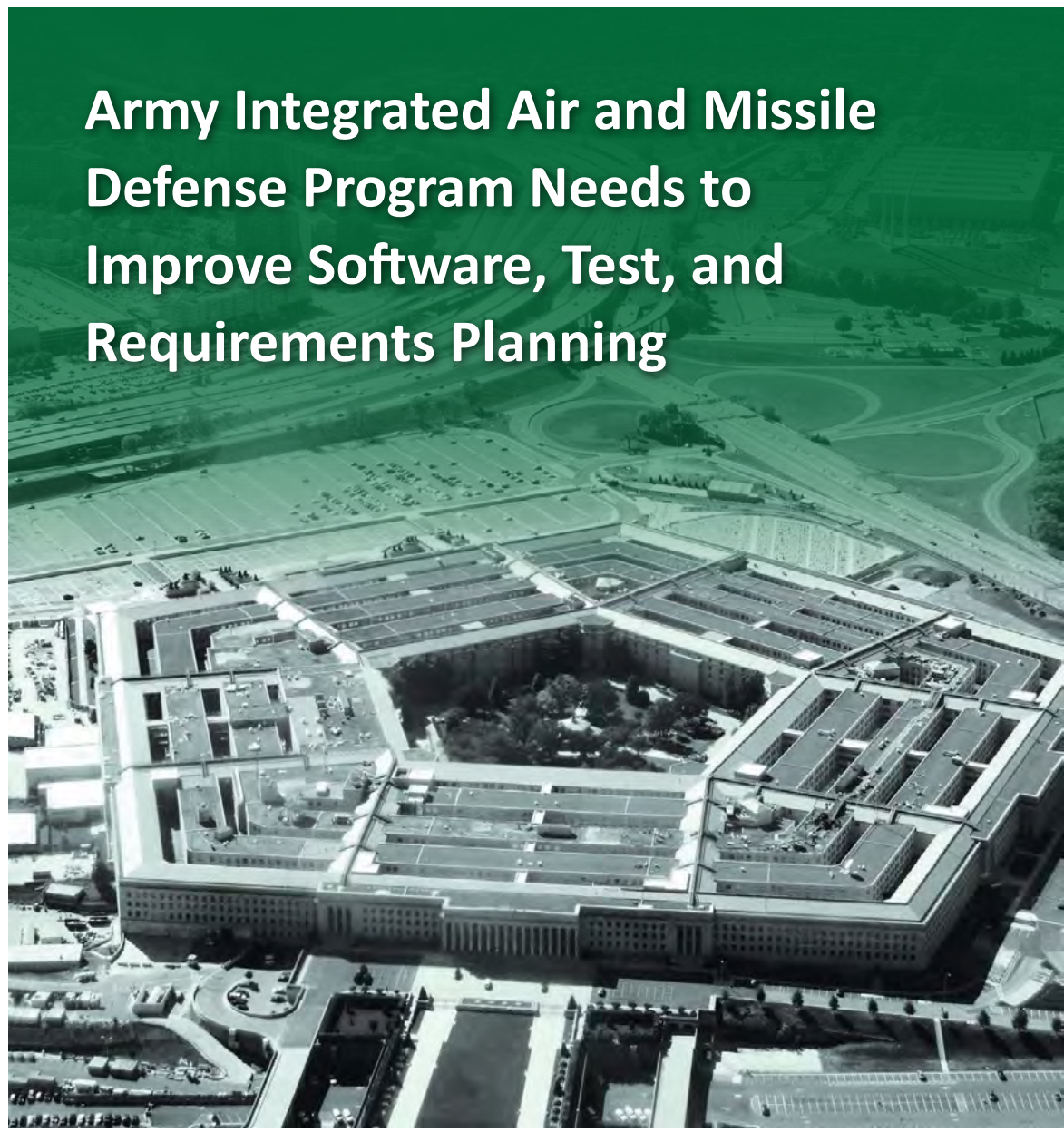


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# INSPECTOR GENERAL

*U.S. Department of Defense*

JUNE 9, 2014



## Army Integrated Air and Missile Defense Program Needs to Improve Software, Test, and Requirements Planning

INTEGRITY ★ EFFICIENCY ★ ACCOUNTABILITY ★ EXCELLENCE

~~The document contains information that may be exempt from mandatory disclosure under the Freedom of Information Act.~~

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INTEGRITY ★ EFFICIENCY ★ ACCOUNTABILITY ★ EXCELLENCE

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# Results in Brief

## *Army Integrated Air and Missile Defense Program Needs to Improve Software, Test, and Requirements Planning*

June 9, 2014

### Objective

We evaluated the efforts to prepare the Army Integrated Air and Missile Defense (IAMD) program for initial production. We also determined whether six allegations in an August 2012 Defense Hotline complaint concerning the Army's management of the program were substantiated.

### Findings

The project manager planned the initial production decision before completing the software deliveries and testing needed to demonstrate the Army IAMD Battle Command System can fully meet initial capability requirements. The software and testing deficiencies occurred because:

- the project manager had not fully adjusted the program schedule to respond to contractor delays in delivering system software, and
- the Army sent soldiers and equipment originally allocated for testing overseas to protect troops.

As a result, the Army could acquire 31 IAMD Battle Command System units costing \$416.1 million that have not fully demonstrated they can control and manage the Army IAMD sensors and weapons to provide an effective IAMD capability.

The Army Fires Center of Excellence (AFCOE) did not adequately define system capability

### Findings (cont'd)

requirements to support developing the second of two planned increments of the Army IAMD System. This occurred because AFCOE staff, in using incremental development, did not follow DoD practice for defining system requirements. Without fully defined requirements, system developers incur greater risk that the additional \$493 million planned for the second increment development will not provide the Army the most useful and supportable missile defense.

We substantiated one allegation and partially substantiated three of the six Defense Hotline allegations but, after reviewing project manager actions relating to the allegations, we concluded no recommendations were needed.

### Recommendations

We recommend the Under Secretary of Defense for Acquisition, Technology, and Logistics postpone the initial production decision until the project manager completes testing that shows the Army IAMD meets planned requirements.

We recommend the Commander, Army Fires Center of Excellence fully define system capability requirements for the planned second increment of the Army IAMD.

### Management Comments and Our Response

The Assistant Secretary of Defense for Acquisition agreed with the recommendation and addressed all the specifics of the recommendations. The Commander, Army Fires Center of Excellence agreed with the recommendations, and his comments addressed B.1 and partially addressed B.2. Therefore, we request additional comments on recommendation B.2. Also, we received unsolicited comments from the Project Manager for IAMD Project Office. Please see the Recommendations Table on the back of this page.

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### **Recommendations Table**

<b>Management</b>	<b>Recommendations Requiring Comment</b>	<b>No Additional Comments Required</b>
Under Secretary of Defense for Acquisition, Technology, and Logistics		A.1., A.2.
Commander, Fires Center of Excellence	B.2.	B.1.

\* Provide management comments by July 9, 2014.



**INSPECTOR GENERAL  
DEPARTMENT OF DEFENSE  
4800 MARK CENTER DRIVE  
ALEXANDRIA, VIRGINIA 22350-1500**

June 9, 2014

MEMORANDUM FOR DISTRIBUTION UNDER SECRETARY OF DEFENSE FOR ACQUISITION,  
TECHNOLOGY, AND LOGISTICS  
DIRECTOR, OPERATIONAL TEST AND EVALUATION  
DIRECTOR, DEFENSE CONTRACT MANAGEMENT AGENCY  
AUDITOR GENERAL, DEPARTMENT OF THE ARMY

SUBJECT: Army Integrated Air and Missile Defense Program Needs to Improve Software,  
Test, and Requirements Planning  
(Report No. DODIG-2014-081 )

We are providing this report for your review and comment. We determined that the Program Executive Officer, Missiles and Space, needs to improve software delivery and test planning for the Army Integrated Air and Missile Defense program before acquiring 31 Integrated Air and Missile Defense Battle Command Systems at an estimated cost of \$416.1 million. Also, the Army needs to specifically define the capability requirements for the second program increment to increase the likelihood that the system will provide useful and supportable capabilities that can be effectively developed, tested, and produced at an affordable cost.

We considered management comments on a draft of this report in preparing the final report. DoD Directive 7650.3 requires that recommendations be resolved promptly. Comments from the Under Secretary of Defense for Acquisition, Technology, and Logistics addressed all specifics of the recommendations. The comments from the Commander, Army Fires Center of Excellence addressed the B.1 recommendation and partially addressed B.2 recommendation. Therefore, we request additional comments on recommendation B.2 by July 9, 2014.

Please provide comments that conform to the requirements of DoD Directive 7650.3. If possible, send a Microsoft Word (.doc) file and portable document format (.pdf) file containing your comments to [audapi@dodig.mil](mailto:audapi@dodig.mil). Copies of management comments must have the actual signature of the authorizing official. We are unable to accept the /Signed/ symbol in place of the actual signature. If you arrange to send classified comments electronically, you must send them over the SECRET Internet Protocol Router Network (SIPRNET).

We appreciate the courtesies extended to the staff. Please direct questions to me at (703) 604-9077 (DSN 664 9077).

*Jacqueline L. Wiccarver*  
Jacqueline L. Wiccarver  
Assistant Inspector General  
Acquisition, Parts, and Inventory

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## Introduction

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### Objective

The overall audit objective was to determine whether the Program Executive Officer, Missiles and Space, was effectively preparing the Army Integrated Air and Missile Defense (IAMD) program for the low-rate initial production (initial production) phase of the acquisition process. As part of this objective, we determined whether six allegations in an August 2012 Defense Hotline complaint concerning the Army's management of the program were substantiated (Finding C). See Appendix A for a discussion of our scope and methodology.

### Background

~~(FOUO)~~ The Army IAMD program is an acquisition category ID<sup>1</sup> major defense acquisition program in the Engineering and Manufacturing Development (development) phase of the acquisition process. The Under Secretary of Defense for Acquisition, Technology, and Logistics (the Defense Acquisition Executive) designated the Army IAMD as an acquisition program in December 2009. The Army is developing the IAMD in preparation for the initial production decision for first quarter FY 2016. As of February 2014, the Army had spent about \$835.0 million in research, development, test, and evaluation funds and plans to spend an additional \$1.6 billion for system development through FY 2021.

### ***System Description and Mission***

The Army IAMD will integrate multiple sensors (radar) and shooters (missile launchers), using a mission command single integrated fire control network,<sup>2</sup> to provide the warfighter a full view of defended airspace, including friendly force and threat information. The mission command element of the Army IAMD, known as the IAMD Battle Command System (IBCS), will provide the capabilities needed to control and manage the IAMD-enabled sensors and weapons. Specifically, the IBCS integrates the Patriot, the Improved Sentinel, and the two developmental Joint Land Attack Cruise Missile Defense Elevated Netted Sensor (JLENS) components. The IBCS will also integrate future

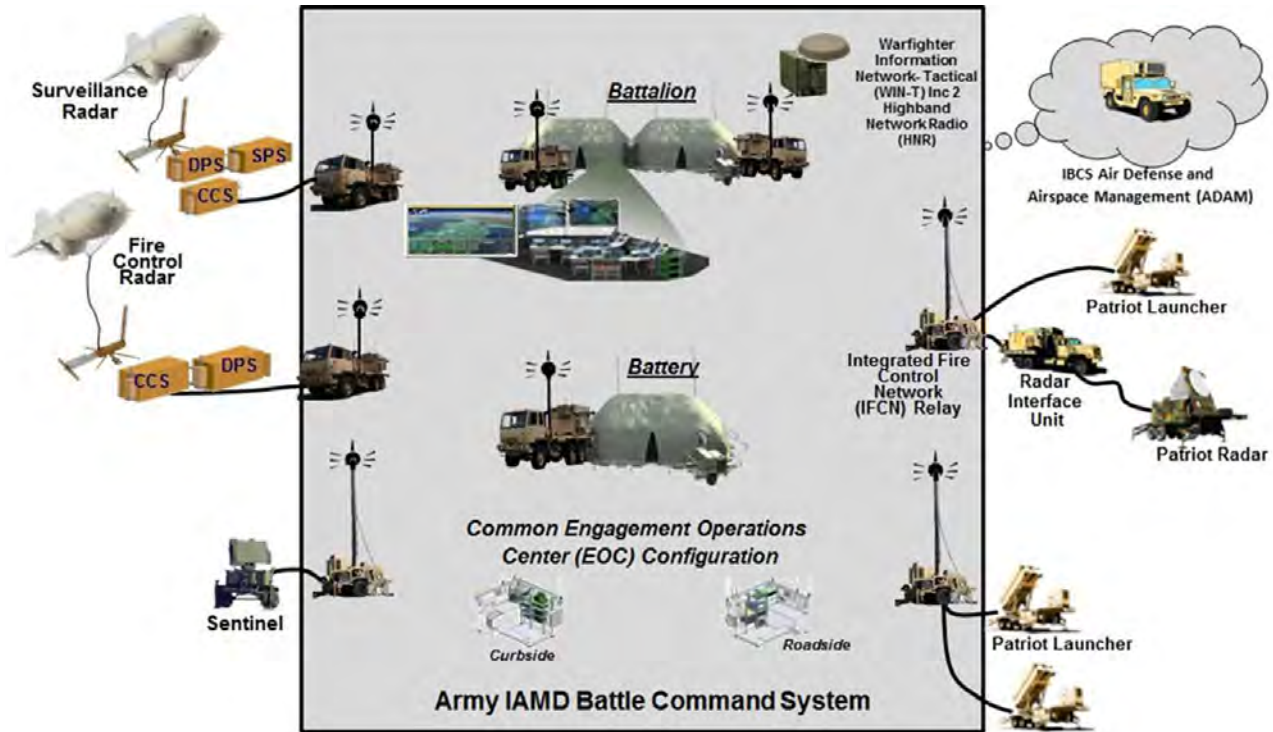
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<sup>1</sup> Acquisition category ID is a major defense acquisition program for which the Under Secretary of Defense for Acquisition, Technology, and Logistics estimates eventual total expenditure for research, development, test, and evaluation of more than \$480 million in FY 2014 constant dollars or, for procurement, of more than \$2.79 billion in FY 2014 constant dollars.

