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BALLISTIC MISSILE DEFENSE

DOD Needs to Address Planning and Implementation Challenges for Future Capabilities in Europe

GAO-11-220

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Highlights

Highlights of GAO-11-220, a report to congressional addressees

Why GAO Did This Study

In September 2009, the President announced a revised approach for ballistic missile defense (BMD) in Europe. The European Phased Adaptive Approach (EPAA) is designed to defend against existing and near-term ballistic missile threats and build up defenses over four phases as threats mature and new BMD technologies become available. Although the approach will include capabilities such as radars and land- and sea-based BMD assets, the Department of Defense (DOD) has not yet established EPAA life-cycle costs. EPAA is DOD's first implementation of its new, regional approach to BMD.

GAO was asked to evaluate DOD's plans for implementing EPAA. GAO reviewed the extent to which: (1) DOD has developed guidance and addressed management of cost and schedule for EPAA, and (2) DOD planning for EPAA is informed by operational performance data. GAO reviewed key legislation, policy and guidance, and initial plans for implementation and asset allocation.

What GAO Recommends

GAO recommends that DOD provide guidance on EPAA end states; develop EPAA life-cycle cost estimates; and integrate its phase schedule with acquisition, infrastructure, and personnel activities. GAO also recommends that DOD adopt operational performance metrics and include them in the BMD test program. DOD generally concurred with GAO's recommendations.

View GAO-11-220 or key components.
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What GAO Found

DOD has initiated multiple simultaneous efforts to implement EPAA but faces three key management challenges—the lack of clear guidance, life-cycle cost estimates, and a fully integrated schedule—which may result in inefficient planning and execution, limited oversight, and increased cost and performance risks. Since the September 2009 announcement of EPAA, stakeholders throughout DOD—including U.S. European Command, the Missile Defense Agency, and the military services—as well as the State Department, have taken steps to implement this policy, including considering options for the deployment of assets, requesting forces, preparing for testing, and analyzing infrastructure needs. However, effective planning requires clear guidance regarding desired end states and key BMD stakeholders, including the combatant commands and military services, believe that such guidance is not yet in place for EPAA. Further, key principles for preparing cost estimates state that complete and credible estimates are important to support preparation of budget submissions over the short-term as well as to assess long-term affordability. DOD has not developed EPAA life-cycle cost estimates because it considers EPAA an adaptive approach that will change over time. However, best practices for cost estimating include methods for developing valid cost estimates even with such uncertainties. These estimates could serve as a basis for DOD to assess its goal of fielding affordable and cost-effective ballistic missile defenses as well as determine if corrective actions are needed. Finally, the EPAA phase schedule is not fully integrated with acquisition, infrastructure, and personnel activities that will need to be synchronized. As a result, DOD is at risk of incurring schedule slips, decreased performance, and increased cost as it implements the phases of EPAA.

DOD also faces planning challenges for EPAA because DOD has not yet established key operational performance metrics that would provide the combatant commands with needed visibility into the operational capabilities and limitations of the BMD system they intend to employ. DOD is incorporating some combatant commands' requirements into BMD testing, in part, by having U.S. European Command participate in the test design process. However, the system's desired performance is not yet defined using operationally relevant quantifiable metrics, such as how long and how well it can defend. The combatant commands are attempting to define operational performance metrics to enable credible assessment of operational performance gaps. However, these metrics have yet to be finalized and implemented. Without a more complete understanding of BMD operational capabilities and limitations, the combatant commands face potential risk in EPAA operational planning.

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January 26, 2011

The Honorable Michael R. Turner
Chairman
The Honorable Loretta Sanchez
Ranking Member
Subcommittee on Strategic Forces
Committee on Armed Services
House of Representatives

The Honorable Jim Langevin
House of Representatives

On September 17, 2009, the President announced a revised approach for ballistic missile defense (BMD) in Europe, with significant implications for the Department of Defense's (DOD) BMD program. In response to this guidance, DOD cancelled the previously-planned European missile defense program—a fixed interceptor site in Poland and a fixed radar site in the Czech Republic—intended to defend against future long-range Iranian ballistic missiles.[1] Instead, DOD now will deploy in phases increasingly capable elements and interceptors in Europe to defend against the growing ballistic missile threat.[2] This "European Phased Adaptive Approach" (EPAA) to BMD is designed to defend against existing and near-term threats posed by short- and medium-range ballistic missiles, as well as build up defenses against longer-range ballistic missile threats

[1]GAO previously reported that DOD's $4 billion estimate that included the European Interceptor Site in Poland and the European Midcourse Radar in the Czech Republic was incomplete. See GAO, *Ballistic Missile Defense: Actions Needed to Improve Planning and Information on Construction and Support Costs for Proposed European Sites*, GAO-09-771 (Washington, D.C.: Aug. 6, 2009).

[2]The Missile Defense Agency (MDA) defines many of its major BMD systems as "elements," including the ship-based Aegis Ballistic Missile Defense (Aegis BMD), the Ground-based Midcourse Defense, and Upgraded Early Warning Radar. An interceptor is a component of some ballistic missile defense elements that is used to destroy an adversary's ballistic missile. For example, MDA is currently building the Standard Missile-3 (SM-3) to be used as a ballistic missile defense interceptor as part of the Aegis BMD element. For a further listing and description of the elements that may be included as part of the revised approach to BMD in Europe, including any associated interceptors, see appendix II.

over time as those threats mature.[3] The Administration stated that the new approach will augment current protection of the U.S. homeland against long-range ballistic missile threats and will use more flexible and survivable systems to provide for the defense of U.S. deployed forces, their families, and our allies in Europe sooner and more comprehensively than the previous approach.

The President's announcement, further elaborated upon several months later in the Ballistic Missile Defense Review Report,[4] lays out the most comprehensive shift in U.S. BMD policy since 2002 when the Secretary of Defense created the Missile Defense Agency (MDA) and the President directed fielding of an initial set of missile defense capabilities by 2004. To assist Congress in its review of this policy shift and its implications, we were asked to assess DOD's efforts to implement the phased adaptive approach for BMD in Europe. In December 2010, we issued a correspondence on acquisition management and near-term development risks related to EPAA.[5] For this report, we assessed:
(1) the extent to which DOD has developed guidance and addressed management of cost and schedule in the planning and implementation of EPAA, and (2) the extent to which DOD planning for EPAA is informed by operational performance data.

To address these objectives, we reviewed key legislation related to ballistic missile defenses in Europe and DOD's overall approach for planning, implementing, and preparing to support BMD. To review the extent to which DOD has developed guidance and addressed management of EPAA cost and schedule, we interviewed DOD and State Department officials and reviewed documents and briefs that specifically described

[3]Ballistic missiles are classified by the distance they can fly as follows: Short-Range Ballistic Missile (SRBM)—up to 1000 km; Medium-Range Ballistic Missile (MRBM)—between 1000 km and 3000 km; Intermediate-Range Ballistic Missile (IRBM)—between 3000 km and 5500 km; and Intercontinental Ballistic Missile (ICBM)—range over 5500 km.

[4]Congress mandated in the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, § 234 (2008) that the Secretary of Defense review and report on United States BMD policy, strategy, plans, and programs. In response to this direction, and guided by a presidential directive, DOD conducted a review and issued the Ballistic Missile Defense Review Report in February 2010, referred to in this report as the Ballistic Missile Defense Review.

[5]GAO, *Defense Acquisitions: Missile Defense: European Phased Adaptive Approach Acquisitions Face Synchronization, Transparency, and Accountability Challenges*, GAO-11-179R (Washington, D.C.: Dec. 21, 2010).

DOD efforts to plan for and implement EPAA and assessed their implications for managing EPAA cost and schedule. To review the extent to which DOD planning for EPAA is informed by operational performance data, we interviewed DOD officials and reviewed DOD documents on policy and guidance needed for military planning. To address these objectives, we also conducted site visits and interviewed officials from the Office of the Secretary of Defense, the U.S. European Command and its components, as well as officials from U.S. Strategic Command, U.S. Northern Command, the Ballistic Missile Defense System Operational Test Agency, and various Navy, Army, and MDA offices.

We conducted this performance audit from December 2009 to January 2011 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. Additional details on our scope and methodology are discussed in more detail in appendix I.

