastructure, network management, and network defense capabilities to meet the multimedia information transport needs of Air Force bases.

<sup>38</sup>See Pub. L. No. 113-291, § 831(a) (Dec. 19, 2014).

the addition of new requirements and program restructures. Table 3 identifies causes cited by the programs for the delays in establishing the APBs.

**Table 3: Causes for Delays in Establishing Acquisition Program Baselines for the 12 Selected Programs**

Component/program	More time needed for planning activities	Changes to acquisition or deployment strategies	Increased scope	Contract award delays	Contractor performance problems	Organizational restructure	Underestimated system development complexity
<b>Air Force</b>							
DEAMS Increment 1	✓					✓	✓
AFIPPS	✓	✓					
ECSS Increment 1		✓		✓	✓		✓
JMS Increment 1	✓	✓					
<b>Army</b>							
DCGS-A Increment 1	✓	✓	✓				
GCSS-Army	✓		✓				
IPPS-A Increment 1	✓	✓					
<b>DLA</b>							
DAI Increment 1	✓						
EProcurement		✓	✓				
<b>Navy</b>							
NGEN Increment 1	✓	✓		✓			
GCSS-MC Increment 1	✓			✓	✓		✓
CAC2S Increment 1	✓						
<b>Total</b>	<b>10</b>	<b>7</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>3</b>

Source: GAO analysis based on data reported by DOD officials. | GAO-15-282

The delay in establishing baselines for these major, multibillion dollar IT acquisition programs has multiple negative implications. Specifically,

- MAIS programs that have not established APBs receive less oversight from USD (AT&L) and Congress than those that have established APBs. For example, while baselined MAIS programs are required to submit quarterly reports to USD (AT&L), which include information on cost, schedule, and performance, as well as assessments from the

program managers, unbaselined MAIS programs generally are not required to do so.<sup>39</sup> Moreover, the additional oversight provided by USD (AT&L) in conducting monthly deep-dive reviews on baselined programs is generally not extended to unbaselined MAIS programs. Further, while the Secretary of Defense is required to submit to Congress annual budget justification documents for both baselined and unbaselined MAIS programs, DOD guidance further clarifies that unbaselined programs should limit cost information to 4 years of funding needs and are not required to provide schedule information in the reports.

- The delays in establishing program baselines also have implications for these programs' accountability. In the absence of baselines, programs lack cost, schedule, and performance targets that they need to meet. As a result, programs are able to proceed without focusing on meeting such targets.
- Lastly, as previously mentioned, OMB guidance calls for IT investments to deliver rapidly, incrementally, and every 6 months. However, delays in establishing baselines reduce programs' ability to meet OMB's requirements.

Until programs establish their cost and schedule baselines within 2 years of beginning work, they may continue to spend hundreds of millions of dollars with limited oversight and accountability and fail to meet the incremental and rapid development requirements called for in federal law and OMB guidance.

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### Most Selected MAIS Programs Met or Planned to Meet Time Frames for Deploying Capabilities

As established by law,<sup>40</sup> a MAIS program should achieve a full deployment decision (which authorizes system deployment to all planned locations) within 5 years of milestone A or the date that the preferred alternative is selected for the program. This date may be the same as the start of a program, or it may occur at some point afterward, which can be several years later. If it is determined that a program has not reached a full deployment decision within 5 years, DOD is required to, among other

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<sup>39</sup>According to a USD (AT&L) Senior Acquisition Analyst and Primary Action Officer for our review, unbaselined programs are not required to submit quarterly reports to USD (AT&L) unless the program's milestone decision authority or the Under Secretary of Defense for Acquisition, Technology, and Logistics requests that they do so.

<sup>40</sup>10 U.S.C. § 2445c.

things, report to Congress. Of the 20 selected MAIS programs, 11 programs reached or planned to reach their full deployment decisions within 5 years, while 5 programs did not; for the remaining 4 programs, the 5-year time frame was not applicable.<sup>41</sup>

Table 4 summarizes the selected programs' time frames for reaching a full deployment decision.

**Table 4: Selected MAIS Programs' Time Frames for Reaching Full Deployment Decision**

Component	Program	Reached full deployment decision within 5 years after milestone A decision or selecting preferred alternative (actual or planned time)	Did not reach full deployment decision within 5 years after milestone A decision or selecting preferred alternative (actual or planned time)
Air Force	AFIPPS <sup>a,b</sup>		✓ (5 years, 3 months)
	BITI Wired <sup>b</sup>	✓ (4 years, 6 months)	
	BITI Wireless	✓ (1 year, 7 months)	
	DEAMS Increment 1 <sup>b</sup>		✓ (10 years)
	ECSS Increment 1		✓ <sup>c</sup>
	FIRST	Not applicable <sup>d</sup>	Not applicable <sup>d</sup>
	JMS Increment 1	✓ (2 years, 3 months)	
Army	DCGS-A Increment 1	✓ (5 years)	
	GCSS-Army	✓ (4 years, 5 months)	
	IPPS-A Increment 1	✓ (3 years, 6 months)	
	TMC	Not applicable <sup>d</sup>	Not applicable <sup>d</sup>

<sup>41</sup>The 5-year time frame was not applicable for 3 programs because they achieved full deployment decision before the 5-year requirement went into effect. One program—Defense Logistics Agency's DAI Increment 1 program—was not a MAIS program at the time it achieved full deployment decision; as such, the 5-year time frame was not applicable to it.

Component	Program	Reached full deployment decision within 5 years after milestone A decision or selecting preferred alternative (actual or planned time)	Did not reach full deployment decision within 5 years after milestone A decision or selecting preferred alternative (actual or planned time)
DHA	iEHR Increment 1 <sup>b</sup>	✓ (3 years, 8 months)	
DLA	DAI Increment 1	Not applicable <sup>e</sup>	Not applicable <sup>e</sup>
	EProcurement	✓ (4 years, 11 months)	
Navy	CAC2S Increment 1	✓ (2 years, 6 months) <sup>f</sup>	
	CANES <sup>b</sup>		✓ (6 years, 6 months)
	DCGS-N Increment 1	✓ (2 years, 7 months)	
	GCSS-MC Increment 1 <sup>b</sup>		✓ (10 years, 4 months)
	Navy ERP	Not applicable <sup>d</sup>	Not applicable <sup>d</sup>
	NGEN Increment 1 <sup>b</sup>	✓ (4 years, 4 months)	
<b>Total</b>		<b>11</b>	<b>5</b>

Source: GAO analysis based on agency data. | GAO-15-282

<sup>a</sup>As of November 2014, AFIPPS had not established an APB; as a result, its estimated time frame for reaching full deployment decision was based on the program's latest pre-baseline schedule estimate, as of November 2014.

<sup>b</sup>As of November 2014, the AFIPPS, BITI Wired, CANES, DEAMS, and GCSS-MC programs had not yet reached full deployment decision; the time frames listed are based on their latest estimates for achieving full deployment decision, as of November 2014.

<sup>c</sup>After the start of its 5-years to full deployment decision time frame, the ECSS program went on for 7 years and 7 months before it was canceled by DOD in December 2012. It never established an APB or reached full deployment decision.

<sup>d</sup>The 5-years-to-full deployment decision time frame was not applicable for FIRST, TMC, or Navy ERP because those programs achieved full deployment decision before the 5-year condition went into effect.

<sup>e</sup>DAI Increment 1 was not a MAIS program at the time it achieved full deployment decision; as such, the 5-year condition was not applicable to it.

<sup>f</sup>CAC2S achieved full deployment decision within the 5-year time frame; however, this was over 11 years after the program had established its first APB. In April 2009, CAC2S experienced a critical change and program restructure because it could not achieve initial operational capability (now called full deployment decision) as planned due to significant system performance problems. The program's 5-year time frame did not begin until after this program restructure.

For the 11 programs that met or planned to meet the 5-year time frame, these programs reached their full deployment decision within, on average, 3 years, 7 months. Of these 11 programs, 5 had been restructured and split into smaller, incremental programs. For example, the Air Force's

JMS program was restructured into multiple increments after an independent program assessment found that the plan to implement the program in a single increment increased program risk. According to a USD (AT&L) Senior Acquisition Analyst and Primary Action Officer for our review, the 5-year time frame for reaching full deployment decision encouraged DOD to start breaking up programs into smaller, more incremental programs in order to meet this condition.

Of the five programs that did not reach a full deployment decision within the 5-year period, one program—Air Force’s ECSS—was canceled about 9 years after the program began. The remaining four programs planned to reach full deployment decision within, on average, 8 years. Program officials attributed these longer development time frames to multiple causes, including the addition of new requirements and system performance issues. Table 5 identifies causes cited by the programs for the delays in reaching full deployment decision.

**Table 5: Causes for Delays in Reaching Full Deployment Decision for the 5 Selected Programs**

Component/ program	More time needed for planning activities	Changes to acquisition or deployment strategies	Increased scope	Contract award delays	Contractor performance problems	System performance problems	Underestimated system development complexity	Delays in availability of test environment	Budget delays and reduction
<b>Air Force</b>									
AFIPPS	✓	✓							
DEAMS Increment 1	✓		✓				✓		
ECSS Increment 1		✓		✓	✓	✓	✓		
<b>Navy</b>									
CANES				✓				✓	✓
GCSS-MC Increment 1						✓			
<b>Total</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>

Source: GAO analysis based on data reported by DOD officials. | GAO-15-282

These delays for the five programs have resulted in capabilities not being delivered for several years. For example, as previously discussed, as of November 2014, the Air Force’s DEAMS program expected to reach full deployment decision and deploy capabilities in May 2015, which is 10 years after the program selected its preferred development approach and nearly 12 years after the program was initiated.

As required by law,<sup>42</sup> four of the five programs that did not reach their full deployment decision within the 5-year time frame (Air Force's DEAMS and ECSS, and Navy's CANES and GCSS-MC) reported to congressional defense committees their critical changes.<sup>43</sup> Also, as required by law, these four programs conducted evaluations on (1) projected costs and schedules for completing their programs if current requirements were not modified, (2) projected costs and schedules for completing their programs based on reasonable modifications of their requirements, and (3) rough order of magnitude costs and schedules for any reasonable alternative systems or capabilities.

These evaluations and the subsequent oversight provided by Congress, OMB, and DOD helped to improve the programs when possible and prevent them from spending additional resources when they were not delivering needed capabilities to users. For example, Navy's GCSS-MC Increment 1 program reported a critical change in February 2013 because its full deployment decision date had slipped by more than 1 year. Subsequently, based on the program's evaluation of the critical change, the Marine Corps removed the second of the two planned releases from the program due to technical challenges experienced when developing that release. Continued reporting to Congress and the additional oversight provided by DOD and Congress when programs do not reach a full deployment decision in 5 years will help to ensure that programs are held accountable for delivering the intended functionality to users within agreed-upon costs and time frames.

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<sup>42</sup>10 U.S.C. § 2445c.

<sup>43</sup>As of November 2014, while the AFIPPS program had not yet established an APB, its latest estimate for achieving full deployment decision was March 2019, which would be more than 5 years after the start of its 5-year period. Since the program has not yet experienced a breach of the 5-year period, it is not yet required to report to the congressional defense committees.

## Selected MAIS Programs Changed Cost and Schedule Estimates, and One Did Not Fully Meet Performance Targets

The four MAIS programs selected for our study varied in the extent to which they had changed their planned cost and schedule estimates and met system performance targets. Of the four selected MAIS programs, all had cost and schedule data available, while two had system performance data available. Of these four programs, two had experienced changes in their cost estimates, while two did not. Additionally, three programs had experienced changes in their schedule estimates—all of which were schedule slippages—and one program did not experience a change in its schedule. Further, of the two programs that had system performance data available, one program reported meeting its system performance targets, while the other did not meet its targets. Table 6 provides a summary of the cost, schedule, and performance results for the four selected programs.

**Table 6: Summary of Cost, Schedule, and System Performance Results for the Selected Programs**

Component/ program	No change in cost estimate	Change in cost estimate (%)	No change in schedule estimate	Change in schedule estimate	Met system performance targets	Did not fully meet system performance targets
<b>Air Force</b>						
JMS Increment 2	✓			→ 5 months		✓
<b>Army</b>						
IPPS-A Increment 2 <sup>a,b</sup>		↓ 4		→ 2 years		
LMP Increment 2	✓		✓		✓	
<b>Navy</b>						
DCGS-N Increment 2 <sup>b,c</sup>		↑ 7		→ 3.5 years		
<b>Total</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>

Legend: ↑ cost increase ↓ cost decrease → schedule slippage ← schedule acceleration

Source: GAO analysis of data provided by DOD officials. | GAO-15-282

<sup>a</sup>IPPS-A Increment 2 had not established an APB. As such, we compared the program's latest life-cycle cost estimate to the Army's initial cost estimate for the program. We also compared the program's latest schedule estimate for achieving milestone B to its initial schedule estimate for that milestone. These pre-APB cost and schedule estimates were based on limited information about the program's requirements.

