



April 2014

# BALLISTIC MISSILE DEFENSE

## Actions Needed to Address Implementation Issues and Estimate Long-Term Costs for European Capabilities

# GAO Highlights

Highlights of [GAO-14-314](#), a report to congressional requesters

## Why GAO Did This Study

Since 2002, DOD has spent over \$98 billion developing a ballistic missile defense system to protect the United States, U.S. forces, and allies against inbound threat missiles. In December 2011, DOD deployed the initial phase of a revised approach for Europe, with increased capabilities to be deployed in later phases. GAO has reported on potential risks to DOD's implementation caused by the lack of a coordinated management approach and an absence of life-cycle cost estimates. Given DOD's BMD investment and revised approach, GAO was asked to review EPAA's implementation. GAO evaluated the extent to which DOD (1) identified and planned to resolve implementation issues before deploying BMD capabilities to Europe; and (2) estimated the long-term costs to operate and support BMD elements in Europe. GAO reviewed DOD instructions, manuals, and other documents on the acceptance process and the status of operating and support cost estimates that have been developed to-date, and interviewed cognizant officials.

## What GAO Recommends

GAO recommends that DOD identify and plan to resolve implementation issues prior to deploying and operating BMD elements and require and set a deadline for completing business-case analyses and joint cost estimates for all BMD elements in Europe. DOD agreed with three recommendations and partially agreed with one, expressing concern about the proper entities for resolving implementation issues. GAO believes that the recommendation can be implemented through collaboration as discussed further in this report.

View [GAO-14-314](#). For more information, contact John Pendleton at (404) 679-1816 or [pendletonj@gao.gov](mailto:pendletonj@gao.gov).

April 2014

## BALLISTIC MISSILE DEFENSE

### Actions Needed to Address Implementation Issues and Estimate Long-Term Costs for European Capabilities

## What GAO Found

The Department of Defense (DOD) met the presidentially announced time frame to deploy initial ballistic missile defense (BMD) capabilities in Europe under the European Phased Adaptive Approach (EPAA) but did not fully identify and plan to resolve implementation issues before deployment. As a result, DOD experienced implementation issues, such as incomplete construction of housing facilities for soldiers arriving at the EPAA radar site in Turkey and incomplete implementing arrangements defining how to operate with allies when certain BMD elements arrived in the host country. U.S. Strategic Command, in coordination with other combatant commands, developed criteria to assess whether a BMD capability is ready for operational use to ensure that BMD capabilities can be used as intended when they are delivered. However, the assessment criteria used during this process focused on effectiveness, suitability, and interoperability areas—such as whether BMD elements can work together to track ballistic missile threats—and did not explicitly require DOD to comprehensively identify and plan to resolve implementation issues prior to deploying these capabilities. DOD plans to continue to use its existing process to accept BMD capabilities planned for Europe in the future. Without identifying and planning to resolve implementation issues before deployment, DOD risks continuing to encounter implementation issues after it deploys additional BMD capabilities in Europe, which may lead to significant delays and inefficiencies.

DOD has estimated the long-term operating and support cost estimates for some but not all BMD elements in Europe, and existing estimates could change. Specifically, initial estimates indicate these costs could total several billion dollars over the elements' lifetime, but key decisions that have not been made are likely to change these estimates. Also, DOD has not developed a comprehensive estimate for a key element—Aegis Ashore. In prior work developing cost-estimating best practices, GAO concluded that cost estimates can assist decision makers in budget development and are necessary for evaluating resource requirements at key decision points and effectively allocating resources. Office of Management and Budget guidance also emphasizes that agencies should plan for operations and maintenance of capital assets. In 2012, the Army and the Missile Defense Agency (MDA) estimated the lifetime operating and support costs for two BMD elements, a forward-based radar and terminal high-altitude air defense batteries. However, DOD has not completed business-case analyses for them, which would underpin a decision on long-term support strategies, and has not decided where to station the terminal-defense battery. In addition, MDA and the Navy have separately begun to identify some costs but have not developed a comprehensive joint estimate of lifetime operating and support costs for the two planned Aegis Ashore sites. Although MDA and the services agreed to jointly develop estimates of lifetime operating and support costs, there is no explicit requirement to complete business-case analyses to support a decision on long-term product support, and jointly develop cost estimates, before deploying BMD elements in Europe. However, without completed business-case analyses and up-to-date operating and support cost estimates, DOD and decision makers are limited in their ability to develop sound budgets and identify the resources needed over the long term to operate and support BMD elements in Europe.

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**Abbreviations**

BMD	Ballistic Missile Defense
DOD	Department of Defense
EPAA	European Phased Adaptive Approach
MDA	Missile Defense Agency
NATO	North Atlantic Treaty Organization
THAAD	Terminal High Altitude Area Defense

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April 11, 2014

The Honorable Mike Rogers  
Chairman  
Subcommittee on Strategic Forces  
Committee on Armed Services  
House of Representatives

The Honorable Mike Turner  
House of Representatives

Since 2002, the Department of Defense (DOD) has spent over \$98 billion to develop a ballistic missile defense (BMD) system intended to defend the United States, U.S. forces, and allies around the world against inbound threat missiles. In 2009, the President announced a revised approach for BMD in Europe called the European Phased Adaptive Approach (EPAA). This approach is to include ships, land-based radars and interceptors, and a communications network, to be implemented in phases of increasing capabilities beginning in 2011. EPAA is intended to be a flexible and cost-effective way to address short-, medium-, and intermediate-range ballistic missile threats from Iran. EPAA replaced a prior plan to defend both Europe and the United States from longer-range ballistic missiles by deploying a radar in the Czech Republic and ground-based intercontinental missile interceptors in Poland.

We have issued numerous reports over the last 10 years on development, acquisition, and plans for operating ballistic missile defense capabilities. In 2010 and 2011, we reported that DOD's efforts to establish EPAA lacked clear guidance and an integrated schedule, which could result in decreased performance and increased costs, and that DOD had not fully implemented a management process to synchronize EPAA acquisition activities and ensure transparency and accountability.<sup>1</sup> DOD generally agreed with our recommendations to provide guidance on EPAA that describes desired end states, develop an integrated EPAA

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<sup>1</sup>GAO, *Ballistic Missile Defense: DOD Needs to Address Planning and Implementation Challenges for Future Capabilities in Europe*, [GAO-11-220](#) (Washington, D.C.: Jan. 26, 2011); and *Missile Defense: European Phased Adaptive Approach Acquisitions Face Synchronization, Transparency, and Accountability Challenges*, [GAO-11-179R](#) (Washington, D.C.: Dec. 21, 2010).

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schedule, and adopt BMD performance metrics for durability and effectiveness, but has not yet taken any actions. Given the resources dedicated to BMD and the revised approach, you asked us to review EPAA's implementation. For this report, we assessed the extent to which DOD has (1) identified and planned to resolve implementation issues before deploying BMD capabilities to Europe; and (2) estimated the long-term costs to operate and support BMD elements in Europe.

To assess the extent to which DOD has identified and planned to resolve implementation issues before deploying BMD capabilities to Europe, we reviewed the U.S. Strategic Command document titled *Ballistic Missile Defense System (BMDS) Warfighter Capability Acceptance*.<sup>2</sup> This document described the goal of the warfighter acceptance process, which is, in essence, to ensure that capabilities can be used as intended when they are delivered, and culminates in formal acceptance of BMD capabilities by U.S. Strategic Command. We also reviewed key documents, such as the Chairman of the Joint Chiefs of Staff Instruction titled *Policy Guidance for Ballistic Missile Defense Operations* and the Joint Staff Publication on *Countering Air and Missile Threats*, which describe DOD's BMD guidance and responsibilities of various organizations. We also met with officials from the Office of the Secretary of Defense, the Joint Staff, U.S. European Command and its military service components, and U.S. Strategic Command to understand how DOD's acceptance process was implemented. In addition, we reviewed after action-reports and briefings from the Army and Air Force that described implementation challenges experienced during the deployment of BMD elements to Europe and other regions, and provided an assessment of lessons learned for future BMD element deployments.

To assess the extent to which DOD has estimated the long-term costs to operate and support BMD elements in Europe, we first reviewed agreements and their annexes between the Missile Defense Agency (MDA) and the Army and between MDA and the Navy regarding how these organizations would work together to manage the BMD elements, including information on how they would jointly develop cost estimates. To determine the general purpose for estimating long-term costs, we identified and reviewed documents containing best practices for

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<sup>2</sup>The document is issued by U.S. Strategic Command's Joint Functional Component Command for Integrated Missile Defense.

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determining high-quality cost estimates from the Office of Management and Budget and the *GAO Cost Estimating and Assessment Guide*. Specifically, we determined that cost estimates can assist decision makers in budget development and are necessary for evaluating resource requirements at key decision points and effectively allocating resources. In addition, we reviewed the Army's regulation on *Integrated Logistic Support*, which includes guidance on business-case analysis, and is referenced in the agreement annexes between MDA and the Army, to identify DOD criteria for conducting business-case analyses to assess alternatives for providing long-term support. We then reviewed documentation of estimates developed by MDA and the services for BMD elements designated for EPAA, as well as elements that DOD could deploy to support EPAA. Finally, we met with DOD officials from MDA, and various Navy, Army, and Air Force offices, to identify key decisions that could affect the estimates.

We conducted this performance audit from December 2012 to 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. Further details on our objectives, scope, and methodology can be found in appendix I.

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## Background

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### EPAA Capabilities and Time Frames

In September 2009, the President announced a revised approach to missile defense in Europe called EPAA, which consists of phases of increasing capability to be deployed in the 2011, 2015, and 2018 time frames. EPAA serves as the U.S. contribution to the North Atlantic Treaty Organization's (NATO) mission to protect alliance populations, territory, and forces against ballistic missile threats. As originally announced, EPAA included a fourth phase that was expected to add U.S. homeland defense and expanded regional defense in the 2020 time frame. In March 2013, the Secretary of Defense canceled Phase Four, due, in part, to development delays with a key element of this phase.

In 2011, DOD deployed BMD elements to meet the President's announced time frame for the first phase of EPAA. This provided capability against short- and medium-range threats and included: Aegis

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BMD-capable ships with the Standard Missile-3 Block IA interceptor stationed in the Mediterranean; an Army Navy/Transportable Radar that is forward-based in Turkey; and a Command, Control, Battle Management and Communications system deployed to an Air Force base in Germany.<sup>3</sup> DOD is in the process of preparing for the second phase of EPAA scheduled for implementation in December 2015. The second phase will include Aegis Ashore based in Romania to provide additional capability against short- and medium-range threats with a more advanced interceptor.<sup>4</sup> The third phase of EPAA is scheduled for late 2018 and will include Aegis Ashore based in Poland to provide capability against medium- and intermediate-range threats. Additionally, although Patriot and Terminal High Altitude Area Defense (THAAD) batteries were not BMD elements originally announced as part of the revised approach to missile defense in Europe, DOD officials stated that both elements could deploy to support EPAA as needed, independent of the EPAA phases.<sup>5</sup> Figure 1 summarizes DOD's proposed time frames and BMD elements for the three phases of EPAA. Figure 2 graphically displays increasing U.S. BMD capabilities introduced in each EPAA phase.