<sup>2</sup> An integrated fire control network allows missile defense warfighters to use any sensor and any shooter connected to the network to defend against air and missile threats such as ballistic or cruise missiles, and manned or unmanned aircraft.

air and missile defense capabilities to support engagement of air and missile defense threats. In Figure 1, the shaded portion shows the system components of the IBCS.

Figure 1. Army Integrated Air and Missile Defense



Source: IAMD Project Office

Abbreviations:

CCS: Communications Control Station

DPS: Data Processing Station

SPS: Signal Processing Station

The mission of the IAMD Project Office is to define, develop, acquire, field, and sustain the Army's portion of the future Joint IAMD.<sup>3</sup> This includes developing, acquiring, fielding, and sustaining the Army IBCS component of the air and missile defense architecture and integrating radar and missile launchers developed through other acquisition programs to provide an effective air and missile defense capability. When operational, the Army IAMD will integrate air and missile defense radar, missile launchers, and mission control, enabling air and missile defense capabilities not achievable by the individual systems. Appendix B provides a detailed description of the Army IAMD system and the advantages it will provide for air and missile defense.

<sup>3</sup> The Army IAMD will be the air and missile defense interface to the Joint Forces and will include foreign allied air and missile defense forces.

## **Acquisition Strategy**

(~~FOUO~~) The Army IAMD program experienced a significant restructure and an increase in the quantity of IBCS units needed after the Defense Acquisition Executive's initial approval to begin the development phase. These changes were the result of decisions made in response to the Secretary of the ~~OSD/JS: (b)(5)~~

(~~FOUO~~) As a result of the ~~OSD/JS: (b)(5)~~ the Army decided to:

- (~~FOUO~~) cancel procurement of the Surface-Launched Advanced Medium Range Air-to-Air Missile, one of the air defense systems the Army IAMD system was to integrate with, to provide U.S. and friendly forces protection from air attacks; and
- (~~FOUO~~) reduce the planned system buy of the JLENS System, an aerial surveillance system the Army IAMD will integrate with to identify and track cruise missiles and other aerial and surface threats.

(~~FOUO~~) To achieve future air defense capabilities, the IAMD project manager plans to integrate the Army IAMD with the Indirect Fire Protection Capability and two JLENS orbits.<sup>4</sup> Associated with these actions was the Army Air and Missile Defense User's decision to expand the Army IAMD battle command capabilities from the platoon level to the Army Air and Missile Defense Command level, to provide more flexibility in controlling air and missile defense operations. This decision increased the planned procurement quantity from 285 IBCS units to 431 units.

(~~FOUO~~) The President's Budget for FY 2012 added \$525 million<sup>5</sup> to accelerate placing the Patriot launchers and radar under the direct control of the Army IAMD. The increased funding caused the Army to exceed the threshold limit the Defense Acquisition Executive approved in the June 28, 2010, Acquisition Program Baseline.

(~~FOUO~~) On February 1, 2012, in the "Army Integrated Air and Missile Defense (IAMD) Acquisition Decision Memorandum (ADM)," the Defense Acquisition Executive approved a new Acquisition Program Baseline, which included 431 IBCS units. The Defense Acquisition Executive also approved restructuring the program to integrate Patriot

<sup>4</sup> The JLENS orbit is a surveillance system and fire control system that can stay aloft up to 30 days.

<sup>5</sup> The additional funding resulted from the Office of the Secretary of Defense decision to not procure the Medium Extended Air Defense System beyond the design and development phase.

~~(FOUO)~~ launchers and radar directly onto the Army IAMD fire control network, an effort originally planned for a later program increment. The increase in the IBCS units enabled the Army to expand the distribution of the IBCS units within the Army and to accelerate the integration of the Patriot radar and launchers into the Army IAMD fire control network.

~~(FOUO)~~ The project manager is using an incremental acquisition strategy to design and produce the Army IAMD. Under this strategy, developers deliver an initial system capability (less than the full requirement) and deliver additional capability incrementally to meet the full requirement. For the Army IAMD, the incremental strategy will deliver an initial air and missile defense capability in FY 2016 and then deliver product and capability improvements in FY 2018 and FY 2020. The delivery of the follow-on capabilities will result from contractor development work on two pre-planned product improvements starting in FY 2014 and FY 2016, respectively, to fully meet requirements for the Army IAMD. Under the pre-planned product improvement concept, the design of the initial system will include provisions for future system enhancement. Appendix B provides details on the capabilities the Army plans to provide through the FY 2016 and FY 2018 program increments.

Table 1 shows the key organizations and officials responsible for managing the acquisition of the Army IAMD program.

*Table 1. Key Organizations and Officials Responsible for Managing the Army IAMD Program*

Organization or Official	Responsibilities for the Army IAMD Program
Defense Acquisition Executive	As the Milestone Decision Authority, can approve the entry of the program into the next phase of the acquisition process.
Program Executive Officer Missiles and Space	Oversees program resources and statutory compliance for missile and space programs.
Project Manager Army IAMD	Provides day-to-day program management.
U.S. Army Fires Center of Excellence (AFCOE)	Develops and documents the system capability requirements, which define what the system must do to perform its mission.
Army Deputy Chief of Staff, G 3/5/7	Validates the number of systems the Army will procure.
Joint Requirements Oversight Council	Approves the system capability requirements the AFCOE develops for the Army IAMD.
Army Test and Evaluation Command	Independently tests and evaluates the program for the Army; responsible for system test planning.
Director, Operational Test and Evaluation	Provides oversight of operational test and evaluation (realistic field testing) for the program and approves test plans.
Deputy Assistant Secretary of Defense, Developmental Test and Evaluation	Provides oversight of developmental test and evaluation (design testing)

## ***Funding and Contract Data***

As of July 2013, the Army's budget to develop and procure the IAMD system totaled \$6.38 billion.<sup>6</sup> In September 2008, the Army awarded two contracts, one to Northrop Grumman Space and Mission Systems Corp. for \$15.0 million (contract W31P4Q-08-C-0418) and the other to Raytheon Company for \$14.9 million (contract W31P4Q-08-C-0419), to design the IBCS prototype. The contracts included options to develop the prototype design. In December 2009, the Defense Acquisition Executive approved the Army IAMD entry into the Engineering, Manufacturing, Development phase of the acquisition process, and the Army exercised a \$475 million contract option for development with Northrop Grumman. As of January 17, 2014, the contract was valued at \$636.8 million.

On September 19, 2012, the Army finalized a contract with Raytheon Company (W31P4Q-12-C-0120) for \$126 million to develop the hardware and software necessary for the IBCS to integrate with the radar and missile launch components of the IAMD. As of January 17, 2014, the Army had obligated \$100.1 million on the Raytheon contract.

## **Review of Internal Controls**

DoD Instruction 5010.40, "Managers' Internal Control Program Procedures," May 30, 2013, requires DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended and to evaluate the effectiveness of the controls. We identified internal control weaknesses in test planning and the defining of system requirements. Specifically, we determined the Army planned the initial production decision review to occur before the Army completes and tests the software needed to demonstrate the IAMD can fully meet capability requirements for the first increment. We also determined the Army was not adequately defining capability requirements for future developmental increments of the IAMD. We will provide a copy of the report to the senior Army officials responsible for internal controls.

---

<sup>6</sup> Of the \$6.38 billion, \$2.44 billion is research, development, test, and evaluation funding; and the remaining \$3.94 billion is procurement funding.

## Management Comments on Review of Internal Controls and Our Response

Although not required to comment, the project manager, Army IAMD provided comments on the report section discussing our review of internal controls. A summary of the project manager's comments, along with our responses, follows below. For the full text of the comments, see the Management Comments section of the report.

### ***Internal Controls***

The project manager disagreed with the report section discussing internal controls. He stated that the established program processes for internal controls were working as designed to allow the program stakeholders to maintain awareness of ongoing development activities and progress, and to ensure that progress is acceptable to meet future milestone decisions.

### ***Our Response***

We disagree with the project manager's assertion that processes for internal controls were working as designed to allow stakeholder awareness of ongoing development activities and progress and to ensure that progress is acceptable to meet future milestone decisions. Specifically, at the time of our audit, the project manager had not yet used established internal control processes to recognize and report that progress in both software delivery and test asset availability for the Army IAMD program was not adequate to meet the requirements for the initial production decision planned to occur in first quarter FY 2016. Finding A provides details on the deficiencies in software delivery and test asset availability.

## Finding A

### Deficiencies in Software Delivery and Test Asset Availability Will Limit Testing to Support the Low Rate Initial Production Decision

The project manager planned the initial production decision to occur in first quarter FY 2016, before completing the software deliveries and testing needed to demonstrate the IBCS can fully and successfully meet initial capability requirements. The incomplete software deliveries will occur because the project manager did not adequately adjust the date for the planned initial production decision after the Program Executive Officer for Missiles and Space accepted the contractor's revised software delivery schedule. The contractor's revised delivery schedule also delayed the program in meeting contract system specification requirements. Additionally, the Army may not have sufficient test equipment and fully trained testers to support testing in FY 2015 before the initial production decision. The testing deficiency occurred because the Army deployed the Patriot Test Battalion to provide air and missile defense for overseas troops starting in April 2013. As a result, the Army could acquire 31 IBCS units in initial production at an estimated cost of \$416.1 million that have not fully demonstrated that they can enable commanders to control existing sensors (radar) and shooters (missile launchers) to provide the most effective air and missile defense capability.

### Planned Software Delivery Not Expected to Fully Meet Contract System Specification Requirements

As of December 8, 2013, the project manager <sup>OSD/JS: (b) (5)</sup> [REDACTED]  
[REDACTED]  
[REDACTED] [REDACTED]  
[REDACTED]  
[REDACTED]

[REDACTED] The IBCS must meet these specifications to demonstrate that the missile defense capabilities planned for the Army IAMD program are on a path to meet the system performance requirements in the "Capability Development Document (CDD) for: Army Integrated Air and Missile Defense System-of-Systems (AIAMD SoS) Increment: 2," October 21, 2010. The project manager planned to use software version 3.0.2 to demonstrate IBCS capabilities during the limited user test (the operational test), scheduled to be completed in fourth quarter FY 2015, before the initial production

decision, scheduled in first quarter FY 2016. Department of the Army Regulation 73-1, “Test and Evaluation Policy,” August 1, 2006, defines a limited user test as an operational test that examines a system’s ability to perform its mission when operated and maintained by soldiers under realistic operational (combat) conditions. It does not address all the effectiveness, suitability, and survivability requirements and is therefore more limited than an initial operational test, which must address all effectiveness, suitability, and survivability requirements.

### ***Inadequate Adjustment for Slippage in Software Delivery Schedule***

OSD/JS: (b) (5)  
[Redacted]

[Redacted] In December 2012, the contractor briefed the Program Executive Officer for Missiles and Space on [Redacted]

[Redacted] According to the Army IAMD project manager, [Redacted]

In January 2013, the contractor [Redacted]

OSD/JS: (b) (5)  
[Redacted]

On April 3, 2013, the project manager met with the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (the Army Acquisition Executive), senior contractor staff, and independent software engineers [Redacted]

[Redacted] OSD/JS: (b) (5)  
[Redacted]



OSD/JS: (b) (5)  
[Redacted]  
[Redacted]  
[Redacted]

The Army Acquisition Executive asked consultants from the Software Engineering Institute of Carnegie Mellon University to conduct an assessment<sup>7</sup> of the program. The consultants reported that the program [Redacted] [Redacted]. In their report, the consultants [Redacted] [Redacted] " but stated that the project office had [Redacted] [Redacted]. However, the project office [Redacted] [Redacted]. Although the consultants credited the project office with [Redacted] [Redacted] they concluded that [Redacted] [Redacted]. As an example, the consultants stated that [Redacted] [Redacted]

OSD/JS: (b) (5) *of Software Development*

Our comparison of the project manager's projections of the ability of software [Redacted] [Redacted]. Specifically, the project manager projected in July 2013 that [Redacted] [Redacted] contract system specification requirements, while [Redacted] [Redacted]. However, his December 2013 projection showed that the number of contract system specification requirements the software will [Redacted] [Redacted]

<sup>7</sup> Software Engineering Institute of Carnegie Mellon University, "IAMD Review—March 15, 2012, Assessment and Recommendations," was provided to the Army as part of a yearly funded contract.

*Software Concerns in Risk Management Reporting and Program Working Group Minutes*

The most current risk status report, dated December 10, 2013, stated [redacted]. The report documents that [redacted]. Specifically, the report states:

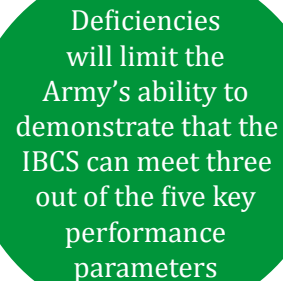
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]

From the report statements, we concluded [redacted]  
[redacted]  
[redacted] the planned production decision. Although the report identifies [redacted]  
[redacted] between December 2013 and June 2015, [redacted]  
[redacted]

[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]  
[redacted]

## ***Effects of Deficiencies in Software Delivery***

Deficiencies in meeting contract system specification requirements will reduce what the Army initially planned to demonstrate, through the limited user test. Specifically, the deficiencies will limit the Army's ability to demonstrate that the IBCS can meet three out of the five key performance parameters (primary requirements) and four of the six key system attributes (secondary requirements) defined in the capability development document. As explained in the "Manual for the Operation of the Joint Capabilities Integration and Development System," January 19, 2012, (JCIDS Manual) the capability development document is the "primary means" of proposing system capability requirements needed for a solution intended to close or reduce gaps in U.S. military capabilities.



Deficiencies will limit the Army's ability to demonstrate that the IBCS can meet three out of the five key performance parameters

The capability development document includes primary requirements, the performance attributes (system abilities) considered critical to the development of an effective military capability. The JCIDS Manual also states that failure to meet a validated primary requirement may result in a reevaluation or reassessment of the program or a modification of the production increments. However, programs are not required to fully demonstrate they meet primary system requirements until testing to support the full-rate (final) production decision in third quarter FY 2017. The JCIDS Manual defines secondary requirements as attributes or characteristics considered essential to achieving a "balanced operational testing approach to a system" but not critical enough to be designated as a primary requirement. System requirements that do not qualify as primary or secondary requirements are designated as "additional attributes."