<sup>b</sup>System performance data for the DCGS-N Increment 2 and IPPS-A Increment 2 programs were not available because these programs were early in their planning phases and no portions of the systems were fully developed.

<sup>c</sup>As of November 2014, DCGS-N Increment 2 had not established an APB. As such, we compared the latest estimate developed by the program office to its initial estimate.

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## Two Selected Programs Experienced Changes in Their Cost Estimates

Two of the four selected programs had experienced changes in their planned total life-cycle cost estimates, while two did not experience changes in these estimates. Specifically, Army's IPPS-A Increment 2 had reduced its estimate, and Navy's DCGS-N Increment 2 had increased its estimate; these two programs had not yet established approved APBs.

- As of November 2014, IPPS-A Increment 2's latest, pre-APB planned total life-cycle cost estimate was about \$2.0 billion, which was an approximately 4 percent decrease from the program's initial April 2014 estimate of about \$2.1 billion. According to program officials, this decrease was due, in part, to a change in the number of expected labor hours and the average labor rates, and the program's negotiation of sustainment costs with the Defense Information Systems Agency, which is to host the system.
- The latest life-cycle cost estimate for Navy's DCGS-N Increment 2 program as of November 2014 had increased about 7 percent compared to its initial estimate from February 2009—from approximately \$2.64 billion to about \$2.82 billion.<sup>44</sup> DCGS-N officials attributed the increase, in part, to having a better understanding of the program, changes in the installation schedule based on ship availability, and a 3-year extension in the program's planned operations and maintenance phase.

As of November 2014, the other two selected programs had not experienced any cost increases or decreases in their planned total life-cycle cost estimates.

- The latest cost estimate (as of November 2014) for Army's LMP Increment 2 program was about \$729.9 million, which is the same as the program's first APB estimate, which was established in August 2013.
- Air Force's JMS Increment 2 program's latest cost estimate was approximately \$1.1 billion, which is consistent with its first APB established in June 2013.

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<sup>44</sup>DCGS-N Increment 2's latest cost estimate was developed by the program office; it was not an APB and had not been approved by the program's milestone decision authority.

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## Three Selected Programs Experienced Schedule Delays

Three of the four selected programs experienced slippages in their schedule estimates. These delays ranged from about 5 months to approximately 3.5 years.

- Compared to its first APB schedule established in June 2013, Air Force's JMS Increment 2 program had experienced about a 5-month slippage in the planned date of milestone C—from the end of March 2016 to early September 2016. Program officials attributed this delay to a variety of factors, including fiscal year 2013 and 2014 funding reductions (e.g., rescissions in previously approved budget authority and automatic budget cuts—referred to as sequestration); implementation of newly mandated information assurance and cyber testing requirements; and impacts from the October 2013 government shutdown.
- Army's IPPS-A Increment 2 program experienced about a 2-year delay in the planned date for milestone B (which authorizes a program to begin system development) compared with its initial schedule—from the first quarter of fiscal year 2013 to December 2014. Program officials attributed this slippage, in part, to the IPPS-A program being directed to conduct an assessment of the sufficiency of the program's design, the implementation of recommendations based on that assessment, the source selection process taking about 2 years, and a restructuring to deliver the program incrementally through waves and releases.
- Navy's DCGS-N Increment 2 program experienced about a 3.5-year slip in the planned date for milestone B compared with its initial schedule—from the third quarter of fiscal year 2012 to the second quarter of fiscal year 2016. Navy officials attributed the slippage primarily to the program taking longer than planned to analyze the alternative approaches for developing the system once the program decided to add a cloud-based solution to its analysis. Program officials also attributed the schedule slip to 2013 and 2014 automatic budget cuts (i.e., sequestration) and continuing resolutions.

One of the selected programs did not experience a change in its schedule estimate. Specifically, the Army's LMP Increment 2 program's schedule estimate did not change.

Table 7 provides a summary of the slippages experienced by the selected MAIS programs.

**Table 7: Selected MAIS Programs' Schedule Delays Compared with First Approved Baseline Schedules or Initial Estimates**

Component	Program	Schedule slippage since first acquisition program baseline (delayed milestone)	Schedule slippage since initial estimate (delayed milestone) <sup>a</sup>
Air Force	JMS Increment 2	5 months (milestone C)	
Army	IPPS-A Increment 2		2 years (milestone B)
	LMP Increment 2	None	
Navy	DCGS-N Increment 2		3.5 years (milestone B)

Source: GAO analysis of data provided by DOD officials. | GAO-15-282

<sup>a</sup>IPPS-A Increment 2 and DCGS-N Increment 2 had not yet established program baselines. As such, we compared these programs' latest schedule estimates to their initial schedule estimates.

**One Program Reported Meeting System Performance Targets, while Another Did Not; the Remaining Two Were in Planning Phase**

One of the four selected programs reported fully meeting its system performance targets, one did not fully meet its targets, and two programs did not yet have system performance data. Specifically, the Army's LMP Increment 2 program reported meeting its system performance targets, as of September 2014. In particular, while the program had identified 157 deficiencies with LMP Increment 2, wave 2, capabilities during developmental tests from January through September 2014, the program reported that these deficiencies were fully addressed by September 2014.

By contrast, the Air Force's JMS Increment 2 program reported experiencing system performance problems, which resulted in the system not performing as intended. Specifically, the program had identified category 1 and category 2 urgent deficiencies<sup>45</sup> prior to and during developmental and integrated testing from March through September 2014. As of November 2014, the program reported that it had addressed 96 percent of the category 1 deficiencies and 65 percent of the category 2 deficiencies. Program officials expected to address the remaining deficiencies in the program's next two releases, which were expected to be fielded beginning in October 2015 and February 2016, respectively.

Two programs did not yet have system performance data available. Specifically, Navy's DCGS-N Increment 2 and Army's IPPS-A Increment 2 programs were in the planning stages and had not yet fully developed any portion of their systems.

<sup>45</sup>Category 1 deficiencies are those that, among other things, critically restrict the combat readiness capabilities of the using organization; category 2 deficiencies are those that impede or constrain successful mission operations.

## Selected Programs Fully Implemented or Were on Track to Fully Implement Key Risk Management Practices

According to CMMI-ACQ and the PMBOK® Guide, an effective risk management process identifies potential problems before they occur, so that risk-handling activities may be planned and invoked, as needed, across the life of the project in order to mitigate adverse impacts on achieving objectives. Specifically, key risk management practices include

- identifying risks, threats, and vulnerabilities that could negatively affect work efforts;
- evaluating and categorizing each identified risk using defined risk categories and parameters, such as likelihood and consequence, and determining each risk’s relative priority;
- developing risk mitigation plans for selected risks to proactively reduce the potential impact of risk occurrence; and
- monitoring the status of each risk periodically and implementing the risk mitigation plan as appropriate.

Navy’s DCGS-N Increment 2 and Army’s LMP Increment 2 had defined and managed their key risks, while Army’s IPPS-A Increment 2 and Air Force’s JMS Increment 2 have made improvements and are in the process of finalizing their risk management practices. Table 8 provides a summary of the selected MAIS programs’ implementation of risk management best practices.

**Table 8: Selected MAIS Programs’ Implementation of Risk Management Best Practices**

Program	Implementation of best practices
DCGS-N Increment 2	●
IPPS-A Increment 2	Ⓜ
JMS Increment 2	Ⓜ
LMP Increment 2	●

● Fully implemented ● Partially implemented Ⓜ On track to fully implement ○ Not implemented

Source: GAO analysis of agency data. | GAO-15-282

## The Navy Program Had Implemented Key Risk Management Practices

DCGS-N Increment 2 is intended to converge afloat and ashore intelligence, surveillance, reconnaissance, and targeting capabilities into an integrated enterprise solution. This increment is also intended to replace the DCGS-N Increment 1 system and improve the Navy’s ability to process, exploit, and disseminate intelligence from the Navy’s intelligence, surveillance, and reconnaissance systems. Additionally, the

system is intended to enhance the Navy's ability to detect and identify maritime threats, and improve access to intelligence community data for Maritime Forces. DCGS-N Increment 2 capabilities are planned to be implemented in five releases. As of November 2014, DCGS-N Increment 2 expected to achieve milestone B (which authorizes a program to begin system development) in the second quarter of fiscal year 2016.

The DCGS-N Increment 2 program had implemented key risk management practices as part of its risk management process.

- **Identify risks, threats, and vulnerabilities that could negatively affect work efforts.** DCGS-N had identified risks, threats, and vulnerabilities that could negatively affect work efforts. For example, as of October 2014, a key risk for the program was the possibility of another Navy program not providing infrastructure needed by DCGS-N Increment 2 on time.
- **Evaluate and categorize each identified risk using defined risk categories and parameters, such as likelihood and consequence, and determine each risk's relative priority.** The program had evaluated and categorized its risks based on probability and impact. For example, as of October 2014, the program had categorized 1 of its 15 risks as low risk, 9 as medium risk, and 5 as high risk.
- **Develop risk mitigation plans for selected risks to proactively reduce the potential impact of risk occurrence.** DCGS-N had developed risk mitigation plans to proactively reduce the potential impact of risk occurrence. For example, to mitigate the medium-level risk that another Navy program may not provide infrastructure needed by DCGS-N Increment 2 on time, DCGS-N officials have been collaborating with officials from that other program to further define DCGS-N's infrastructure requirements and identify potential shortfalls.
- **Monitor the status of each risk periodically and implement the risk mitigation plan as appropriate.** DCGS-N monitored its risks and documented the status of risk mitigation actions that had been taken. For example, the program had monitored its risks on a monthly basis and tracked the open mitigation steps for each risk.

In taking these actions, the DCGS-N Increment 2 program had established and utilized effective risk management practices. Doing so should better position the program to mitigate adverse impacts from potential problems before they occur.

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## Army's Human Resources System Program Recently Took Steps to Address Risk Management Weaknesses

The Army's IPPS-A program is intended to provide a 24-hour, web-based, integrated human resources system to soldiers, human resources professionals, combatant commanders, personnel and pay managers, and other authorized Army users. Specifically, IPPS-A Increment 2 is to include four releases, which are intended to build on the database of personnel information that was delivered by IPPS-A Increment 1.

The IPPS-A Increment 2 program has efforts under way to improve risk management weaknesses described below.

- **Identify risks, threats, and vulnerabilities that could negatively affect work efforts.** The IPPS-A Increment 2 program had identified risks, threats, and vulnerabilities that could negatively affect work efforts. In May 2014, a new IPPS-A program manager was hired and directed the program to revamp its approach to risk management for IPPS-A Increment 2, which the program began to do in June 2014. As part of this revamped approach, officials planned to establish an updated risk management plan and validate IPPS-A Increment 2's risks. As of early January 2015, officials expected the program's risk management plan to be finalized by the end of January 2015. Additionally, the program completed its validation of program risks and mitigation plans in October 2014. For example, as of November 2014, a key risk for the program was the possibility that if the requirements for a certain capability were not adequately identified, then system deployment may be delayed and sensitive data could be compromised.
- **Evaluate and categorize each identified risk using defined risk categories and parameters, such as likelihood and consequence, and determine each risk's relative priority.** The program had evaluated and categorized its risks based on probability and consequence. For example, as of November 2014, the program had categorized 15 of its 18 risks as medium risk and 3 as high risk.
- **Develop risk mitigation plans for selected risks to proactively reduce the potential impact of risk occurrence.** The program had developed mitigation plans for its identified risks. For example, to mitigate the high-level risk that system deployment may be delayed if requirements were not adequately identified, the program planned to, among other things, establish a working group, identify lessons learned from other efforts, and engage the system integrator after its contract was awarded.

- **Monitor the status of each risk periodically and implement the risk mitigation plan as appropriate.** As part of improvements to its risk management process, the program also updated the charter for IPPS-A's Risk Management Control Board. As of early January 2015, the program expected to finalize this charter by the end of the month.

Once the program officials finalize the risk management plan and the Risk Management Control Board charter, the program should be better positioned to appropriately identify and mitigate program risks and avoid the likelihood that its risks materialize into issues.

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### The Air Force Program Had Taken Steps to Implement Risk Management Practices, and Is on Track to Resolve Risk Mitigation Weaknesses

Air Force's JMS program is intended to deliver service capabilities, such as a space catalog (knowledge of space objects) and predicting and reporting of orbital conjunctions (collisions of space objects); mission applications that are to enhance the accuracy, sustainability, and responsiveness of space surveillance capabilities; and infrastructure that will enable migration off of legacy systems. JMS increment 2 capabilities are to be implemented in four releases, which the program refers to as service packs 7, 9, 11, and 13. In November 2014, the program received temporary approval to modify the system so that a subset of the service pack 7 capabilities (about 90 percent) could be deployed into operations. Additionally, as of November 2014, the program was developing service pack 9 capabilities, designing service pack 11 capabilities, and planning the effort required for service pack 13.