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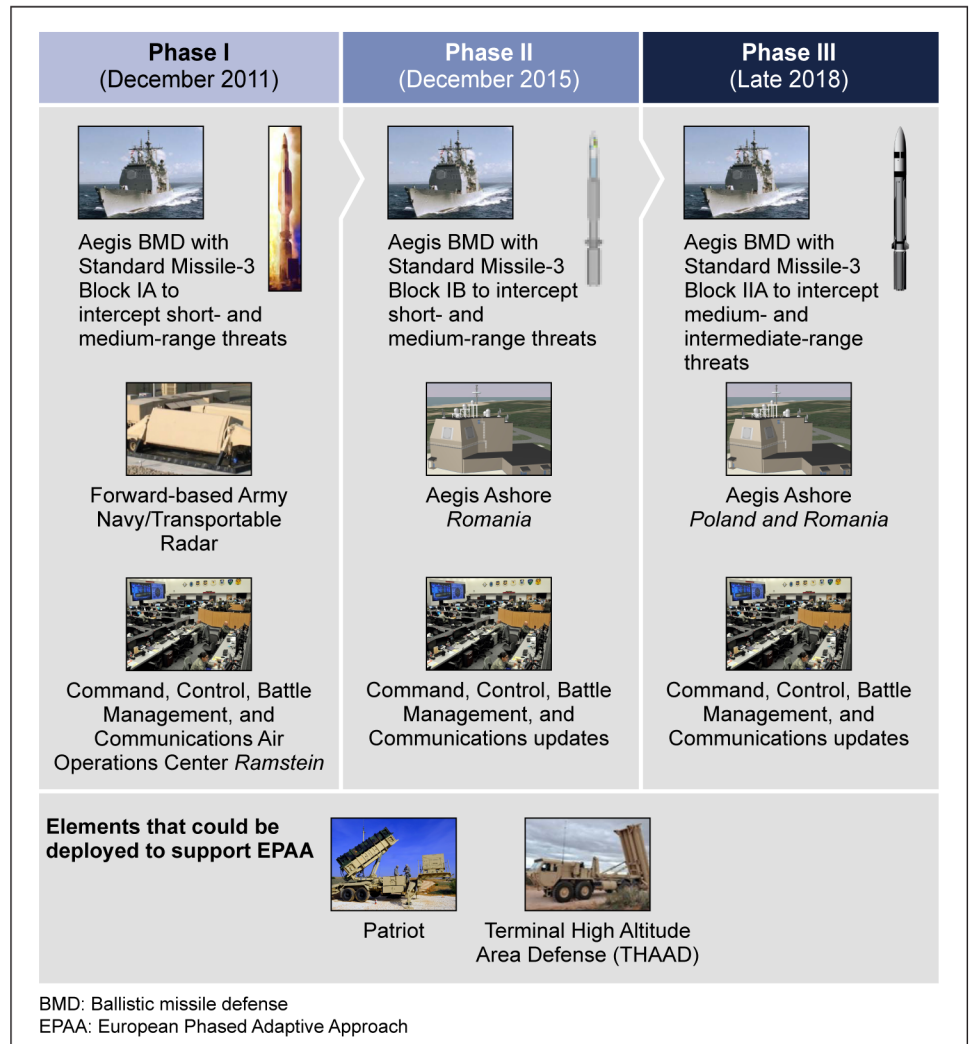
<sup>3</sup>The Command, Control, Battle Management and Communications system is a networked computer and communications element developed by MDA to integrate the BMD system by providing deliberate planning, situational awareness, sensor management, and battle management capabilities.

<sup>4</sup>Aegis Ashore is a land-based element designed by MDA to provide capability to detect, track, and intercept threats by leveraging capabilities that exist on Aegis BMD ships.

<sup>5</sup>Patriot provides simultaneous air and missile defense capabilities in defense of U.S. deployed forces and allies against short-range ballistic missiles. THAAD employs the THAAD interceptor and the Army Navy/Transportable Radar (in THAAD mode) to engage ballistic missile targets in the late mid-course and terminal phases of their trajectory. THAAD can act as a surveillance sensor, providing sensor data to cue other elements of the BMD system.

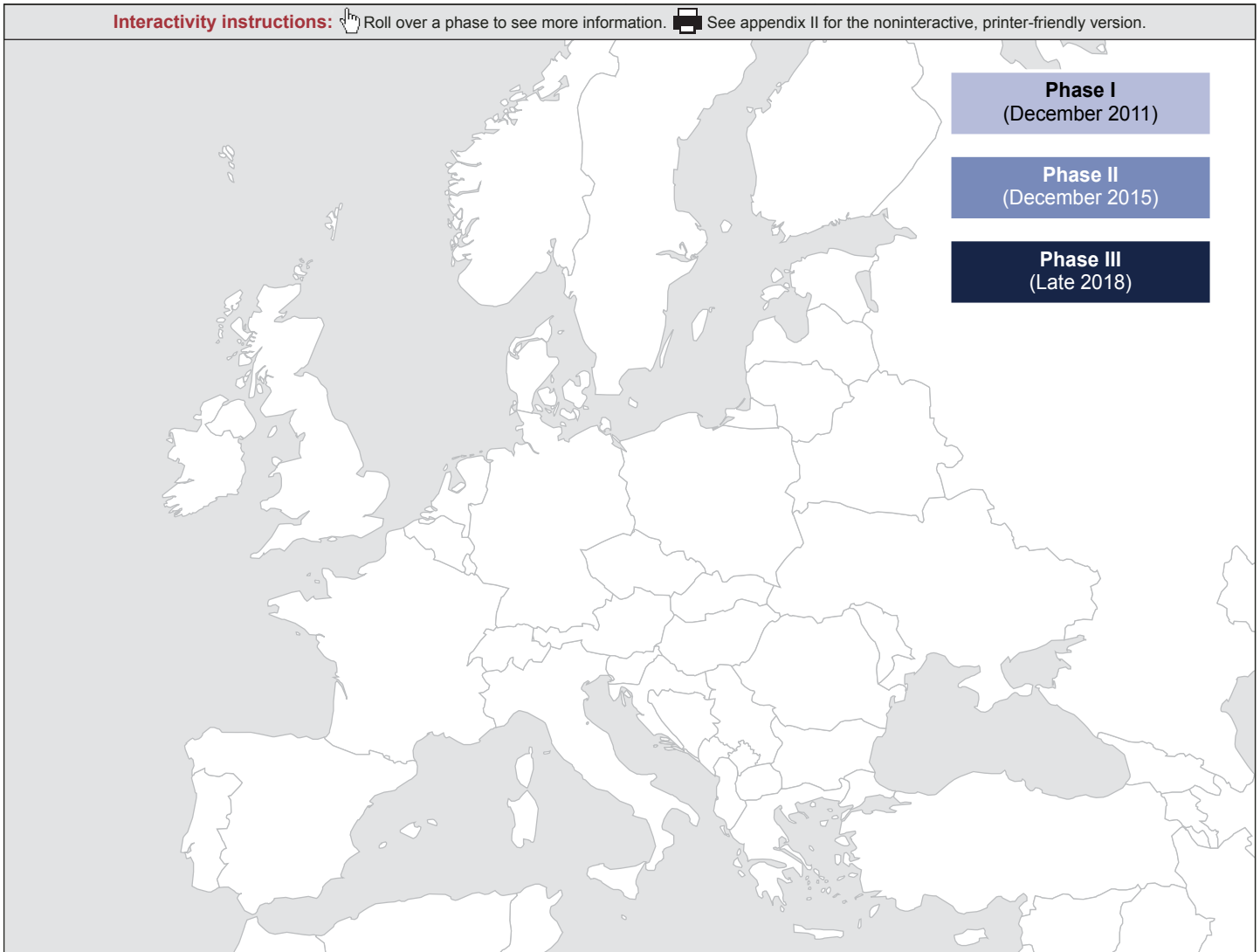


**Figure 1: European Phased Adaptive Approach Time Frames and Elements**



Source: GAO analysis of DOD documents (data); Missile Defense Agency and U.S. Air Force (images).

**Figure 2: U.S. Ballistic Missile Defense (BMD) Capabilities Available by European Phased Adaptive Approach (EPAA) Phase**



Source: GAO analysis of DOD documents.

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## BMD and EPAA Roles and Responsibilities

A number of stakeholders within DOD have roles and responsibilities in developing, building, deploying, and managing resources for BMD, including MDA, combatant commands, the services, and other organizations. MDA is responsible for the development, acquisition, and testing of BMD system elements in close collaboration with the warfighter community and testing organizations.<sup>6</sup> The combatant commands mainly involved in EPAA implementation are U.S. Strategic Command and U.S. European Command. U.S. Strategic Command's responsibilities include synchronizing planning for global missile defense in coordination with other combatant commands, the services, MDA, and appropriate agencies, while U.S. European Command has operational control over BMD elements located within its area of responsibility and collaborates with the services that would employ the BMD elements during combat. See appendix III for a summary of key stakeholders across DOD that are involved in the implementation of EPAA.

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## Our Prior Work on BMD

In previous reports on BMD, we have identified challenges associated with MDA's BMD efforts and DOD's broader approach to BMD planning, implementation, and oversight. In an April 2013 report, we found that MDA's cost baselines were not useful for decision makers to gauge progress because they did not include operating and support costs from the military services and thus were not sufficiently comprehensive.<sup>7</sup> Although MDA reports some operating and support costs in its annual accountability report, we have found that this report does not include

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<sup>6</sup>The warfighter community generally includes the combatant commands, service and joint functional component commands, units, military personnel, the military services, and their supporting components associated with the BMD mission.

<sup>7</sup>GAO, *Missile Defense: Opportunity to Refocus on Strengthening Acquisition Management*, [GAO-13-432](#) (Washington, D.C.: Apr. 26, 2013).

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services' costs.<sup>8</sup> DOD partially agreed with our recommendation to include in its resource baseline cost estimates all life-cycle costs including operating and support costs. Subsequently, as we found during this review, MDA is working with the services to jointly develop estimates of operating and support costs for two BMD elements. Further, we reported in 2011 that DOD had not developed a life-cycle cost estimate for BMD in Europe because the department considers EPAA an approach—not a program—that is flexible and would change over time.<sup>9</sup> At that time, we recommended that DOD develop an EPAA life-cycle cost estimate which would allow the department to assess whether its plans were affordable. DOD responded that a more-effective approach would be to prepare element-specific cost estimates.<sup>10</sup>

In a January 2011 report, we reported that, though DOD initiated multiple simultaneous efforts to implement EPAA, it faced key management challenges that could result in inefficient planning and execution, limited oversight, and increased cost and performance risks. We also reported that DOD faced planning challenges because the BMD system's desired performance was not defined using operationally relevant quantifiable

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<sup>8</sup>[GAO-13-432](#). MDA's annual report is titled the *Ballistic Missile Defense System Accountability Report*. Section 225 of Title 10, U.S. Code, enacted in 2011, requires MDA to establish and maintain acquisition baselines for each program element of the ballistic missile defense system and each designated major subprogram, and to provide an accountability report regarding the baselines. See 10 U.S.C. § 225(a), (c) (enacted by the National Defense Authorization Act for Fiscal Year 2012, Pub. L. No. 112-81, § 231(a)(1) (2011)). MDA must develop a life-cycle cost estimate as part of the baseline, including costs regarding operations and sustainment. See § 225(b)(3)(A). A provision in the National Defense Authorization Act for Fiscal Year 2014 recently amended section 225, adding a requirement for the Director of MDA to ensure that each life-cycle cost estimate includes both the operations and sustainment costs for which MDA is responsible and a description of the operations and sustainment functions and costs for which a military department is responsible. See Pub. L. No. 113-66, § 231(b) (2013) (codified at § 225(e)).