Background

DOD revised its approach to BMD in Europe as part of the department's comprehensive review of BMD strategy and policy, which culminated in the February 2010 Ballistic Missile Defense Review. In that report, DOD set out to match U.S. BMD strategies, policies, and capabilities to the requirements of current and future threats and to inform DOD planning, programming, budgeting, and oversight. Judging that the current and planned defenses against intercontinental ballistic missiles will protect the United States against such threats from North Korea and Iran for the foreseeable future, DOD is refocusing its resources to defend deployed forces and allies against regional threats. Each region will have a phased adaptive approach to BMD tailored to the threats and circumstances unique to that region, with a principal focus on Europe, East Asia, and the Middle East. DOD's goal is to enable a flexible, scalable response to BMD threats around the world by incorporating new technologies quickly and cost-effectively and concentrating on the use of mobile and relocatable BMD assets instead of fixed assets. In addition, DOD expressed a commitment to testing new assets before fielding to allow assessment under realistic operational conditions. Finally, DOD is emphasizing working with regional allies to strengthen BMD and its deterrent value.

The European Phased Adaptive Approach to BMD is the first implementation of this revised strategy and policy. EPAA currently

consists of four phases of increasing capability that spans to 2020. Table 1 summarizes DOD's proposed time frames and capabilities for the four phases of EPAA. For a further description of the various BMD assets that may be part of EPAA, see appendix II.

Table 1: General Description of EPAA

	Time frame	Planned capability (capabilities are cumulative)
Phase 1	2011	Deploy existing missile defenses to defend against short- and medium-range ballistic missiles. Planned BMD assets to include deployment of: • An existing sensor (the AN/TPY-2 radar),[a] • BMD-capable Aegis ships (Aegis BMD),[b] and the currently fielded Standard Missile-3 interceptor (SM-3 Block IA).
Phase 2	2015	Field enhanced capability to defend against short- and medium-range ballistic missiles. Planned BMD assets to include: • One Aegis Ashore—a land-based version of the Aegis BMD weapon system—in Romania and the more advanced SM-3 Block IB interceptor.
Phase 3	2018	Field enhanced capability to defend against medium- and intermediate-range ballistic missiles. Planned BMD assets to include: • One additional Aegis Ashore in Poland and the upgraded SM-3 Block IIA interceptor.
Phase 4	2020	Field enhanced capability to defend against potentially longer-range threats, including intercontinental ballistic missiles. Planned BMD assets include: • Further upgraded SM-3 Block IIB interceptors.

Source: GAO summary of DOD information.

Notes: DOD plans for all four phases to include upgrades to the missile defense command and control system, known as the Command, Control, Battle Management, and Communications (C2BMC).

[a]DOD intends to use the Army Navy/Transportable Radar Surveillance system (AN/TPY-2) both for defense against regional threats and for homeland defense.

[b]Aegis BMD is a ship-based system that (1) provides a forward-deployed sensor capability for other BMD elements and (2) employs its own sensor and interceptors. The element is based on a modification to existing Navy Aegis ships and utilizes the Standard Missile-3 (SM-3) interceptor. For further details on the phases and elements, see figure 1 and appendix II.

A number of stakeholders within DOD play a role in the developing, building, fielding, and governing of BMD. MDA is responsible for the acquisition of the elements that comprise the integrated Ballistic Missile Defense System (BMDS). MDA continues to be exempted from DOD's traditional joint requirements determination, acquisition, and associated oversight processes and retains its expanded responsibility and authority to define BMD technical requirements, change goals and plans, and allocate resources. Although not required to build elements to meet specific operational requirements as it would be under traditional DOD processes, MDA is required to work closely with the combatant commands when developing BMD capabilities. DOD reported in the Ballistic Missile

Defense Review that it would maintain its existing policy of developing, building, fielding, and governing BMD as it had prior to the EPAA announcement. Table 2 identifies some of the key DOD stakeholders that are involved in the implementation of EPAA.

Table 2: Key DOD Stakeholders Involved in Planning and Implementing EPAA

Organization	Primary role in EPAA
Under Secretary of Defense for Policy	Develops and integrates U.S. missile defense policy within the broader framework of national security strategy and ensures consistency between missile defense policy and development and acquisition plans and approaches.
Under Secretary of Defense for Acquisition, Technology, and Logistics	Provides acquisition policy direction, program guidance, and overall management oversight of MDA. Chairs the Missile Defense Executive Board, provides program guidance, and makes recommendations to the Deputy Secretary of Defense on missile defense issues.
Chairman of the Joint Chiefs of Staff	Provides advice on desired BMD system capabilities and characteristics. Through the Joint Integrated Air and Missile Defense Organization, directly supports U.S. Strategic Command—the Air and Missile Defense Integrating Authority and operational proponent for global BMD.
Missile Defense Executive Board	A senior-level body that reviews DOD's BMD efforts and provides the Under Secretary of Defense for Acquisition, Technology, and Logistics or Deputy Secretary of Defense, as necessary, with a recommended BMD strategic program plan and feasible funding strategy for approval.
U.S. European Command	The geographic combatant command whose area of responsibility includes all of Europe (including Russia and Turkey), Greenland, Israel, and surrounding waters. It is the primary geographic combatant command responsible for planning 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 in Europe.[a,b]
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 their area of responsibility.
U.S. Strategic Command	Functional combatant command with responsibilities to integrate global missions and capabilities that cross the boundaries of the geographic combatant commands, such as planning, integrating, and coordinating global missile defense, including missile defense advocacy for the combatant commands.[c]
Missile Defense Agency	Responsible for the research, development, testing, and acquisition of the integrated BMDS, comprised of individual BMD elements.
Military Services	Responsible for providing forces and resources to support fielding of the BMD assets, and assisting in planning for and managing the operations and maintenance and infrastructure needs of BMD assets.
Army Corps of Engineers	Perform site studies for EPAA installations, help identify infrastructure requirements, and oversee construction to meet MDA and service requirements.

Source: GAO summary of DOD information.

[a]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.

[b]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.

[c]The four functional combatant commands are U.S. Joint Forces Command, U.S. Special Operations Command, U.S. Strategic Command, and U.S. Transportation Command.

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. For instance, we concluded in a February 2010 report that although MDA had shown progress in demonstrating increased performance, its cost estimates could not be thoroughly assessed and some planned capability could not be verified due to target shortfalls and modeling limitations.[6] In addition, in September 2009, we reported that DOD had not identified its requirements for BMD elements and interceptors and had not fully established units to operate the elements before making them available for use.[7] For additional GAO reports on BMD, see the Related GAO Products section.

[6]GAO, *Defense Acquisitions: Missile Defense Transition Provides Opportunity to Strengthen Acquisition Approach*, GAO-10-311 (Washington, D.C.: Feb. 25, 2010).

[7]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).

DOD has Initiated Efforts to Implement EPAA but Faces Key Management Challenges Due to Incomplete Guidance and the Lack of Life-Cycle Cost Estimates and an Integrated Schedule

DOD has initiated multiple simultaneous efforts to implement EPAA, including considering options for the deployment of assets, requesting forces, preparing for testing, analyzing infrastructure needs, and gaining North Atlantic Treaty Organization (NATO) support for BMD in Europe. DOD manages its BMD efforts by individual program elements and considers EPAA a flexible approach, not a program. However, the department faces three key management challenges—lack of clear guidance, life-cycle cost estimates,[8] and a fully integrated schedule—that may result in inefficient planning and execution, increased cost and performance risks, and limited oversight of EPAA. First, DOD has not yet established clear guidance to help direct and align its EPAA efforts. Without such guidance, DOD faces uncertainty in planning and implementing this revised approach. Second, DOD has not yet developed EPAA life-cycle cost estimates and has indicated that it is unlikely to do so because EPAA is considered a policy designed to maximize flexibility. As a result, DOD does not have a basis from which to assess EPAA's affordability and cost-effectiveness and is missing a tool with which to monitor implementation progress. Finally, the EPAA phase schedule is not fully integrated with acquisition, infrastructure, and personnel activities. As a result, DOD does not have the information it needs to assess whether the EPAA schedule is realistic and achievable, identify potential problems, or analyze how changes will impact the execution of this effort, and therefore is exposed to increased schedule, performance, and cost risks. Without addressing these three management challenges, DOD will likely face difficulties in planning for and implementing EPAA, potentially resulting in significant cost increases.