The Air Force had taken steps to implement key risk management practices for JMS, and the program has a plan in place to improve its risk mitigation steps.

- **Identify risks, threats, and vulnerabilities that could negatively affect work efforts.** As of October 2014, the JMS program had identified program risks, threats, and vulnerabilities that could negatively affect work efforts. For example, a key risk identified for the program was the possibility that the deployment of space catalog capabilities would be delayed if the Joint Space Operations Center lacked resources in the future.
- **Evaluate and categorize each identified risk using defined risk categories and parameters, such as likelihood and consequence, and determine each risk's relative priority.** The program had evaluated and categorized its identified risks based on likelihood and impact. For example, as of October 2014, the program had

categorized 4 of its 14 risks as low risk, 5 as medium risk, and 5 as high risk.

- **Develop risk mitigation plans for selected risks to proactively reduce the potential impact of risk occurrence.** JMS had developed mitigation plans for its identified risks; however, aspects of those plans were not being developed in accordance with the program's risk management plan. Specifically, while JMS's risk management plan stated that the program should document planned dates for implementing its risk mitigation steps and track actual versus planned progress in implementing these steps, JMS did not always identify or track the planned and actual completion dates for all of its mitigation steps. In October 2014, program officials stated that, for the missing planned completion dates, the program needed more information to determine how best to mitigate that risk and, for the missing actual completion dates, the risk log was still in draft so the actual completion dates had not yet been incorporated into the log. JMS officials also stated that the program is in the process of updating its risk mitigation plans to align with the Space and Missile Systems Center's risk management standards. Officials expected to complete this alignment by March 2015 and intend to replace the planned dates with actual dates as the steps are completed.
- **Monitor the status of each risk periodically and implement the risk mitigation plan as appropriate.** The program monitored its risks and implemented its risk mitigation plans; however, as previously stated, the program was updating its mitigation plans to align with the Space and Missile Systems Center's risk management standards. JMS officials expected to complete this alignment by March 2015.

Once the Air Force program completes its updates to the risk mitigation plans, the program should be better positioned to appropriately mitigate program risks.

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## Army's Logistics System Program Implemented Key Risk Management Practices

The Army's LMP system is intended to streamline the maintenance, repair, and overhaul; planning; finance; acquisition; and supply of weapon systems, spare parts, services, and material for the Army's working capital fund. LMP is a key component of the DOD plan for achieving fully auditable financial statements by September 30, 2017, as required by the National Defense Authorization Act for Fiscal Year 2010. LMP Increment 2 is intended to fully enable near real-time, end-to-end supply chain visibility and, among other things, automate processes for tracking labor and material expenses, and improve processes for receiving, storing, and

issuing ammunition. LMP Increment 2 is to be developed in three waves, which are comprised of seven releases.

The Army had implemented key risk management practices for LMP.

- **Identify risks, threats, and vulnerabilities that could negatively affect work efforts.** The LMP program had identified risks, threats, and vulnerabilities that could negatively affect work efforts. For example, as of October 2014, one of the program's key risks was the possibility of the program not achieving financial auditability by the September 30, 2017, deadline established in the National Defense Authorization Act for Fiscal Year 2010.
- **Evaluate and categorize each identified risk using defined risk categories and parameters, such as likelihood and consequence, and determine each risk's relative priority.** The program had evaluated and categorized its risks based on probability and impact. For example, as of October 2014, LMP's Risk Management Board had categorized 5 of the program's 16 risks as low risk and 11 as medium risk; it did not categorize any risks as high risk.
- **Develop risk mitigation plans for selected risks to proactively reduce the potential impact of risk occurrence.** LMP had developed mitigation plans to proactively reduce the potential impact of risk occurrence. Specifically, the program office's risk log and the system integrator's risk log both outlined mitigation steps for their associated risks.
- **Monitor the status of each risk periodically and implement the risk mitigation plan as appropriate.** The program monitored its risks and documented the status of risk mitigation actions that had been taken. Specifically, in its monthly risk logs, the program documented the mitigation steps for each risk and tracked the implementation status of each of mitigation step.

In taking these actions, the LMP Increment 2 program had established and used effective risk management practices. Doing so should help enable the program to mitigate adverse impacts from potential problems before they occur.

## Selected Programs Have Made Mixed Progress in Applying Key IT Acquisition Best Practices

Key IT acquisition best practices identified by CMMI-ACQ, the PMBOK® Guide, and our prior work include, among other areas, requirements development and project planning. The four selected MAIS programs varied in their implementation of IT acquisition best practices for requirements development and project planning. Specifically, DCGS-N Increment 2 and IPPS-A Increment 2 were both in their planning phases and were in the process of implementing key requirements development practices. However, the JMS Increment 2 and LMP Increment 2 programs had not developed schedules that incorporated all selected scheduling best practices. Further, DOD had not fully developed a project plan for implementation of the LMP Increment 2 program, including when it would test the auditability of LMP Increment 2 functionality to ensure that such testing occurs prior to the LMP program management office deploying future functionality. Without fully implementing effective acquisition management practices, these programs may be at risk of not meeting planned cost and schedule milestones, and may implement systems that do not fully meet user needs.

Table 9 provides a summary of the selected MAIS programs' implementation of requirements development and project planning best practices.

**Table 9: Selected MAIS Programs' Implementation of Requirements Development and Project Planning Best Practices**

Program name	Requirements development	Project planning
DCGS-N Increment 2 <sup>a</sup>	Ⓜ	Ⓜ
IPPS-A Increment 2 <sup>a</sup>	Ⓜ	Ⓜ
JMS Increment 2	●	◐
LMP Increment 2	●	◐

● Fully implemented ◐ Partially implemented Ⓜ On track to fully implement ○ Not implemented

Source: GAO analysis of agency data. | GAO-15-282

<sup>a</sup>As of November 2014, DCGS-N Increment 2 and IPPS-A Increment 2 were both in their planning phases and were in the process of implementing many of the selected project planning and requirements development best practices.

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Two Selected MAIS Programs Fully Implemented Key Requirements Development Best Practices; Two Were on Track to do so

According to CMMI-ACQ and the PMBOK® Guide, effective requirements development involves<sup>46</sup>

- eliciting stakeholder needs, expectations, and constraints, and transforming them into prioritized customer requirements;
- developing and reviewing operational concepts and scenarios to refine and discover requirements;
- analyzing requirements to ensure that they are complete, feasible, and verifiable;
- analyzing requirements to balance stakeholder needs and constraints; and
- testing and validating the system as it is being developed.

Two of the four selected programs in our review had fully implemented these practices, while the other two were in the process of implementing them, as discussed in more detail below.

Navy's Program Was on Track to Implement Key Requirements Development Practices

The DCGS-N Increment 2 program was early in its planning phase and was in the process of implementing requirements development best practices.

- **Elicit stakeholder needs, expectations, and constraints, and transform them into prioritized customer requirements.** The program had elicited stakeholder needs, expectations, and constraints, and translated them into draft customer requirements. Specifically, officials stated that the program elicited customer requirements through weekly teleconferences and brainstorming sessions with stakeholders, and participated in DCGS-N Increment 1 post-deployment reviews to collect end-user satisfaction results. The program used the results of these activities to develop DCGS-N Increment 2's draft requirements. The Navy approved these requirements in October 2014, and program officials expected DOD's Joint Requirements Oversight Council to approve them in the second quarter of fiscal year 2015.

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<sup>46</sup>CMMI-ACQ, Version 1.3 (November 2010), and *PMBOK® Guide*, Fifth Edition, (2013).

- **Develop and review operational concepts and scenarios to refine and discover requirements.** DCGS-N had developed draft operational concepts and scenarios to refine and discover requirements. Similar to the program's requirements, the Navy approved the program's operational concepts in October 2014 and expected DOD's Joint Requirements Oversight Council to approve them in the second quarter of fiscal year 2015.
- **Analyze requirements to ensure that they are complete, feasible, and verifiable.** Given that the program was early in its planning phase and its requirements had not yet been approved by DOD (as discussed earlier), DCGS-N had not yet fully analyzed its draft requirements to ensure that they were complete, feasible, and verifiable. In December 2014, program officials stated that they were completing this analysis and expected to finish in February 2015.
- **Analyze requirements to balance stakeholder needs and constraints.** As discussed previously, DCGS-N officials did not expect the program's requirements to be approved by DOD until the second quarter of fiscal year 2015; accordingly, the program had not yet analyzed its draft requirements to balance stakeholder needs and constraints. Program officials stated that they planned to do this for the first release of DCGS-N Increment 2 by the end of the fourth quarter of fiscal year 2015 and planned to analyze requirements for releases 2 through 5 annually, consistent with the program's development approach.
- **Test and validate the system as it is being developed.** As stated previously, DCGS-N Increment 2 was early in its planning phase. Thus, the program had not started system development and could not yet test and validate the system to identify issues and unstated requirements.

Going forward, implementation of these remaining requirements development best practices should increase the likelihood that the program will deliver a system with all intended functionality to meet users' needs.

Army's Human Resources System Program Was in the Process of Implementing Key Requirements Development Practices

The Army's IPPS-A program was nearing the end of its planning phase and was in the process of implementing many of the selected requirements development best practices.

- **Elicit stakeholder needs, expectations, and constraints, and transform them into prioritized customer requirements.** The program had elicited stakeholder needs, expectations, and constraints, and translated them into draft customer requirements. Specifically, IPPS-A officials stated the program was leveraging the Army's portion of requirements that were developed for the now-canceled DOD-wide Defense Integrated Military Human Resources System program. According to officials, since fiscal year 2011, IPPS-A had been working to review and refine those requirements into lower-level requirements. The program's proposed requirements were documented in IPPS-A Increment 2's draft business case, which program officials expected to be approved by the end of January 2015. The Army had also prioritized IPPS-A Increment 2's draft requirements into four releases. These requirements and their associated releases were documented in the program's requirements traceability matrix.
- **Develop and review operational concepts and scenarios to refine and discover requirements.** IPPS-A had developed an operational concept to refine and discover requirements. For example, IPPS-A had developed a high-level graphic to visually depict the operational capabilities that the IPPS-A system is intended to provide. The program had also developed additional operational and system views for each of the program's four planned releases.
- **Analyze requirements to ensure that they are complete, feasible, and verifiable.** As discussed previously, IPPS-A Increment 2 was in its planning phase as of November 2014, and its requirements had not yet been approved by DOD. DOD officials stated that analysis of program requirements would be completed during the program's two system design reviews, which are intended to ensure that requirements are defined and feasible, and that the proposed design can meet those requirements within cost, schedule, and other system constraints. As of November 2014, these reviews were planned for the third quarter of fiscal year 2015 through the third quarter of fiscal year 2016.
- **Analyze requirements to balance stakeholder needs and constraints.** As discussed previously, IPPS-A officials do not expect the program's requirements to be approved by DOD until the end of January 2015. Officials stated that the program will analyze IPPS-A's requirements during the program's two system design reviews, which were planned for the third quarter of fiscal year 2015 through the third quarter of fiscal year 2016.

- **Test and validate the system as it is being developed.** As stated previously, as of November 2014, IPPS-A Increment 2 was in its planning phase. Thus, the program had not started system design and development and could not yet test and validate the system to identify issues and unstated requirements. IPPS-A officials expected the program's requirements to be validated by the program's systems integrator and program stakeholders in June 2015.

Implementation of these remaining requirements development practices should help ensure that the system will be developed with all intended functionality to meet users' needs.

The Air Force Program's Key Requirements Development Practices Were Sound

JMS had fully implemented key best practices for its requirements development process.

- **Elicit stakeholder needs, expectations, and constraints, and transform them into prioritized customer requirements.** JMS had elicited stakeholder needs, expectations, and constraints, and transformed them into prioritized customer requirements. Specifically, JMS had prioritized its requirements into four releases, which the program refers to as "service packs."
- **Develop and review operational concepts and scenarios to refine and discover requirements.** The program had reviewed operational concepts and scenarios to refine and discover requirements. For example, during an April 2014 user engagement session, the JMS program office reviewed with stakeholders from the Joint Space Operations Center an operational concept for one of the JMS system's mission applications.
- **Analyze requirements to ensure that they are complete, feasible, and verifiable.** The program analyzed its requirements to ensure that they were complete, feasible, and verifiable. For example, the program mapped its lower-level requirements to its higher-level requirements to ensure that the lower requirements would provide the essential capabilities needed to successfully conduct mission operations.
- **Analyze requirements to balance stakeholder needs and constraints.** The Air Force analyzed requirements to balance stakeholder needs and constraints. Specifically, the Air Force conducted prototypes to help determine the solution that would best

meet stakeholder needs, and leveraged lessons learned from building the prototypes to finalize requirements.