<sup>9</sup>[GAO-11-220](#).

<sup>10</sup>We did not evaluate the quality of the estimates in this review. However we found in 2011 that MDA lacked high quality cost estimates—estimates that are comprehensive, well-documented, accurate, and credible. We also found that cost progress cannot be independently evaluated until MDA reports baselines that are supported by reliable, high quality cost estimates. DOD concurred with our recommendation to take steps to ensure that cost estimates are high quality and reliable. See GAO, *Missile Defense: Actions Needed to Improve Transparency and Accountability*, [GAO-11-372](#) (Washington, D.C.: Mar. 24, 2011). Subsequently, we found in a follow-on April 2013 report that MDA had made little progress improving the quality of its cost estimates that support its resource baseline. See [GAO-13-432](#).

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metrics—such as how long and how well it can defend—that would provide the combatant commands with needed visibility into the operational capabilities and limitations of the BMD system they intended to employ.<sup>11</sup> As noted earlier, DOD generally agreed with our recommendations to provide guidance on EPAA that describes desired end states, develop an integrated EPAA schedule, and adopt BMD performance metrics for durability and effectiveness but to date has not taken any action. In a September 2009 report, DOD generally agreed with our recommendations to perform a comprehensive analysis identifying its requirements for BMD elements and require the establishment of operational units before making elements available for use.<sup>12</sup> In response, DOD completed an analysis of BMD requirements which, according to DOD officials, informed the Army’s process for fielding BMD elements with operational units. For additional GAO reports on BMD, see the Related GAO Products section at the end of this report.

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<sup>11</sup>[GAO-11-220](#).

<sup>12</sup>GAO, *Missile Defense: DOD Needs to More Fully Assess Requirements and Establish Operational Units before Fielding New Capabilities*, [GAO-09-856](#) (Washington, D.C.: Sept. 16, 2009).

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**DOD Met EPAA Phase One Deployment Time Frame, but Its Warfighter Acceptance Process Does Not Fully Identify and Plan to Resolve Implementation Issues**

DOD met the presidentially announced time frame to deploy EPAA Phase One capabilities to Europe when DOD positioned EPAA elements in the region, and MDA declared EPAA Phase One architecture to be technically capable in December 2011.<sup>13</sup> According to DOD officials, the BMD capabilities were in place and could have been used if needed. U.S. Strategic Command, through its warfighter operational readiness and acceptance process, used an established set of criteria to assess EPAA Phase One capabilities and formally accepted the EPAA Phase One architecture into the global BMD system in April 2012. However, DOD experienced implementation issues deploying BMD capabilities in Europe, such as incomplete construction of infrastructure, including housing and dining facilities, for soldiers arriving at the EPAA forward-based radar site and incomplete implementing arrangements defining how DOD would operate with allies when certain BMD elements arrived in the host country.<sup>14</sup> DOD's existing warfighter acceptance process does not explicitly require the combatant commands, the services, and MDA to comprehensively identify and develop a plan to resolve such issues before deploying BMD capabilities. Without taking steps to resolve implementation issues prior to deployment, DOD risks encountering similar challenges as it deploys additional BMD capabilities to Europe.

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**DOD Used Its Warfighter Acceptance Process and Criteria to Assess EPAA Phase One Capabilities**

DOD's warfighter acceptance process and criteria were used to accept EPAA Phase One capabilities. The manual guiding the process for warfighter acceptance of BMD capabilities indicates that the end state of acceptance is crew knowledge and doctrine, tactics, techniques, and procedures that reflect the reality of the fielded system or ensure that the

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<sup>13</sup>The BMD system is an integrated, layered architecture that provides multiple opportunities to destroy missiles and their warheads before they reach their targets. The system's architecture includes networked sensors and ground- and sea-based radars for target detection and tracking; ground- and sea-based interceptor missiles for destroying a ballistic missile; and a command, control, battle management, and communications network providing the warfighter with the needed links between the sensors and interceptor missiles. See Joint Chiefs of Staff, *Space Operations*, Joint Pub. 3-14, at IV-13 (May 29, 2013).

<sup>14</sup>According to officials from the Department of State, agreements with allies would generally take the form of implementing arrangements to preexisting agreements. We reported in 2009 that, in the context of BMD, implementing arrangements were expected to serve as executing documents for broader agreements and address day-to-day working relationships between countries on a range of issues related to BMD, including security.

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warfighter can fight with and optimize MDA-delivered BMD capabilities.<sup>15</sup> In essence, the goal of the warfighter acceptance process is to ensure that capabilities can be used as intended when they are delivered. This process—separate from but a companion to MDA’s process for technical capability declaration<sup>16</sup>—informs MDA’s testing so that the warfighter understands the elements’ capabilities and limitations and can more effectively employ BMD capabilities. In addition, the U.S. Strategic Command, in coordination with other combatant commands, develops criteria to assist in the determination of whether to officially accept an element for operational use by the combatant commands.<sup>17</sup> The criteria used during the warfighter acceptance process focuses primarily on areas such as effectiveness, suitability, and interoperability.<sup>18</sup> For example, one of the acceptance criteria used to assess initial EPAA capabilities was the extent to which the forward-based radar<sup>19</sup> and Aegis BMD ship were capable of searching for and tracking ballistic missile threats. By comparing these acceptance criteria against BMD test results, U.S. European Command and the services were able to better understand the capabilities, limitations, and risks of initial EPAA BMD elements and developed their plans, tactics, and procedures accordingly.

In addition to using acceptance criteria, U.S. European Command conducted a separate BMD exercise in Europe with servicemembers operating actual BMD elements to demonstrate the performance of initial

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<sup>15</sup>See Joint Functional Component Command for Integrated Missile Defense, *Ballistic Missile Defense System (BMDS) Warfighter Capability Acceptance* (Sept. 20, 2012). According to U.S. Strategic Command officials, the manual was in use prior to its issuance in September 2012 and was used for Phase One of EPAA.

<sup>16</sup>MDA’s December 2011 technical capability declaration was used to announce the completion of EPAA Phase One. According to MDA guidance, a technical capability declaration requires sufficient testing of the system being fielded to support an understanding of overall capabilities and limitations of the system to support the combatant command missile defense mission. See Missile Defense Agency Directive 5000.17, *Ballistic Missile Defense System Operational Capacity Baseline Procedures* (May 3, 2013). MDA may provide support to the acceptance process, but MDA technical capability declarations are independent from the warfighter acceptance process.

<sup>17</sup>These criteria are developed by U.S. Strategic Command’s Joint Functional Component Command for Integrated Missile Defense.

<sup>18</sup>Throughout this report, we will refer to these criteria collectively as acceptance criteria.

<sup>19</sup>In this report, we refer to the Army Navy/Transportable Radar as the forward-based radar.

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EPAA capabilities within the region. Using the results, U.S. European Command and U.S. Strategic Command coordinated to identify technical improvements that could be made, and U.S. Strategic Command accepted the EPAA Phase One architecture into the global BMD system in April 2012.<sup>20</sup> After acceptance, U.S. European Command also conducted a subsequent BMD exercise in May 2013 with U.S. and NATO servicemembers to demonstrate interoperability of initial EPAA capabilities with NATO BMD capabilities.

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### DOD's Warfighter Acceptance Process Did Not Fully Identify and Resolve Warfighter Implementation Issues before Deploying BMD Elements

As discussed above, DOD used its warfighter acceptance process to assess BMD elements dedicated to Phase One of EPAA. However, though the goal of the warfighter acceptance process is, in essence, to ensure that capabilities can be used as intended when they are delivered, this process did not explicitly require the combatant commands, the services, and MDA to comprehensively identify and develop plans for resolving various implementation issues prior to deploying these and other supporting elements to Europe. As a result, DOD experienced three implementation issues related to deploying BMD capabilities to Europe. These included: (1) incomplete infrastructure, such as housing and dining facilities, for soldiers arriving at the forward-based radar site in Turkey; (2) lack of defined policies and procedures for sharing BMD radar data across geographic combatant commands; (3) and incomplete implementing arrangements and tactics, techniques, and procedures with allies.

- Incomplete facilities in Turkey: DOD deployed the forward-based radar to Turkey in December 2011 before completing construction of infrastructure, such as permanent housing, dining, and other facilities for soldiers arriving on the site. According to officials, construction could not be completed prior to deploying the forward-based radar due to compressed deadlines in order to meet the presidentially announced time frame. As a result, Army officials stated that soldiers arrived at the remote mountain-top radar site in winter conditions, and their tent-based expeditionary facilities—though climate controlled and equipped with latrines, showers, and other basic facilities—were initially unable to withstand the conditions. Also, at the time, roads leading to the nearest town were not well-maintained, which created safety challenges and made access to nearby services less efficient.

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<sup>20</sup>Details of these technical improvements are classified.



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The Army made some improvements after the 2011-2012 winter season, such as replacing the expeditionary facilities with those typically used in Alaska in order to better suit the wintery conditions, but construction of longer-term infrastructure will not begin until mid-2014. Until the permanent facilities are completed, soldiers deployed to the site may continue to face difficult conditions. Further, without a process that accounts for implementation issues such as this, DOD may encounter similar challenges as it deploys additional capabilities to the region.

- Lack of defined policies and procedures for sharing BMD radar data across geographic combatant commands: Sharing BMD element data, such as radar data, can improve missile defense performance, but DOD accepted its most-recently deployed forward-based radar before finalizing policies and procedures that address potential overlapping operational priorities across geographic combatant commands. Subsequent to its deployment of a forward-based radar for EPAA in 2011, DOD deployed another forward-based radar in the operational area of U.S. Central Command in 2013. DOD had begun discussions on the benefits and drawbacks of sharing radar data, but the most-recent deployment proceeded without a decision for how to address these issues, even though both regions face a common threat. According to officials, the first priority for deploying each radar was to support separate missions in their respective areas of responsibility, and a decision to use one radar to support the other radar was a secondary priority and thus did not require resolution prior to deployment. However, officials also stated that sharing radar data between the recently deployed radar with the EPAA forward-based radar could benefit missile defense in Europe and potentially increase operational effectiveness across both geographic combatant commands. DOD guidance states that U.S. Strategic Command is responsible for synchronizing global missile defense planning in coordination with the combatant commands, services, MDA, and appropriate agencies.<sup>21</sup> Guidance further indicates that U.S. Strategic Command, working with the geographic combatant commands, integrates and synchronizes various BMD elements, such as radars.<sup>22</sup>

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<sup>21</sup>See Chairman of the Joint Chiefs of Staff Instruction 3295.01, enc. A, para. 2.b(2) (May 24, 2013).