DOD and the State Department Have Taken Multiple Steps to Implement EPAA

Since the September 2009 announcement of EPAA, stakeholders throughout DOD—including U.S. European Command (EUCOM), MDA, and the military services—as well as the State Department, have taken steps to implement this policy, including considering options for the deployment of assets, requesting forces, preparing for testing, analyzing infrastructure needs, and gaining NATO support for BMD in Europe. For example, EUCOM initiated EPAA planning efforts and submitted an official request for some of the BMD assets it determined are needed for Phase 1, including the personnel to operate them. EUCOM, with the

[8]Life-cycle costs are the total cost to the government for a program over its full life, consisting of research and development, production, operations, maintenance, and disposal costs and are helpful in assessing whether a program's cost is affordable.

assistance of its service components, has been developing an operation plan for EPAA.[9] DOD officials told us that this plan, covering Phase 1, is expected to be approved in the spring of 2011. EUCOM officials told us that their efforts have been informed by the command's close collaboration with MDA, which has provided it with information on the capabilities of BMD assets the command intends to employ in its operational plan. In order to facilitate the information exchange, MDA has located representatives at EUCOM headquarters. EUCOM has also been working with MDA to develop test designs for the BMD system that may be fielded in EUCOM's area of responsibility. In particular, EUCOM designed notional EPAA architectures[10] that will be used in testing. The results of these tests are intended to provide the command with greater visibility into the performance of the BMD system it will be responsible for employing.

MDA has also taken a number of steps to implement EPAA. As we reported in December 2010,[11] MDA has made progress in acquisition planning for EPAA, including integrating and aligning its test planning efforts with EPAA phases through its semiannual Ballistic Missile Defense System Integrated Master Test Plan.[12] MDA has collaborated with the combatant commands and members of the testing community to develop an Integrated Master Test Plan to support planning and execution of all BMD testing for the phased adaptive approach. Additionally, according to MDA, its Global Deployment Program Office has been actively engaged in an effort to align the acquisition activities of EPAA with the EPAA efforts of other stakeholders, such as the State Department, host country embassy personnel, the Office of the Under Secretary of Defense for Policy, EUCOM, the Joint Staff, and the military services.

[9]Operation plan refers to any plan for the conduct of military operations prepared in response to actual and potential contingencies.

[10]Architecture is a framework or structure that portrays relationships among all the elements of the subject force, system, or activity. See Joint Publication 1-02. For BMD, this would include the type, number, and location of elements and their linkages to each other.

[11]GAO-11-179R.

[12] The Integrated Master Test Plan is a semiannual MDA document that establishes the executable test program for the BMDS. The Integrated Master Test Plan is an overarching document that describes the BMDS test environment, supporting test organizations, developmental and operational test programs, and management of MDA test resources. The Integrated Master Test Plan is the definitive source for detailed BMDS test planning and execution guidance.

Officials from the military services and EUCOM's service components told us they are also pursuing activities to support EPAA planning, as the following examples illustrate.

- The Navy has established the Ballistic Missile Defense Enterprise, which is an effort aimed at coordinating all Navy BMD activities to support EPAA as well as other BMD missions.[13]
- The Army Corps of Engineers is working with MDA and the Navy on the preliminary stages of a technical analysis related to Aegis Ashore site options.
- U.S. Naval Forces Europe is analyzing its Aegis BMD ship presence options and requirements as well as planning for Aegis Ashore.
- U.S. Army Europe is conducting resource planning for potential basing concepts and manning requirements of Army BMD assets that may be allocated for EPAA, such as the Terminal High-Altitude Area Defense (THAAD) element and the AN/TPY-2 radar.
- U.S. Air Forces in Europe is drafting a concept of operations[14] that, when approved by the EUCOM Commander, will establish the command and control relationships for conducting BMD operations for EPAA. Similar efforts are in progress within NATO.

The State Department, in coordination with DOD, has also made significant progress in achieving NATO support for BMD in Europe. NATO recently adopted the territorial missile defense mission—to protect its populations and territories in Europe against ballistic missile attack—but now must undertake the challenging task of reaching agreement on how to implement this new mission. Poland and Romania have agreed to host U.S. BMD assets although the U.S. has not yet found a host nation for a critical sensor planned for deployment in 2011. Finally, NATO members may provide BMD assets to assist in the defense of Europe. However, the U.S. currently is the only NATO member with BMD assets designed to provide territorial defense. See appendix IV for more details of NATO support for BMD in Europe.

[13]The Navy Ballistic Missile Defense Enterprise effort allows missile defense experts from across the Navy to meet regularly to discuss EPAA implementation issues and challenges, develop analyses of alternatives, and work to identify courses of action and solutions.

[14]A concept of operations expresses what the joint force commander intends to accomplish and how it will be done using available resources. The concept is designed to give an overall picture of the operation. It is also called commander's concept. See Joint Publication 1-02.

DOD's Guidance for EPAA Is Not Yet Complete

DOD has initiated many efforts to implement EPAA, but the department has not yet established clear guidance to help direct and align its efforts. According to DOD, effective planning requires clear guidance on desired end states.[15] In the context of BMD, this could include information such as the purpose and duration of the mission and areas to be defended, as well as priorities within a region and between regions. While senior DOD officials stated that the President's EPAA announcement and the Ballistic Missile Defense Review provide sufficient guidance to begin planning and implementation, a recent DOD study recommended planning guidance be further refined. Further, key BMD stakeholders, including those from the Joint Staff, combatant commands, and military services believe that additional guidance is needed for EPAA.

Senior DOD officials from the Office of the Under Secretary of Defense for Policy, the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, the Joint Staff, and MDA told us it was their view that the President's announcement and the Ballistic Missile Defense Review[16] provide sufficient guidance to enable the Joint Staff, combatant commands, and services to begin planning and implementing EPAA. The officials also noted that some additional guidance would be forthcoming through the regular updating of DOD's high-level policy and planning documents.[17] According to these officials, EPAA is a policy framework for the evolutionary development and fielding of missile defenses in Europe to defend against ballistic missile threats. They further indicated that the EPAA framework does not establish or dictate a specific architecture or force structure requirement. Additionally, the officials stated that the Joint Staff and the combatant commands are responsible for translating the

[15]Joint Chiefs of Staff, Joint Publication 5-0, *Joint Operation Planning* (Washington, D.C.: Dec. 26, 2006).

[16]See the Background section and footnote 4 for more details on the Ballistic Missile Defense Review.

[17]The high-level DOD policy and planning documents the officials referred to include the Guidance for the Employment of the Force, the Defense Planning and Programming Guidance, and the Joint Strategic Capabilities Plan. The Guidance for the Employment of the Force is a DOD policy document signed by the Secretary of Defense that provides, among other things, comprehensive, near-term planning guidance and overarching policy for global posture, force allocations, and contingency planning. The Defense Planning and Programming Guidance is a DOD policy document signed by the Secretary of Defense that provides investment guidance to services and agencies. The Joint Strategic Capabilities Plan is a Joint Chiefs of Staff document that translates the Office of the Secretary of Defense's overarching policy and planning guidance into combatant command direction to prepare specific contingency plans.

overarching policy into specific requirements to allow military forces to execute the policy. Moreover, the senior officials also stated that the specific requirements for EPAA, including architecture, would be developed by the combatant commands and Joint Staff in consultation with the Office of the Secretary of Defense using standard DOD planning processes and that any policy gaps that may emerge would be addressed as plans are iterated through the normal planning process.