- **Test and validate the system as it is being developed.** JMS had tested and validated the system as it was being developed. For example, between March and September 2014, the program conducted developmental and integrated tests on the first service pack of JMS Increment 2. As a result of these tests, the program identified category 1 and category 2 urgent deficiencies.<sup>47</sup> As of November 2014, the program reported that it had addressed 96 percent of the category 1 deficiencies and 65 percent of the category 2 deficiencies. Program officials expected to address the remaining deficiencies in service packs 9 and 11, which are expected to be fielded beginning in October 2015 and February 2016, respectively.

As a result, the JMS program had established and utilized effective requirements development practices, which should increase the likelihood that the program delivers a system that meets users' needs.

Army's Logistics System  
Program Fully Implemented  
Key Requirements  
Development Best Practices

The Army had fully implemented key requirements development best practices for LMP Increment 2.

- **Elicit stakeholder needs, expectations, and constraints, and transform them into prioritized customer requirements.** LMP had elicited stakeholder needs, expectations, and constraints, and transformed them into prioritized customer requirements. Specifically, the program had prioritized its requirements into three waves, which are made up of seven releases.
- **Develop and review operational concepts and scenarios to refine and discover requirements.** LMP had developed and reviewed operational concepts and scenarios to refine and discover requirements. Specifically, the program reviewed and approved its operational concepts and scenarios at design reviews for each of its three waves.

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<sup>47</sup>Category 1 deficiencies are those that, among other things, critically restrict the combat readiness capabilities of the using organization; category 2 deficiencies are those that impede or constrain successful mission operations.

- **Analyze requirements to ensure that they are complete, feasible, and verifiable.** LMP had analyzed its requirements during design workshops to determine whether they were complete, feasible, and verifiable. As a result of this analysis, and due to funding and resource constraints, the program decided to defer selected ammunition-related requirements to a future increment.
- **Analyze requirements to balance stakeholder needs and constraints.** LMP analyzed requirements to balance stakeholder needs and constraints. For example, the program analyzed whether its lower-level requirements could be met by the planned commercial, off-the-shelf system solution. According to LMP program officials, if a requirement could not be met by the commercial system, stakeholders had to justify to senior management why it was necessary to spend money to develop the functionality to meet the requirement.
- **Test and validate the system as it is being developed.** LMP had tested and validated the system as it was being developed. For example, from January 2014 through September 2014, the program conducted developmental tests on LMP Increment 2, wave 2. During these tests the program identified 157 deficiencies and, as of September 2014, had addressed all of them.

As a result, the LMP program had established effective requirements development best practices, which should help ensure that the LMP system will be deployed with functionality that meets users' needs.

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**Air Force, Army, and Navy Programs Had Implemented Many Key Project Planning Practices, but Lacked Others**

According to CMMI-ACQ, the PMBOK® Guide, and our prior work, an effective project planning process establishes project objectives and outlines the course of action required to attain those objectives. It also provides a means to track, review, and report progress and performance of the project by defining project activities and developing cost and schedule estimates, among other things. Key activities in planning the program include

- establishing and maintaining the program's acquisition strategy;
- developing and maintaining the program's cost estimate;
- establishing and maintaining the program's schedule estimate;

- 
- identifying the necessary knowledge and skills needed to carry out the program, and ensuring staff have the needed knowledge and skills;
  - conducting business process reengineering;
  - developing and maintaining the overall project plan, and obtaining commitment from relevant stakeholders;
  - planning for the use of an IV&V agent; and
  - planning for and maintaining stable leadership.

The four selected programs varied in the extent to which they implemented these practices, as discussed in detail below.

#### The Navy Program Made Progress in Implementing Project Planning Practices

DCGS-N Increment 2 was early in its planning phase and was in the process of implementing many of the selected project planning best practices.

- **Establish and maintain the program's acquisition strategy.** The Navy was working to develop the program's acquisition strategy, which officials expected to be finalized in the third quarter of fiscal year 2015.
- **Develop and maintain the program's cost estimate.** The program office had developed and updated its pre-baseline cost estimate (see the DCGS-N Increment 2 profile in app. II for more details on these estimates). The program had not yet established its APB, which will include the program's life-cycle cost estimate approved by DCGS-N's milestone decision authority. Program officials expected the APB to be approved by DOD at milestone B, which was planned for the second quarter of fiscal year 2016.
- **Establish and maintain the program's schedule estimate.** Similar to the program's cost estimate, DCGS-N officials had developed and updated the program's pre-baseline schedule estimate (see the DCGS-N Increment 2 profile in app. II for more details on these estimates). The program had not yet established its APB—including a schedule estimate approved by the program's milestone decision authority—but expected to establish it at milestone B, which was planned for the second quarter of fiscal year 2016.

- **Identify the necessary knowledge and skills needed to carry out the program, and ensure staff have the needed knowledge and skills.** The program had not yet identified the necessary knowledge and skills needed to carry out the program; however, DCGS-N officials stated that they considered the program office to be fully staffed (excluding Lead System Integrator positions and contractor support). Officials reported that they expected to complete a knowledge and skills gap assessment during early fiscal year 2015.
- **Conduct business process reengineering.** DCGS-N Increment 2 is not designated as a defense business system that is subject to DOD business process reengineering assessment requirements;<sup>48</sup> accordingly, we did not assess the program's business process reengineering efforts.
- **Develop and maintain the overall project plan, and obtain commitment from relevant stakeholders.** DCGS-N had not yet developed an overall project plan. Officials reported that the project plan and other planning information, such as a resource plan and stakeholder involvement plan, are expected to be finalized in the third quarter of fiscal year 2015.
- **Plan for the use of an IV&V agent.** The program had planned for the use of an IV&V agent. Specifically, DCGS-N officials stated that IV&V will be part of the program's formal development test events. Officials expected planning for IV&V to occur in fiscal year 2015.
- **Plan for and maintain stable leadership.** The program had maintained stable leadership by establishing and aiming to carry out program manager tenure agreements. Specifically, since the program began in February 2009, there had been two program managers for DCGS-N—the first program manager was also the program manager for DCGS-N Increment 1 and completed his tenure with the DCGS-N program in September 2011, and the second program manager has been with the program since then to serve out his tenure.

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<sup>48</sup>10 U.S.C. § 2222(a) requires that, prior to the obligation of funds, defense business system program investments with a total cost in excess of \$1 million over the department's 6-year financial plan period (referred to as the Future-Years Defense Program) be certified as demonstrating that appropriate business process reengineering efforts have been undertaken.

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Army's Human Resources System Program Was Well Under Way in Its Implementation of Project Planning Practices

Implementation of these project planning best practices should better position the program to track program progress and manage the program going forward.

The Army was in the process of implementing selected practices for planning the IPPS-A Increment 2 program.

- **Establish and maintain the program's acquisition strategy.** The IPPS-A program was near the end of its planning phase and had developed a draft business case that outlined the high-level acquisition approach for the program. Officials expected the business case to be approved by the end of January 2015.
- **Develop and maintain the program's cost estimate.** The Army had developed a draft, pre-baseline life-cycle cost estimate for IPPS-A Increment 2. The program expected the cost estimate to be approved by DOD by the end of January 2015.
- **Establish and maintain the program's schedule estimate.** Similar to the program's cost estimate, IPPS-A had developed a draft, pre-baseline schedule estimate. The program expected the schedule estimate to be approved by DOD by the end of January 2015.
- **Identify the necessary knowledge and skills needed to carry out the program, and ensure staff have the needed knowledge and skills.** The IPPS-A program had ensured existing staff had the needed knowledge and skills to perform their designated responsibilities, but the Army had not yet identified the necessary knowledge and skills needed to carry out the program. Specifically, while the program prepared a preliminary estimate in October 2013 that indicated the program was at about a 42 percent staffing level, in response to our inquiries, IPPS-A Increment 2 officials told us in January 2015 that they were reassessing the program's staffing requirements to determine what gaps currently exist and did not yet know when the assessment would be complete. Once the program completes this analysis and takes steps to fill any existing skill gaps, the IPPS-A program should be better positioned to deliver the system on time and within budget.
- **Conduct business process reengineering.** The IPPS-A Increment 2 program completed its second—and most recent—business process reengineering effort in October 2014. According to program officials, this included the assessment of 146 business processes associated with IPPS-A Increment 2 against the commercial, off-the-shelf product

the program plans to use. Officials stated that this effort reduced the number of needed business processes from 146 to 31. The program completed its assessment near the end of our audit; thus, we did not review the results of this assessment.

- **Develop and maintain the overall project plan, and obtain commitment from relevant stakeholders.** IPPS-A had developed draft program planning documents, such as the program's business case, risk management plan, and systems engineering plan. IPPS-A obtained commitment from relevant stakeholders for the systems engineering plan in September through December 2014, and officials expected to obtain stakeholder commitment for the other documents by the end of January 2015. Additionally, the program had developed draft cost and schedule estimates, which the program expected to be approved by the end of January 2015.
- **Plan for the use of an IV&V agent.** The IPPS-A Increment 2 program had not yet developed specific plans for the use of an IV&V agent; however, in August 2014, the recently hired IPPS-A program manager stated that he planned to use an IV&V agent for the program. IPPS-A officials also stated that the Army's Program Executive Office for Enterprise Information Systems had engaged an IV&V agent that IPPS-A Increment 2 could use.
- **Plan for and maintain stable leadership.** As of November 2014, the IPPS-A Increment 2 program was still in its planning phase and had maintained stable leadership by establishing and intending to carry out program manager tenure agreements. Specifically, according to program officials, IPPS-A had two program managers since IPPS-A Increment 2 was initiated in October 2011. The tenures of these program managers were: October 2011 to May 2014, and May 2014 to present (as of November 2014). According to IPPS-A officials, the first program manager (who was also a program manager for IPPS-A Increment 1) left in May 2014 after the IPPS-A Increment 1 program achieved two milestones, which officials stated was a requirement identified in the program manager's tenure agreement. The current program manager has a 4-year, 3-month tenure agreement.

Establishing and using these project planning best practices should increase the likelihood that the program will be effectively implemented and managed going forward.

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The Air Force Program Had Implemented Most Project Planning Best Practices, but the Program's Schedule Estimate Was Not Reliable

The program had implemented nearly all key practices for project planning, but the program's schedule estimate was not reliable.

- **Establish and maintain the program's acquisition strategy.** JMS had established and maintained its acquisition strategy. For example, the strategy identified the capabilities that the program is intended to deliver, the acquisition approach, and the type of supplier agreements that will be used to procure commercial software and licenses, and engineering support services.
- **Develop and maintain the program's cost estimate.** JMS had developed and maintained a life-cycle cost estimate that substantially met selected best practices for developing a reliable cost estimate. Specifically, consistent with best practices from our cost guide,<sup>49</sup> JMS had determined the cost estimating structure, including developing a work breakdown structure and a dictionary that defined the scope of each work breakdown structure element;<sup>50</sup> identified ground rules and assumptions; obtained historical data to provide insight into actual costs on similar programs; and developed the point estimate<sup>51</sup> and compared it to an independent cost estimate.
- **Establish and maintain the program's schedule estimate.** Of the three selected scheduling best practices that we evaluated from our schedule assessment guide exposure draft,<sup>52</sup> the program had substantially met one of the practices (capturing all activities in the schedule) and partially met the other two. JMS's schedule estimate partially met the best practice of sequencing all activities within the schedule. Specifically, according to best practices, activities should be logically sequenced in the order that they are to be carried out, and no artificial date constraints should be included in the schedule. However, the program had used artificial schedule constraints (e.g., specifying a specific date by which an activity must start) on 69 of its

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<sup>49</sup>[GAO-09-3SP](#).

<sup>50</sup>A work breakdown structure defines, in detail, the work necessary to accomplish a project's objectives.

<sup>51</sup>A point estimate is a single cost estimate number representing the most likely cost.

<sup>52</sup>[GAO-12-120G](#).

remaining 1,849 milestone and detail<sup>53</sup> activities, which affected the schedule's ability to properly calculate dates and predict changes in the future. Without the correct linkages between activities, the schedule cannot predict future delays or identify opportunities for efficiency where activities may start earlier than originally planned.

Further, the program's schedule estimate partially met the best practice of updating the schedule with actual progress and logical relationships between activities (e.g., identifying predecessor and successor activities, and identifying dependencies between those activities in order to depict the sequence in which activities occur). Specifically, best practices call for the schedule to be updated with actual dates, dependencies between activities, and progress in order to adjust forecasts of when the remaining effort will occur. Additionally, all changes made to the schedule should be documented and justified, along with their likely effect on future planned activities.