<sup>22</sup>See Joint Chiefs of Staff, Joint Pub. 3-01, *Countering Air and Missile Threats*, app. E (Mar. 23, 2012).

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However, the warfighter acceptance process did not explicitly require a comprehensive assessment of whether policies and procedures for sharing BMD radar data are defined. The combatant commands, including U.S. European Command, have made progress on addressing this implementation issue. For example, since deployment, U.S. European Command, in coordination with U.S. Strategic Command, has requested technical analysis from MDA in order to determine the extent to which the radars can share information. In addition to the technical analysis, U.S. European Command officials stated that DOD has held several senior-level meetings to discuss policies and procedures for addressing potential overlapping operational priorities and to discuss possible consequences that might occur if the radars are integrated. As a result of not completing such policies and procedures prior to accepting BMD capabilities, DOD continues to operate these radars separately and may face difficulty in sharing the radar data across geographic combatant commands, thus affecting efficient BMD operations in Europe.

- Incomplete implementing arrangements and procedures for working with allies: DOD's experience delivering Patriot batteries to Turkey in early 2013 demonstrates some of the difficulties the warfighter could encounter by not finalizing implementing arrangements and tactics, techniques, and procedures with allies prior to deployment. DOD deployed Patriot batteries to Turkey as part of a NATO mission to support the country's air defense, but this action was not part of EPAA's first phase. However, U.S. European Command officials indicated that it shaped this deployment to be similar to future U.S. deployments of Patriot batteries to Europe, and interoperability with NATO is a key aspect of EPAA. However, according to Army officials, host-nation implementing arrangements had not been finalized before the Patriot batteries arrived in Turkey, resulting in the equipment remaining at an airfield for several weeks before it could be deployed for operations. In addition, according to Army officials, foreign disclosure issues were not resolved by the time Patriot batteries arrived in Turkey, and initially there were limitations on what intelligence information could be shared with non-U.S. forces. Further, according to Army officials, soldiers had to receive supplemental training to perform the NATO mission, including using NATO tactics, techniques, and procedures, which can differ from those of the United States. According to officials, DOD was aware of these issues but could not address them prior to deploying Patriot batteries to Turkey due to the need to address threats there. Further, officials stated they must also adhere to certain political and host-nation decisions that

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can affect their ability to address all implementation issues before deployment. Nonetheless, the warfighter acceptance process did not explicitly require a comprehensive assessment of whether these implementing arrangements and procedures were completed prior to deployment. By not completing implementing arrangements and procedures for how to work with allies before deployment, Army officials stated that they spent extensive time working with allies to resolve these implementation issues, which put a strain on Army's limited existing resources.

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### DOD's Process for Accepting New BMD Capabilities Could Result in Future Implementation Challenges

DOD recognizes that it has encountered previous implementation challenges related to deploying BMD capabilities to Europe and is taking steps to address them, but these efforts may not prevent future problems. According to U.S. European Command officials, one step they have taken is to establish a synchronization board that tracks EPAA implementation, but this board has focused more on Aegis Ashore than on potential Patriot or THAAD battery deployments. Additionally, the Navy, in coordination with MDA and U.S. European Command, is tracking the development and deployment of the Aegis Ashore weapon systems and facilities. However, these efforts are not part of DOD's warfighter acceptance process, which means that issues raised through these efforts would not necessarily be addressed prior to accepting or deploying additional EPAA capabilities. Also, the acceptance criteria used to assess BMD elements in areas such as effectiveness, suitability, and interoperability do not include a detailed identification of potential implementation issues that may affect operational performance. Further, DOD officials said that they plan to use the existing acceptance process to accept and deploy future EPAA capabilities, but may not for other BMD elements that could support BMD operations in Europe, such as THAAD. In using the existing process, which does not explicitly require a comprehensive assessment of various implementation issues prior to deployment, DOD may deploy future BMD capabilities without identifying or developing a plan to resolve implementation issues, such as incomplete host-nation implementing arrangements for Aegis Ashore radar operations.

One of the more-difficult challenges facing DOD is completing implementing arrangements for access to frequencies that Aegis Ashore is designed to use. We have previously reported on issues related to

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frequency access for Aegis Ashore.<sup>23</sup> The two Aegis Ashore elements dedicated to EPAA Phases Two and Three—which are expected to operate in Romania and Poland by 2015 and 2018 respectively—have radars that DOD has designed to use a certain range of frequencies for full operations, including maintenance, periodic testing of equipment, and training of crews. However, according to U.S. European Command officials, some of the frequencies Aegis Ashore is designed to use are reserved for civil use, such as commercial and cell phone services.<sup>24</sup> Accordingly, U.S. European Command officials stated that resolving frequency access issues and completing the implementing arrangements for U.S. radars takes time and must be initiated early in the planning process to allow time for completion before DOD deploys Aegis Ashore in Romania. According to U.S. European Command officials, in 2013, DOD and Romanian officials worked together to agree on frequencies available for Aegis Ashore operations so that both the radar and the commercial and cell phone services can coexist, with restrictions, by early 2015. In Poland, however, resolving frequency range access issues is more complex, according to DOD officials. Specifically, the frequency range is more congested in central Europe, which increases the potential for cross-border interference with neighboring countries. In addition, according to U.S. European Command officials, Poland is in the process of issuing new commercial licenses for frequencies within its civil frequency range that overlap with those Aegis Ashore is designed to use. This process may affect the time frame for resolving Aegis Ashore’s access to these frequencies. DOD officials stated that they plan to work closely with their Polish counterparts to resolve these issues prior to the

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<sup>23</sup>We reported the potential for frequency access issues for Aegis Ashore as early as 2010. In 2011 and 2012, we reported on two specific issues: the possibility that the radar might interfere with host-nation wireless usage; and that DOD and the relevant host nation authorities must work together to ensure that host nations approve use of the operating frequency needed for the radar. See [GAO-13-432](#). Although our reports noted that frequency access presented challenges, GAO made no recommendations on this issue.

<sup>24</sup>The International Telecommunication Union has issued guidance on managing frequencies. The International Telecommunication Union is an international organization within the United Nations System where governments and the private sector coordinate global telecom networks and services. According to this guidance, frequencies are a shared resource that national governments monitor and manage to prevent and eliminate harmful interference and reduce potential for overlap and interference between uses. The guidance also notes that, in the European Union, national standards reflect European standards and national policy is to implement European Policy. For more information, see International Telecommunication Union, *Guidance on the Regulatory Framework for National Spectrum Management*, Report ITU-R SM.2093-1 (September 2010).

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planned deployment of Aegis Ashore in 2018. According to DOD officials, construction of Aegis Ashore can proceed without these issues being resolved. However, the extent to which the radar could be used to train, maintain, and test the capabilities may be limited. As a result, the current warfighter acceptance process, with its focus on meeting operational needs based on criteria that do not comprehensively include potential implementation issues, may not ensure that radar capabilities can be fully used once deployed.

In addition, DOD may choose to forward station or deploy Patriot and THAAD batteries to supplement EPAA or NATO operations. U.S. Strategic Command officials stated that the warfighter acceptance process will not be applied to Patriot batteries, and they have not yet decided whether the process will be applied to THAAD batteries. Nonetheless, it is important that the warfighter be prepared to operate the batteries and that implementing arrangements be in place. As with the Aegis Ashore radar, if DOD forward-stationed a THAAD battery to Europe, it may need to negotiate implementing arrangements for the THAAD radar to access frequency ranges for periodic testing, maintenance, and training to support BMD operations. Also, if Patriot batteries were sent to Europe, DOD may need to negotiate implementing arrangements and coordinate tactics, techniques, and procedures with allies as it did for the Patriot deployment to Turkey. Since DOD's experience has shown that it may require considerable time in order to develop necessary implementing arrangements, it would be important for these types of issues to be identified as soon as possible. Unless DOD comprehensively identifies and develops a plan to resolve implementation issues for elements that may deploy to support BMD operations in Europe, DOD risks experiencing challenges that may affect the warfighter's ability to fully utilize the systems as designed.

DOD has encountered various implementation issues when deploying BMD capabilities in Europe and risks encountering similar issues in the future, because there is no explicit requirement within the warfighter acceptance process to ensure that these types of issues are comprehensively identified before the capabilities are deployed. The current warfighter acceptance process does not produce an integrated, holistic identification of implementation issues and, as a result, DOD does not identify and develop a plan to resolve them before BMD capabilities are deployed. Instead, responsibilities are diffused across several organizations. For example, U.S. Strategic Command officials view their role as ensuring that EPAA capabilities function within the BMD system worldwide, which includes BMD elements that are not among those

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dedicated to EPAA. U.S. European Command is responsible for conducting BMD operations in its area of responsibility. The services operate individual BMD elements and provide the manpower and training necessary to do so. Although U.S. Strategic Command considers input from U.S. European Command and the services when defining acceptance criteria, the criteria used to-date do not fully assess the extent to which implementation issues may affect operational performance, for instance by limiting the available frequencies for radar use in a particular country or region. As a result, DOD will likely continue to face implementation issues unless a more holistic, integrated view is taken to identify and plan to resolve these issues before BMD capabilities are deployed in Europe, which may result in less-efficient BMD operations.

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## DOD Lacks a Complete Understanding of the Long-Term Operating and Support Costs for BMD Elements in Europe

DOD has estimated the long-term operating and support costs for some, but not all, BMD elements in Europe. Initial estimates indicate that these costs could total several billion dollars over the elements' lifetime, but these estimates do not provide a complete picture of the likely costs. For example, key decisions that have not yet been made—such as what long-term support strategies to adopt and where to forward-station some BMD elements—are likely to change the estimates for THAAD and the forward-based radar. In addition, DOD has not developed a comprehensive, joint estimate of operating and support costs for the two planned Aegis Ashore sites. The lack of complete, long-term operating and support cost estimates for the BMD elements could hinder DOD's ability to develop budgets and allocate resources for BMD operations in Europe.

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## Initial Operating and Support Cost Estimates for THAAD and the Forward-Based Radar Are Likely to Change

DOD developed initial estimates of operating and support costs for THAAD and the forward-based radar—both of which are ultimately to be managed by the Army—but these estimates are likely to change as these programs mature and DOD completes business-case analyses<sup>25</sup> and makes key decisions, such as what their long-term support strategies will be and where to forward-station these elements. The Army and MDA have signed a memorandum of agreement and several annexes since 2009 outlining how the two organizations are to manage responsibilities

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<sup>25</sup>A business-case analysis is conducted to assist decision makers by assessing the costs and benefits of alternative support strategies, which are compared to determine the most-efficient and effective means of support. Typically, a long-term or lifetime support strategy is selected based on the results of a business-case analysis.