DOD examined the need for policy guidance in the Global Force Management Development Project, a study to clarify and more fully assess the scope and implications of the decision to adopt EPAA and the phased adaptive approach in general. This effort was led by the Joint Staff and included participation from U.S. Strategic Command, EUCOM, U.S. Pacific Command, U.S. Central Command, U.S. Northern Command, U.S. Joint Forces Command, the Office of the Under Secretary of Defense for Policy, and technical assistance from MDA. The study was tasked with developing the plan and facts to be used to allocate limited BMD assets among the combatant commands as regional situations and national strategies require. The classified study was unable to fully address this task but concluded, among other things, that DOD needed to refine its BMD planning guidance, identifying 14 BMD-related general planning guidance questions that DOD needed to answer. According to Joint Staff officials, the study's findings were briefed to and endorsed by several senior DOD boards, including the Missile Defense Executive Board in May 2010. Officials from the Office of the Under Secretary for Defense for Policy told us that it takes time to fully develop all of the strategic planning and investment guidance necessary to implement a significant policy shift like EPAA. Further, the officials added that some of the guidance questions identified in the study could not be addressed immediately because they had to be sequenced with other events. They gave the example that some of the guidance would rely on decisions made by NATO, which has only recently adopted the territorial missile defense mission.[18]

Consistent with the study's findings, officials from the Joint Staff, combatant commands, and services told us that DOD needed to provide more clarity on desired EPAA end states to ensure that they were appropriately executing their responsibilities. For example, Army officials told us that the Army's primary concern with EPAA was the lack of clear

[18]For further discussion of EPAA and NATO, including NATO's adoption of the territorial missile defense mission, see appendix IV.

guidance on end states and said that the Army could not be certain that it was appropriately preparing to support EPAA assets without knowing what assets would be deployed when, where, and for how long. In addition, the Navy created a new organization to help coordinate the service's BMD efforts and also developed its own set of EPAA facts and assumptions so that it could support EPAA requirements. However, Navy officials told us that although they coordinate with other BMD stakeholders regularly, they did not know if everyone was operating under the same end-state assumptions, including assumptions about force allocation and deployment deadlines. Combatant command officials also told us that existing guidance did not provide clarity on desired end states, including prioritization of regions to be defended. By contrast, other BMD policy decisions, such as the 2002 decision to deploy BMD and the later decision to deploy an AN/TPY-2 radar to Israel, were based on clear and formal policy guidance, according to Joint Staff officials. The officials told us that the lack of clear guidance for EPAA was leading different organizations to make different assumptions about desired end states and that this was resulting in inefficient planning and execution.

A reason that BMD stakeholders throughout DOD may be seeking further planning guidance is that there is a lack of clarity on both the relative priority of EPAA to other BMD missions around the world and the extent to which BMD assets will be deployed forward. Although the Ballistic Missile Defense Review presents the phased adaptive approach as pertaining to all geographic combatant commands, EPAA was a presidential policy decision, implying a certain priority for European BMD needs. However, this priority has not yet been formally codified through a presidential directive or memorandum. Additionally, statements by senior DOD officials have detailed potential EPAA plans that, if carried out, would consume a significant portion of DOD's BMD assets, depending on the amount of physical presence required. For example, depending on interpretation of existing guidance for EPAA, Aegis BMD ships could be tasked with maintaining a continuous physical forward presence; only needing to be available to surge into the theater in response to heightened threat situations; or be available for a mixture of forward presence and surge capability. The Ballistic Missile Defense Review also discusses the need to have a strategic approach to regional BMD and tailor the requirements to the unique and varied needs of each region, including Europe. DOD is undertaking several studies related to regional BMD led by the Joint Staff and U.S. Strategic Command that should help to better define force allocation and quantity needs for both surge and forward presence BMD forces. Additionally, senior officials from the Office of the Under Secretary of Defense for Policy, the Office of the Under Secretary of

Defense for Acquisition, Technology, and Logistics, and MDA said that there is a draft presidential directive that will help clarify EPAA policy. However, DOD has not yet issued formal guidance clarifying the EPAA mission, including its relative priority among the regions identified for the phased adaptive approach. DOD officials told us that combatant commands responded to the EPAA announcement and the uncertainty about priorities with a surge of requests for BMD forces to ensure that their requirements would be met. Without establishing guidance to more fully align understanding throughout the department on what the desired end states are for EPAA, including its relative priority to other regional BMD architecture requirements, the department faces uncertainty in planning and implementing this revised approach.

DOD Has Not Established EPAA Life-Cycle Cost Estimates

DOD has not established life-cycle cost estimates for EPAA and therefore is missing an important management tool for preparing budgets, monitoring progress and assessing long-term affordability of its revised approach to BMD in Europe. DOD has stated two main reasons for not establishing life-cycle cost estimates for EPAA. First, DOD officials told us that DOD does not intend to prepare separate life-cycle cost estimates for EPAA because DOD views it as an approach, not a program, and so funding is provided through the individual BMD elements that make up EPAA. However, in introducing the revised approach to BMD, the department emphasized that it would be fiscally sustainable and affordable. Additionally, in referring to EPAA in prepared testimony before Congress, the MDA Director stated that DOD was "committed to fully funding this program."[19] Although DOD reported that the acquisition cost estimates and annual BMD budget request for individual elements include EPAA costs, we found that such information does not include full life-cycle costs.[20] Further, this budgeting method is fragmented and so does not provide decision makers with a transparent and holistic view of EPAA

[19]Lieutenant General Patrick J. O'Reilly, Director, Missile Defense Agency, *Missile Defense in Europe*, statement for the House Armed Services Committee (Washington, D.C.: Oct. 1, 2009).

[20]We have previously reported that we were unable to assess MDA's actual costs against a baseline for total acquisition costs for BMD elements for 7 years in a row because MDA had not baselined such costs (GAO-10-311) and that DOD lacked independently verified life-cycle cost estimates for BMD elements (GAO-08-1068). GAO, *Defense Acquisitions: Missile Defense Transition Provides Opportunity to Strengthen Acquisition Approach*, GAO-10-311 (Washington, D.C.: Feb. 25, 2010) and GAO, *Missile Defense: Actions Needed to Improve Planning and Cost Estimates for Long-Term Support of Ballistic Missile Defense* GAO-08-1068 (Washington, D.C.: Sept. 25, 2008).

costs. Second, DOD has emphasized that the inherent flexibility of EPAA makes developing life-cycle cost estimates for the approach difficult. However, without life-cycle cost estimates DOD may not be able to determine whether its revised approach to BMD in Europe is fiscally sustainable and affordable.

We have found that key principles for managing major investments such as EPAA include that an organization should understand the financial commitment involved and ensure appropriate transparency and accountability.[21] Further, according to the GAO cost estimating guide,[22] a credible cost estimate is required in order to assess a program's affordability and cost-effectiveness and to serve as a basis for a budget.[23] The guide identifies 12 steps necessary for developing credible cost estimates.[24] Following these steps ensures that realistic cost estimates are developed and presented to management, enabling them to make informed decisions about whether the program is affordable within the portfolio plan. Providing decision makers with a program's updated cost estimate helps them monitor the implementation of the program and ensure that adequate funding is available to execute the program according to plan. Finally, credible cost estimates serve as a basis for a program's budget and validate that a program's strategy has an adequate budget for its planned resources.

[21]GAO-11-179R.

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

[23]The GAO cost estimating guide (GAO-09-3SP) refers to programs broadly to include not only a specific acquisition program but also projects or investments. The guide's applicability includes an investment or project that requires special management attention because (1) of its importance to the mission of the agency or component of the agency; (2) it supports financial management and obligates more than $500,000 annually; (3) it has significant program or policy implications; (4) it has high executive visibility; (5) it has high development, operating, or maintenance costs; or (6) it is defined as major by the agency's capital planning and investment control process. The cost guide is therefore applicable to EPAA.

[24]The 12 steps for developing credible cost estimates are: (1) defining the estimate's purpose; (2) developing the estimating plan; (3) defining the project's characteristics; (4) determining the estimating approach; (5) identifying ground rules and assumptions; (6) obtaining data; (7) developing the point estimate and comparing it to an independent cost estimate; (8) conducting sensitivity analysis; (9) performing a risk and uncertainty analysis; (10) documenting the estimate; (11) presenting the estimate to management for approval; and (12) updating the estimate to reflect actual costs and changes. See GAO-09-3SP.

Part of the challenge in determining EPAA life-cycle costs results from uncertainty about what elements and interceptors will be included in EPAA. According to the GAO cost estimating guide, the final accuracy of cost estimates depends on how well a program is defined. In order to develop credible estimates, an organization needs detailed technical, program, and schedule descriptions from which all life-cycle cost estimates can be derived. Some of these details would include system architecture, deployment details, operational concepts, personnel requirements, and logistics support. DOD's phased schedule for EPAA is comprised of multiple elements and interceptors to provide ever-improving integrated BMD capability, but many aspects of the approach have not yet been determined. For example, DOD has thus far committed to using two Aegis Ashore facilities and at least one AN/TPY-2 radar. Additionally, each EPAA phase could have as many as three Aegis BMD ship patrol areas, but DOD has not yet committed to a specific number of ships or SM-3 interceptors for each phase. As we reported in December 2010,[25] DOD also has not yet committed to the specific type or number of the other elements and interceptors that will be part of the EPAA phases. Figure 1 summarizes the current status of DOD's BMD assets that may be part of EPAA.