While JMS's schedule had been updated to reflect current progress, the schedule had more than 100 illogical or incongruous data points and did not have a well-documented narrative explaining the status updates. For example, the schedule showed that progress had been made in conducting a developmental activity, but the schedule did not identify an actual start date for that activity. Program officials attributed the data inconsistencies to the program's use of an Agile development methodology. In particular, officials stated that there are time lags associated with its activities because details are not incorporated into the schedule until developmental periods—which may include multiple developmental activities—are completed. Additionally, program officials stated that they only document significant changes in the schedule narrative. However, these data inconsistencies and lack of a narrative explaining all updates made to the schedule make the reliability of the schedule questionable. Until such inconsistencies in the schedule's data are corrected, management will be limited in its understanding of what work has been started or completed to date. Further, until these schedule issues are addressed, it will be unclear whether the program will be able to meet the planned dates for its remaining milestones (see app.

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<sup>53</sup>Detail activities (also known as "normal" or "work" activities) are at the lowest level of the work breakdown structure and represent actual discrete work that is planned to be performed in the project.

ll for more information on JMS's remaining schedule milestones and dates).

- **Identify the necessary knowledge and skills needed to carry out the program, and ensure staff have the needed knowledge and skills.** DOD identified the necessary knowledge and skills needed to carry out the program, and ensured that staff had the required knowledge and skills. For example, in 2012, DOD conducted an independent program assessment of JMS Increment 2 and identified the knowledge and skills needed to perform the program, such as the need for a certified developmental and operational testing lead. Subsequently, according to JMS officials, the program hired additional personnel based on the results of the independent assessment.
- **Conduct business process reengineering.** JMS Increment 2 is not designated as a defense business system that DOD subjects to business process reengineering assessment requirements; as such, we did not assess the program's business process reengineering efforts.<sup>54</sup>
- **Develop and maintain the overall project plan, and obtain commitment from relevant stakeholders.** JMS had established and maintained its project planning documentation, including the acquisition strategy, and obtained commitment from relevant stakeholders. For example, the program received approval for its acquisition strategy from senior management, including the Secretary of the Air Force and the USD (AT&L). Additionally, these planning documents have been periodically updated to reflect changes to the program. For example, the program added an addendum to its acquisition strategy after it had further defined the contract strategy and scope for JMS Increment 2.
- **Plan for the use of an IV&V agent.** The program planned for and used an IV&V agent to conduct developmental and integrated testing on the system. For example, from March 2014 to September 2014, an

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<sup>54</sup>10 U.S.C. § 2222(a) requires that, prior to the obligation of funds, defense business system program investments with a total cost in excess of \$1 million over the department's 6-year financial plan period (referred to as the Future-Years Defense Program) be certified as demonstrating that appropriate business process reengineering efforts have been undertaken.

independent Air Force test agency evaluated a subset of capabilities of the JMS system.

- **Plan for and maintain stable leadership.** While the program experienced early turnover with the program managers, more recently the program had planned for and maintained stable leadership. Specifically, the program reported that it has had three program managers since JMS Increment 2 was initiated in December 2011. The tenures of these program managers were December 2011 to June 2012, June 2012 to May 2014, and May 2014 to present (as of November 2014). According to JMS officials, the first program manager (who was also the program manager prior to the 2011 decision to restructure the JMS program from a single increment into multiple increments) retired in June 2012, and the second program manager left in May 2014 after he was promoted to another position. The current program manager has been assigned to the program for a minimum of 3 years, per the Air Force's typical tenure agreement terms.

Army's Logistics System Program Implemented Key Project Planning Best Practices, but More Work Remains

Similar to JMS, the Army had implemented project planning best practices for LMP Increment 2, but the program had not implemented all selected schedule estimating best practices or fully developed a project plan for when it will conduct auditability testing of LMP Increment 2 functionality to ensure that such testing occurs prior to the LMP program management office deploying future functionality.

- **Establish and maintain the program's acquisition strategy.** LMP had established and maintained its acquisition strategy. For example, the program's business case identified the capabilities that the program is intended to deliver, as well as the planned approach for acquiring LMP Increment 2.
- **Develop and maintain the program's cost estimate.** LMP had developed and maintained a life-cycle cost estimate that substantially met selected best practices for developing a reliable cost estimate. Specifically, consistent with best practices from our cost guide,<sup>55</sup> LMP Increment 2 had substantially determined the cost estimating structure, including developing a work breakdown structure and associated dictionary; identified assumptions used in developing the

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<sup>55</sup>[GAO-09-3SP](#).

estimate; obtained historical data to provide insight into actual costs on similar programs; and developed the point estimate and compared it to a second cost estimate developed outside of the program office.

- **Establish and maintain the program’s schedule estimate.** Of the three selected scheduling best practices that we assessed, the program had substantially met two of the practices and partially met one of the practices. LMP had substantially met the best practices of capturing all activities in the schedule and updating it with actual progress and logical relationships between activities. The program’s schedule estimate partially met the best practice of sequencing all activities. As of October 2014, the program’s schedule had a large number of unjustified constraints (e.g., specifying a date that an activity must start); potential issues with several activities that all must be completed before a single successor activity can begin, which decreases the chances of the successor activity starting on time; and a significant number of leads, which allow successor activities to start before their predecessor activities are completed. These scheduling practices had affected the schedule’s ability to properly calculate dates and predict changes in the future.

LMP officials acknowledged these issues and stated that they would update the schedule to correct the issues by the end of October 2014. However, as of November 2014, while the program had improved the schedule to remove all leads in it, the schedule continued to have a large number of unjustified constraints on activity start dates, and had a lag on an activity that is being used to delay the start date of a successor activity by more than a month without justifying the delay.<sup>56</sup> Program officials stated that they believe their current process is working and that they do not consider it worth the effort to update the schedule to justify these delays. Nevertheless, until the program either justifies why these constraints and lag are needed in the schedule or removes them, the program will be limited in its ability to use the schedule to identify opportunities for efficiency and, when available, to start activities earlier than originally planned.

- **Identify the necessary knowledge and skills needed to carry out the program, and ensure staff have the needed knowledge and skills.** The program had identified the necessary knowledge and skills

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<sup>56</sup>A lag in a schedule denotes the passage of time between two activities.

needed to carry out the program, and ensured existing staff had the needed knowledge and skills. For example, LMP officials stated that when the program began they had conducted an assessment to determine the program's necessary knowledge and skills. Officials also stated that the program management office used what they learned from implementing LMP Increment 1 when they assessed the necessary knowledge, skills, and abilities needed to successfully deliver LMP Increment 2. Additionally, the program had ensured that its acquisition staff were appropriately certified for their positions.

- **Conduct business process reengineering.** The LMP program had reengineered its business processes. For example, according to officials, in May 2014, the program submitted a business process reengineering assessment to the Army's Office of Business Transformation and DOD's Office of the Deputy Chief Management Officer. Based on this assessment, the program determined that LMP Increment 2 would use 57 existing business processes from LMP Increment 1, modify 60 existing processes, and add 13 new business processes to support the requirements for Increment 2. This submission also provided supporting objective evidence for the program's assessment.<sup>57</sup>
- **Develop and maintain the overall project plan, and obtain commitment from relevant stakeholders.** DOD had not developed and maintained a comprehensive program plan for development of LMP Increment 2, including auditability testing of the Increment 2 system. Specifically, while the LMP program had developed and obtained commitment from stakeholders for a plan that covered key program planning aspects, such as defining the program's budget, schedule, and acquisition approach, LMP Increment 2's program plan did not include time frames for when the auditability of the overall LMP system would be tested. However, as previously stated, LMP is a key component of DOD's plan for achieving fully auditable financial statements by fiscal year 2017. The lack of auditability-testing time frames in the program's schedule was also identified in a January 2012 report by the House Armed Services Committee's Panel on Defense Financial Management and Auditability Reform;<sup>58</sup> the report

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<sup>57</sup>We reviewed whether LMP had provided supporting objective evidence for its business process reengineering assessment, but we did not evaluate the quality of the assessment.

<sup>58</sup>House Armed Services Committee Panel on Defense Financial Management and Auditability Reform Findings and Recommendations (Jan. 24, 2012).

recommended that enterprise resource planning program offices—including LMP—integrate milestones from DOD’s Financial Improvement and Audit Readiness strategy for achieving auditability into their program schedules.<sup>59</sup>

According to LMP and officials from the Office of the Assistant Secretary of the Army (Financial Management and Comptroller) (ASA (FM&C)), the LMP program office is not responsible for planning or testing the overall auditability of the LMP system; instead, these officials stated that the office of the ASA (FM&C) holds this responsibility. However, ASA (FM&C) did not have a plan for auditability testing of LMP Increment 2 functionality. As a consequence, LMP had deployed four releases without determining whether auditability testing was needed. Only recently, in November 2014, and in response to our inquiries—nearly 11 months after release 1 was deployed, and 3 months after releases 2, 3, and 4 were deployed—did the Army reportedly assess these releases to determine if any of the new functionality needed to be tested to ensure it enabled auditability.

Further, ASA (FM&C) had not yet begun to develop a plan for auditability testing of LMP Increment 2 wave 3 functionality, which is to include releases 5, 6, and 7. The Army Working Capital Fund Audit Readiness Director, ASA (FM&C) said that he expects that wave 3 functionality will impact auditability functions. In lieu of a plan that outlined time frames for the auditability testing of LMP, the Director stated that ASA (FM&C) expects to assess which functionality needs auditability testing after the LMP program management office deploys the new functionality. As a result, the LMP Increment 2 program will continue to develop and deploy new functionality without knowing whether the functionality enables auditability of the system. Until ASA (FM&C) completes a plan for conducting auditability testing of LMP Increment 2 functionality to ensure that such testing occurs prior to the LMP program management office deploying future functionality, DOD will be limited in its assurance that it is developing and deploying needed functionality for financial management improvement and audit readiness.

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<sup>59</sup>We have ongoing work to examine DOD’s efforts to address the recommendations made in this January 2012 report by the House Armed Services Committee’s Panel on Defense Financial Management and Auditability Reform.

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- **Plan for the use of an IV&V agent.** The LMP program planned for and used an IV&V agent. For example, as of October 2014, an IV&V contractor had reviewed areas such as testing and training for LMP Increment 2, wave 3.
  - **Plan for and maintain stable leadership.** The program had planned for and maintained stable leadership by establishing and intending to carry out its program manager tenure agreements. Specifically, the LMP Increment 2 program had two program managers since the program began in December 2011. The tenures of these program managers were December 2011 to July 2014 and July 2014 to present (as of December 2014). The current program manager was assigned to the program for 3 years, consistent with the Army's typical tenure agreement terms.

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## Conclusions

Without baselines, MAIS programs are allowed to spend hundreds of millions of dollars without concern for meeting cost, schedule, or performance targets. Additionally, such programs are subject to limited oversight by USD (AT&L) and Congress until they establish their baselines. This is especially problematic when a majority of MAIS programs are taking more than 2 years to baseline, and in some cases are taking up to 9 years and spending—on average—\$452 million. Until MAIS programs are required to establish cost, schedule, and performance baselines within 2 years of starting, they may continue along this troubling course, and fail to use more incremental development best practices, as called for by federal law and OMB guidance.

Notably, over half of the selected MAIS programs have met or planned to meet the statutorily established time frame to fully deploy capabilities within 5 years; four programs that were unable to do so, however, met their statutory obligations to report specific information to congressional defense committees in response to the breach. This reporting requirement and the additional subsequent oversight provided by DOD and Congress will help to ensure that programs are held accountable for delivering the intended functionality to users within agreed-upon costs and time frames.

Of the four selected MAIS programs, three had experienced a cost increase, schedule slippage, or system performance problems. Consequently, these programs were either costing more than planned or taking longer than planned—or the systems had not performed as intended.

While all four had implemented best practices in the key areas of risk management, requirements development, and project planning, areas for improvement exist. Specifically, until the inconsistencies in the Air Force's JMS Increment 2 program's schedule are addressed, management's understanding and oversight of the program will continue to be limited. Additionally, the Army's LMP Increment 2 program's use of unjustified constraints on planned activities in its schedule limits the program's ability to use the schedule to identify opportunities for efficiency. Moreover, until ASA (FM&C) develops a plan for conducting auditability testing of LMP Increment 2 functionality, DOD will be limited in its assurance that it is developing and deploying releases that will enable LMP to have fully auditable financial statements.

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## Recommendations for Executive Action

We are making four recommendations, in total. First, we recommend that the Secretary of Defense direct the Under Secretary of Defense for Acquisition, Technology, and Logistics to require MAIS programs to establish their first APB within 2 years of beginning work on the programs.

We recommend that the Secretary of Defense direct the Secretary of the Air Force to direct the JMS program office to develop a schedule that fully incorporates best practices, including sequencing all activities and updating the schedule with actual progress and logic.

We also recommend that the Secretary of Defense direct the Secretary of the Army to direct the LMP program office to develop a schedule that fully incorporates the best practice of properly sequencing all schedule activities.

Additionally, we recommend that the Secretary of Defense direct the Secretary of the Army to direct the Army (Financial Management and Comptroller) to complete a plan for conducting auditability testing of LMP Increment 2 functionality to ensure that such testing occurs prior to the LMP program management office deploying future functionality.