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for BMD elements, which includes jointly estimating operating and support costs.<sup>26</sup> In addition, the element-specific annexes direct the development of business-case analyses as part of determining the long-term support strategy for these elements.<sup>27</sup> Further, Army guidance, which is referenced in the annexes, similarly directs the use of business-case analyses as part of selecting the product-support strategy.<sup>28</sup>

In January 2012, the Army and MDA estimated that the EPAA forward-based radar would cost \$61 million in fiscal year 2014 and \$1.2 billion in then-year dollars over its 20-year life. However, this estimate assumes continued contractor support throughout the life of the forward-based radar. Even though forward-based radars have been deployed since 2006, DOD has not yet completed a business-case analysis as part of determining the long-term support as described in an Army regulation and in the forward-based radar annex, which is to include an assessment of alternatives to contractor-provided support over the lifetime of this element. In addition, the Army has made changes to reduce operating and support costs for the forward-based radar, but these changes are not reflected in the \$1.2 billion lifetime cost estimate previously cited. Army officials stated that the Army and MDA met in November 2013 to begin developing the business-case analysis for the radar, which they intend to complete in fiscal year 2015. However, the annex does not include an explicit requirement that this analysis be completed by a specific time. Also, MDA and Army officials said that completion of this analysis to inform a decision on a long-term support strategy will, in turn, provide information for updating the operating and support cost estimates for the forward-based radar.

In December 2012, the Army and MDA estimated operating and support costs for six THAAD batteries for 20 years, totaling \$6.5 billion in then-

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<sup>26</sup>The overarching Memorandum of Agreement, signed by the Director of MDA and the Secretary of the Army in 2009, is supplemented and implemented by annexes released in subsequent years and signed by various officials.

<sup>27</sup>Specifically, the annexes require the development of an Army-approved business-case analysis prior to the transfer of the capability from MDA to the Army.

<sup>28</sup>See Army Regulation 700-127, *Integrated Logistics Support* (Mar. 26, 2012).

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year dollars.<sup>29</sup> This estimate also assumes continued contractor support throughout the life of THAAD. Even though the first two THAAD batteries have been available since early 2012, DOD has not yet completed a business-case analysis as part of determining the long-term support strategy, as provided for in the annex, which is to include an assessment of alternatives to contractor-provided support over the lifetime of THAAD. Specifically, MDA conducted an initial THAAD business-case analysis, which it provided to the Army for comment. The Army did not agree with the analysis because it was not done in accordance with Army regulations. As the Army and MDA work through these disagreements, the THAAD business-case analysis remains incomplete as of December 2013, and there is no firm deadline to complete the analysis. Completion of this analysis to inform a decision on a long-term support strategy will, in turn, provide information for updating the operating and support cost estimates for the THAAD.

In addition, the estimate of operating and support costs for THAAD assumed that all six batteries would be located in the United States. However, DOD officials stated that they are examining options for forward-stationing some THAAD batteries overseas. Doing so would likely increase operating and support costs due to higher operational tempo, contractors that are deployed with the system, additional needed security, life-support facilities such as barracks and a mess hall, and site preparation for the equipment. For example, MDA recently estimated that operating and support costs for one THAAD battery in Guam could be \$11 million higher annually than if the battery was located in the continental United States. However, this estimate does not include costs for military personnel, fuel, site activation, transportation, or some contractor costs. Further, costs could be even higher if an element is located at an austere location due to additional costs for site preparation, security, transportation, and some contractor costs.

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<sup>29</sup>DOD plans to buy a total of six THAAD batteries. As explained earlier in this report, DOD's plans for EPAA include the possibility of forward-stationing a THAAD battery in Europe. However, the estimate did not provide a per battery cost for operating and supporting THAAD in Europe.



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## DOD Has Not Developed a Comprehensive Joint Estimate of Operating and Support Costs for Aegis Ashore

MDA and the Navy have not developed a comprehensive, joint estimate of the operating and support costs for the two European Aegis Ashore sites over their expected 25-year life span, and it is unclear when such an estimate will be completed. The Navy and MDA completed an annex to a memorandum of agreement in August 2012 describing how they are to jointly manage Aegis Ashore, which notes that the two organizations will collaborate on cost estimating and budget planning.<sup>30</sup> Under the annex, MDA responsibilities include providing funding for construction of certain mission-essential facilities and the operations and support of aspects of the Aegis weapon system through fiscal year 2017. The Navy responsibilities include providing funding for construction and operations and sustainment of housing and quality-of-life facilities, as well as the training facility, which is located in the United States. The Navy will be responsible for all Aegis Ashore operating and support costs at the two planned sites beginning in fiscal year 2018. Although the Navy and MDA have agreed to jointly develop cost estimates, and officials from the Navy and MDA have stated these estimates will focus on operating and support costs, their August 2012 memorandum of agreement does not include a clear deadline for first completing a joint cost estimate.<sup>31</sup> This estimate would enable MDA and the Navy to more-accurately budget for their respective share of the costs.

Although MDA and the Navy have not developed a comprehensive joint estimate, they have individually begun to identify some costs. Specifically, the Navy has estimated \$155 million will be required for manning, operating, and supporting the base facilities from fiscal year 2014 through fiscal year 2018. MDA has reported in its 2013 *Ballistic Missile Defense System Accountability Report* that operating and support costs for the Aegis Ashore test facility and the two European sites may total \$82 million through fiscal year 2018, but this does not include operating and support costs for the entire expected 25-year life. In addition, MDA officials stated that their estimate does not include costs for base facilities, military personnel, or other Navy costs and, therefore, cautioned against combining both Navy and MDA's individual estimates in order to approximate total Aegis Ashore operating and support costs. By fiscal

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<sup>30</sup>Similar to the Army, the Navy and MDA entered into an overarching Memorandum of Agreement in 2010, supplemented and implemented by specific annexes at later dates.

<sup>31</sup>In June and July 2013, the Navy and MDA signed a Cost Analysis Requirements Description, which is a document that is used as the basis for developing a cost estimate.

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year 2018, the Navy will assume responsibility for all operating and support costs for the Aegis Ashore sites in Romania and Poland. However, without a comprehensive, joint estimate of the lifetime operating and support costs for the two Aegis Ashore sites that is updated as key program decisions are made, it will be difficult for the Navy to develop accurate budgets for operating and supporting this element of EPAA.

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## More-Comprehensive Cost Estimates Can Aid Budget Development

We and the Office of Management and Budget have reported that cost estimates are important to support budget development. Specifically, cost estimates can assist decision makers in budget development and are necessary for evaluating resource requirements at key decision points and effectively allocating resources.<sup>32</sup> In addition, Office of Management and Budget guidance containing principles for capital asset acquisitions emphasizes that government agencies should understand all costs in advance of proposing acquisitions in the budget, and notes that agencies should plan for operations and maintenance of capital assets.<sup>33</sup> Further, it is important to fully identify operating and support costs since these costs can be up to 70 percent of a weapon system's lifetime costs. Major defense acquisition programs within DOD generally follow an acquisition process that includes steps in which cost estimates are developed, including operating and support costs. Due to the acquisition flexibilities MDA has been granted, application of this process has been deferred and MDA follows a separate process for development and acquisition.<sup>34</sup> Nonetheless, DOD has not required completed operating and support cost estimates prior to introducing BMD capabilities in Europe. In addition, existing memorandums of agreement and related annexes between MDA and the services, while they require the completion of business-case analyses for the forward-based radar and THAAD, do not clearly require that these analyses be completed in a timely manner to support a decision on long-term support strategies before introducing capabilities. Similarly, these memorandums of agreement also do not clearly require developing estimates in a timely manner, such as before capabilities are

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<sup>32</sup>GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: March 2009).

<sup>33</sup>See Office of Management and Budget, *Capital Programming Guide: Supplement to OMB Circular A-11: Planning, Budgeting, and Acquisition of Capital Assets*, ver. 3.0 (July 2013).

<sup>34</sup>BMD elements are expected to enter the defense acquisition system at a later stage.

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introduced, or updating those estimates to support budget development after long-term support strategies or other key program decisions—such as whether to forward-station certain elements overseas—are made.<sup>35</sup> The lack of an estimate and subsequent updates could limit decision makers' ability to identify the resources that will be needed over the long term to support the planned investment in the system's capabilities.

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## Conclusions

DOD has made a substantial investment in BMD, and its initial deployment of capabilities for EPAA proceeded in line with the President's announced timelines. However, the rapid fielding of EPAA has resulted in challenges that, unless DOD takes action, are likely to continue as DOD implements additional capabilities. By not fully identifying and planning to resolve implementation issues in its acceptance process to-date, U.S. Strategic Command, U.S. European Command, and the services have had to rush to secure and emplace the resources needed to support the capabilities it has already deployed. Without identifying the resources, implementing arrangements, infrastructure, and other items that need to be in place before deploying additional EPAA capabilities, DOD may continue to face challenges in operating BMD elements as it moves forward with the future phases of EPAA. In addition, if DOD does not also take action to identify and plan to resolve these types of implementation issues for all current and future BMD capabilities that could support BMD operations in Europe, DOD is likely to experience additional implementation challenges.

Similarly, the department's commitment to EPAA implementation has proceeded without a full understanding of the related long-term operating and support costs, thereby lessening assurance of the approach's sustainability through all phases. Although the services and MDA have begun to estimate operating and support costs, there are no firm deadlines for completing and revising estimates as the programs mature and key decisions are made, such as completing business-case analyses to support decisions on long-term support strategies or where the BMD capabilities may be forward-stationed. Making such decisions and updating the estimates accordingly would enable the services and MDA

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<sup>35</sup>According to DOD officials, the cost estimates may be updated to reflect some actual costs, such as fuel consumption, but will not be updated to reflect a change in the support strategy until a decision on the long-term strategy is made based on the business-case analysis.

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to more-accurately develop budgets for their respective share of the costs. Further, the lack of a comprehensive, joint estimate of operating and support costs for Aegis Ashore can make it difficult for the Navy and MDA to develop budgets to cover these costs. Without completed and updated estimates for the long-term operating and support costs of BMD elements in Europe, the department and congressional decision makers may not be fully aware of the resources that will be needed over time to support DOD's commitment of providing BMD capabilities to Europe.

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## Recommendations for Executive Action

To improve DOD's ability to identify and resolve implementation issues and to improve budgeting for long-term operating and support costs of BMD elements in Europe, we recommend that the Secretary of Defense take the following four actions.

- To ensure that BMD capabilities can be used as intended when they are delivered, in coordination with the Chairman of the Joint Chiefs of Staff, direct U.S. Strategic Command to identify and develop a plan to resolve implementation issues prior to deploying and operating future BMD capabilities in Europe. U.S. Strategic Command should work in consultation with U.S. European Command and the services to resolve implementation issues such as infrastructure, resolving policies and procedures to address potential overlapping operational priorities if radars are integrated across geographic combatant commands, completing host-nation implementing arrangements, and any other key implementation issues.