[25] GAO-11-179R.

Figure 1: Current Status of DOD's BMD Assets That May Be Part of EPAA

Element		Phase 1 (~2011)	Phase 2 (~2015)	Phase 3 (~2018)	Phase 4 (~2020)
	1 AN/TPY-2 sensor (location not established)	●	●	●	●
	Aegis BMD ships	◒	◒	◒	◒
	SM-3 interceptors	◒	◒	◒	◒
	PAC-3	○	○	○	○
	THAAD batteries	○	○	○	○
	THAAD interceptors	○	○	○	○
	1 Aegis Ashore (Romania)		●	●	●
	SM-3 interceptors		●	●	●
	1 Aegis Ashore (Poland)			●	●
	SM-3 interceptors			●	●
	Additional AN/TPY-2 sensor		○	○	○
	PTSS			◒	◒
	ABIR sensor			○	○

● EPAA assets and their quantities known
◒ EPAA assets known, quantities to be determined
○ Assets that may be part of EPAA, quantities to be determined

ABIR (Airborne Infrared sensor); **AN/TPY-2** (Army Navy Transportable Radar Surveillance - Model 2)
PAC-3 (Patriot Advanced Capability-3); **PTSS** (Precision Tracking Space System)
SM-3 (Standard Missile-3); **THAAD** (Terminal High-Altitude Area Defense)

Source: GAO analysis of DOD data; Missile Defense Agency (images).

For a further description of the various BMD assets that may be part of EPAA, see appendix II.

Despite the current lack of detail on the implementation of EPAA policy, best practices for cost estimating include methods by which to develop valid cost estimates when a program's details are limited and thus still provide markers for measuring progress and assessing affordability. The cost guide makes special mention of spiral development efforts that, like EPAA, do not have clearly defined final requirements.[26] In such cases, valid cost estimates can be developed as long as they clearly state the requirements that have been included and account for those that have been excluded. The Congressional Budget Office and the Institute for Defense Analysis have completed such analyses for the previous approach to BMD in Europe and the Institute for Defense Analysis also completed a cost estimate for EPAA.[27] As the types and quantities of elements and interceptors needed for EPAA become better defined over time, cost estimates should be updated to ensure that managers understand the impact of any changes.

DOD has also emphasized that the inherent flexibility of EPAA makes developing life-cycle cost estimates for the approach difficult. According to senior DOD officials, the department could develop a life-cycle cost estimate for the phased adaptive approach but they were unsure of the relevancy of characterizing unique costs for EPAA. The officials said that DOD places significant emphasis on flexibility in its new approach to regional BMD, calling EPAA flexible by nature. The officials also stated

[26]In spiral development, a desired capability is identified but the end-state requirements are not yet known. These requirements are refined through demonstration and risk management, based on continuous user feedback. This approach allows each increment to provide the best possible capability. Spiral development is often used in the commercial market because it significantly reduces technical risk while incorporating new technology. The approach can, however, lead to increased cost and schedule risks. Spiral development can also present contract challenges due to repeating phases, trading requirements, and redefining deliverables. See GAO-09-3SP.

[27]Congressional Budget Office, *Options for Deploying Missile Defenses in Europe* (Washington, D.C.: Feb. 2009), Institute for Defense Analysis, *IDA Paper P-4359: Independent Assessment of the Proposed Deployment of the Ballistic Missile Defense Systems in Europe* (Washington, D.C.: July 2008), and Institute for Defense Analysis, *IDA Paper P-4660: Independent Assessment of the European Phased Adaptive Approach: Follow-on Analysis* (Washington, D.C.: Sept. 2010). The Congressional Budget Office study was prepared at the request of the Chairman and Ranking Member of the House Armed Services Committee's Strategic Forces Subcommittee. The first IDA study was undertaken in response to section 226 of the National Defense Authorization Act for Fiscal Year 2008, Pub. L. No. 110-181 (2008). The second IDA study was undertaken in response to section 235 of the National Defense Authorization Act for Fiscal Year 2010, Pub. L. No. 111-84 (2009). We did not assess these estimates and have not yet obtained the latest IDA report from DOD.

that DOD's focus on using mobile and relocatable BMD assets for EPAA and in other regions means that the mix of elements and interceptors in each region could be adjusted to adapt to changes in threat. The result of this flexibility, according to the Ballistic Missile Defense Review, is that the actual life-cycle cost of the missile defense system is difficult to determine because there is no final configuration for the system. However, an organization can develop estimates for a range of possible scenarios. A cost estimating best practice in developing technical baselines includes defining deployment details for various scenarios, such as peacetime, contingency, and war. By presenting a range of scenarios, decision makers can better understand the short-term and long-term cost implications of different options and better evaluate their choices. While we recognize that life-cycle cost estimates will have increased levels of uncertainty for the later phases compared to the near-term phases, the level of flexibility inherent in EPAA needed to respond to changes in threat or technology over the four phases of this approach is bounded and cost estimating practices are adaptive enough to allow for the development of valid cost estimates. Table 3 describes our assessment of DOD's rationales for EPAA flexibility, factors limiting flexibility or the need for it, and their impact on DOD's ability to develop life-cycle cost estimates for EPAA.

Table 3: DOD Rationale for EPAA Flexibility, Limitations, and Implications for Life-Cycle Cost Estimates

DOD rationale for flexibility in EPAA	Limitations	Implications for EPAA life-cycle cost estimation
Preserves ability to respond to changes in quantity of threat missiles.	Large and growing numbers of threat missiles and relatively low numbers of BMD assets for the foreseeable future mean that high demand for BMD assets for EPAA is essentially a constant. Year-to-year change in numbers of threat missiles is relatively predictable, according to DOD officials.	The marginal change in the already high EPAA demand for BMD assets caused by an unexpected increase in threat missiles should be limited and therefore should not impede the development of cost estimates. The Joint Staff is leading a study, expected to be completed in the spring of 2011, that should help identify the specific BMD assets needed to address this high demand.
Preserves ability to respond to crises by surging mobile and relocatable BMD assets wherever needed.	A surge strategy assumes a baseline BMD capability as well as defined capabilities that could be surged to a given region as threats change.	A developed surge strategy should include details on assumed baselines and surged assets and so would provide details that could improve the quality of a cost estimate. U.S. Strategic Command is leading a force allocation study, expected to be complete in the spring of 2011, that should help to better define DOD's surge strategy.
Preserves ability to integrate new BMD technology that has been proven effective through operationally realistic testing.[a]	Taking new BMD technologies from concept to fielding, including testing them, can take many years. We have previously found that BMD testing schedules have tended to slip.[b]	Given DOD's commitment to deploying only proven BMD capabilities means that timelines for deploying new technologies as part of EPAA should be relatively predictable, allowing for the updating of cost estimates.

Source: GAO analysis of DOD data.

[a]The Ballistic Missile Defense Review lays out how DOD currently uses its testing approach to evaluate operational effectiveness. In sum, the Integrated Master Testing Plan identifies a number of ground and flight tests that an asset must participate in to obtain data needed to validate models and simulations that, in turn, are intended to provide further visibility into the asset's operational performance. DOD has also added additional operational test events controlled by the testing community and combatant commands that include additional ground and flight tests. According to DOD, it is the information gathered from this combination of efforts that can be used to evaluate an asset's operational effectiveness.

[b]See for example, GAO, *Defense Acquisitions: Missile Defense Transition Provides Opportunity to Strengthen Acquisition Approach*, GAO-09-338 (Washington, D.C.: Feb. 25, 2010).