### ***Limitations in Demonstrating Primary System Requirements***

Software deficiencies may limit the Army's ability to demonstrate, during the limited user test, three primary system requirements included in the capability development document. These are the primary systems requirements.

- Net Readiness—Requirements include the ability to interoperate and exchange information with other systems. To perform its mission, the IBCS must send and receive from joint forces (interagency, intergovernmental, and multinational) the critical information needed to maintain awareness of air and missile threats.

- Integrated Defense Effectiveness—Requirements include the ability to select the specific missile system and firing assignments to provide greater protection to high priority assets and lesser protection to lower priority assets.
- Force Protection and Survivability—Requirements include the situational awareness necessary for soldiers to react to threats, including chemical and biological agents, while still being able to operate the IBCS.

To identify the software deficiencies that may affect the primary performance requirements, we worked with project office staff to trace the contract system specification requirements back to the requirements defined in the capability development document. In performing the requirements trace, the project office staff used the July 10, 2013, projection, which showed that [redacted] contract system specification requirements. Table 2 shows how the traced software deficiencies affected the primary (most critical) system requirements. Overall, [redacted] the system’s ability to demonstrate it can meet the three primary system requirements in the limited user test discussed above. For those specifications partially met, the table shows the estimated percentage of the software functionality [redacted]

*Table 2. Primary System Requirements Affected by Software Deficiencies in Meeting the Contract System Specification Requirement (project manager’s estimated percentages)*

	Contract System Specification Requirement	Primary System Requirements		
		Net Readiness	Integrated Defense Effectiveness	Force Protection and Survivability
1	Net Centricity	[redacted]		
2	Joint External System Interfaces			
3	Global Information Grid IA			
4	Confidentiality, Integrity, Availability			
5	Administration			
6	External Sensor Data Used for Engagements			
7	Adjacent Army System of Systems Task Force			
8	Upper Tier/Lower-Tier Coordination			
9	Engagement Processing			
10	Kill Assessment			
11	Common Operational Picture			
12	Nuclear/Biological/Chemical			

Source: Project manager’s estimated projections

The project manager had not yet determined the exact impact the [redacted]

[redacted]

However, in his briefing "IAMD IBCS Software Replan Update," December 6, 2013, the project manager informed the Army IAMD action officer in the Office of the Director, Operational Test and Evaluation, that [redacted]

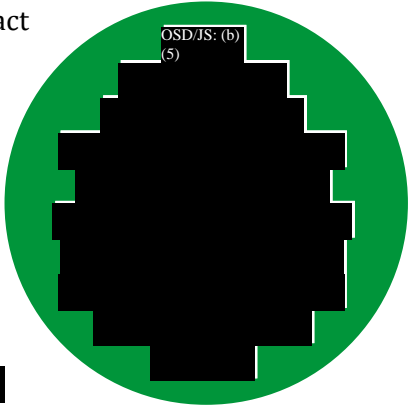
[redacted]

[redacted]

[redacted]. The briefing also states that the project manager [redacted]

[redacted]

The remaining [redacted] deficiencies affected secondary system requirements and additional attributes.



*Limitations in Demonstrating Secondary System Requirements*

The secondary requirement most affected by software deficiencies is the requirement for a single integrated air picture. A single integrated air picture allows the warfighter to have full visualization of defended airspace, to include both friendly and threat information. The project manager identified [redacted] software deficiencies against contracted system specification requirements that affect this requirement. Although listed as a secondary requirement, demonstrating the single integrated air picture is very important to showing that IBCS can perform the air and missile defense function. The capability development document states, "The process for meeting the air and missile defense threat begins with the development and maintenance of an accurate Single Integrated Air Picture." Additionally, the single integrated air picture is required to meet the primary system requirements for integrated defense effectiveness, discussed previously, and common command and control. The common command and control requirement involves the system's ability to enable defense planning, warfighter-machine interface, and battle monitoring and control. Other secondary requirements affected by software deficiencies included diagnostics (the ability to localize hardware faults), maintenance, and ownership cost (the costs to field and maintain the system).

*Unclear When Software Will Fully Meet Contract Requirements*

The contractor is scheduled to deliver software Version 3.1 in fourth quarter 2015, before the initial production decision and after the limited user test is completed. The program office planned for this version of the software to address all system

specification requirements not met or only partially met in Version 3.0.2. However, the project manager's December 2013 projection <sup>OSD/JS: (b) (5)</sup> [REDACTED]

[REDACTED] The Defense Acquisition Executive should postpone the initial production decision for the Army IAMD until the project manager completes operational testing using software that meets all system specification requirements, as defined for contract W31P4Q-08-C-0418.

### ***Recent Army Actions to Decrease Software Integration Risk***

On April 18, 2014, in a memorandum responding to our draft report, the project manager stated that, because of a funding reduction in the President's FY 2015 Budget Request, the Army had moved the initial production decision for IAMD from first quarter FY 2016 to fourth quarter FY 2016. The project manager's memorandum then stated that the contractor's software delivery schedule did not change. Therefore, the project manager stated the Army's revised program schedule will allow additional time for software integration to decrease program risk. The Assistant Secretary of the Army (Acquisition, Logistics, and Technology) endorsed the project manager's memorandum on May 3, 2014. The project manager further stated that the IAMD will provide at least a partial capability during limited user testing in each of the five primary and six secondary requirements discussed in finding section "Effects of Deficiencies in Software Delivery."

Because the contractor will deliver software version 3.1 to the Government's system integration laboratory in the fourth quarter of FY 2015, project office staff stated they will use this version, rather than the incomplete version 3.0.2, to conduct the limited user test before the initial production decision. Using the project manager's December 2013 projection to compare software versions 3.0.2 and 3.1 shows that using version 3.1 will reduce the number of unmet contract system specifications by 50 percent (<sup>OSD/JS: (b) (5)</sup> [REDACTED]) and the number of partially met requirements by 51 percent (<sup>OSD/JS: (b) (5)</sup> [REDACTED]).

### **Deployment of Patriot Test Battalion Will Reduce Test Program Effectiveness**

In April 2013, the Army determined that needs for air and missile defense assets, including the Patriot Test Battalion, to protect troops and operations overseas superseded the testing needs of the IAMD and other weapons development and acquisition efforts. The Army's decision removed Patriot test equipment and soldiers previously designated to support IAMD testing planned through FY 2015. In response to the loss of the Patriot Test Battalion, Army Training and Doctrine Command's

Fires Center of Excellence, the Army IAMD project office, and the Army Test and Evaluation Command (the requirements, program, and testing staffs) briefed the Army's General Officers Steering Committee on July 16, 2013, on [redacted] [redacted]

[redacted] for testing the IAMD. The Steering Committee's [redacted] [redacted]. Although [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

### ***Reduced Availability of Test Equipment***

The "Army Integrated Air and Missile Defense Test and Evaluation Master Plan," May 30, 2012 (the Test and Evaluation Master Plan) required four Patriot batteries, each including six Patriot launching stations, to support the operational testing before the initial production decision. As a result of the deployment of the Patriot Test Battalion, staff at Army Test and Evaluation Command stated that they planned to use three, rather than four, Patriot batteries for the operational testing. As of December 2013, only two of the three Patriot batteries were funded to allow them to be fully configured to support the operational testing of the Army IAMD. Test staff at the Army Test and Evaluations Command stated that a fully configured third battery was needed to demonstrate system capability requirements including information assurance, performance in threat maneuvering, and data collection for reliability, availability, and maintainability.

Additionally, even if Army provided the project manager funds to upgrade the third battery, testers will be one battery short of the four batteries required in the Test and Evaluation Master Plan for conducting operational testing in support of the initial production decision. The action officer for the Army IAMD in the Office of the Director, Operational Test and Evaluation, stated that [redacted]

[redacted]

[redacted]

[redacted]

### ***Availability of Trained Soldiers Will Delay Testing***

The soldiers assigned to the deployed Patriot Test Battalion will not be available for testing the Army IAMD. In July 2013, requirements and testing staff briefed the Steering Committee of the need for [redacted]. Army Regulation

73-1, "Test and Evaluation Policy," August 1, 2006, states that operational testing must be conducted under realistic operational conditions with users who represent those expected to operate and maintain the system when it is fielded or deployed. Army Test and Evaluation Command staff stated that <sup>OSD/JS: (b) (5)</sup> [REDACTED]

[REDACTED]. The Defense Acquisition Executive should postpone the initial production decision until the project manager completes operational testing using test assets and trained soldiers sufficient to demonstrate that the Integrated Air and Missile Defense can integrate with external radar and missile launchers to provide an effective integrated air and missile defense.

### ***Recent Army Actions to Increase Test Program Effectiveness***

In response to our draft report, the project manager stated that the Army's schedule change moving the Initial Production Decision from first quarter FY 2016 to fourth quarter FY 2016 has mitigated the adverse effects of deploying the Patriot Test Battalion. He stated the revised schedule allows the user community (the Army Training and Doctrine Command) adequate time to:

- train soldiers assigned to operationally test the IAMD system before the initial production decision;
- obtain a dedicated IAMD test detachment;
- de-conflict IAMD test asset requirements with requirements of other programs; and
- obtain additional dedicated test assets for use in development and operational testing.

The project manager stated that the above actions will provide adequate support to the IAMD program. On May 12, 2014, Army Training and Doctrine Command staff provided the audit team documentation showing the above improvements will increase the effectiveness of the limited user tests planned to begin in first quarter FY 2016.

## **Conclusion**

Deficiencies in software delivery and test planning will reduce what the Army initially planned to demonstrate, through the limited user test. The limited user test was planned to demonstrate that the Army IAMD System can integrate with externally developed radar and missile firing units to provide an effective integrated air and missile defense



capability before the planned initial production decision in first-quarter 2016. As a result, the Army could acquire, at an estimated cost of \$416.1 million, 31 IBCS units in initial production that have not fully demonstrated they can control and manage the IAMD sensors and weapons to provide an effective integrated air and missile defense capability.

## **Project Manager, Integrated Air and Missile Defense Comments on the Finding and Our Response**

Although not required to comment, the project manager provided comments on the overall finding and on the finding sections discussing planned software delivery not expected to fully meet contract specifications, effects of deficiencies in software delivery, and deployment of the Patriot Test Battalion. A summary of the project manager's comments along with our responses follow below. For the full text of the comments, see the Management Comments section of the report.

### ***Overall Finding***

The project manager agreed with the overall finding and identified recent actions that address concerns in our finding. For example, in response to a funding reduction to the program in the President's FY 2015 Budget Request, the Army moved the initial production decision from the first quarter FY 2016 to fourth quarter FY 2016. The project manager stated that because the contractor's software delivery schedule did not change, the adjusted program schedule will allow additional time for software integration and to complete testing to decrease program risk before the initial production decision. The funding reduction will also delay developmental test events (flight tests) and the limited user test. The delay in these test events provides the user community (the Army Training and Doctrine Command) an opportunity to de-conflict resource issues (personnel and equipment) in support of the IBCS Test program. The Assistant Secretary of the Army (Acquisition, Technology, and Logistics) endorsed the project manager's comments on May 3, 2014.

### ***Our Response***

We agree that recent Army actions will help address concerns in the finding. In recognition of Army actions, we revised the finding discussion to include two new sections titled, "Recent Army Actions to Reduce Software Integration Risk" and "Recent Army Actions to Increase Test Program Effectiveness."

## ***Planned Software Delivery Not Expected to Fully Meet Contract System Specification Requirements***

The project manager agreed, as of December 8, 2013, his projections showed that the contractor's <sup>OSD/JS: (b) (5)</sup> [REDACTED].

However, the project manager stated he did not agree with the characterization that the software would fail to meet requirements and the implication that the planned partial implementation was not on a path to meet the capability development document requirements. He stated the program plan was designed for incremental capabilities delivered over time to make sure test events have required capabilities present and milestone decisions have the proper body of evidence to allow for an informed decision.

The project manager also stated that the IAMD system specification affected by software delays was discussed with key stakeholders to obtain their feedback and understanding of software limitations and software suitability for the limited user test. The project manager stated he facilitated discussions with stakeholders to summarize the software impacts for each IAMD System Specification section, and to show the percentage of the requirements planned to be met by each software version. However, he admitted the summary did not convey whether the software section would pass or fail its underlying requirements or was sufficient for the limited user test. The stakeholder team recommended continuing execution of the approved program plan to meet required capabilities and achieve a successful initial production decision.

### ***Our Response***

We revised the finding discussion to include a new section, "Recent Army Actions to Reduce Software Integration Risk." In this section, we acknowledge that the Army's program schedule change to delay the initial production decision allows the project manager to perform the limited user test with more advanced software and reduces the number of contract specification requirements not met or partially met. This will allow additional time for software integration to decrease program risk and provide the program office an opportunity to demonstrate required IAMD capabilities and obtain test results that will lead to an informed milestone decision.

### ***Effects of Deficiencies in Software Delivery***

~~(FOUO)~~ The project manager agreed with the finding that deficiencies in meeting contract system specification requirements will affect three of five primary system requirements and four of six secondary requirements. He also agreed that the

(FOUO) secondary requirement for a single integrated air picture was affected by <sup>OSD/</sup><sub>JS:</sub> software deficiencies against contracted system specifications. However, the project manager disagreed with how the draft report characterized the capabilities the IAMD system would provide during the limited user test. The project manager stated that during the limited user test, the IAMD system will provide at least a partial capability in each of five primary and six secondary requirements and that not all system specification requirements are required to demonstrate that the program is on a path to demonstrate capabilities. He also stated that he coordinated with the Army Training and Doctrine Command and the Army Test and Evaluation Command regarding the requirements affected by the software. Further, the project manager disagreed with the draft report characterization that the planned partial software implementation was not on a path to meet program requirements. The project manager and stakeholder team recommended continuing with the approved program plan to meet required capabilities and achieve a successful initial production decision.