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## Agency Comments and Our Evaluation

We received written comments on a draft of this report from DOD's Assistant Secretary of Defense (Acquisition). The comments are reprinted in appendix IV.

In its comments, the department concurred with three of our four recommendations and partially concurred with the other one. Specifically, the department concurred with our recommendations that the JMS and

LMP programs develop schedules that fully incorporate best practices, and our recommendation that the Army (Financial Management and Comptroller) complete a plan for conducting auditability testing of LMP Increment 2 functionality to ensure that such testing occurs prior to the LMP program management office deploying future functionality.

The department partially concurred with our recommendation to require MAIS programs to establish their first APB within 2 years of beginning work on the programs. In this regard, the department stated that it agreed with the sentiment that an APB should be established as soon as possible. However, DOD commented that the 2-year time frame is too specific and problematic. Specifically, the department stated that the time needed to establish a reliable APB depends on the period the program must spend in the technology maturation and risk reduction phase of acquisition (during this phase a program is to determine the preferred technology solution and validate that it is affordable, satisfies program requirements, and has acceptable technical risk). The department specified that some programs will require considerable time in this phase while others will not.

Rather than requiring programs to baseline within 2 years, in its comments, the department stated it would like to develop a nuanced policy that accommodates the variety of risks found among MAIS programs and also outlined potential ideas for a new policy that it is considering, such as setting target dates for baselining and reporting progress. The department noted that, prior to establishing such a policy, considerable work and coordination among the department's components is necessary.

We support the department's tentative plans to begin working to develop a new policy on establishing APBs for MAIS programs; however, we maintain that establishing a baseline within 2 years of beginning work is a reasonable expectation. As previously discussed, MAIS programs that have not established APBs receive less oversight from USD (AT&L) and Congress than those that have established APBs. And, while we agree that programs should spend a sufficient amount of time in planning to ensure that the preferred technology solution is appropriate and acceptable, we disagree that the 2-year time frame is too specific and problematic. As we stated in the report, programs that require more than 2 years to commit to a cost and schedule baseline are likely too large and complex and could benefit from being divided into smaller increments with fewer requirements and less risk. In fact, our report showed that restructuring programs into smaller increments helped them to

successfully reach full deployment decision within 5 years. Developing IT solutions in smaller increments—as advocated by the Defense Science Board, federal statute, and OMB guidance—increases the likelihood that a program will achieve its cost, schedule, and performance goals.

In addition, the department provided an explanation of steps it has taken to address our recommendation that the JMS program develop a schedule that fully incorporates best practices, including sequencing all activities and updating the schedule with actual progress and logic. In this regard, the department explained that the JMS program had removed the 69 activities that we found had artificial schedule constraints. However, the program's schedule also had more than 100 illogical or incongruous data points and did not have a well-documented narrative explaining updates made. Therefore, while the program's reported actions should help improve their schedule, additional actions are still needed to fully implement our recommendation.

In addition, we received technical comments from DOD officials, which we have incorporated, as appropriate.

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We are sending copies of this report to the appropriate congressional committees; the Secretary of Defense; and other interested parties. This report also is available at no charge on the GAO website at <http://www.gao.gov>.

Should you or your staffs have any questions on information discussed in this report, please contact me at (202) 512-4456 or [ChaC@gao.gov](mailto:ChaC@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.



Carol R. Cha  
Director  
Information Technology Acquisition Management Issues

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*List of Committees*

The Honorable John McCain  
Chairman

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

The Honorable Ron Johnson  
Chairman

The Honorable Thomas R. Carper  
Ranking Member  
Committee on Homeland Security and Governmental Affairs  
United States Senate

The Honorable Thad Cochran  
Chairman

The Honorable Richard J. Durbin  
Ranking Member  
Subcommittee on Defense  
Committee on Appropriations  
United States Senate

The Honorable Mac Thornberry  
Chairman

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

The Honorable Jason Chaffetz  
Chairman

The Honorable Elijah Cummings  
Ranking Member  
Committee on Oversight and Government Reform  
House of Representatives

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The Honorable Rodney Frelinghuysen  
Chairman  
The Honorable Pete Visclosky  
Ranking Member  
Subcommittee on Defense  
Committee on Appropriations  
House of Representatives

# Appendix I: Descriptions of Selected MAIS Programs

Table 10 provides descriptions of each of the selected MAIS programs that are included in this review.

**Table 10: Selected DOD MAIS Programs**

Component/ Program Name	Description
<b>Air Force</b>	
Air Force Integrated Personnel and Pay System (AFIPPS)	Intended to provide a comprehensive, web-based solution to integrate existing personnel and pay processes from 30 of the Air Force's existing systems into one self-service system that can be accessed worldwide. Further, it is intended to support the Air Force's Regular, Reserve, and Air National Guard components.
Base Information Transport Infrastructure Wired (BITI Wired)	Expected to provide the core network infrastructure, such as network cables and servers, for over 150 active duty, Air Force Reserve, and Air National Guard bases. Specifically, the program is to update the fixed local area network and all necessary information transport infrastructure in order to support current and future communications needs of the Air Force and Joint Command warfighter.
Base Information Transport Infrastructure Wireless (BITI Wireless)	The program provides a secure wireless infrastructure, which includes features such as intrusion detection, monitoring, and central administration that incorporates high-availability and multitiered network administration for wireless entry into local area networks at 97 Air Force bases worldwide.
Defense Enterprise Accounting and Management System (DEAMS) Increment 1	The program is intended to provide 60 percent of the Air Force with the entire spectrum of financial management capabilities, including collections; commitments and obligations; cost accounting; general ledger; funds control; receipts and acceptance; accounts payable and disbursement; billing; and financial reporting. DEAMS is also intended to be a key component of the DOD plan for achieving fully auditable financial statements by September 30, 2017, as required by the National Defense Authorization Act for Fiscal Year 2010.
Expeditionary Combat Support System (ECSS) Increment 1	It is to provide the Air Force with a single, integrated logistics system—including transportation, supply, maintenance and repair, engineering, and acquisition. ECSS was also intended to provide financial management and accounting functions. It was to be a key component of the DOD plan for achieving fully auditable financial statements by September 30, 2017, as required by the National Defense Authorization Act for Fiscal Year 2010. However, the program was canceled in December 2012.
Financial Information Resource System (FIRST)	The system maintained an inventory of the department's force structure (i.e., organizations, weapons systems, and flying hours), and enabled users to perform functions such as allocating aircraft vehicles and forecasting future aircraft attrition. FIRST was retired in July 2013.
Joint Space Operations Center Mission System (JMS) Increment 1	Intended to provide an integrated, network-based, space situational awareness and command and control capability for the Joint Force Component Commander for Space at the Joint Space Operations Center near Lompoc, California. Specifically, it established the foundational capabilities for future JMS increments, including deploying an initial set of operator mission tools, such as providing automated links to existing data sources and a user-defined operational picture to integrate and display information.

**Appendix I: Descriptions of Selected MAIS Programs**

<b>Component/ Program Name</b>	<b>Description</b>
JMS Increment 2	It is intended to provide an integrated, network-based, space situational awareness and command and control capability for the Joint Force Component Commander for Space at the Joint Space Operations Center near Lompoc, California. Specifically, JMS Increment 2 is intended to provide service capabilities (e.g., a catalog of space objects, and predicting and reporting of collisions of space objects) and mission applications that are to enhance the accuracy, sustainability, and responsiveness of space surveillance capabilities. Additionally, JMS Increment 2 will provide infrastructure that will enable migration off of legacy systems.
<b>Army</b>	
Distributed Common Ground System-Army (DCGS-A) Increment 1	The program is intended to be the Army's primary system for collecting, processing, integrating, and displaying intelligence, surveillance, and reconnaissance information about potential adversarial forces, the weather, and the terrain to Army Commanders at all echelons. It is intended to acquire and synthesize data from multiple intelligence sources, such as humans, geospatial information (e.g., imagery of earth's terrain), and information derived from electronic transmissions.
Global Combat Support System-Army (GCSS-Army)	It is to provide all active Army, National Guard, and Army Reserve tactical units worldwide with the capability to track supplies, spare parts, and organizational equipment. It is also to be used to track unit maintenance, total cost of ownership, and other financial transactions related to logistics for all Army units. Additionally, GCSS-Army is intended to be a key component of the DOD plan for achieving fully auditable financial statements by September 30, 2017, as required by the National Defense Authorization Act for Fiscal Year 2010.
Integrated Personnel and Pay System-Army (IPPS-A) Increment 1	This increment is intended to provide a 24-hour, web-based, integrated human resources system to soldiers, human resources professionals, combatant commanders, personnel and pay managers, and other authorized Army users. Specifically, IPPS-A Increment 1 is intended to provide a consolidated, foundational database of trusted personnel data that is extracted from 15 existing human resources systems (additional functionality is intended to be part of a different MAIS program—IPPS-A Increment 2, as discussed below).
IPPS-A Increment 2	This subsequent increment is intended to provide a 24-hour, web-based, integrated human resources system to soldiers, human resources professionals, combatant commanders, personnel and pay managers, and other authorized Army users. Specifically, IPPS-A Increment 2 is intended to provide integrated personnel and pay services for all Army Components (Active, National Guard, and Reserve), building on the database delivered by the IPPS-A Increment 1 program.
Logistics Modernization Program (LMP) Increment 2	It is intended to streamline the maintenance, repair, and overhaul; planning; finance; acquisition; and supply of weapon systems, spare parts, services, and material for the Army's working capital fund. LMP is a key component of the DOD plan for achieving fully auditable financial statements by September 30, 2017, as required by the National Defense Authorization Act for Fiscal Year 2010. LMP Increment 2 is intended to fully enable real-time, end-to-end supply chain visibility and, among other things, automate processes for tracking labor and material expenses, and improve processes for receiving, storing, and issuing ammunition.
Tactical Mission Command (TMC)	It is a suite of products—including both hardware and software—that are intended to provide Army and joint community commanders and their staffs with improved battle command capabilities, such as real-time situational awareness, and displays of unified information on subject matters, such as friendly forces and enemy forces (referred to as the common operational picture). TMC products have been fielded worldwide and are intended to support decision making, planning, rehearsal, and execution management.

**Appendix I: Descriptions of Selected MAIS Programs**

**Defense Health Agency**

Integrated Electronic Health Record (iEHR) Increment 1	It is to provide the infrastructure and services for standardizing and integrating electronic healthcare data between DOD's and VA's systems. Specifically, increment 1 of iEHR is intended to provide DOD with seven capabilities: (1) enhance user sign-in, (2) enhance medical record views among multiple systems, (3) allow users to roam among multiple devices, (4) upgrade a DOD medical record database, (5) deploy a testing facility for DOD and VA electronic record integration, (6) develop a pilot to consolidate data centers, and (7) develop a pilot graphical user interface.
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**Defense Logistics Agency**

Defense Agencies Initiative (DAI) Increment 1	The system is intended to modernize the financial management processes of 21 defense agencies and components by streamlining financial management capabilities and transforming the budget, finance, and accounting operations. When DAI is fully implemented, it is expected to have the capability to control and account for all appropriated working capital and revolving funds at each of the 21 agencies and components. DAI is also intended to be a key component of the DOD plan for achieving fully auditable financial statements by September 30, 2017, as required by the National Defense Authorization Act for Fiscal Year 2010.
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EProcurement	Intended to provide enterprise-wide procurement capabilities, such as managing purchase requests and contract awards, for Defense Logistics Agency acquisition and procurement users. The system is to replace multiple legacy procurement systems to reduce redundancy and cost, and to standardize a contract writing and administration methodology across the agency.
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**Navy**

Common Aviation Command and Control System (CAC2S) Increment 1	Expected to be a scalable and flexible command, control, and communications system of systems that can be deployed via Humvees, helicopters, airplanes, amphibious ships, and landing craft within 24 hours of receiving a movement order, to effectively command, control, and coordinate aviation operations.
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Consolidated Afloat Networks and Enterprise Services (CANES)	Designed to consolidate and standardize the Navy's existing network infrastructures and services. This system is intended to, among other things, reduce and eliminate existing standalone afloat (i.e., surface ships and submarines) networks, provide a technology platform that can rapidly adjust to changing warfighting requirements, and reduce the hardware footprint on 259 afloat and maritime operations center platforms.
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Distributed Common Ground System-Navy (DCGS-N) Increment 1	Intended to provide integration of intelligence, surveillance, reconnaissance, and targeting support capabilities to the Navy's commanders on vessels and ashore to increase their battlespace awareness. It is intended to merge three existing Navy intelligence, surveillance, and reconnaissance systems into a single system.
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DCGS-N Increment 2	This increment is expected to converge afloat and ashore intelligence, surveillance, reconnaissance, and targeting capabilities into an integrated enterprise solution. It is to replace the DCGS-N Increment 1 system and improve the Navy's ability to process, exploit, and disseminate intelligence from the Navy's intelligence, surveillance, and reconnaissance systems. Additionally, the system is intended to enhance the Navy's ability to detect and identify maritime threats, and improve access to intelligence community data for Maritime Forces.
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Global Combat Support System-Marine Corps (GCSS-MC) Increment 1	Intended to be the primary technology enabler for the Marine Corps logistics modernization strategy and provides the backbone for all logistics information required by the Marine Air Ground Task Force. GCSS-MC Increment 1 is intended to support logistics planners and operators worldwide to manage combat logistics, including planning, warehousing, distribution, depot maintenance, and asset visibility.
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**Appendix I: Descriptions of Selected MAIS Programs**

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Navy Enterprise Resource Planning (ERP)	According to DOD officials, Navy ERP streamlines the Navy's financial and supply-chain management business operations to enable visibility to senior leadership. In addition, DOD officials stated that it enables financial compliance and auditability. In particular, Navy ERP replaced segregated legacy systems with a single integrated software system that provides an end-to-end supply chain solution for receiving, processing, and fulfilling requests for resources; integrated financial management; workforce management; inventory management; material operations; and rapid response to logistical needs of operating forces.
Next Generation Enterprise Network (NGEN) Increment 1	The program is to replace and improve the enterprise network and services (e.g., data storage, e-mail, and video teleconferencing) that were provided by the Navy Marine Corps Intranet through a department-wide network services contract to Navy and Marine Corps personnel worldwide. NGEN Increment 1 will transition the service provider, while maintaining the same network infrastructure and services that were provided by the Navy Marine Corps Intranet. Increment 1 is also intended to form the foundation for the Navy's future networking environment.