To identify resources needed to support its plans for providing BMD capabilities in Europe and to support budget development, direct the Under Secretary of Defense for Acquisition, Technology and Logistics to require and set a deadline for the following three actions:

- completing a business-case analysis for the forward-based radar to support a decision on the long-term support strategy, and updating the joint MDA and Army estimate for long-term operating and support costs after a decision on the support strategy is made;
- completing a business-case analysis for THAAD to support a decision on the long-term support strategy, and updating the joint MDA and Army long-term operating and support cost estimate after this and other key program decisions, such as where the THAAD batteries are likely to be forward-stationed, are made; and

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- completing a joint MDA and Navy estimate of the long-term operating and support costs for the Aegis Ashore two sites, and updating the estimates after key program decisions are made.

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## Agency Comments and Our Evaluation

We provided a draft of this report to DOD and the Department of State for review and comment. DOD provided written comments, which are reproduced in appendix IV, and the Department of State did not provide written comments on the report. In its comments, DOD partially agreed with one recommendation and agreed with three other recommendations. Also, DOD completed a security review of this report and determined that its contents were unclassified and contained no sensitive information. DOD and the Department of State provided technical comments, which we incorporated as appropriate.

DOD partially agreed with our recommendation that U.S. Strategic Command, in consultation with U.S. European Command and the services, identify and develop a plan to resolve implementation issues prior to deploying and operating future BMD capabilities in Europe. In its comments, DOD stated that U.S. Strategic Command does not have the authority or mission to resolve implementation issues, but the services and MDA will work to identify and resolve implementation issues for future BMD capabilities in Europe. DOD further stated that U.S. Strategic Command will also work in consultation with U.S. European Command and the services to resolve integrated air and missile defense requirements and warfighter acceptance criteria, validate element performance and system integration, and advise cross global combatant command capability optimization/sharing as part of its global missile defense role. We understand that U.S. Strategic Command may not have the authority to directly resolve all implementation issues. However, it does have a role in integrating capabilities across combatant commands, as we discuss in this report.

In addition, our recommendation does not state that U.S. Strategic Command should resolve all implementation issues prior to deploying capabilities, but rather that it identify and develop a plan to resolve implementation issues prior to deployment and to do so in consultation with U.S. European Command and the services. As we note in the report, the acceptance criteria used to-date focuses on effectiveness, suitability, and interoperability; however, the manual describing the acceptance process indicates that prerequisites for credibly assessing operational suitability include assessing whether such things as organization, training, or facilities are defined and in place for BMD elements. While it may be

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appropriate for U.S. European Command and/or the services to take the lead in resolving some implementation issues, such as ensuring proper infrastructure is in place, U.S. Strategic Command, in its advocacy and integration roles, can help in identifying and planning to resolve some issues, such as advising cross-combatant command capability sharing. Further, U.S. Strategic Command's warfighter acceptance process is the only existing high-level forum where all key BMD stakeholders come together to assess operational utility of BMD elements. Therefore, we believe that U.S. Strategic Command, in conjunction with U.S. European Command and the services, can use its position as the warfighter advocate to elevate implementation issues, such as cross-combatant command capability sharing and system integration, to ensure that such issues are identified and that a plan to resolve them is developed.

DOD agreed with our recommendation to require and set a deadline for completing a business-case analysis for the forward-based radar to support a decision on the long-term support strategy, and updating the joint MDA and Army estimate for long-term operating and support costs after a decision on the support strategy is made. DOD stated that the business-case analysis will be delivered in late fiscal year 2015 and that the joint cost estimate is updated biennially. The department further stated that if the business-case analysis results substantially change the underlying assumptions of the joint cost estimate, an out-of-cycle joint cost estimate would be conducted. Establishing a target date for completing the business-case analysis is a positive first step, and we believe that DOD needs to be vigilant to ensure that the late fiscal year 2015 date is met in order to be fully responsive to the intent of our recommendation. Doing so will enable DOD to update operating and support cost estimates, which, in turn, can improve budget development.

DOD agreed with our recommendation to require and set a deadline for completing a business-case analysis for THAAD to support a decision on the long-term support strategy, and update the joint MDA and Army estimate for long-term operating and support costs after this and other key program decisions, such as where the THAAD batteries are likely to be forward-stationed, are made. DOD stated that THAAD is a "surge support" asset for EPAA with no specifically assigned area of responsibility, battery quantities, or locations. DOD further stated that MDA and the Army will support the decision to deploy THAAD assets and any related business-case analysis for projected sites. According to an Army official, conducting a business-case analysis to assess a weapon system's lifetime support strategy and making stationing decisions are two separate, independent decisions although both affect operating and

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support costs. In other words, a business-case analysis can be completed and a support strategy decided upon without a decision on where the weapon system may be located. The purpose of a business-case analysis is to identify the optimum support concept at the lowest life-cycle cost, and DOD had previously planned to complete a business-case analysis for THAAD by late 2011. We recognized in this report that THAAD could deploy to support EPAA as needed and that options are being examined for forward-stationing some THAAD batteries overseas. We also noted that operating and support costs can account for up to 70 percent of a weapon system's lifetime costs and that these costs are generally higher when a system is stationed overseas. Given that decision makers need to understand and therefore adequately budget for THAAD operating and support costs, we believe it is important for DOD to set a deadline for completing the business-case analysis to support a decision on the long-term support strategy and update the joint estimate of lifetime operating and support costs accordingly. DOD should also update the cost estimate after other key decisions are made, such as where THAAD may be located. Completing these actions would meet the intent of our recommendation.

DOD agreed with our recommendation to complete a joint estimate of the long-term operating and support costs for the two Aegis Ashore sites and update the estimates after key program decisions are made. However, DOD did not set a deadline for completing the estimate, such as before introducing these capabilities in Europe—in late fiscal year 2015 and 2018—as we also recommended. We noted in the report that the operating and support costs will likely be significant and that the Navy will be responsible for all Aegis Ashore operating and support costs at the two planned sites beginning in fiscal year 2018. The lack of a joint estimate of the long-term operating and support costs will make it difficult for the Navy to accurately budget for these costs and can limit decision makers' ability to identify the resources that will be needed over the long term to support DOD's planned investment in Aegis Ashore. Therefore, we believe that DOD should set a deadline for completing this estimate in order to meet the intent of our recommendation.

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We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense, the Under Secretary of Defense for Acquisition, Technology, and Logistics, the Commanders of the U.S. Strategic Command and U.S. European Command, the Secretaries of the Army and Navy, the Director of the Missile Defense Agency, and the Secretary of State. In addition, this report will be available at no charge on GAO's Web site at <http://www.gao.gov>.

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If you or your staff have any questions about this report, please contact me at (404) 679-1816 or [pendletonj@gao.gov](mailto:pendletonj@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix V.

John H. Pendleton

A handwritten signature in black ink that reads "John H. Pendleton". The signature is written in a cursive style with a long, sweeping underline that extends to the right.

Director  
Defense Capabilities and Management



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# Appendix I: Scope and Methodology

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During our review of the Department of Defense's (DOD) implementation of the European Phased Adaptive Approach (EPAA), we examined relevant documentation and met with representatives from numerous agencies and offices. To assess the extent to which DOD has identified and planned to resolve implementation issues before deploying ballistic missile defense (BMD) capabilities to Europe, we reviewed the U.S. Strategic Command document titled *Ballistic Missile Defense System (BMDS) Warfighter Capability Acceptance*<sup>1</sup>. This document describes the goal of the warfighter acceptance process, which is, in essence, to ensure that capabilities can be used as intended when they are delivered, and culminates in formal acceptance of BMD capabilities by U.S. Strategic Command. We also reviewed key documents, such as the Chairman of the Joint Chiefs of Staff Instruction 3295.01, *Policy Guidance for Ballistic Missile Defense Operations*, and the Joint Staff Publication 3-01, *Countering Air and Missile Threats*, which describe DOD's BMD guidance and responsibilities of various organizations, and U.S. Strategic Command's June 2013 Instruction 538-03 on *Integrated Air and Missile Defense (IAMD) Warfighter Involvement Process (WIP)*. We also met with officials from the Office of the Secretary of Defense, the Joint Staff, U.S. European Command and its service components, and U.S. Strategic Command to understand how DOD's process was implemented. In addition, we reviewed U.S. European Command planning documents, briefings on EPAA implementation and results of BMD exercises, and minutes from synchronization board meetings to identify implementation issues and assess the extent to which these issues are related to DOD's acceptance process.

We also reviewed Navy instructions and documents from the Navy Ballistic Missile Defense Enterprise and U.S. Naval Forces Europe to understand how the Navy monitors and addresses technical and implementation issues related to Aegis Ashore for EPAA Phases Two and Three. We reviewed 10th Army Air and Missile Defense Command and 32nd Army Air and Missile Defense Command reports and briefings that described implementation challenges experienced during the deployment of BMD elements to Europe and other regions, and provided an assessment of lessons learned for future BMD element deployments. We also reviewed documents and briefings from the U.S. Air Forces Europe

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<sup>1</sup>This document is issued by U.S. Strategic Command's Joint functional Component Command for Integrated Missile Defense.

603rd Air Operations Center to understand whether implementation issues—such as U.S.–NATO command and control relationships—are identified and channeled through U.S. European Command as a part of DOD’s capability acceptance process. We spoke to senior-level officials from the Army, Navy, Air Force, U.S. Strategic Command, U.S. European Command, U.S. Army Europe, U.S. Navy Europe, U.S. Air Forces Europe, Joint Staff, the Office of the Secretary of Defense, and the Missile Defense Agency (MDA) about their participation in the acceptance process, including the selection of acceptance criteria to assess EPAA Phase One BMD elements, identification and resolution of implementation issues prior to accepting EPAA BMD elements, and any planned adjustments to the existing process.

Finally, we spoke to senior-level State Department officials to understand their role leading up to the deployment of EPAA Phase One capabilities and overall involvement in subsequent EPAA implementation efforts. We also spoke to senior-level NATO officials to get their perspectives on possible implementation issues related to command and control relationships during NATO-led BMD operations and interoperability among U.S., NATO, and member-nation BMD systems.

To assess the extent to which DOD has estimated the long-term costs to operate and support BMD elements in Europe, we first reviewed agreements and their annexes between MDA and the Army and between MDA and the Navy regarding how these organizations are to work together to manage the BMD elements, including information on how they are to jointly develop cost estimates. We identified and reviewed documents containing best practices for determining high-quality cost estimates from the Office of Management and Budget and the GAO *Cost Estimating and Assessment Guide*, which indicate that estimating long-term operations and support costs assists in budget development and the allocation of resources. In addition, we reviewed the Army’s regulation on *Integrated Logistic Support*, which includes guidance on business-case analysis and is referenced in the agreement annexes between MDA and the Army to identify DOD criteria for conducting business-case analyses to assess alternatives for providing long-term support. We then reviewed documentation of estimates developed by MDA and the services for the BMD elements that are part of EPAA or could be deployed to support EPAA, which include Aegis Ashore, forward-based Army Navy/Transportable Radar, Terminal High Altitude Area Defense (THAAD), Command, Control, Battle Management and Communications, Patriot, and Aegis BMD-capable ships. We focused our assessment on the first three elements, because the services and MDA are sharing the

operating and support costs for these elements. We assessed the documentation of the Army and MDA December 2012 joint estimate of operating and support costs for THAAD and the January 2012 joint estimate of operating and support costs for the forward-based Army Navy/Transportable Radar. We interviewed Army and MDA officials to understand the key assumptions underpinning each estimate.