### ***Our Response***

We revised the finding discussion to include a new section “Recent Army Actions to Reduce Software Integration Risk.” In this section, we include the project manager’s statement that during operational testing, the IAMD system will provide at least a partial capability in each of five primary and six secondary requirements. Also, as a result of the Army’s schedule change, the Army will use the more complete software version 3.1, rather than version 3.0.2, for the limited user test. We agree with the project manager and stakeholder recommendations to continue execution of the “approved program plan” to meet required capabilities and achieve a successful initial production decision.

### ***Development of Patriot Test Battalion***

The project manager agreed with the risks the draft report identified relating to the loss of the Patriot Test Battalion. However, after our initial site visit, the Army mitigated these risks. The schedule change that moved the initial production decision to fourth quarter FY 2016 allows adequate time to:

- train soldiers assigned to operationally test the IAMD system before the initial production decision;
- obtain a dedicated IAMD test detachment;

- de-conflict IAMD test asset requirements with requirements of other programs; and
- obtain additional dedicated test assets for use in development and operational testing.

### ***Our Response***

We revised the finding discussion to include a new section, “Recent Army Actions to Increase Test Program Effectiveness.” In this section, we include the project manager’s statement that the Army’s schedule revision to move the initial production decision to fourth quarter FY 2016 has mitigated the adverse effects of deploying the Patriot Test Battalion.

## **Recommendations, Management Comments, and Our Response**

### ***Recommendation A***

We recommend the Under Secretary of Defense for Acquisition, Technology, and Logistics postpone the low-rate initial production decision for the Army Integrated Air and Missile Defense until the project manager completes Limited User Testing using:

1. software that meets all system specification requirements, as defined for contract W31P4Q-08-C-0418; and
2. test assets and trained soldiers sufficient to demonstrate that the Integrated Air and Missile Defense can integrate with external radar and missile launchers to provide an effective integrated air and missile defense.

### ***Under Secretary of Defense for Acquisition, Technology, and Logistics***

The Assistant Secretary of Defense for Acquisition responded for the Under Secretary of Defense for Acquisition, Technology, and Logistics. The Assistant Secretary agreed with the intent of the recommendation, stating that program decisions should not occur until adequate testing and evaluation has been completed that demonstrates planned system performance. She then stated that the Army IAMD plan was designed for incremental capabilities delivered over time to make sure test events had required capabilities present and milestone decisions had the proper body of evidence to

allow for an informed decision. She indicated that all program decisions would be supported by an appropriate body of evidence, including verification of mature software capability consistent with the software development schedule. She explained that since our review of the program, the project manager has modified the program schedule to allow adequate time for soldier training before limited user testing and that the Army had procured additional test assets to mitigate risk to test asset availability.

### ***Our Response***

The Assistant Secretary of Defense for Acquisition's comments addressed the recommendation. Although her comments do not describe a specific course of action, they reference specific actions provided in the Army IAMD plan, which explained the modifications the project manager and the Army have made to the program schedule and how the modifications mitigate program risks. The details of these modifications, which include moving the Initial Production Decision to fourth quarter FY 2016, are described in the Army's comments to the finding. Additionally, the Army reported the schedule modifications in the Selected Acquisition Report for IAMD, December 2013 (as of the FY 2015 President's Budget). We summarized the Army's comments in the section "Project Manager Integrated Air and Missile Defense Comments on the Finding and Our Response." Additionally, we described how the Army had taken action to allow additional time for software integration to decrease program risk and to mitigate the adverse effects of deploying the Patriot Test Battalion in the new finding sections "Recent Army Actions to Decrease Software Integration Risk" and "Recent Army Actions to Increase Test Program Effectiveness," respectively. In summary, we believe the actions in "the Army IAMD Plan" meet the intent of the recommendation by increasing what the Army can demonstrate before the initial production decision to show that the Army IAMD can control and manage sensors and weapons to provide an effective integrated air and missile defense capability.

### ***Project Manager, Integrated Air and Missile Defense***

Although not required to comment, the project manager stated that he disagreed with the recommendation based on the guidance provided in the Interim DoD Instruction 5000.02, "Operation of the Defense Acquisition System," November 25, 2013, indicating that the standard to meet "all" system specification requirements is above the Milestone C standards as established in the Instruction. He then stated that the general criteria for the Milestone C initial production decision included, among other requirements, an operational assessment (which would be the limited user test) and mature software capability consistent with the software development schedule.

***Our Response***

We did not change our recommendation to remove the word “all” because we were referring to system specification requirements in the contract, which was written for the Milestone C initial production decision. We agree with the project manager’s statement that criteria for the Milestone C initial production decision includes mature software capability consistent with the software development schedule. That is why we explain in the finding section “Deterioration of Software Development,” how the project manager’s projections showed a bigger shortfall in meeting contract performance specifications in his December 2013 projection than in his July 2013 projection. We recognize that the Army is using incremental development for the IAMD system and agree the Army’s action to move the initial production decision to fourth quarter FY 2016, will permit the Army to use a more mature version of the software, which meets the intent of our recommendation.

## Finding B

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### Need to Better Define Capability Requirements for Incremental System Development

The Army Fires Center of Excellence (AFCE) initially defined capability requirements for two developmental increments in a single draft production document. The second increment will require about \$493 million in Research, Development, Testing and Evaluation funding, enough to qualify as an Acquisition Category II<sup>8</sup> major system. It will not be completed until FY 2020, almost 5 years after the initial production decision. This occurred because AFCE did not follow guidance recommending the use of multiple production documents for incremental development efforts that were defined earlier in the capability development document.

With a single production document, it will be more difficult for AFCE to apply lessons from development of the first increment to better define capability requirements for the second increment of the IAMD system. Without fully defined requirements, system developers incur a greater risk that the \$493 million planned for second increment development will not provide the Army the most effective missile defense. Two production documents, each fully defining the capability requirements of the increment they cover, would increase the likelihood the project manager and the testing community can provide Army system sponsors with the most useful and supportable operational capabilities for IAMD at an affordable cost.

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<sup>8</sup> Acquisition category II is a major defense system for which the DoD Component Head estimates eventual total expenditure for research, development, test, and evaluation of more than \$185 million in FY 2014 constant dollars or, for procurement, of more than \$835 million in FY 2014 constant dollars.

## Single Production Document is Not Adequate to Define Capability Requirements for Two Developmental Increments

(FOUO) An August 2013 draft production document states the Army will incrementally develop and field the IAMD. The document defines capability requirements for two increments of development, when development experience and lessons learned will focus on the first increment of system development planned to occur before the first quarter FY 2016. In writing the draft document, AFCOE did not follow the JCIDS Manual, which states that multiple production documents from a single development document are typical for incremental development efforts. An earlier version of the JCIDS Manual (January 31, 2011) discussed the use of multiple production documents as an option, stating that a development document may be used for two or more production documents where incremental development under an evolutionary acquisition strategy is used. In addition, the Army IAMD development document, May 2010, defined the overall capability requirements and stated that this capability would be reached through two program increments. The Army Fires Center of Excellence should revise the draft production document to define capability requirements for developing the initial capability of the system and to state that another capability production document will follow, which will define capability requirements for the Pre-Planned Product Improvements One and Two.

AFCOE did not follow the JCIDS Manual, which states that multiple production documents from a single development document are typical for incremental development efforts.

## Development Lessons Cannot Be Applied to Refine Capability Requirements

A single production document, will limit the ability of the program manager and testers to use lessons learned in development and testing to better define capability requirements

(FOUO) A single production document, prepared for the planned initial production decision in first quarter FY 2016, will limit the ability of the program manager and testers to use lessons from the development and testing to better define capability requirements in the second increment of development. The project manager plans to deliver the initial Army IAMD capability (the first increment) in the beginning of FY 2016. He then plans to conduct additional development and testing



(FOUO) to implement Pre-planned Product Improvements One and Two (together making up the second increment), to achieve full system capability. The “Army Integrated Air and Missile Defense Program Overview” brief, July 8, 2013, states that the development and testing effort for Pre-planned Product Improvement One will not be completed until the end of FY 2018, almost 3 years after the initial production decision. Development and testing for Pre-planned Product Improvement Two will not complete until the end of FY 2020, almost 5 years after the initial production decision.

(FOUO) The JCIDS Manual states that the most significant difference between development documents and production documents is the refinement (increased precision) of threshold (minimum) and objective (desired) capability requirements. Refinement of the capability requirements occurs through applying lessons learned during the development phase and lessons learned from previous increments. Although AFCOE personnel stated they were capturing lessons learned for the first draft production document, this production document is needed for the initial production decision at the beginning of FY 2016. Because the development and testing work for the Pre-planned Product Improvement efforts will not complete until 3 to 5 years later, lessons learned after the production decision for the first increment may not be captured for future development. According to Army estimates, the second increment of development will require about \$493 million of development funding, which meets the Acquisition Category II major system requirements.

(FOUO) Additionally, the development effort on the second increment will notably increase system capabilities by enabling the Army IAMD to integrate with:

- (FOUO) Air Defense Airspace Management Cells (facilitates earlier awareness and destruction of air and missile threats);
- (FOUO) Indirect Fire Protection Capability (acquires, tracks, engages, and defeats rockets, artillery, and mortar projectiles);
- (FOUO) Avenger (defeats low-flying unmanned aerial systems, cruise missiles, rotary and fixed-wing aircraft); and
- (FOUO) Terminal High Altitude Area Defense (provides intercept capability against high-altitude ballistic missile threats).

(FOUO) The Defense Acquisition Guidebook states that pre-planned product improvements and similar efforts that provide a significant increase in operational capability should be managed as separate program increments. Acquisition managers should be able to trace each increment back to an approved requirements document that has its own set of minimum and desired values. By developing this production

~~(FOUO)~~ document, AFCOE will increase the likelihood the acquisition community can provide the Army useful and supportable operational capabilities. The Army Fires Center of Excellence should develop a separate production document that defines capability requirements for the Pre-Planned Product Improvements One and Two to support the planned management review for Pre-Planned Product Improvement One at the end of FY 2018.

## Conclusion

~~(FOUO)~~ Without fully defined requirements, system developers incur greater risk that the \$493 million planned to develop the second increment will not provide the Army the most useful and supportable missile defense capability. During the audit, Army Test and Evaluation Command and AFCOE staff recognized the advantages of using separate production documents to define the developmental increments of the IAMD. Specifically, on August 27, 2013, Army Test and Evaluation Command staff stated a second production document, focused on the pre-planned product improvements, would add value in writing test and evaluation plans to integrate IAMD with Air Defense Airspace Management Cells, Indirect Fire Protection Capability, and Terminal High Altitude Area Defense. They explained that neither the development document nor the draft production document provided much detail on these requirements. On September 23, 2013, the audit team briefed AFCOE on the need for separate production documents to better define capability requirements to incrementally develop the Army IAMD. AFCOE agreed but, as of April 2014, had not implemented the recommendation.

## Recommendations, Management Comments, and Our Response

### ***Recommendation B***

**We recommend that the Commander, Army Fires Center of Excellence:**

- 1. revise the draft capability production document for the Integrated Air and Missile Defense to define capability requirements for developing the initial capability of the system and to state that another capability production document will follow, which will define capability requirements for the Pre-Planned Product Improvements One and Two; and**

### ***Commander, Army Fires Center of Excellence***

The Commander, Army Fires Center of Excellence, agreed with our recommendation, stating that he was revising the draft capability production document to make sure the requirements are defined to comply with interim Department of Defense Instruction 5000.02

guidance. As recommended, the Commander stated the capability production document will address the follow-on requirements by increment(s), which will be further defined in a respective (second) capability production document. Further, the Commander stated the initial capability production document will undergo worldwide staffing no later than October 2014 to achieve an approved capability production document no later than 6 months before Milestone C, scheduled for August 25, 2016.

### ***Our Response***

Comments from the Commander, Army Fires Center of Excellence addressed all specifics of the recommendation, and no further comments are required.

- 2. prepare a follow-on capability production document that defines capability requirements for the Pre-Planned Product Improvements One and Two to support the planned management review for Pre-Planned Product Improvement One at the end of FY 2018.**

### ***Commander, Army Fires Center of Excellence***

The Commander, Army Fires Center of Excellence, agreed with our recommendation, stating the Increment 3 capability production document will be developed to support Terminal High Altitude Area Defense integration. Further, the Commander stated the current plan is to develop the initial Increment 3 capability production document for world-wide staffing no later than first quarter FY 2018 in order to achieve an approved Increment 3 capability production document no later than first quarter FY 2022.

### ***Our Response***

Comments from the Commander, Army Fires Center of Excellence partially addressed the recommendation. Although the Commander stated he planned to develop an Increment 3 capability production document that will define the Terminal High Altitude Area Defense integration (Pre-Planned Product Improvement Two), his response does not state a plan of action for defining the capability requirements for Pre-Planned Product Improvement One. Therefore, we request that the Commander, Army Fires Center of Excellence, provide clarifying comments on the final report.

## Finding C

### Defense Hotline Allegations

The Defense Hotline received a complaint concerning management of the Army IAMD Program. After reviewing six allegations from the complaint, we substantiated one, partially substantiated three allegations, and did not substantiate two. Specifically, we:

- substantiated that Raytheon already had a similar system that would perform functions of the Army IAMD;
- partially substantiated that the project office routinely accepted inadequate contract data requirements list deliverables;
- partially substantiated that the project manager changed (lowered) the objectives for the 2013 System Demonstration;
- partially substantiated that the design maturity of the Army IAMD system was insufficient to support conducting the critical design review;
- did not substantiate that the need for the Army IAMD was questionable; and
- did not substantiate that Army IAMD officials covered up or explained away reporting two Nunn-McCurdy<sup>9</sup> breaches.

Although we substantiated one allegation and partially substantiated three allegations from the August 6, 2012, complaint, our review and analysis of program documentation and Army IAMD project manager actions related to the allegations did not result in any recommendations for corrective action. Additional details follow regarding each of the six allegations.

### Raytheon System Could Perform Functions of the Integrated Air and Missile Defense

~~(FOUO)~~ We substantiated the allegation that Raytheon had developed a system that could perform at least some of the missile defense functions of the Army IAMD. Raytheon was part of the competitive prototyping the project office conducted for the IBCS; however, based on the source selection evaluation, Raytheon was determined

<sup>9</sup> A Nunn-McCurdy unit-cost breach occurs when a major defense acquisition program experiences an increase of at least 15 percent in program unit cost above the unit costs in the Acquisition Program Baseline.