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Source: Data provided by DOD officials.

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# Appendix II: Profiles of Selected MAIS Programs

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This section contains profiles of the four selected major automated information system (MAIS) programs for which we determined whether they had changed their planned cost and schedule estimates and met performance measures. Each profile presents data on the program's purpose and status, its latest cost and schedule estimates compared to the first acquisition program baseline (APB) (where established) or initial estimates (where an APB had not yet been established), as well as system performance data, where available.<sup>1</sup>

The first page of each two-page profile contains a description of the program's purpose and a figure that provides a comparison of the program's first APB (where established) or initial schedule to the program's latest schedule. The years depicted on the figure represent calendar years, and the milestones represent the program's best estimates of dates for those milestones. The program's start represents the date that program officials reported that they first started work on the program.<sup>2</sup> The first page also provides (1) essential program details, such as the name of the prime contractor, the total number of active contractors—which includes the prime contractor—and any other contractors (and in some cases subcontractors) supporting the program; (2) program costs (in then-year dollars), comparing the program's latest life-cycle cost estimate (separated into acquisition and operations and maintenance costs) to its first APB (where established) or initial estimate (subsequent APBs that may have been established are not identified);<sup>3</sup> (3) deployment details, such as the number of expected users and locations to which the system will be deployed; and (4) a summary of the cost, schedule, and performance of each program, which is further discussed on the second page of the profile. The arrows included in the summary box on the first page of each profile and in the headings on the second page represent whether a program's cost estimate had increased (↑) or decreased (↓), and whether the program's schedule estimate had

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<sup>1</sup>A program's first APB contains the original life-cycle cost estimate, schedule estimate, and performance parameters that were approved for that program by the milestone decision authority. The first APB is established after the program has assessed the viability of various technologies and refined user requirements to identify the most appropriate technology solution that demonstrates that it can meet users' needs.

<sup>2</sup>This date is different than what DOD considers formal program initiation—the date that a program achieves milestone B.

<sup>3</sup>An estimate in then-year dollars includes the effects of economic inflation.

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slipped (→) or been accelerated to meet milestones earlier than planned (←).

The second page of each profile provides detailed information on each program's status, costs, schedule, and performance. In the status section, we discuss recent and upcoming milestones and events for each program. In the cost section, we identify the extent to which the program's life-cycle cost estimate has changed from its first APB (where established) or initial estimate, as well as the causes for any changes identified. In the schedule section, we discuss the extent to which the program's schedule has changed from its first APB (where established) or initial estimate, and the causes for any schedule changes identified. Finally, in the performance section, we identify the extent to which each program has met its established measures, as well as discuss the results of system performance tests. These performance ratings represent a point-in-time assessment as reported by the program. System performance targets were rated as "met" when (1) system tests were passed with no deficiencies or limitations, (2) the program fully met all of its key performance parameters, or (3) a program had addressed all deficiencies or limitations that were identified during system tests. System performance was rated as "not fully met" when a program either (1) did not fully pass system testing and was still in the process of addressing the deficiencies or limitations identified during system testing or (2) did not pass system testing and subsequently removed the problematic functionality from the system in order to pass subsequent system tests, instead of fixing the problematic functionality and keeping it in the planned release of the system.

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**Appendix II: Profiles of Selected MAIS  
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# Appendix III: Objectives, Scope, and Methodology

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The National Defense Authorization Act for Fiscal Year 2012 mandated that we select, assess, and report on selected Department of Defense (DOD) major automated information system (MAIS) programs annually through March 2018.<sup>1</sup> This report is the third in our series of annual assessments. Our objectives were to (1) determine whether selected MAIS programs are meeting time frames for establishing program baselines and deploying capabilities; (2) describe the extent to which selected MAIS programs have changed their planned cost and schedule estimates and met performance targets; (3) assess selected MAIS programs' actions to manage risks; and (4) assess the extent to which selected MAIS programs used key information technology (IT) acquisition best practices.

To address the first objective, of the 40 total MAIS programs, we established the following criteria for selecting a sample from the subset of 29 DOD MAIS programs that were included in our prior MAIS reviews and the 4 MAIS programs included in the other objectives of this review (as discussed later). To narrow the list of programs, we excluded those that were follow-on increments (e.g., increment 2) because those programs generally establish a baseline and begin shortly after the prior increment ends. As a result, we selected the following 20 programs:

- the Air Force's
  - Air Force Integrated Personnel and Pay System;
  - Base Information Transport Infrastructure Wired (formerly called Information Transport Services Increment 1);
  - Base Information Transport Infrastructure Wireless;
  - Defense Enterprise Accounting and Management System Increment 1;
  - Expeditionary Combat Support System Increment 1;
  - Financial Information Resource System; and
  - Joint Space Operations Center Mission System Increment 1.
- The Army's
  - Distributed Common Ground System-Army Increment 1;

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<sup>1</sup>Pub. L. No. 112-81 § 1078 (Dec. 31, 2011).

- Global Combat Support System – Army;
- Integrated Personnel and Pay System-Army (IPPS-A) Increment 1; and
- Tactical Mission Command.
- The Defense Health Agency’s Integrated Electronic Health Record Increment 1;
- The Defense Logistics Agency’s
  - Defense Agencies Initiative Increment 1 and
  - EProcurement.
- The Navy’s
  - Common Aviation Command and Control System Increment 1;
  - Consolidated Afloat Networks and Enterprise Services;
  - Distributed Common Ground System – Navy (DCGS-N) Increment 1;
  - Global Combat Support System-Marine Corps Increment 1;
  - Navy Enterprise Resource Planning; and
  - Next Generation Enterprise Network Increment 1.

To determine whether these programs met time frames for establishing their first acquisition program baselines (APB), we determined the amount of time between when program officials reported starting work on the program<sup>2</sup> and the date that each program’s first APB was approved and compared it to the 2-year time frame for developing APBs that was supported by the Defense Science Board.<sup>3</sup> To determine whether these programs met or planned to meet a 5-year time frame, specified by law, for deciding to fully deploy capabilities,<sup>4</sup> we determined the amount of

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<sup>2</sup>This date is different than what DOD considers formal program initiation—the date that a program achieves milestone B.

<sup>3</sup>Defense Science Board, *Report of the Defense Science Board Task Force on Department of Defense Policies and Procedures for the Acquisition of Information Technology* (Washington, D.C.: March 2009). Pursuant to § 1078(a)(2)(C) of Pub. L. No. 112-81 (Dec. 31, 2011), we are required to assess whether the DOD MAIS programs employ best practices for the acquisition of information technology systems as identified by the Defense Science Board along with DOD and GAO.

<sup>4</sup>10 U.S.C. § 2445c.

time between the start date of each program's 5-year period (by law, this date is either milestone A in DOD's acquisition process or, if a program did not have milestone A, the date that the program's preferred development approach was selected, which in certain instances can be several years after a program was started) and the date that each program achieved or planned to achieve full deployment decision, and compared it to the 5-year time frame. Prior to the December 2014 enactment of the Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015, if a program did not reach full deployment decision within 5 years of reaching the milestone A decision or selecting a preferred alternative, it was required to, among other things, report a critical change to Congress. We also interviewed officials with the selected programs for information on the time they took to establish the programs' first APBs and reach full deployment decision. Further, we interviewed appropriate DOD officials regarding DOD's guidance on time frames for establishing program baselines, and to determine the oversight controls that were in place for DOD to manage unbaselined programs.

To address the second, third, and fourth objectives, we established the following criteria for selecting 4 of the 40 DOD MAIS programs that were included in DOD's February 2014 official list of MAIS Programs:<sup>5</sup>

- the program had planned to spend money in fiscal year 2014;
- the program was not fully implemented or recently approved for termination;
- the program was not included in our first or second MAIS annual reviews;<sup>6</sup>
- the program was not included in a recent GAO review that examined the program's cost, schedule, and/or system performance;
- at least one enterprise resource planning system was included in our review;<sup>7</sup> and

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<sup>5</sup>As of December 2014, DOD had 35 MAIS programs.

<sup>6</sup>GAO, *Major Automated Information Systems: Selected Defense Programs Need to Implement Key Acquisition Practices*, [GAO-13-311](#) (Washington, D.C.: Mar. 28, 2013) and *Major Automated Information Systems: Selected Defense Programs Need to Implement Key Acquisition Practices*, [GAO-14-309](#) (Washington, D.C., Mar. 27, 2014).

- the programs represented a variety of DOD components.

Eight of DOD's MAIS programs met all of these criteria. From these eight, we first selected the three programs that had the highest planned spending for fiscal year 2014. These programs were:

- Army's Logistics Modernization Program (LMP) Increment 2;
- Air Force's Joint Space Operations Center Mission System (JMS) Increment 2; and
- Army's IPPS-A Increment 2.

For the final program, we selected the Navy's DCGS-N Increment 2 program—the only Navy program in the list of eight potential programs—to ensure that we had representation from all military departments.

To address the second objective, we analyzed and compared each selected program's first APB objective cost estimate (in then-year dollars) to the latest life-cycle objective estimate to determine the extent to which planned program costs had changed.<sup>8</sup> For the programs that had not established APB estimates—Navy's DCGS-N Increment 2 and Army's IPPS-A Increment 2—we compared these programs' initial life-cycle cost estimates to their latest cost estimates (in then-year dollars). Similarly, to determine the extent to which these programs had changed their planned schedule estimates, we compared each program's first APB schedule (or initial schedule, for the programs that had not established APBs) to the latest schedule. We did not compare the latest cost or schedule estimates to subsequent APBs established after the first APB, as this was outside the scope of our review. We relied on the thresholds established by statute to describe the amount of any deviation (i.e., significant or critical) that each program's latest life-cycle cost and schedule estimates

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<sup>7</sup>An enterprise resource planning system is an automated system using commercial off-the-shelf software consisting of multiple, integrated functional modules that perform a variety of business-related tasks, such as general ledger accounting, payroll, and supply chain management.

<sup>8</sup>The Defense Acquisition Guidebook (which complements and further explains DOD's acquisition policies and process) refers to a program's best cost and schedule estimates as objective estimates.

experienced from the first APB.<sup>9</sup> To develop the schedule graphics included in each program profile in appendix II, we used DOD's interim Instruction on the Operation of the Defense Acquisition System that was established in November 2013.<sup>10</sup>

To determine whether the selected programs met their performance targets, we compared system performance targets against actual performance data in test reports. We reviewed the results of operational assessments and program evaluations conducted on the systems. We also reviewed additional information on each program's cost, schedule, and performance, including program documentation such as DOD's MAIS annual reports, APBs, monthly status briefings, and system test reports. We also interviewed program officials from each of the selected MAIS programs to obtain additional information on cost, schedule, and performance. System performance targets were rated as "met" when (1) system tests were passed with no deficiencies or limitations, (2) the program met all of its key performance parameters, or (3) a program had addressed all deficiencies or limitations that were identified during system tests. System performance was rated as "not fully met" when a program either (1) did not fully pass system testing and was still in the process of addressing the deficiencies or limitations identified during system testing or (2) did not pass system testing and subsequently removed the problematic functionality from the system in order to pass subsequent system tests, instead of fixing the problematic functionality and keeping it in the planned release of the system. We provided our assessments to

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<sup>9</sup>10 U.S.C. § 2445c(c), (d). With regard to schedule and cost deviations, a program is considered to have undergone a "significant" change when it has (1) experienced a schedule change that will cause a delay of more than 6 months but less than a year; (2) estimated its acquisition or life-cycle costs to have increased by at least 15 percent, but less than 25 percent, over the original estimate; or (3) experienced a significant, adverse change in the expected performance of the system. A program is considered to have undergone a "critical" change when it has (1) experienced a schedule change that will cause a delay of 1 year or more; (2) estimated its acquisition or life-cycle costs to have increased by 25 percent or more over the original estimate; (3) failed to achieve a full deployment decision within 5 years after the milestone A decision for the program or, if there was no milestone A decision, the date when the preferred alternative is selected for the program; or (4) experienced a change in the expected performance of the system or major IT investment to be acquired under the program that will undermine the ability of the system to perform the functions anticipated.