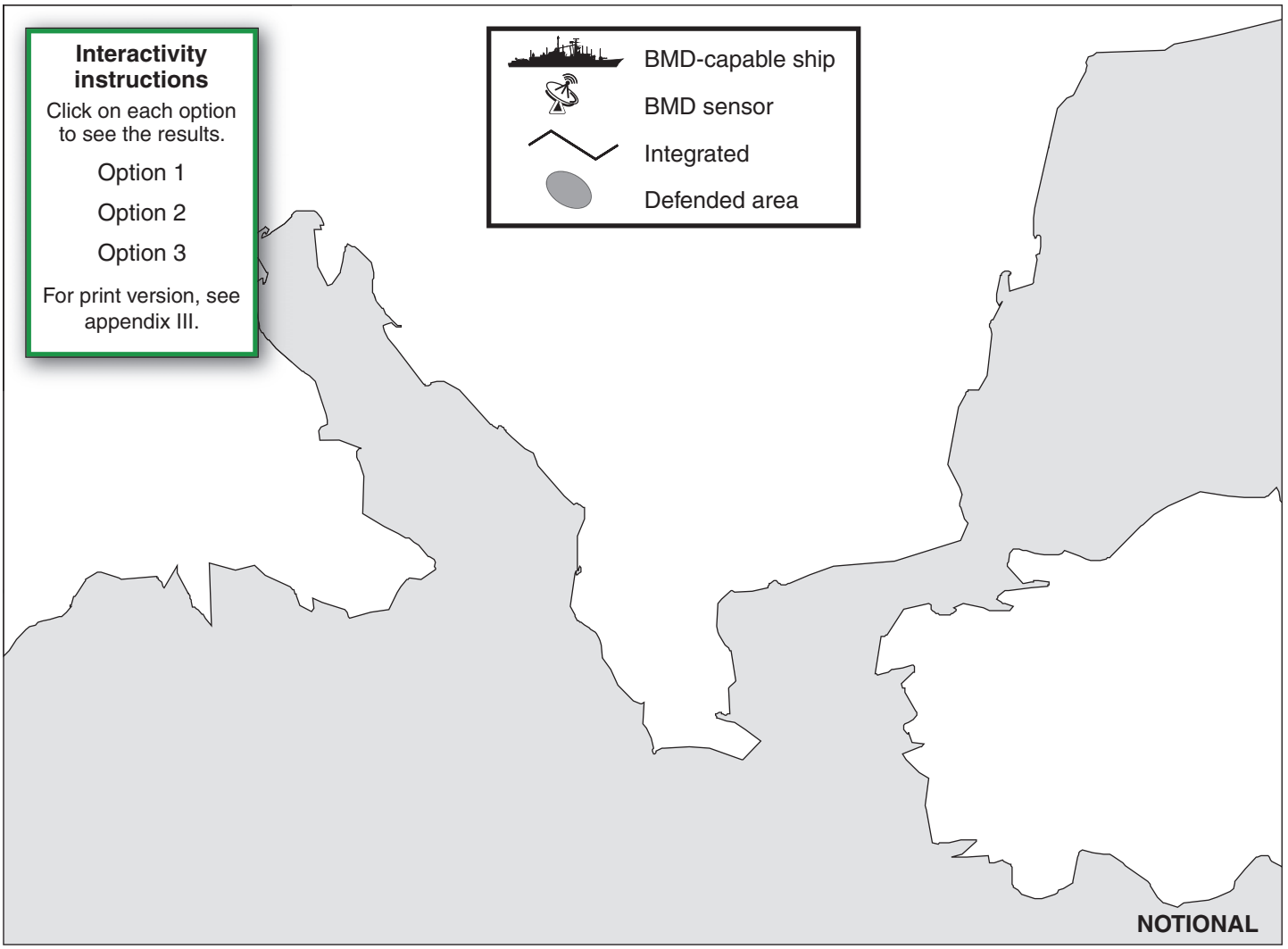
There may be occasions when DOD, in response to more rapid than projected quantitative and qualitative developments in the existing threat or the emergence of new missile threats from an unexpected location, will need to adjust to those threats. Good life-cycle cost estimates are equipped to deal with such unforeseen circumstances because they clearly list the facts and assumptions on which they are based. In such circumstances, a life-cycle cost estimate would provide additional information to decision makers in DOD and Congress as they evaluate their options. Until DOD develops EPAA life-cycle cost estimates—which could potentially be part of a larger phased adaptive approach life-cycle cost estimate—the department will not have an accurate basis from which to determine the

financial sustainability and affordability of the revised approach to BMD in Europe and is missing a tool with which to monitor its implementation.

DOD's EPAA Phase Schedule Does Not Fully Integrate Key Acquisition, Infrastructure, and Personnel Activities

DOD established the EPAA phase schedule without fully integrating it with key acquisition, infrastructure, and personnel activities and, as a result, the department does not have an important management tool with which to assess whether the EPAA schedule is realistic and achievable, identify potential problems, or analyze how changes will impact the execution of this effort. As a result, the program may be exposed to schedule, performance, and cost risks. Implementing EPAA will require the synchronization of numerous efforts, including acquisition, infrastructure, and personnel activities. For example, DOD must develop and produce the BMD elements and interceptors for EPAA and must be able to integrate them into a system. The performance of a fielded BMD architecture, including the size of the area defended, is dependent on several factors, including the types and numbers of elements and interceptors fielded, the extent to which fielded elements are linked together operationally, and the geographic location of the elements (see fig. 2). Further, DOD must also have the appropriate infrastructure in place—such as needed power, water, roads, facilities, and security—in time to support not only the EPAA elements and interceptors it intends to field as part of EPAA but also the personnel necessary to operate and maintain them. DOD must also have these trained personnel available in time to carry out those duties. The department is working to implement EPAA, but EPAA timelines may not match the time needed to integrate and execute the necessary acquisition, infrastructure, and personnel activities.

Figure 2: BMD Architecture Performance: Impact of Quantities, Integration, and Location on Defended Area



Source: GAO analysis of DOD data.

Notes: The defended areas shown are for illustrative purposes only.

This graphic is interactive in the electronic version of this report. For the print version, the graphic is broken out by the different options in appendix III.

Our past work shows that a program's success depends on the quality of its schedule.[28] If it is well-integrated, a schedule clearly shows the relationships between program activities, activity resource requirements and durations, and any constraints that affect their start or completion. The schedule shows when major events are expected as well as the completion dates for all activities leading up to them, which can help determine if the schedule is realistic and achievable. When fully laid out, a detailed schedule can be used to identify where problems are or could potentially be. Moreover, as changes occur within a program, a well-integrated schedule will aid in analyzing how they affect the program. For these reasons, an integrated schedule is key in managing program performance and is necessary for determining what work remains and the expected cost to complete it.

According to officials from MDA, the Navy, the Army, the Office of the Secretary of Defense, U.S. Naval Forces Europe, and EUCOM, a principle challenge for implementing EPAA is meeting its schedule. DOD established the EPAA phase schedule based on a top-level evaluation of the implementation activities that could impact or be impacted by that schedule and, as a result, DOD may face challenges executing it. EPAA is a policy framework and not a fully developed architecture or program, according to senior DOD officials responsible for developing the policy. Further, the schedule for EPAA was largely based on the alignment of the changes in the threat to availability of new technology, including the various SM-3 interceptor variants. These officials said that they relied upon acquisition feasibility and affordability information for various options that was provided by MDA and that the Joint Staff represented service and combatant command concerns during the development of the phased schedule. However, they also stated that the military services and combatant commands began examining the specific implementation requirements of EPAA after the policy's announcement.

Phases Not Yet Integrated with Supporting Acquisition Activities

EPAA's phases are not yet integrated with key acquisition activities and so are exposed to risk of schedule slips, decreased performance, and increased cost. As we reported in December 2010,[29] EPAA policy calls for DOD to deliver BMD capabilities on a timeline that requires concurrency

[28] GAO-09-3SP. As noted earlier, the GAO cost estimating guide refers to programs broadly to include not only a specific acquisition program but also projects or investments, such as EPAA.

[29] GAO-11-179R.

among technology, design, testing, and other development activities; this concurrency introduces risk of increased costs, schedule delay, or performance shortfalls that must be addressed. A sound acquisition has firm requirements, mature technologies, and a strategy that provides sufficient time for design activities before the decision is made to start development and demonstration or to transition to production. As we reported, it is questionable whether DOD's approach allows sufficient time for these activities. Schedules for the individual elements are highly optimistic in technology development, testing, production, and integration, leaving little room for potential delays.