(FOUO) not to offer the Government the best value. The Office of the Secretary of Defense changed the IBCS acquisition strategy to include two contractors through the Milestone B<sup>10</sup> decision. In response, on September 23, 2008, the Army awarded contract W31P4Q-08-C-0418 to Northrop Grumman and contract W31P4Q-08-C-0419 to Raytheon for Phase I IBCS Preliminary Design efforts with options for follow-on Phase II and III efforts. One year later, on September 10, 2009, the Source Selection Authority for IBCS acquisition, OSD/JS: (b) (5)

[REDACTED] The Source Selection Authority determined that Northrop Grumman provided the best overall value that satisfied the Army’s needs. This selection was based upon the Source Selection Authority’s assessment and comparison of the Northrop Grumman and Raytheon proposal evaluations.

(FOUO) The Source Selection Evaluation Board OSD/JS: (b) (5)

[REDACTED] Table 3 shows Source Selection Evaluation Board Results for each contractor.

(FOUO) *Table 3. Source Selection Evaluation Board Results*

Evaluation Factors	Northrop Grumman	Raytheon
(FOUO)	OSD/JS: (b) (5)	
(FOUO)		
(FOUO)		
(FOUO)		
(FOUO)		
(FOUO)		
Result Definitions:		
OSD/JS: (b) (5)		

Source: Source Selection Decision Memorandum

<sup>10</sup> At Milestone B a program of record is established and the milestone decision authority designates the acquisition category level of the program.

## Project Office Accepted Contractor Reports That Did Not Meet Contract Requirements

We partially substantiated the allegation that the project office routinely accepted reports that should have been rejected. The allegation stated that project office staff initially rejected 105 reports received between February 2010 and May 2011. The project manager accepted the reports with comments to the contractor that specified required corrective actions.

We determined it was within the project manager's authority to determine whether to reject or accept the reports. Specifically, the "Integrated Air and Missile Defense (IAMD) Contract Data Requirements List (CDRL) Review Standard Operating Procedure (SOP)," June 10, 2010, states that the project manager has the final decision on whether the reports are approved, approved with comments, or rejected. We also determined the project manager had a valid reason for accepting the reports with comments, rather than rejecting them. Project office staff stated the project manager had stood firm on the delivery dates in the contract. However, rather than rejecting the reports and having the contractor continue to resubmit every 30 days until meeting the contract requirements, the project office would accept the reports with comments, allowing the contractor to gather more information and correct the problems. Project office staff stated that if they had rejected the reports, it would have cost more and taken the contractor more time to meet the requirements of the contract.

We also found the project manager OSD/JS: (b) (5)

[REDACTED] For the contractor's second submission of reports, which occurred between December 2010 and July 2012, the project manager's

OSD/JS: (b) (5)

[REDACTED] On these reports, the project office staff and the project manager OSD/JS: (b) (5)

## Changing 2013 System Demonstration Objectives

We partially substantiated the allegation that to minimize schedule slip, the Army IAMD project manager lowered the objectives of the planned 2013 system demonstration so that the IAMD software could support the demonstration. The project manager agreed the 2013 system demonstration was schedule-driven. According to DoD Instruction 5000.02, "Operation of Defense Acquisition System," December 8, 2008, testing will be event-driven, meaning tests should not be conducted until the program has met predetermined criteria. However, the 2013 system

demonstration was not a required testing event under DoD Instruction 5000.02. The project manager stated that the system demonstration was designed only to provide a snapshot of Army IAMD efforts and was conducted to satisfy the Army Air and Missile Defense Command's desire for an early system demonstration. Additionally, the project manager stated that the 2013 system demonstration was over and above the software testing required in the Test and Evaluation Master Plan to support the initial production decision for the Army IAMD.

Because neither the Test and Evaluation Master Plan nor DoD Instruction 5000.02 required the 2013 system demonstration, we made additional inquiries to determine whether there was an adequate return on investment for spending an estimated \$3.2 million to conduct the 2013 demonstration. Personnel from Army Test and Evaluation Command and the Joint Interoperability Test Command agreed the 2013 system demonstration was beneficial to developing and managing the Army IAMD program. Army Test and Evaluation Command staff stated that the results from the 2013 system demonstration will be used as a pilot test to make sure planned developmental and operational testing runs smoothly. They further stated that the demonstration provided soldier feedback, improved joint analysis team processes, an early safety assessment, and a refinement of test and evaluation strategy. Additionally, Joint Interoperability Test Command staff stated that participation in the 2013 system demonstration helped them finalize the Army IAMD interoperability certification evaluation plan. This plan will serve as a guide for the Army IAMD program to achieve joint interoperability certification.

### **Design Maturity Did Not Support Critical Design Review**

~~(FOUO)~~ We partially substantiated the allegation that the design maturity did not support holding a critical design review. The Defense Acquisition Guidebook states the critical design review confirms the system design is stable, meets performance requirements, affordable, and establishes the initial production baseline. The system critical design review occurs during the engineering and manufacturing development phase and typically marks the end of the integrated system design efforts. Readiness continues with system capability and manufacturing process demonstration activities.

~~(FOUO)~~ On August 15, 2012, the Deputy Assistant Secretary of Defense, Systems Engineering, issued the memorandum "Army Integrated Air and Missile Defense (AIAMD) Critical Design Review (CDR) Assessment," (the Assessment). ~~OSD/JS: (b) (5)~~

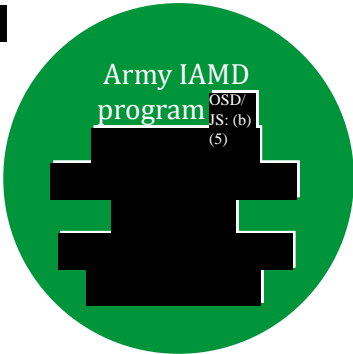
~~\_\_\_\_\_~~

~~\_\_\_\_\_~~

(FOUO) OSD/JS: (b) (5)  
[Redacted]

(FOUO) On April 19, 2013, the Deputy Assistant Secretary of Defense, Systems Engineering, issued a second memorandum, "Army Integrated Air and Missile Defense (AIAMD) Critical Design Review (CDR) Assessment Closeout."

OSD/JS: (b) (5)  
[Redacted]



### Unjustified Need for Integrated Air and Missile Defense

(FOUO) We did not substantiate that the need for the Army IAMD system was unjustified. In February 2012, the Acting Defense Acquisition Executive requested the project office conduct and report on an assessment of the Army IAMD program, focusing on investment and sustainment costs, quantities, and overall program affordability. The Army and Office of the Secretary of Defense personnel conducted an independent program assessment in March 2012. It found that the IBCS was fundamental to the future of air and missile defense, was the number-one priority within the air and missile defense portfolio, and will enable the Army to replace only those key components that provide the greatest or most critical air and missile defense capabilities.

OSD/JS: (b) (5)  
[Redacted]



(FOUO) OSD/JS: (b) (5)  
[Redacted text block]

## Alleged Coverup of Nunn-McCurdy Cost Breaches

We did not substantiate the allegation that Army IAMD officials covered up or explained away reporting of at least two Nunn-McCurdy unit cost breaches. The project office and Defense Contract Management Agency staff stated that there has not been a Nunn-McCurdy breach. The project office staff stated that although there was a program re-structure and re-plan, neither caused a Nunn-McCurdy breach, and neither was done to avoid a Nunn-McCurdy breach. Additionally, an operations research analyst with the Office of Cost Assessment and Program Evaluation<sup>11</sup> stated that project office staff had asked about the risk of a Nunn-McCurdy unit cost breach with the increase in planned system buy occurring in the restructure.

Program acquisition unit cost decreased from \$19.4 million to \$14.2 million after the restructure

The operations research analyst stated that although the program restructure increased the overall program cost and the system buy, it did not result in a Nunn-McCurdy breach because the unit cost decreased. Our review of program cost documentation supported the analyst’s statement that no breach had occurred. Specifically, we determined that the program acquisition unit cost decreased from \$19.4 million to \$14.2 million after the restructure. We also reviewed costs reported against the contract, the selected acquisition reports,<sup>12</sup> and the Acquisition Program Baseline, to determine whether there were any inappropriate transfers of cost that would indicate a potential coverup of a cost breach. We did not identify any inappropriate cost transfers.

<sup>11</sup> The Office of Cost Assessment and Program Evaluation is responsible for verifying DoD program costs are presented accurately and completely. .

<sup>12</sup> Selected acquisition reports are reports program managers are required to periodically submit to Congress; they include key cost, schedule, and technical information.

## Appendix A

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### Scope and Methodology

We conducted this performance audit from May 2013 through April 2014 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.

We interviewed key personnel and performed fieldwork at the following organizations:

- Program Executive Office, Missile and Space (Redstone Arsenal, Alabama);
- IAMD Project Office (Redstone Arsenal, Alabama);
- Capabilities Development Integration Directorate–Requirements Determination Division and the Army Training and Doctrine Command Capability Manager–Army Air and Missile Defense Command, both at AFCOE (Fort Sill, Oklahoma);
- Director, Operational Test and Evaluation (The Pentagon, Washington, D.C.);
- Army Test and Evaluation Command (Aberdeen Proving Ground, Maryland);
- Joint Interoperability Test Command (Fort Huachuca, Arizona);
- Office of Cost Assessment and Program Evaluation (The Pentagon, Washington, D.C.);
- Defense Contract Management Agency (Madison, Alabama);
- Northrop Grumman (Huntsville, Alabama); and
- Raytheon (Huntsville, Alabama).

We collected, reviewed, and analyzed documents dated August 2006 through February 2014. We reviewed the Army IAMD acquisition strategy, requirements, test and evaluation, contracts, and funding documentation to determine whether the Army is effectively preparing the program to acquire 31 units at the initial production decision.

Additionally, we reviewed program planning and reporting documents against the policies and guidance in the following DoD and Army issuances:

- Chairman of the Joint Chiefs of Staff Instruction 3170.01F, “Joint Capabilities Integration and Development System,” May 1, 2007;<sup>13</sup>
- Chairman of the Joint Chiefs of Staff “Manual for the Operation of the Joint Capabilities Integration and Development System,” January 19, 2012;
- DoD Instruction 5000.02, “Operation of the Defense Acquisition System,” December 8, 2008;<sup>14</sup>
- Defense Acquisition Guidebook, May 15, 2013.

## Use of Computer-Processed Data

We relied on computer-processed data from the Army. We used the Dynamic Object-Oriented Requirements System to trace system specification requirements between the System Specification for the Army IAMD System of Systems and the Capability Development Document. We also used the Electronic Document Access system to obtain contract modifications. To determine the data reliability, we compared the data we obtained from both systems with hard-copy documentation we obtained from the project office. As a result of our analysis, we determined that the data within the two systems were sufficiently reliable for the purpose of our review.

## Use of Technical Assistance

A computer engineer from the Technical Assessment Directorate, DoD Office of Inspector General, assisted with the audit. The engineer assisted the team in evaluating and reviewing Contract Data Requirements List and related documentation to support the audit team work on the hotline allegation.

## Prior Coverage

No prior coverage has been conducted on Army IAMD during the last 5 years.

<sup>13</sup> This version of the Instruction was current at the time AFCE was developing the IAMD capability development document. The current version of the instruction is 3170.01H, January 10, 2012.

<sup>14</sup> On November 26, 2013, the Deputy Secretary of Defense issued an interim version of the 5000.02, to create an acquisition policy environment that will achieve greater efficiency and productivity in defense spending and effectively implement the department’s Better Buying Power initiatives.

## Appendix B

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### Description of the Integrated Air and Missile Defense and Its Planned Developmental Increments

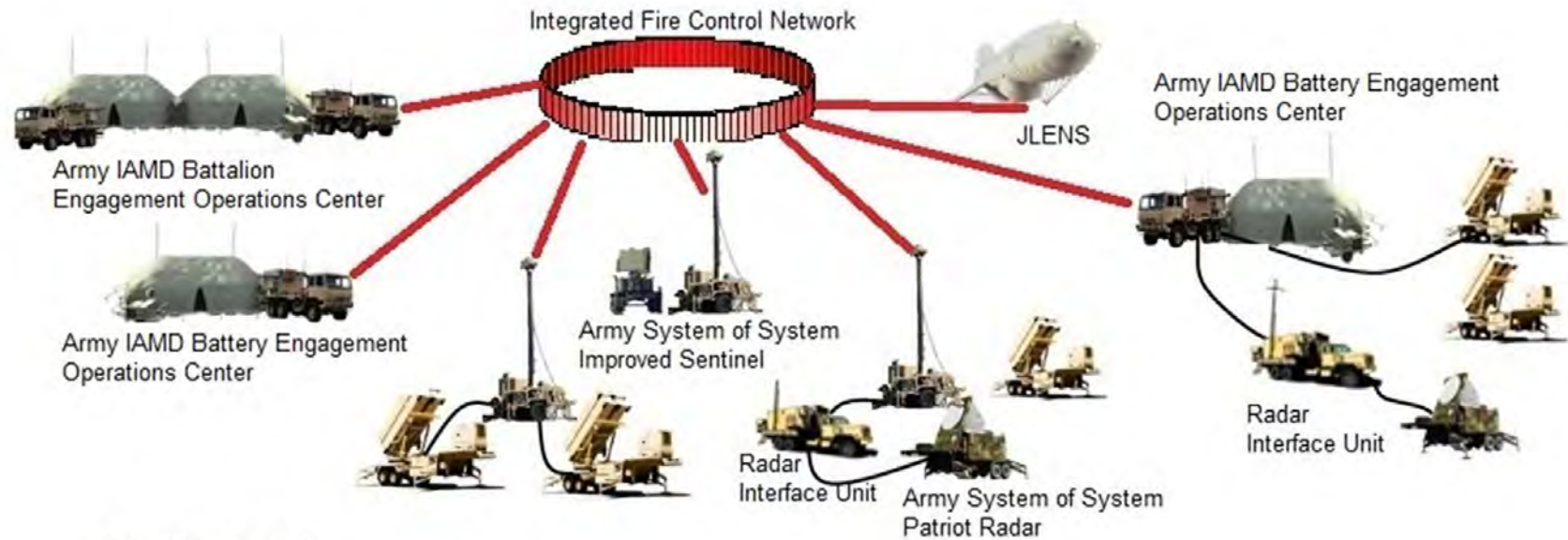
The project manager used an incremental acquisition strategy to design and produce the Army IAMD, which included delivering an initial air and missile defense capability in FY 2016 (the first increment) and delivering two product and capability improvements in FY 2018 and FY 2020 to complete the second increment.