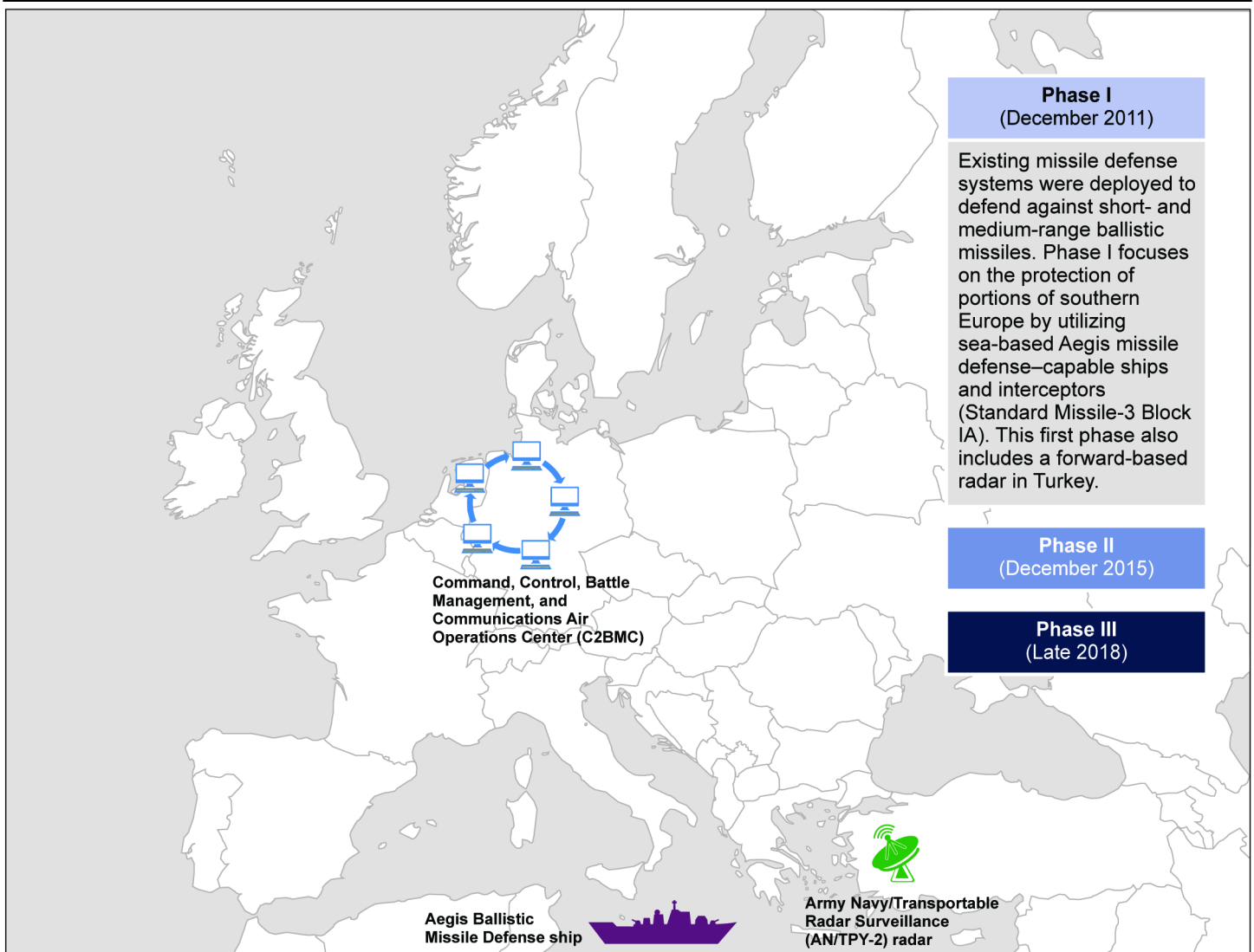
Further, we examined the key issues that could affect these estimates including DOD proposals for locating THAAD units overseas and the lack of business-case analyses for supporting a decision on the long-term support strategy for each element, which are called for by the BMD element agreements between the Army and MDA and by Army guidance referenced in those agreements. For Aegis Ashore, we confirmed with MDA and Navy officials that the two organizations had not yet jointly developed a comprehensive, long-term estimate. We did, however, assess Navy and MDA documentation of some Aegis Ashore costs that each organization expects to fund over the next 5 years. We did not evaluate the quality of the estimates in this review since we reported in 2011 that six of MDA's life-cycle cost estimates did not meet the characteristics of a high-quality cost estimate.<sup>2</sup> Since our objective for the current review was to assess the extent to which DOD had identified the operating and support costs of BMD elements, documenting the existence or absence of estimates was sufficient for our purposes.

We conducted this performance audit from December 2012 to 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.

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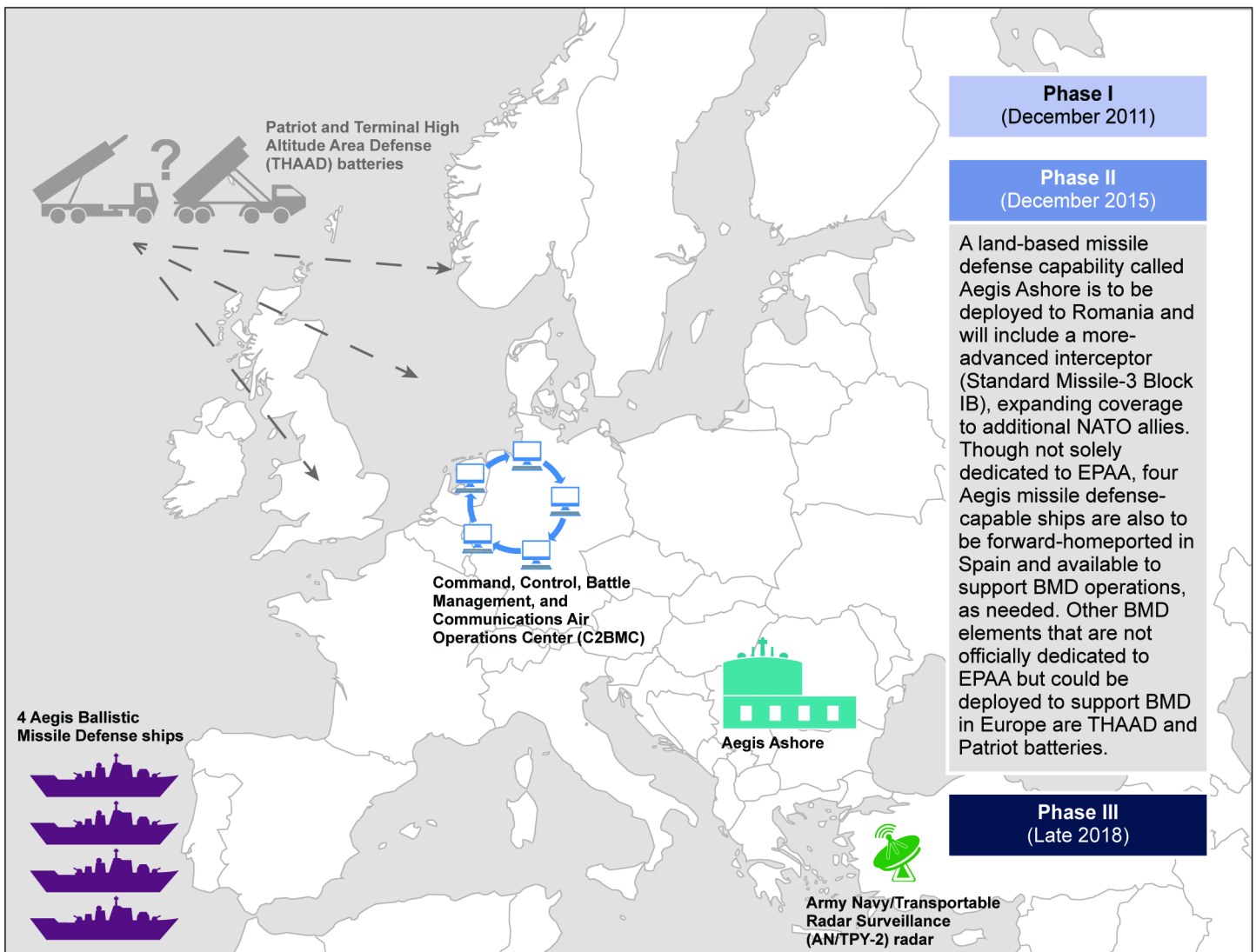
<sup>2</sup>GAO, *Missile Defense: Actions Needed to Improve Transparency and Accountability*, [GAO-11-372](#) (Washington, D.C.: Mar. 24, 2011).

# Appendix II: U.S. Ballistic Missile Defense (BMD) Capabilities Available by European Phased Adaptive Approach (EPAA) Phase