Additionally, DOD has not formally or fully aligned acquisition programming to support EPAA or set acquisition decision points for each phase, including production decisions. An integrated schedule defines major decision points at which to review demonstrated progress and follow-on plans. It establishes exit and entrance criteria to show that components are ready to move from one developmental step to the next, and that the component fits within the context of the bigger system to which it contributes. While individual BMD elements have a schedule, DOD has not developed an integrated schedule for EPAA that aligns the necessary acquisition activities. As a result, decisions about production of individual elements, risks associated with individual elements and interceptors, overall BMD system interoperability and integration, and assessment of the integrated system do not appear to be fully linked to the phases. Additionally, the Missile Defense Executive Board, which is responsible for overseeing missile defense portfolio developments, has thus far focused program reviews solely at the element level, not the broader EPAA level.[30] According to DOD, the department is developing an integrated acquisition schedule for EPAA. Without such a schedule, DOD acquisition managers, stakeholders, and Congress lack an integrated EPAA-level view of BMD development. Table 4 summarizes some development risks for the individual BMD assets as well as the integrated system that may be exacerbated by the EPAA schedule compression.

[30]According to a DOD official, the Missile Defense Executive Board has performed a program review of the THAAD system and plans to do a program review of Aegis BMD.

Table 4: System Development Risks May Be Exacerbated by EPAA Schedule Compression

Command, Control, Battle Management, and Communications (C2BMC)	The C2BMC element, which is designed to integrate the BMDS capabilities and provide planning, situational awareness, sensor management, and battle management, may present an incorrect picture of the battle space because it may not accurately group threat missile tracks to reduce multiple cues from sensors about the tracks.
Aegis Ashore	The Aegis BMD weapon system currently in service on ships will require modifications for use on land as Aegis Ashore.[a] According to Navy officials, overall system design has not been selected. Also, detail design has not yet begun. The contract for a portion of Aegis Ashore is scheduled for award prior to preliminary or critical design reviews for Aegis Ashore; we have reported that such sequencing can lead to costly modifications later in the process.[b] Integration of Aegis Ashore with C2BMC, which links Aegis Ashore to cueing forward sensors, is critical and has not been demonstrated. Testing of Aegis Ashore has been reduced from four flight test intercepts to two intercept tests, eliminating opportunities for DOD to learn about the performance of the system.
Standard Missile-3 (SM-3) IB	Technology development of a key subsystem is following a high-risk path. According to the Director, MDA, a flight test was recently rescheduled to allow time to complete all qualifications prior to the test.
Terminal High-Altitude Area Defense (THAAD)	Some production risks for THAAD batteries—including incomplete system and some component qualification, potential design changes, and demonstrated production rates for interceptor components not supporting production needs—have caused more than a six-month delay in production. The program has now addressed most of these risks and has mitigation plans in place for those remaining.
Interoperability and Assessment of Integrated System Performance	As a system-of-systems, the BMDS is expected to perform as a whole, not just the sum of its individual parts; thus technical interoperability and integration among individual systems is key to whole system performance. Ability of testing and assessment plans to fully demonstrate BMDS capabilities in a regional context is constrained by existing limitations in models and simulations. These limitations include incorrect representations of how BMDS elements are linked in the real world and can result in overstating integrated system performance. Interoperability with friends and allies is uncertain; who will contribute, how, and the degree of technical feasibility and investment to interoperate with other nations has yet to be determined.

Source: GAO analysis of DOD data.

Notes: This table is based on the findings of GAO-11-179R. For additional information and findings regarding EPAA acquisition issues, please see that report.

[a]Modifications necessary for converting the Aegis BMD weapon system for shore use include design, integration, and fabrication of a new deckhouse enclosure for the radar, modification of the interceptor vertical launching system, and suppression or disabling of certain features used at sea, such as software for a ship's pitch and yaw.

[b]GAO, *Best Practices: High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding*, GAO-09-322 (Washington, D.C.: May 13, 2009).

Phases Not Yet Integrated with Supporting Infrastructure Requirements

Furthermore, the EPAA phase schedule is not yet integrated with key infrastructure activities and therefore is also exposed to risk of schedule slips, decreased performance, and increased cost. BMD assets, such as the

AN/TPY-2 radar and Aegis Ashore, require infrastructure to support and secure the assets. Designing, funding, and building military infrastructure can take years. Officials from MDA, the Navy, EUCOM, U.S. Naval Forces Europe, and the Army Corps of Engineers[31] stated that having the necessary infrastructure in place to support the scheduled 2015 operational date for the first Aegis Ashore could be challenging. There were some early design questions about how relocatable Aegis Ashore was supposed to be, which had direct implications for infrastructure requirements. According to officials from MDA and the U.S. Army Corps of Engineers, initial design options included a modular construction option that allowed for placement or removal of Aegis Ashore from a site within 120 days. Infrastructure needs for the initial modular design option would have been minimal. Nevertheless, DOD decided not to pursue the initial modular design because of technical challenges that may have impacted performance and driven up the Aegis Ashore development and acquisition costs, as well as potentially increasing costs for operating and sustaining the element. However, there was disagreement among the officials to whom we spoke about the impact of pursuing a new design on infrastructure needs—ranging from no change to requiring significant additional infrastructure.

Although DOD is beginning to narrow its design approach for Aegis Ashore, DOD is operating under a compressed schedule to meet the 2015 operational date for Phase 2. Construction, and therefore funding, for all of the necessary Phase 2 Aegis Ashore facilities and associated infrastructure needs to begin in fiscal year 2013, according to officials from the U.S. Army Corps of Engineers, Navy, and U.S. Naval Forces Europe. However, MDA reported to us and a senior DOD official testified to Congress that Aegis Ashore site construction will take approximately 1 year. According to officials from the Navy and U.S. Army Corps of Engineers, Aegis Ashore infrastructure costs remain unknown because the designs have not yet been finalized for the system itself or the supporting infrastructure. U.S. Army Corps of Engineers officials said that they are working closely with the Navy and MDA to reach basic agreement on the design of the infrastructure in March 2011, which is in time for MDA to

[31]The Army Corps of Engineers is assigned as the construction agent for most of Europe, including Romania and Poland. DOD Directive 4270.5, *Military Construction*, para. 3.2; 4.4.1, enc. 1 (Feb. 12, 2005). As such, the Army Corps of Engineers is responsible for awarding and monitoring construction contracts to build Aegis Ashore sites in Romania and Poland by 2015 and 2018, respectively. It is also involved in the design of the infrastructure.

budget for the needed facilities in fiscal year 2013. However, Army Corps of Engineers officials said that the Romania Aegis Ashore site design and construction estimate will not be as mature as those of typical military construction projects, which may expose the Aegis Ashore construction site to increased risk of design modifications, increased costs, and possible delays. As we have previously reported, DOD underestimated its BMD support infrastructure requirements and military construction costs for the prior plan for BMD in Europe when it did not follow the traditional military construction requirements.[32] Army Corps of Engineers officials noted that DOD is accepting this extra risk with Aegis Ashore, because waiting for a more complete design for Aegis Ashore in Romania would result in missing the 2015 deadline.

A significant infrastructure-related schedule risk to EPAA over which DOD and the U.S. government in general has limited control but which can have significant implications for implementation is the entry into force requirements of agreements, such as ratification, with nations to host EPAA assets and personnel.[33, 34] Delays in ratification could impact the schedule for infrastructure because U.S. law prohibits DOD from constructing land-based BMD interceptor facilities in Europe until after the host nation ratifies the agreements it has reached with the U.S.[35] State Department officials stated that the host nation negotiations and

[32]GAO, *Ballistic Missile Defense: Actions Needed to Improve Planning and Information on Construction and Support Costs for Proposed European Sites*, GAO-09-771 (Washington, D.C.: Aug. 6, 2009).

[33]According to DOD, it is longstanding DOD policy to make best efforts to conclude a binding international agreement documenting the host nation's permission for the presence of DOD personnel and equipment in its territory as well as adequate status protections for such personnel.

[34]According to the State Department, an agreement enters into force when the parties consent to be bound by the agreement, at which point the parties are legally obligated to comply with the agreement's provisions. Depending on the form of the agreement and the parties' domestic requirements, entry into force may require any number of events, including signature, ratification, exchange of notes, or some combination of these.