<sup>10</sup>DOD recently updated and finalized this guidance in January 2015. This updated framework was not used during this review. Department of Defense, *Operation of the Defense Acquisition System*, Instruction 5000.02 (Jan. 7, 2015).

the program management offices of each selected program for comment. We aggregated and summarized the results of these analyses across the programs, as well as developed individual profiles for each program (see app. II).

To address the third objective, we reviewed risk management documentation from the four selected programs and compared it to key risk management best practices, including the Software Engineering Institute's Capability Maturity Model® Integration for Acquisition (CMMI-ACQ) and Project Management Institute's Guide to the Project Management Body of Knowledge (PMBOK®).<sup>11</sup> These key practices are

- identifying risks, threats, and vulnerabilities that could negatively affect work efforts;
- evaluating and categorizing each identified risk using defined risk categories and parameters, such as likelihood and consequence, and determining each risk's relative priority;
- developing risk mitigation plans for selected risks to proactively reduce the potential impact of risk occurrence; and
- monitoring the status of each risk periodically and implementing the risk mitigation plan, as appropriate.

Specifically, to identify levels of risks and determine the status of each program's key risks and the actions that were taken to manage these risks, we analyzed program risk documentation, including monthly risk logs and reports, risk-level assignments, risk management plans, risk mitigation plans, and risk board meeting minutes. Additionally, we interviewed program officials to obtain additional information about their risks and risk management practices.

To address the fourth objective, we analyzed each selected program's IT acquisition documentation and compared it to key requirements development and project planning best practices—including CMMI-ACQ and PMBOK Guide® practices, and best practices identified by GAO—to

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<sup>11</sup>Software Engineering Institute, *Capability Maturity Model® Integration for Acquisition (CMMI-ACQ), Version 1.3* (Pittsburgh, Pa.: November 2010); Project Management Institute, *A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition*, (Newton Square, Pa.: 2013). "PMBOK" is a trademark of the Project Management Institute, Inc.

determine the extent to which the programs were implementing these selected acquisition best practices.<sup>12</sup> In particular, the key requirements development best practices were:

- elicit stakeholder needs, expectations, constraints, and interfaces and transform them into prioritized customer requirements;
- develop and review operational concepts and scenarios to refine and discover requirements;
- analyze requirements to ensure that they are complete, feasible, and verifiable;
- analyze requirements to balance stakeholder needs and constraints; and
- test and validate the system as it is being developed.

Additionally, the key project planning best practices were:

- establish and maintain the program's acquisition strategy;
- develop and maintain the program's cost estimate;
- establish and maintain the program's schedule estimate;
- identify the necessary knowledge and skills needed to perform the program, and ensure staff have the needed knowledge and skills;
- conduct business process reengineering;
- develop and maintain the overall project plan, and obtain commitment from relevant stakeholders;
- plan for the use of an independent verification and validation agent; and
- plan for and maintain stable leadership.

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<sup>12</sup>CMMI-ACQ, PMBOK Guide®, and GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: March 2009), *Information Technology: DHS Needs to Improve Its Independent Acquisition Reviews*, [GAO-11-581](#) (Washington, D.C.: July 28, 2011) and *Information Technology: Critical Factors Underlying Successful Major Acquisitions*, [GAO-12-7](#) (Washington, D.C., Oct. 21, 2011), and *GAO Schedule Assessment Guide: Best Practices for Project Schedules—Exposure Draft*, [GAO-12-120G](#) (Washington, D.C.: May 2012).

Specifically, we analyzed monthly program management review briefings, business cases, acquisition strategies, concepts of operations, milestone and baseline review documentation, independent verification and validation reports, system requirements documentation, minutes from requirements development and project planning meetings, and test and evaluation master plans. We also interviewed program officials to obtain additional information on each program's requirements development and project planning processes. An internal subject matter expert validated our assessments on the four selected programs' implementation of key requirements development and project planning best practices.

Regarding business process reengineering—within the project planning best practices area—10 U.S.C. 2222 requires that, prior to the obligation of funds, business system program investments with a total cost in excess of \$1 million over the department's 6-year financial plan period (referred to as the Future-Years Defense Program) be certified as demonstrating that appropriate business process reengineering efforts have been undertaken. Accordingly, we chose to review whether the two business systems included in this review—LMP Increment 2 and IPPS-A Increment 2—had supporting documentation for their business process reengineering assessments; we did not evaluate the quality of these assessments. We did not review any business process reengineering efforts for DCGS-N Increment 2 or JMS Increment 2. During our review, officials told us that IPPS-A Increment 2 was in the process of conducting its business process reengineering assessment, which the program did not complete until near the end of our audit; thus, we did not review this program's assessment or supporting documentation. For the LMP program, to determine whether the program had objective supporting evidence for its reengineering assessment, we analyzed all supporting documentation that the program had submitted with its assessment to DOD's Office of the Deputy Chief Management Officer.

Additionally, to assess the reliability of the schedules for Army's LMP Increment 2 and Air Force's JMS Increment 2 programs, we obtained and reviewed documentation, including integrated master schedules and work breakdown structures. We assessed these programs' scheduling practices against three relevant selected best practices in the exposure draft of the GAO Schedule Assessment Guide.<sup>13</sup> Specifically, these best

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<sup>13</sup>[GAO-12-120G](#).

practices were to (1) capture all activities, (2) sequence all activities, and (3) update the schedule using actual progress and logic. To assess the reliability of these programs' life-cycle cost estimates, we used our cost guide to evaluate the respective Program Management Offices' estimating methodologies, assumptions, and results.<sup>14</sup> These best practices were (1) determine the estimating structure; (2) identify ground rules and assumptions; (3) obtain the data; and (4) develop the point estimate and compare it to an independent cost estimate. We also obtained and reviewed documentation from each of these programs, including the program office estimate, software cost model, independent cost estimate, and risk and uncertainty analysis. Further, we interviewed key program officials to obtain information about the programs' schedule and cost estimating practices.

Regarding our assessments of the selected programs' efforts to manage risks and implement requirements development and project planning best practices, we assessed a practice area as being fully implemented if the evidence provided by DOD officials demonstrated all aspects of the leading practices in that area. We assessed a practice area as being not implemented if the evidence did not demonstrate any aspect of the leading practices, or if no evidence was provided by DOD for that practice area. We assessed a practice area as being partially implemented if the evidence demonstrated some, but not all, aspects of the leading practices in that area. Finally, we assessed a practice area as "on track to fully implement" if a program was in its planning phase or had concrete plans under way that demonstrated the program was working to satisfy the aspects of the leading practices or had plans to implement the practices in that area.

To assess the reliability of the data that we used to support the findings in this report, we corroborated relevant program documentation and interviews with agency officials. We determined that the data used in this report were sufficiently reliable, with the exception of selected schedule data provided by Air Force's JMS Increment 2 program and Army's LMP Increment 2 program. We discuss limitations of these data in the report. We have also made appropriate attribution indicating the sources of the data.

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<sup>14</sup>GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: March 2009).

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We conducted this performance audit from April 2014 to February 2015 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.

# Appendix IV: Comments from the Department of Defense



ACQUISITION

ASSISTANT SECRETARY OF DEFENSE  
3600 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3600

FEB 13 2015

Ms. Carol Cha  
Director, Information Technology Acquisition  
Management Issues  
U.S. Government Accountability Office  
441 G Street, N.W.  
Washington, DC 20548

Dear Ms. Cha:

This is the Department of Defense (DoD) response to the Government Accountability Office (GAO) Draft Report, GAO-15-282, "DEFENSE MAJOR AUTOMATED INFORMATION SYSTEMS: Cost and Schedule Commitments Need to Be Established Earlier," dated January 16, 2015 (GAO Code 311608). Your staff conducted a thorough study and produced a useful report with which we find much to concur. Comments on the report recommendations are enclosed.

Sincerely,

A handwritten signature in blue ink, reading "Katrina McFarland", is positioned above the typed name.

Katrina McFarland

Enclosure:  
As stated

**GAO DRAFT REPORT DATED JANUARY 16, 2015  
GAO-15-282 (GAO CODE 311608)**

**“DEFENSE MAJOR AUTOMATED INFORMATION SYSTEMS: COST AND  
SCHEDULE COMMITMENTS NEED TO BE ESTABLISHED EARLIER”**

**DEPARTMENT OF DEFENSE COMMENTS  
TO THE GAO RECOMMENDATIONS**

**RECOMMENDATION 1:** The GAO recommends that the Secretary of Defense direct the Under Secretary of Defense for Acquisition, Technology and Logistics to require MAIS programs to establish their first APB within 2 years of beginning work on the programs.

**DoD RESPONSE:** The Department partially concurs with the recommendation, agreeing in particular with the sentiment of the report that an acquisition program baseline (APB) should be established as soon as possible. The 2-year timeframe, however, is too specific and problematic, and the Department proposes to develop alternate articulations of such a policy.

The time needed to establish a reliable APB depends on the period the program must spend in the Technology Maturation and Risk Reduction (TMRR) phase of acquisition. Some programs will require considerable TMRR and should advance to signature of an APB only after uncertain technologies have acceptable levels of risk, have been demonstrated in a relevant environment, and understanding constraints are alleviated. Other programs will require little TMRR and might proceed promptly to advanced phases of the acquisition process and signature of an APB.

The Department would like to develop a nuanced policy that accommodates the variety of risks found among MAIS programs. The policy should also fit with other aspects of the acquisition system—for simplicity if no other reason. The beginning point should be the same as the beginning point used to measure the 10 USC 2445c 5-year development clock. The Capability Development Document Validation decision point could be used to make requirements and content trades, or to form more manageable increments. Target dates for baselining might be set, and progress reporting ordered, etc. Considerable work and coordination among the Department’s Components is necessary.

**RECOMMENDATION 2:** The GAO recommends that the Secretary of Defense direct the Secretary of the Air Force to direct the JMS program office to develop a schedule that fully incorporates best practices, including sequencing all activities and updating the schedule with actual progress and logic.

**DoD RESPONSE:** The Department concurs. The JMS program office (PMO) has an integrated master schedule (IMS) that sequences all activities and updates with actual progress and logic as required to fully incorporate best practices. This IMS existed when the GAO studied the program documentation. The GAO found an additional 69 (out of more than 4,000) tasks in the overall IMS that did not fully adhere to best practices. These 69 tasks were used for internal office purposes to assist the PMO in managing the program; they did not affect the logical flow

or accuracy of the program's IMS. Based on the GAO recommendation, they have been removed from the IMS.

**RECOMMENDATION 3:** The GAO recommends that the Secretary of Defense direct the Secretary of the Army to direct the LMP program office to develop a schedule that fully incorporates the best practice of properly sequencing all schedule activities.

**DoD RESPONSE:** The Department concurs, and the Army views this as a reasonable request calculated to reduce unjustified constraints in schedule and identify opportunities for efficiency.

**RECOMMENDATION 4:** The GAO recommends that the Secretary of Defense direct the Secretary of the Army to direct the Army (Financial Management and Comptroller) to complete a plan for conducting auditability testing of LMP Increment 2 functionality to ensure that such testing occurs prior to the LMP program management office deploying further functionality.

**DoD RESPONSE:** The Department concurs. The Army views this as a reasonable request that the LMP program management office, the Assistant Secretary of the Army for Financial Management and Comptroller (ASA (FM&C)) and the Assistant Secretary of the Army for Acquisition Logistics and Technology (ASA (AL&T)) work together to complete a testing plan to assess which functionality needs auditability testing prior to the Full Deployment Decision (FDD).

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# Appendix V: GAO Contact and Staff Acknowledgments

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## GAO Contact

Carol R. Cha at (202) 512-4456 or ChaC@gao.gov

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## Staff Acknowledgments

In addition to the contact name above, the following staff also made key contributions to this report: Shannin O'Neill, Assistant Director; Juaná Collymore; Jennifer Echard; Rebecca Eyles; Nancy Glover; Javier Irizarry; Zaka Kazi; Emily Kuhn; Jennifer Leotta; Vernetta Marquis; Lee McCracken; and Madhav Panwar.

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