#### First Program Increment

The first increment provides an initial capability that includes the IBCS, the Sentinel Radar, the Patriot Radar and Missile Launchers, and the JLENS sensor components. All these elements are connected to an integrated fire control network to enable direct control through the Army IAMD system. The IBCS will act as the common mission command element, using the integrated fire control network to control Army radar and missile launchers to provide IAMD with a system of systems capability. The IBCS and the fire control network enable all Army IAMD components to work together, as shown in Figure B-1.

.

Figure B-1. Army IAMD Capabilities Delivered Under the First Program Increment



Capabilities Delivered:

- Improved Combat Identification
- Larger Defended Area Asset Against Full Threat Spectrum
- Positive Mission Command
- Responsive Engagement with Advanced Techniques
- Greater Situational Awareness / Situational Understanding
- Flexibility in Choice of Interceptors
- Enables Scalable and Tailorable Force Packages
- Training and Logistics Efficiencies

Source: IAMD Project Office

## ***Benefits of the First Program Increment***

The first program increment capability will provide warfighters with:

- significantly improved combat identification, reducing deaths and woundings by friendly fire;
- a larger defended area against a full spectrum of air and missile threats;
- mission command of air and missile defense assets, enabling effective engagement and force operations;
- responsive threat engagement in complex air and missile defense scenarios; and
- the ability to manage the battle across all integrated radar and missile launchers, with no “single points of failure.” (The system can substitute an alternative sensor or shooter if one is lost or malfunctions.)

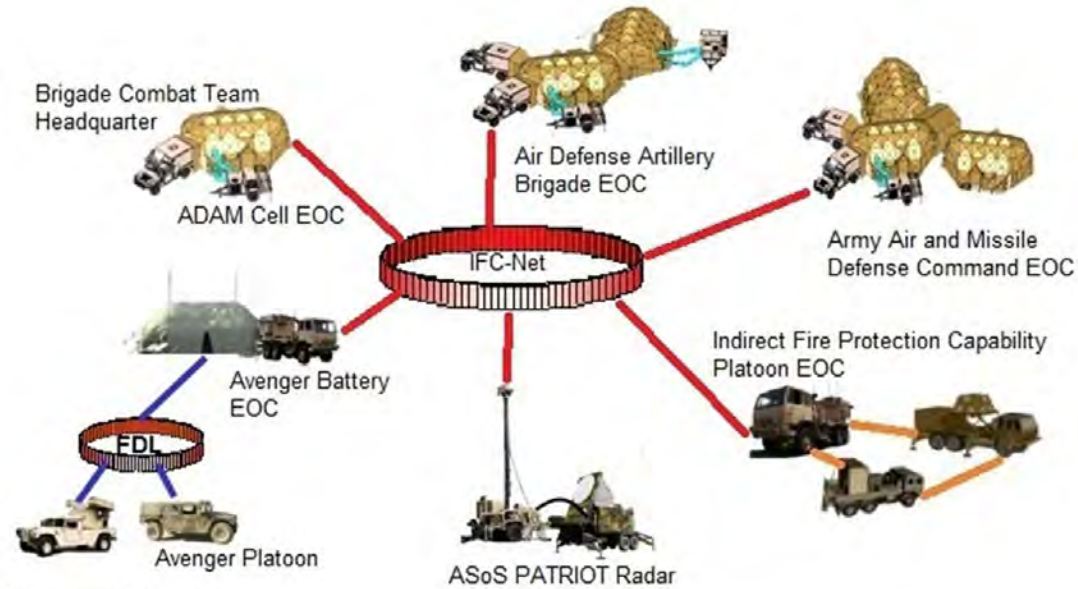
## **Second Program Increment**

The second increment is divided into two Pre-Planned Product Improvement efforts that will provide follow-on product and capability improvements, which the project manager plans to deliver in FY 2018 and FY 2020, respectively.

### ***Pre-Planned Product Improvement One***

As shown in Figure B-2 on the next page, Pre-Planned Product Improvement One will employ the Patriot radar directly on the integrated fire-control network, eliminating the need for the Patriot radar interface from the Army IAMD architecture. Additionally, this improvement includes linking the IAMD capability into Army Air and Missile Command Headquarters, Air Defense Artillery Brigades, Air Defense Airspace Management Cells, Headquarters, and Indirect Fire Protection Capability/Avenger battalions.

Figure B-2. Improvements Delivered Under Army IAMD Pre-Planned Product Improvement One



Improvement Delivered:

- IBCS Functionality at Brigade Combat Team (Air Defense Airspace Management [ADAM]), Air Defense Artillery Brigade Headquarters and Army Air and Missile Defense Command Headquarters
- Patriot Radar Employed Directly on the Integrated Fire Control Network (IFC-Net) Eliminating the Need for the Radar Interface Unit
- Indirect Fire Protection Capability for Counter-Rocket, Artillery and Mortar Capability
- Avenger Force Incorporated into the AIAMD Architecture

Source: IAMD Project Office

Abbreviations:

ADAM: Air Defense Airspace Management  
 ASoS: Army System of Systems  
 EOC: Engagement Operations Center  
 FDL: Forward Area Air Defense Command and Control Data Link  
 IBCS: IAMD Battle Command System  
 IFC-Net: Integrated Fire Control Network

Improvements delivered under Pre-Planned Product Improvement One will include:

- providing greater flexibility in responding to air and missile threats by giving multiple levels (field level through headquarters) within the Air Defense Artillery Command the ability to directly control Army IAMD radar and missile launchers;
- providing improved defenses against rockets, artillery, and mortars by placing two additional air and missile defense systems, the Indirect Fire Protection Capability and Avenger, under Army IAMD command and control; and
- positioning Patriot radar under direct Army IAMD control through the Integrated Fire Control Network to eliminate system interface equipment.

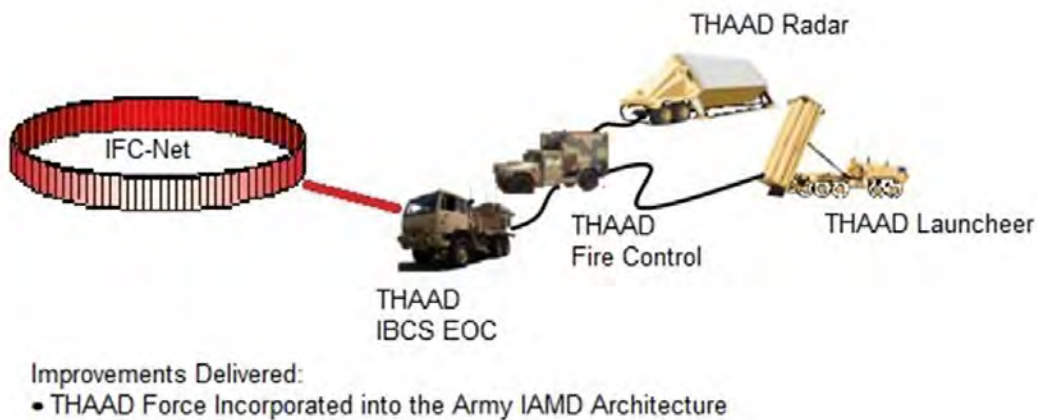
## ***Pre-Planned Product Improvement Two***

Pre-Planned Product Improvement Two will provide additional capabilities to include adding Terminal High Altitude Area Defense batteries into the Army IAMD architecture, as shown in Figure B-3.

The Terminal High-Altitude Area Defense is the upper tier of the Army's two-tier missile defense concept. The Terminal High-Altitude Area Defense program is a complete integrated weapon system, including launchers, missiles, radar, computers, and battle management command and control. The elements of the system work in concert to detect, identify, assign, and destroy incoming theater ballistic missiles.

The most significant improvement delivered under Pre-Planned Product Improvement Two is that the wide-area, higher-altitude protection of the Terminal High-Altitude Area Defense system will complement the lower-tier air and missile defense protection the Patriot system provides.

*Figure B-3. Improvements Delivered Under Army IAMD Pre-Planned Product Improvement Two*



Source: IAMD Project Office

Abbreviations:

EOC: Engagement Operations Center

IFC-Net: Integrated Fire Control Network

THAAD: Terminal High Altitude Area Defense



## Management Comments

### Under Secretary of Defense for Acquisition, Technology, and Logistics Comments



ACQUISITION,  
TECHNOLOGY  
AND LOGISTICS

OFFICE OF THE UNDER SECRETARY OF DEFENSE  
3000 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3000

050914

MEMORANDUM FOR PROGRAM DIRECTOR, ACQUISITION, PARTS AND  
INVENTORY, OFFICE OF THE INSPECTOR GENERAL

THROUGH: DIRECTOR, ACQUISITION RESOURCES AND ANALYSIS

*MS*  
*5/19/14*

SUBJECT: Response to DoD Inspector General Draft Report on Army Integrated Air and  
Missile Defense Program Needs to Improve Software, Test, and Requirements  
Planning (Project No. D2013-D000AE-0136.000)

As requested, I am providing responses to the general content and recommendations  
contained in the subject report.

**Recommendation A:**

We recommend the Under Secretary of Defense for Acquisition, Technology, and Logistics  
postpone the low-rate initial production decision for the Army Integrated Air and Missile  
Defense until the project manager completes Limited User Testing using:

1. software that meets all system specification requirements, as defined for contract  
W31P4Q-08-C-0418; and
2. test assets and trained soldiers sufficient to demonstrate that the Integrated Air and  
Missile Defense can integrate with external radar and missile defense.

**Response:**

Partially Concur. I agree with the intent of Recommendation A, that program decisions should  
not occur until adequate testing and evaluation has been completed which demonstrates planned  
system performance. The Army Integrated Air and Missile Defense (AIAMD) plan is designed  
for incremental capabilities delivered over time to ensure test events have required capabilities  
present and milestone decisions have the proper body of evidence to allow for an informed  
decision. For Example, Milestone C and Low Rate Initial Production Decisions are informed by  
the following operational test events: Test Player Training, Customer Test, Limited User Test  
and Hardware-In-The-Loop tests. AIAMD software is incrementally developed, tested and  
evaluated. Each successive software build brings additional capabilities appropriate for that  
phase of development. All program decisions will be supported by the appropriate body of  
evidence. This includes an assessment of design stability, demonstration of acceptable  
performance against requirements, operational assessment, and verification of mature software  
capability consistent with the software development schedule.

## Under Secretary of Defense for Acquisition, Technology, and Logistics Comments (cont'd)

Since your review of the program, the Program Manager has modified the AIAMD schedule. This change now allows adequate time for soldier training prior to Limited User Testing. The Army has also procured additional test assets to mitigate risk to test asset availability.

Please contact ~~DoD OIG: (b) (6)~~ if additional information is required.



Katrina McFarland

# Commander, Army Fires Center of Excellence Comments



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
HEADQUARTERS, USA FIRES CENTER OF EXCELLENCE AND FORT SILL  
OFFICE OF THE COMMANDING GENERAL  
455 MCNAIR AVENUE, SUITE 100  
FORT SILL, OKLAHOMA 73503

ATZR-C

28 April 2014

MEMORANDUM THRU

Army Capabilities Integration Center (ARCIC), ATTN: Chief, Fires Division, Training and Doctrine Command (TRADOC), 950 Jefferson Avenue Fort Eustis, VA 23604

Headquarters, Training and Doctrine Command (TRADOC), 950 Jefferson Avenue, Fort Eustis, VA 23604-5700

Headquarters, Department of the Army (HQDA), ATTN: G3/5/7, 200 Army Pentagon, Washington, DC 20310-0200

FOR Department of Defense Inspector General, 4800 Mark Center Drive, Alexandria, VA 22350-1500

SUBJECT: Army Integrated Air and Missile Defense (AIAMD) Response to Draft Report for Project No. D2013-D000AE-0136.000

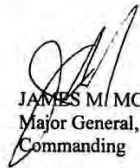
1. Reference Memorandum, Department of Defense Office of the Inspector General, April 3, 2014 Subject: Army Integrated Air and Missile Defense Program Needs to Improve Software, Test, and Requirements Planning (Project No. D2013-D000AE-0136.000).
2. The enclosed response from the United States Army Fires Center of Excellence (FCOE) to this report has been reviewed and staffed by the Army Capabilities Integration Center (ARCIC) at Headquarters, Training and Doctrine Command (TRADOC) for continuity and clarity. The Chief, Fires Division, concurs with this response from FCOE.
3. The FCOE response to the Inspector General report specifically addresses two individual findings in Recommendation B of the report. Both findings dealing with the Capability Production Document are valid and were previously identified at FCOE. The Commanding General of the Fires Center of Excellence concurs with both portions of Recommendation B of the report.

## Commander, Army Fires Center of Excellence Comments (cont'd)

ATZR-C

SUBJECT: Army Integrated Air and Missile Defense (AIAMD) Response to Draft Report for Project No. D2013-D000AE00136.000

4. Point of contact for this action is DoD OIG: (b) (6) or DoD OIG: (b) (6)



JAMES M. MCDONALD  
Major General, US Army  
Commanding

Encl  
FCOE Response to DoD IG Draft report

## Commander, Army Fires Center of Excellence Comments (cont'd)

DOD IG DRAFT REPORT – DATED APRIL 3, 2014  
DOD IG PROJECT NO. D2013-D000AE-0136.000

“ARMY INTEGRATED AIR AND MISSILE DEFENSE PROGRAM NEEDS TO IMPROVE SOFTWARE, TEST, AND REQUIREMENTS PLANNING”

COMMANDER, ARMY FIRES CENTER OF EXCELLENCE (FCOE)  
RESPONSE TO THE DOD IG RECOMMENDATION

RECOMMENDATION B:

1. revise the draft capability production document for the Integrated Air and Missile Defense to define capability requirements for developing the initial capability of the system and to state that another capability production document will follow, which will define capability requirements for the Pre-Planned Product Improvements One and Two; and
2. prepare a follow-on capability production document that defines capability requirements for the Pre-Planned Product Improvements One and Two to support the planned management review for Pre-Planned Product Improvement One at the end of FY 2018.