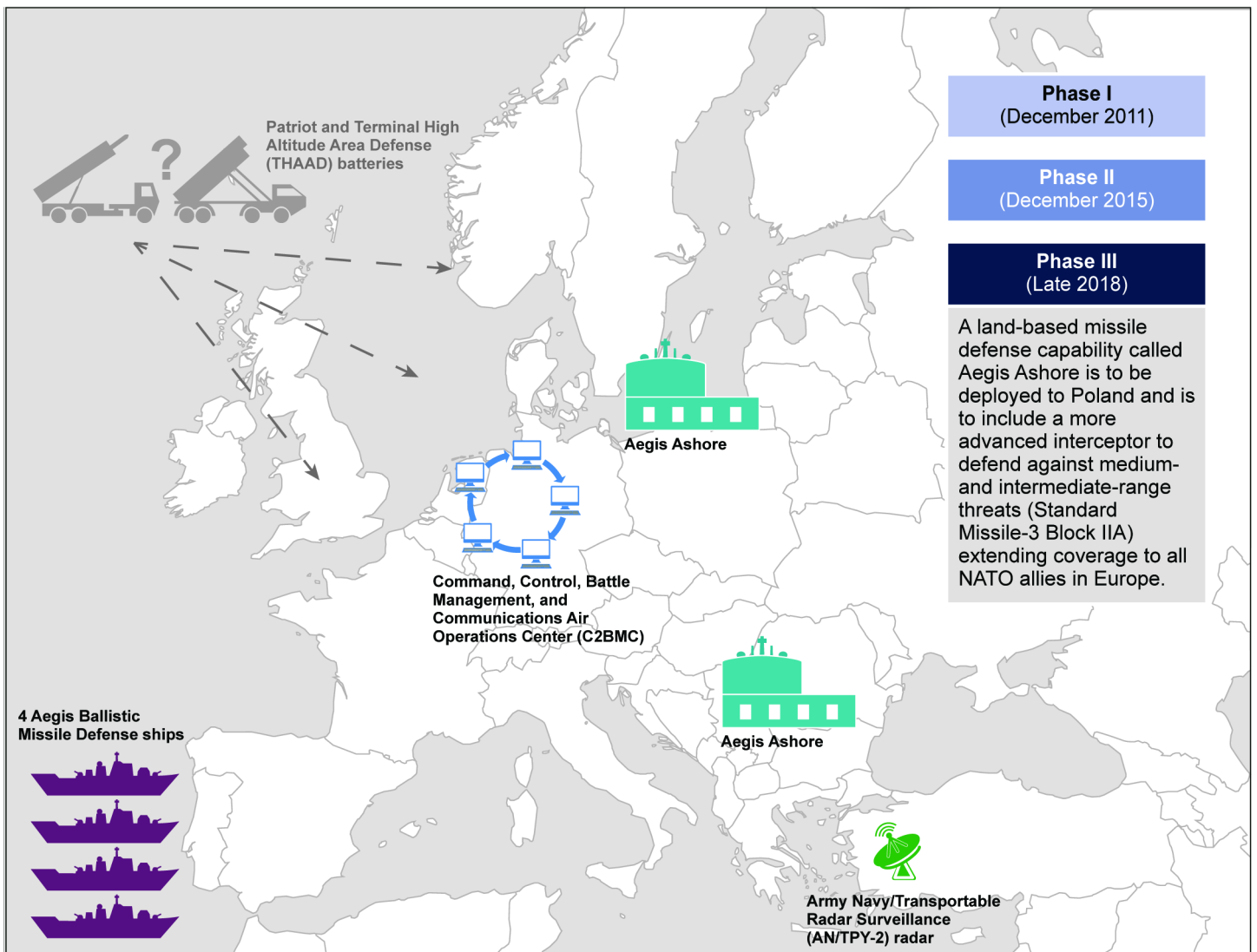
Source: GAO analysis of DOD documents.

**Appendix II: U.S. Ballistic Missile Defense (BMD) Capabilities Available by European Phased Adaptive Approach (EPAA) Phase**



Source: GAO analysis of DOD documents.

**Appendix II: U.S. Ballistic Missile Defense (BMD) Capabilities Available by European Phased Adaptive Approach (EPA) Phase**



Source: GAO analysis of DOD documents.

# Appendix III: Key Department of Defense (DOD) Stakeholders Involved in Planning and Implementing the European Phased Adaptive Approach

Organization	Primary Role in European Phased Adaptive Approach (EPAA)
Under Secretary of Defense for Acquisition, Technology and Logistics	Provides acquisition policy direction, program guidance, and overall management oversight of the Missile Defense Agency. Chairs the Missile Defense Executive Board, provides program guidance, and makes recommendations to the Deputy Secretary of Defense on missile defense issues.
Missile Defense Executive Board	A senior-level body that reviews DOD's ballistic missile defense efforts and provides the Under Secretary of Defense for Acquisition, Technology and Logistics or Deputy Secretary of Defense, as necessary, with a recommended ballistic missile defense strategic program plan and feasible funding strategy for approval.
U.S. European Command	The geographic combatant command <sup>a</sup> whose area of responsibility includes all of Europe (including Russia and Turkey), Greenland, Israel, and surrounding waters. It is the primary geographic combatant command involved in planning for and implementing EPAA. It is assisted in this effort by its service components—principally U.S. Naval Forces Europe, U.S. Army Europe, and U.S. Air Forces Europe. <sup>b</sup>
U.S. Central Command	The geographic combatant command whose area of responsibility includes parts of the Middle East. Coordinates with U.S. European Command to defend against ballistic missile threats originating from its area of responsibility.
U.S. Strategic Command	Functional combatant command <sup>c</sup> with responsibilities to integrate global missions and capabilities that cross the boundaries of the geographic combatant commands, such as synchronizing planning and coordinating operations support for global missile defense, as well as missile defense advocacy for the combatant commands.
Military services	Responsible for providing forces and resources to support fielding of the ballistic missile defense elements and assisting in planning for and managing the operations and maintenance and infrastructure needs of ballistic missile defense elements.
Missile Defense Agency	Responsible for the research, development, testing, and acquisition of the integrated ballistic missile defense system, comprised of individual ballistic missile defense elements. In addition, the Missile Defense Agency is responsible for operating and support costs for some ballistic missile defense elements until this responsibility is undertaken by a military service.
Director, Operational Test and Evaluation	Principal staff assistant and advisor to the Secretary of Defense on operational test and evaluation in DOD. Responsibilities include issuing policy and procedures; reviewing and analyzing results of operational test and evaluation conducted for certain acquisition programs; and other related activities. In the context of the ballistic missile defense system, the director is responsible for conducting effective, independent oversight of operational testing and providing timely assessments to support programmatic decisions and reporting requirements.
Ballistic Missile Defense System Operational Test Agency	Plans and directs independent operational tests and evaluations and provides operational assessments of ballistic missile defense system capability to defend the United States, its deployed forces, friends, and allies against ballistic missiles of all ranges and in all phases of flight. The agency includes representation from service and joint operational test entities.

Source: GAO summary of Department of Defense (DOD) information.

<sup>a</sup>The six geographic combatant commands are U.S. Africa Command, U.S. Central Command, U.S. European Command, U.S. Northern Command, U.S. Pacific Command, and U.S. Southern Command.

<sup>b</sup>A service component command is a command consisting of the service component commander and all those service forces, such as individuals, units, detachments, organizations, and installations under the command, including the support forces that have been assigned to a combatant command.

<sup>c</sup>The three functional combatant commands are U.S. Special Operations Command, U.S. Strategic Command, and U.S. Transportation Command.

# Appendix IV: Comments from the Department of Defense



ACQUISITION

ASSISTANT SECRETARY OF DEFENSE  
3015 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3015

032 414

Mr. John H. Pendleton  
Director  
Defense Capabilities and Management  
U.S. Government Accountability Office  
441 G Street, N.W.  
Washington, DC 20548

Dear Mr. Pendleton:

This is the Department of Defense (DoD) response to the Government Accountability Office (GAO) Draft Report, GAO-14-314, "BALLISTIC MISSILE DEFENSE: Actions Needed to Address Implementation Issues and Estimate Long-Term Costs for European Capabilities," dated February 19, 2014 (GAO Code 351790).

The DoD partially concurred with the first recommendation and concurred with the remaining three recommendations. Detailed comments on the report recommendations are enclosed.

We appreciate the opportunity to comment on the draft report. My point of contact for this effort is Mr. Greg Hulcher, [gregory.d.hulcher.civ@mail.mil](mailto:gregory.d.hulcher.civ@mail.mil), 703-695-2680.

Sincerely,

  
Katrina McFarland

Enclosures:  
As stated.



GAO DRAFT REPORT DATED FEBRUARY 19, 2014  
GAO-14-314 (GAO Code 351790)

ACTIONS NEEDED TO ADDRESS IMPLEMENTATION ISSUES AND ESTIMATE  
LONG-TERM COSTS FOR EUROPEAN CAPABILITIES

DEPARTMENT OF DEFENSE COMMENTS  
TO THE GAO RECOMMENDATIONS

**RECOMMENDATION 1:** To ensure that BMD capabilities can be used as intended when they are delivered, in coordination with the Chairman of the Joint Chiefs of Staff, direct U.S. Strategic Command to identify and develop a plan to resolve implementation issues prior to deploying and operating future BMD capabilities in Europe. U.S. Strategic Command should work in consultation with U.S. European Command and the services to resolve implementation issues such as infrastructure, resolving policies and procedures to address potential overlapping operational priorities if radars are integrated across geographic combatant commands, completing host nation implementing arrangements, and any other key implementation issues.

**DoD Response:** Partially Concur. U.S. Strategic Command does not have the authority or mission to resolve implementation issues. The Services and the Missile Defense Agency (MDA) will work to identify and resolve implementation issues for future BMD capabilities in Europe. U.S. Strategic Command will work in consultation with U.S. European Command and the Services to resolve Integrated Air and Missile Defense (IAMD) requirements and Warfighter Acceptance Criteria, validate IAMD element performance and system integration, support U.S. national policy adjustments, support Warfighter needs, and advise cross Global Combatant Command capability optimization/sharing as part of their global missile defense role.

**RECOMMENDATION 2:** To identify resources needed to support its plans for providing BMD capabilities in Europe and to support budget development, direct the Under Secretary of Defense for Acquisition, Technology, and Logistics to require and set a deadline for completing a business case analysis for the forward-based radar to support a decision on the long-term support strategy and updating the joint MDA and Army estimate for long-term operating and support costs after a decision on the support strategy is made.

**DoD Response:** Concur. MDA is contracting with Army (Aviation and Missile Command Logistics Center (ALC)) to conduct a business case analysis (BCA) to identify the most cost effective long term support strategy. The BCA will be delivered in 4<sup>th</sup> Quarter FY15.

The Army-MDA AN/TPY-2 Joint Operations and Sustainment Cost Estimate is updated biennially and is reviewed by the MDA Cost Director and the Director of Acquisition Costing Directorate at the office of the Deputy Assistant Secretary of the Army for Cost and Economics. If the results of the BCA substantially change the underlying assumptions of the Joint Cost Estimate, an out-of-cycle Joint Cost Estimate would be conducted.

**RECOMMENDATION 3:** To identify resources needed to support its plans for providing BMD capabilities in Europe and to support budget development, direct the Under Secretary of

Defense for Acquisition, Technology, and Logistics to require and set a deadline for completing a business case analysis for THAAD to support a decision on the long-term support strategy and updating the joint MDA and Army long-term operating and support cost estimate after this and other key program decisions, such as where the THAAD batteries are likely to be forward-stationed, are made.

**DoD Response:** Concur. THAAD is identified as a "surge support" asset for EPAA with no specifically assigned area of responsibility, battery quantities or locations. MDA and the Army will support the decision to deploy THAAD assets, and any related business case analysis for projected sites.

**RECOMMENDATION 4:** To identify resources needed to support its plans for providing BMD capabilities in Europe and to support budget development, direct the Under Secretary of Defense for Acquisition, Technology, and Logistics to require and set a deadline for completing a joint MDA and Navy estimate of the long-term operating and support costs for the Aegis Ashore two sites and updating the estimates after key program decisions are made.

**DoD Response:** Concur. MDA and the Navy support completing a joint estimate of the long-term operating and support costs for the Aegis Ashore two sites and updating the estimates after key program decisions are made.

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# Appendix V: GAO Contact and Staff Acknowledgments

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## GAO Contact

John H. Pendleton, (202) 512-3489 or [pendletonj@gao.gov](mailto:pendletonj@gao.gov)

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## Staff Acknowledgments

In addition to the individual named above, Patricia W. Lentini, Assistant Director; Marie A. Mak, Assistant Director; Brenda M. Waterfield; Jennifer S. Spence; Laurie Choi; Virginia A. Chanley; Michael Shaughnessy; Erik Wilkins-McKee; and Amie Steele made key contributions to this report.

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