COMMANDER, AFCE RESPONSE:

**B1: Concur.** The draft capability production document (CPD) is being revised to ensure the requirements are defined to comply with Interim DoDI 5000.02, November 25, 2013. The CPD will address the follow on requirements by increment(s), which will be further defined in a respective CPD. The initial CPD will undergo world-wide staffing no later than October 2014 in order to ensure an approved CPD no later than six months prior to Milestone C, scheduled for August 25, 2016.

**B2: Concur.** Increment 3 CPD will be developed to support Terminal High Altitude Air Defense (THAAD) integration. The current plan is to develop the initial Increment 3 CPD for world-wide staffing no later than first quarter Fiscal Year 2018 in order to ensure an approved Increment 3 CPD no later than first quarter Fiscal Year 2022.

Point of contact for this document is DoD OIG: (b) (6) TCM-Army Air and Missile Defense Command (AAMDC) at Fort Sill, OK. DoD OIG: (b) (6) or by electronic mail at DoD OIG: (b) (6)

## Project Manager, Army Integrated Air and Missile Defense Comments

~~FOR OFFICIAL USE ONLY~~REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
PROGRAM EXECUTIVE OFFICE, MISSILES AND SPACE  
5250 Martin Road  
Redstone Arsenal, AL 35898-8000

SFAE-MSLS-IAMD

18 April 2014

MEMORANDUM THRU

Program Executive Officer, Missiles and Space (SFAE-MSLS), 5250 Martin Road,  
Redstone Arsenal, AL 35898-8000 (b) (6) 5/1/2014 (b) (6)  
Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology),  
103 Army Pentagon, Washington, DC 20301-0103

FOR Office of the Under Secretary of Defense (Acquisition, Technology, and Logistics),  
3010 Defense Pentagon, Washington, DC 20301-3010

SUBJECT: Army Integrated Air and Missile Defense (AIAMD) Response to Draft Report for  
Project No. D2013-D000AE-0136.000

1. Reference Memorandum, Department of Defense Office of the Inspector General, April 3, 2014, Subject: Army Integrated Air and Missile Defense Program Needs to Improve Software, Test, and Requirements Planning (Project No. D2013-D000AE-0136.000)
  2. Thank you for the opportunity to provide the Army position on the findings and recommendations in the referenced report and to provide an update on actions that address the findings and recommendations. Since the initial audit, several events have occurred which impacted the program plan and schedule, in some cases mitigating risks outlined in the report.
  3. The IAMD Project Office has reviewed the above subject report and agrees with the overall finding in Section A, that the Project Manager planned the initial production decision to occur prior to completion of "all" software deliveries for the Integrated Air and Missile Defense Battle Command System (IBCS). The program plan is designed for incremental capabilities delivered over time to ensure test events have required capabilities present and milestone decisions have the proper body of evidence to allow for an informed decision. However, the Project Office does not agree with some of the specific finding statements within the body of the report. Specific comments to the findings, recommendation, and background of the above subject report are attached (Enclosure 2).
- Additionally, the Project Office agrees with the general intent of Recommendation A, that the Initial Production Decision should not occur until adequate testing demonstrating the system will

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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SFAE-MSLS-IAMD

SUBJECT: Army Integrated Air and Missile Defense (AIAMD) Response to Draft Report for Project No. D2013-D000AE-0136.000

meet stated and derived requirements based on acceptable performance during the Engineering Manufacturing and Development (EMD) phase (including the Limited User Test). However, the Project Office believes that standard (as directed in DoDI 5000.02) does not constitute a delay in the program schedule for the Initial Production Decision at this time.

4. Since the time of the audit conclusion, several actions have helped to address the findings and recommendations. As a result of a funding reduction for the IBCS program in the President's FY15 Budget Request, the program Initial Production Decision scheduled for first quarter FY16 has been moved to fourth quarter FY16. The adjusted program schedule (Enclosure 1) still holds the same software delivery schedule from the contractor which allows for additional software integration time to decrease overall risk to the integration effort and provides adequate testing to be completed before the initial production decision. Additionally, the funding reduction pushed developmental test events (flight tests) and the Limited User Test (LUT) to later dates which has allowed the user community to de-conflict resource issues (personnel and equipment) in order to provide adequate support to the IBCS Test program.

5. Point of contact for this action is:

[REDACTED]

DoD OIG: (b) (6)

[REDACTED]

Project Manager  
Integrated Air and Missile Defense  
Project Office

Encl 1: IAMD Program Schedule

Encl 2: IAMD Project Office Responses

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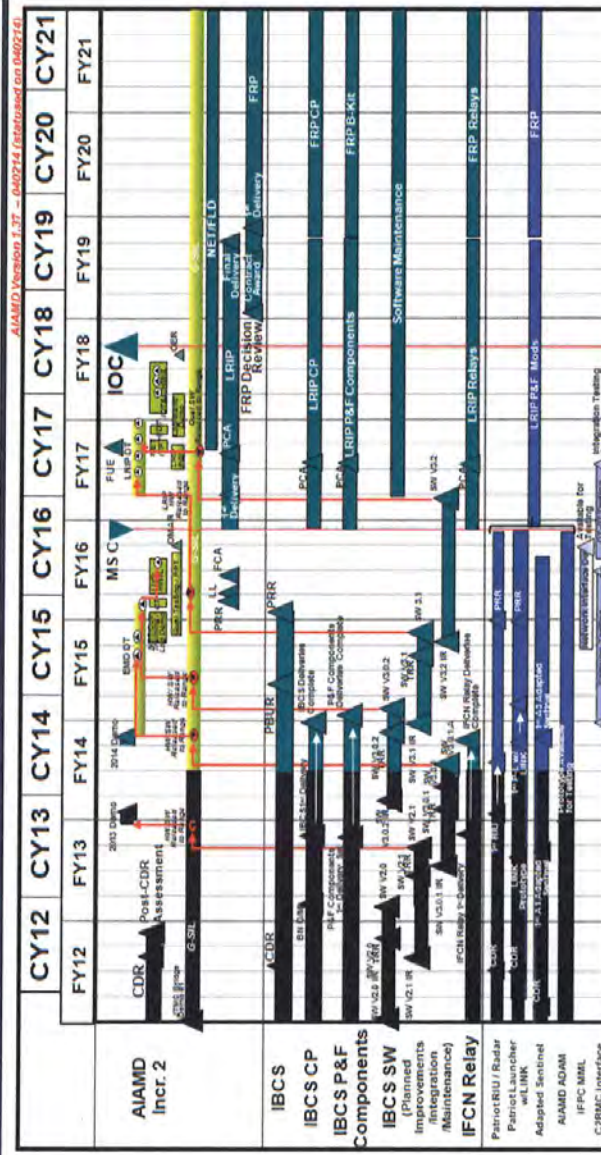
# Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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## AIAMD Program Master Schedule - FY18 3rd Qtr IOC (Supports PB-15) -



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ENCLOSURE 1



## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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**Project:** D2013-D000AE-0136.000

**Audit Location:** Huntsville, Alabama

**Finding Designation:** A

**Finding Title:** Deficiencies in Software Delivery and Test Asset Availability Will Limit Testing to Support the Low Rate Initial Production Decision (Paragraph) Effects of Deficiencies in Software Delivery, (Paragraph) limitations in Demonstrating Secondary System Requirements

**Report Finding:**

(FOUO) "As of December 8, 2013, the project manager <sup>OSD/JS: (b) (5)</sup>

[Redacted]

The IBCS must meet these specifications to demonstrate that the missile defense capabilities planned for the Army IAMD program are on a path to meet the system performance requirements in the "Capability Development Document (CDD) for: Army Integrated Air and Missile Defense System-of-Systems (AIAMD SoS) Increment: 2," October 21, 2010." (DoD IG Report p. 6)

**Project Office Position:**

The Project Manager agrees with the findings on the number of requirements affected but not with the characterization that the software would fail to meet requirements nor with the implication that the planned partial implementation is not on a path to meet the Capability Development Document (CDD) requirements. The program plan is designed for incremental capabilities delivered over time to ensure test events have required capabilities present and milestone decisions have the proper body of evidence to allow for an informed decision.

**Supporting Evidence:**

(FOUO) The IAMD System Specification requirements that were affected have been discussed in several forums, formal and informal, with the User, ATEC and the Director, Operational Test and Evaluation (DOT&E). These discussions included descriptions of the trade-offs required between cost, schedule and performance. This coordination was to ensure a common understanding of the limitations and to incorporate feedback from these key stakeholders to the extent possible to ensure the suitability of the software for LUT (Table A).

(FOUO) Table A: Coordination Meetings

#	Date	Subject	Audience
1	1/29/13	User TIM	TCM
2	2/12/13	SW Capability Discussion With User	TCM
3	3/6/13	SW Directorate/TCM Telecom on TIM actions	TCM
4	3/11/13	IAMD T&E WIPT Special Topics (Pre- WIPT meeting),	ATEC, TCM, DOT&E

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ENCLOSURE 2

## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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5	3/14/13	User SW Build Allocation discussion	TCM
6	4/9/13	AIAMD Limited User Test Planning Meeting	ATEC, TCM, DOT&E
7	5/9/13	AIAMD Program Management Review	TCM
8	5/10/13	TM discussion associated with necessary AMD assets for LUT	ATEC
9	12/6/13	AIAMD Software Replan Update	ATEC, TCM, DOT&E
10	12/16/13	IBCS LUT Build 3.0.2 Initial Review (IR)	TCM, ATEC
11	12/17/13	IBCS Follow Up Deep Dive	TCM, ATEC, DOT&E
12	4/9/14	IBCS Link 16 Message Implementation Planned for LUT Timeframe	ATEC

~~(FOUO)~~ In order to facilitate the coordination, a summary of the impacts for each IAMD System Specification section (136 sections which encompass 765 requirements) was developed which included a simple metric to indicate the percentage of the requirements in each section planned for each software version. This simple metric treats all requirements equally and alone does not convey whether the section will pass or fail its underlying requirements or is sufficient for LUT. In 22 cases, there are less than 6 requirements in a section and in the remaining, the number of requirements is much higher (e.g., Section 3.18.1 Joint Track Management Capability Bridge with 27 requirements).

**Project Office Recommendation:** The Project Manager and stakeholder team recommends continuing execution of the approved program plan to meet required capabilities and ensure a successful low-rate initial production decision.

**Project Office action taken or planned:** The incremental approach for software capabilities and the capabilities planned for LUT are understood by the Project Manager, the User and ATEC. There is a resourced plan in place to address the capabilities beyond LUT with a phased implementation approach, ensuring the capabilities are implemented and tested during IOT&E.

Additionally the following actions will continue:

1. Requirements reviews with User and Test Community to finalize critical requirements to be demonstrated during DT/LUT
2. Involvement with key stakeholders through various established Working Groups to provide a complete and synchronized body of evidence in support of Milestone C.

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ENCLOSURE 2

## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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**Project:** D2013-D000AE-0136.000

**Audit Location:** Huntsville, Alabama

**Finding Designation:** A

**Finding Title:** Deficiencies in Software Delivery and Test Asset Availability Will Limit Testing to Support the Low Rate Initial Production Decision (Paragraph) Effects of Deficiencies in Software Delivery, (Paragraph) limitations in Demonstrating Secondary System Requirements

**Report Finding:**

“Deficiencies in meeting contract system specification requirements will reduce what the Army initially planned to demonstrate, through the limited user test. Specifically, the deficiencies will limit the Army’s ability to demonstrate that the IBCS can meet three out of the five key performance parameters (primary requirements) and four of the six key system attributes (secondary requirements) defined in the capability development document. As explained in the “Manual for the Operation of the Joint Capabilities Integration and Development System,” January 19, 2012, (JCIDS Manual) the capability development document is the “primary means” of proposing system capability requirements needed for a solution intended to close or reduce gaps in U.S. military capabilities.” (DoD IG Report p.10)

**Project Office Position:**

~~(FOUO)~~ The Project Manager agrees with the findings on the number of KPPs and KSAs affected, but not with the characterization of capabilities provided in support of the Limited User Test (LUT). The IAMD software replanning efforts affected 3 of 5 Key Performance Parameters (KPP’s) and 4 of 6 Key System Attributes (KSA’s). During LUT, at least a partial capability is provided in 100% of the instances. In some cases, the requirements were marked as affected when an alternative design was proposed since it was a departure from the original conceptual approach (e.g. 3.2.2.11 Adjacent ASoS Task Force). IAMD System Specification requirements that were affected were coordinated with the User (TRADOC Capability Manager Army Air and Missile Defense (TCM-AAMDC) and Army Test and Evaluation Command (ATEC). The Project Manager disagrees with the characterization that the planned partial implementation is not on a path to meet the CDD requirements. The program’s plan for incremental software capabilities delivered over time ensures test events will have required capabilities present and milestone decisions will have the proper body of evidence to allow for an informed decision. This is further detailed in Table B.

**Supporting Evidence:** 100% of the IAMD System specifications are traced through DOORS and all ultimately roll-up to higher level requirements. Not all system specification requirements are required to demonstrate the program is “on a path” to demonstrate capabilities (per DoDI 5000.02 and JCIDS Manual). Reference Table B.

**Project Office Recommendation:** The Project Manager and stakeholder team recommends continuing execution of the approved program plan to meet required capabilities and ensure a successful low-rate initial production decision.

**Project Office action taken or planned:** The incremental approach for software capabilities and the capabilities planned for LUT are understood by the Project Manager, the User and ATEC. There is a resourced plan in place to address the limitation beyond LUT with a phased implementation approach, ensuring the capabilities are implemented and tested during IOT&E. Additionally the following actions will continue:

1. Requirements reviews with User and Test Community to finalize critical requirements to be demonstrated during DT/LUT as part of scheduled Test Integrated Product Team meetings.


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ENCLOSURE 2

## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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2. Involvement with key stakeholders through various established Working Groups to provide a complete and synchronized body of evidence in support of Milestone C.


<del>(FOUO)</del> Table B		
KPP/KSA	Specification	Justification
KPP1 Net Ready		
KPP2 Integrated Defense Effectiveness		
KPP3 Common Command and Control		
KPP 4 Material Availability		
KPP 5 Force Protection and Survivability		

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ENCLOSURE 2

## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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KSA 1 Diagnostics	3.8.2 Maintainability	 PEO MS: (b) (3), 10 USC § 130
	3.12 Logistics	
KSA 2 Maintenance Ratio	3.8.2 Maintainability	
KSA 3 Material Reliability	Not Affected	
KSA 4 Ownership Cost	Not Affected	
KSA 5 IABM	Not Affected	
KSA 6 Single Integrated Air Picture	Affected	

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ENCLOSURE 2

## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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**Project:** D2013-D000AE-0136.000

**Audit Location:** Huntsville, Alabama

**Finding Designation:** A

**Finding Title:** Deficiencies in Software Delivery and Test Asset Availability Will Limit Testing to Support the Low Rate Initial Production Decision (Paragraph) Effects of Deficiencies in Software Delivery, (Paragraph) limitations in Demonstrating Secondary System Requirements

### Report Finding:

"The secondary requirement most affected by software deficiencies is the requirement for a Single Integrated Air Picture. A Single Integrated Air Picture allows the warfighter to have full visualization of defended airspace, to include both friendly and threat information. The project manager identified software deficiencies against contracted system specification requirements that affect this requirement." (DoD IG report p. 12)

### Project Office Position:

(FOUO) The Project Manager agrees with the findings that software system specification requirements with linkages to Single Integrated Air Picture (SIAP) are affected. In cases, this is a result of a phased implementation approach. In

In the remaining case, an alternate capability will be implemented to meet that requirement. These capabilities and associated implementation timelines were coordinated, at the System Specification requirement level, with the TCM-AAMDC and ATEC. This is detailed in Table C.

### Supporting Evidence:

The IAMD System specifications are all traced through DOORS and all ultimately roll-up to higher level requirements. Not all system specification requirements are required to demonstrate the program is "on a path" to demonstrate capabilities (per DoDI 5000.02 and JCIDS Manual). SIAP related requirements are detailed within KSA 6 (Table C).

**Project Office Recommendation:** The Project Manager and stakeholder team recommends continuing execution of the approved program plan to meet required capabilities and ensure a successful low-rate initial production decision.

**Project Office action taken or planned:** The incremental approach for software capabilities and the capabilities planned for LUT are understood by the Project Manager, the User and ATEC. There is a resourced plan in place to address the limitation beyond LUT with a phased implementation approach, ensuring the capabilities are implemented and tested during IOT&E. Additionally the following actions will continue:

1. Requirements reviews with User and Test Community to finalize critical requirements to be demonstrated during DT/LUT
2. Involvement with key stakeholders through various established Working Groups to provide a complete and synchronized body of evidence in support of Milestone C.

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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<del>(FOUO)</del> Table C: KSA 6 Single Integrated Air Picture		
KSA	System Specification	Justification
KSA 6 Single Integrated Air Picture	PEO MS: (b) (3), 10 USC § 130	

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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	3.18.1 Joint Track Management Capability (JTMC) Bridge	<del>FOR OFFICIAL USE ONLY</del> PEO MS: (b) (3), 10 USC § 130
	3.13.2.1.2 Common Tactical Air Picture	

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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**Project:** D2013-D000AE-0136.000

**Audit Location:** Huntsville, Alabama

**Finding Designation:** A

**Finding Title:** Deficiencies in Software Delivery and Test Asset Availability Will Limit Testing to Support the Low Rate Initial Production Decision (Paragraph) Deployment of Patriot Test Battalion Will Reduce Test Program Effectiveness

**Report Finding:** "In response to the loss of the Patriot Test Battalion, Army Training and Doctrine Command's Fires Center of Excellence, the Army IAMD project office, and the Army Test and Evaluation Command (the requirements, program, and testing staffs) briefed the Army's General Officers Steering Committee (the Steering Committee) on July 16, 2013, [redacted] for testing the IAMD. The Steering Committee's [redacted] (DoD IG Report p.13)

**Project Office Position:** The Army agrees with the identified risk based on the information available at the time. However, since the information was initially provided, the risk has been mitigated.

**Project Office Recommendation:** The Project Manager recommends continuing execution of the approved program plan to meet required capabilities and ensure a successful low-rate initial production decision.

**Project Office action taken or planned:** Since the information was initially provided the risk has been mitigated by the following actions:

1. Recently approved schedule provides adequate time to provide Test Detachment Soldier training prior to Limited User Test (LUT).
2. The TRADOC Capability Manager Army Air and Missile Defense (TCM/AAMDC) has committed to providing a dedicated IAMD Test Detachment in support of LUT.
3. IAMD and PDB-8 test asset requirements are now de-conflicted.
4. IAMD has procured additional dedicated assets for continuous use through Development Test (DT) and LUT.

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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**Project:** D2013-D000AE-0136.000

**Audit Location:** Huntsville, Alabama

**Finding Designation:** A

**Finding Title:** Deficiencies in Software Delivery and Test Asset Availability Will Limit Testing to Support the Low Rate Initial Production Decision (Paragraph) Unclear When Software Will Fully Meet Contract Requirements

**Report Recommendation:** "The Defense Acquisition Executive should postpone the initial production decision for the Army IAMD until the Project Manager completes operational testing using software that meets all system specification requirements, as defined for contract W31P4Q-08-C-0418." (DoD IG Report p.13)

**Project Office Position:** The Project Manager disagrees with the findings based on the guidance provided in the Interim DoDI 5000.02, dated November 25, 2013 as the standard to meet "all" system specification requirements is above the Milestone C standards as established in DoDI 5000.02.

**Supporting Evidence:** "Milestone C is the point at which a program is reviewed for entrance into the Production and Deployment Phase or for Limited Deployment. Approval depends in part on specific criteria defined at Milestone B and included in the Milestone B Acquisition Decision Memorandum (ADM). The following general criteria will also be applied: an updated and approved Acquisition Strategy; demonstration that the production design is stable and will meet stated and derived requirements based on acceptable performance in developmental test; an operational assessment; mature software capability consistent with the software development schedule; no significant manufacturing risks; a validated Capability Production Document or equivalent requirements document; demonstrated interoperability; demonstrated operational supportability; costs within affordability caps; full funding in the FYDP; and properly phased production ramp up and/or fielding support."(Interim DoDI 5000.02, dated November 25, 2013)

**Project Office Recommendation:** The Army recommends continuing execution of the approved program plan to meet required capabilities and ensure a successful low-rate initial production decision.

**Project Office action taken or planned:** The Project Manager is working with program stakeholders within the given trade space parameters. Additionally, several program events prior to the Milestone decision allow opportunities to assess capability performance. These include detailed planning for the Limited User Test (LUT), Test Readiness Reviews (TRR) for all Developmental Tests (DT) and LUT, and the Operational Material Assessment report (OMAR) which is due prior to low-rate initial production decision. These activities provide opportunities to assess and inform leadership on the state of the program's capabilities and would influence the overall timing of the low rate initial production decision.

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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**Project:** D2013-D000AE-0136.000  
**Audit Location:** Huntsville, Alabama  
**Finding Designation:** A  
**Finding Title:** Review of Internal Controls

**Report Finding:** "DoD Instruction 5010.40, Managers" Internal Control Program Procedures," May 30, 2013, required DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended and to evaluate the effectiveness of the controls. We identified internal control weaknesses in test planning and defining system requirements. Specifically, we determined the Army planned the initial production decision review to occur before the Army completes and tests the software needed to demonstrate the IAMD can fully meet capability requirements for the first increment. We also determined the Army was not adequately defining capability requirements for future developmental increments of the IAMD. We will provide a copy of the final report to the senior Army officials responsible for internal controls." (DODIG Report p.5)

**Project Office Position:** The Army disagrees with the findings as the established program processes for internal controls are working as designed to allow the program stakeholders to 1) maintain awareness of ongoing development activities and progress, and 2) ensure that progress is acceptable to meet future milestone decisions.

**Supporting Evidence:** The Project Office is following established acquisition guidelines with respect to the development and operational test planning. As stated in the Defense Acquisition Guidebook (DAG), programs conduct DT&E throughout the systems life cycle, from program initiation through system sustainment, to reduce design and programmatic risks and provide assessments. As such, DT&E:

- Assesses achievement of Critical Technical Parameter(s) (CTPs) and Key System Attribute(s) (KSAs) along with assessment of progress toward achievement of KPPs and Critical Operational Issue(s) (COIs).
- Assesses system satisfaction of the thresholds as described in the capabilities requirements documentation.
- Supports progress toward and final characterization of the system readiness for dedicated IOT&E via the AOTR process and document.
- Characterizes system functionality and provides information for cost, performance, and schedule tradeoffs.
- Assesses system specification compliance.
- Reports progress to plan for Reliability Growth and characterizes reliability and maintainability.
- Identifies system capabilities, limitations, and deficiencies.
- Documents achievement of contractual technical performance and verifies incremental improvements and system corrective actions.

Within the acquisition guidelines, there is not a requirement to fully meet 100 percent of all requirements for Milestone C. The requirement is to demonstrate progress towards meeting those requirements. None of the key development test events have been moved beyond the planned low rate initial production (LRIP) decision. The planned Limited User Test scheduled during the Developmental Testing phase is not the formal operational assessment made by ATEC and DOTE. The progress on all Key Performance Parameters will be demonstrated and made available to the MDA to enable a successful MS C decision.

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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Operational testing will be conducted after Milestone C on the path to the final Operational Assessment conducted by the test community prior to fielding. It is during this phase of the program that the operational effectiveness and operational suitability of the system under realistic operational conditions will be determined. This includes assessment of joint combat operations, the satisfaction of thresholds in the approved JCIDS documents and critical operational issues, impacts to combat operations, and additional information on the system's operational capabilities. All requirements will be addressed during this phase of the program.

The Project Office will continue to conduct Design Reviews with both Army and OSD Systems Engineering organizations. These Design Reviews are in accordance with approved Acquisition Strategy and Systems Engineering Plan and will ensure all required data is available to support a MS C decision.

The Increment 2 Capability Development Document (CDD) fully defines the requirements for an Integrated Air and Missile Defense Capability. Page 1 of the CDD states that "all existing AMD C2 command posts, Tactical Operations Centers and communications will migrate to the Army IAMD SoS common C2 configuration". The CDD goes on to state on page 20 that "...This systems consists of the common C2 capability, the common interface modules on elements (sensors and shooters), and the battle management network to integrate across common C2 and system elements. Radars and weapons will be modified to enable the Army IAMD SoS architecture, but changes in the basic design and capabilities of sensors and weapons on the element-unique side of the interface are not principally impacted by this CDD." The CDD fully defines the requirements for a common mission command throughout the Army's AMD community to be used with various sensor and weapons platforms. While the CDD does explicitly identify some systems to be included in the architecture, it was never intended to identify every potential sensor or weapon. The follow-on increments described in the IG report are the material developers plan on how to implement the current approved requirements. Funding was placed in the program in FY14 to begin the design phase of the follow-on efforts utilizing the Increment 2 CDD as the requirements based on available funding.

**Project Office Recommendation:** The Project Manager recommends continuing execution of the programs Internal Control Processes, ensuring the plan is executable and meets the required capabilities, and ensures a successful low-rate initial production decision.

**Project Office action taken or planned:** The following actions will continue:

1. Requirements reviews with User and Test Community to finalize critical requirements to be demonstrated during DT/LUT.
2. Involvement with key stakeholders through various established Working Groups to provide a complete and synchronized body of evidence in support of Milestone C.

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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Table D: Acronym Listing

Acronym	Definition
ACM	Airspace Control Measure
ACO	Airspace Control Order
AMDWS	Air and Missile Defense Work Station
ASoS	Army Integrated Air and Missile Defense System-of-Systems
BFT	Blue Force Tracker
BIT	Built-In-Test
CCTDI	Classification, Categorization, Typing, Discrimination, & Identification
CDS	Cross Domain Solution
CID	Combat Identification
COBRA	Collection of Broadcast Remote Actions
CTBGR	Cooperative Target Based Geodetic Registration
CTP	Common Tactical Picture
ELNOTS	Electronic Intelligence Notation
FAA	Federal Aviation Administration
GCSS-A	Global Combat Support System- Army
GIG	Global Information Grid
GR	Geodetic Registration
IA	Information Assurance
IABM	Integrated Architecture Behavior Model
IAMD	Integrated Air and Missile Defense
IBCS	IAMD Battle Command System
IBS	Integrated Broadcast Service
ICD	Interface Control Document
IETM	Interactive Electronic Technical Manual
IFCN	Integrated Fire Control Network

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## Project Manager, Army Integrated Air and Missile Defense Comments (cont'd)

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Table D: Acronym Listing

Acronym	Definition
IOT&E	Initial Operational Test and Evaluation
IPP	Impact Point Predication
IUR	Interface Unit Registration
JIFC	Joint Integrated Fire Control
JLENS	Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System
JTMC	Joint Track Management Capability
KPP	Key Performance Parameter
KSA	Key System Attribute
LEOS	Low Earth Orbiting Satellite
LUT	Limited User Test
MTBGR	Mutual Target Based Geodetic Registration
NBC	Nuclear Biological Chemical
PPLI	Precise Participant Location Information
RSM	Radar Signal Modulation
TF	Task Force
UAT	Universal Access Transceiver

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ENCLOSURE 2

## Acronyms and Abbreviations

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- AFCOE** Army Fires Center of Excellence
- IAMD** Integrated Air and Missile Defense
  - IBCS** IAMD Battle Command System
- JCIDS** Joint Capabilities Integration and Development System
- JLENS** Joint Land Attack Cruise Missile Defense Elevated Netted Sensor





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