[35]Section 223 (a) of the Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Pub. L. No. 111-383 (2011) restricts the obligation or expenditure of funds for Fiscal Year 2011 and beyond for site activation, construction, or deployment of missile defense interceptors on European land as part of the phased adaptive approach to missile defense in Europe until certain conditions are met, including host nation signing and ratification of basing agreements and status of forces agreements authorizing deployment of such interceptors. Section 223(c) allows the Secretary of Defense to waive the restrictions seven days after the Secretary submits to the congressional defense committees written certification that the waiver is in the urgent national security interests of the United States.

ratification process for the Aegis Ashore facilities in Romania and Poland—to be completed as part of Phases 2 and 3 respectively—are in progress and, though they do not anticipate any significant delays, they also cannot predict when negotiations and ratification will be complete or when agreements will enter into force. For example, the U.S. government ran into unexpected delays in host nation agreement ratification when it was attempting to implement the previous approach to BMD in Europe. According to DOD, its schedule assumption in 2007 was that both Poland and the Czech Republic would complete the necessary ratification of host nation agreements by the end of fiscal year 2008. However, as we previously reported, delays in the ratification of key host nation agreements presented challenges to DOD's planning and implementation of its prior approach to BMD in Europe.[36] In that report, we also noted that the ratification votes were delayed, in part, because of a desire on the part of both the Polish and Czech parliaments to wait for an indication from the current U.S. administration on its policy toward ballistic missile defenses in Europe. In the end, neither Poland nor the Czech Republic ratified the necessary agreements before September 2009 when the U.S. decided to take a new approach to BMD in Europe.[37] Similar delays in host nation agreement ratification for Aegis Ashore could also impact EPAA and result in schedule slips, decreased performance, or increased cost. Additionally, the U.S. must also reach agreement with nations to host other land-based BMD assets that may be part of EPAA. For example, DOD's plans for EPAA Phase 1 include an AN/TPY-2 radar intended to provide early warning data to engage short- and medium-range ballistic missile threats and provide additional tracking information for homeland defense. According to a senior Joint Staff official, the AN/TPY-2 will significantly increase the capability of Aegis BMD that is also intended to be part of Phase 1. However, the U.S. has not reached agreement with a country to host the AN/TPY-2. If such an agreement is not reached soon, there may not be enough time to construct the necessary facilities for the AN/TPY-2 and deploy it by the end of 2011, thereby diminishing DOD's expected EPAA Phase 1 performance.

[36]GAO-09-771.

[37]According to the State Department, after the current administration came into office in January 2009, the U.S. government advised both the governments of Poland and the Czech Republic that the U.S. was reviewing its approach to European BMD. From that point forward, neither the Czech Republic nor Poland moved their ratification process forward while they awaited the U.S. decision regarding its approach to BMD in Europe that was announced in September 2009 and with the completion of the Ballistic Missile Defense Review in February 2010.

Phases Not Yet Integrated with Supporting Personnel Needs

The EPAA timeline is not yet integrated with key activities to ensure personnel needs are met. The military services are responsible for organizing and training personnel, a process that typically takes years once requirements are identified. DOD generally requires that major weapon systems be fielded with a full complement of organized and trained personnel. As we previously reported, DOD has in the past put BMD elements into operational use before first ensuring that the military services had created units and trained service members to operate them and, as a result, combatant commanders sometimes lacked certainty that the forces could operate the elements as expected.[38] DOD concurred with our recommendation that it require, in the absence of an immediate threat or crisis, that operational units be established with the organizations, personnel, and training needed to perform all of their BMD responsibilities before first making elements available for operational use.

DOD's aggressive EPAA schedule runs the risk of deploying assets without the full complement of trained personnel needed to carry out the mission, which could lead to issues with operational performance. For example, Navy officials told us that they will likely have to extend sailors' rotations beyond the standard deployment length to meet possible EPAA ship requirements for Phase 1, thus placing a strain on the force and possibly affecting performance. The Navy is already dealing with manning issues that may affect BMD asset capabilities. In 2010, separate reports by the Navy found Aegis radar manpower and performance in decline. The reports stressed that the Navy's Aegis crews are already overextended and they lack sufficient numbers of qualified people to meet its radar maintenance requirements. Additional requirements for Aegis presence because of EPAA could contribute further to this problem. Reducing EPAA deployments to address these concerns would result in a decrease in expected capability.

Moreover, DOD has yet to make key decisions that will affect its personnel needs and so does not yet know how these needs will affect the EPAA schedule. For example, Navy officials told us that they lack some crucial information such as the required Aegis ship presence for the early phases of EPAA or the design of Aegis Ashore for later phases. This hinders their ability to fully plan and develop the necessary organizations, personnel, and training requirements. Navy officials said that the Navy expects to keep training requirements for the personnel operating the Aegis Ashore

[38] GAO-09-856.

weapon system very similar to the training needed for the Aegis weapon system on the ship, thus simplifying training requirements. However, Navy officials said that some support infrastructure jobs unique to Aegis Ashore are difficult to assess, and training for these will have to be developed as Aegis Ashore designs mature. The Navy has not yet been able to establish training requirements for maintaining the land-based vertical launch system that is part of Aegis Ashore, for instance, because design has not been finalized. Further, Navy officials told us that the personnel required for Aegis Ashore could differ significantly if it is required to operate at full readiness at all times or if it is required to operate at some lower level of readiness. A requirement for maintaining high readiness could increase personnel costs and challenge the service's ability to provide sufficient personnel. Also, Army officials told us that they need more guidance on what Army systems will be part of EPAA and when these systems will need to be operational. DOD is working to clarify many of its EPAA needs and doing so will help inform personnel needs and allow the services to prepare the necessary organizations and training for personnel. We have already mentioned several of these efforts, such as EUCOM's operational plan expected to be completed in spring 2011, the plan by the Navy, MDA, and Army Corps of Engineers to reach agreement on Aegis Ashore facilities needs in March 2011, and the U.S. Strategic Command-led force allocation study that will inform DOD's decisions on force distribution. However, service processes to ensure that the full complement of trained personnel is in place will take time. Without an integrated schedule, DOD is missing a management tool with which to assess the effects of emerging personnel needs on the execution of the phased adaptive approach in Europe.

Although Combatant Commands' Involvement in BMD Testing Has Increased, Limited Visibility of BMD Operational Capabilities and Limitations Creates Challenges in Integrating BMD into Operational Plans

DOD has not yet established key performance metrics that would provide the combatant commands with needed visibility into the operational capabilities and limitations of the BMD system they intend to employ, creating potential challenges for EUCOM as it integrates BMD into its operational plans. DOD has already incorporated some combatant commands' testing needs into BMD testing; however, as of January 2011, the combatant commands' more detailed, operationally-relevant, quantifiable metrics had not yet been incorporated into DOD's BMD testing plans. Lack of such metrics inhibits EUCOM's understanding of the operational capabilities and limitations of the integrated BMD system they would have to employ. As a result, the combatant commands will lack key information they need to plan for the phased adaptive approach and so may face challenges in integrating BMD into operational plans. The combatant commands recognize this issue and are currently attempting to establish these metrics; however, they have yet to be finalized and implemented.

DOD Has Taken Steps to Increase Combatant Commands' Visibility into BMD Performance

Following the establishment of MDA in 2002, initial BMD system designs did not formally consider combatant command requirements because of MDA's exemption from DOD's requirements process; however, DOD has since taken multiple steps to increase combatant commands' visibility into BMD operational performance. According to U.S. Strategic Command, MDA initially achieved the rapid deployment of BMD capabilities because it was unconstrained by operational requirements. Moreover, its testing did not focus on verification of operational BMD system performance against combatant command requirements. The BMD development and assessment process presented challenges for the combatant commands because MDA's criteria for declaring a BMD element technically capable of performing some tasks did not always allow the combatant commands to thoroughly assess how the element could be operationally employed. For example, after DOD fielded the AN/TPY-2 radar in Japan in 2006, the combatant commands realized they did not have a good understanding of the operational capabilities and limitations of the radar that would allow them to fully employ it.

In response to these problems, U.S. Strategic Command, in its role as warfighter advocate for missile defense, began efforts to incorporate combatant command needs into BMD testing and evaluation in order to assess the operational utility of the elements being fielded. In 2008, U.S. Strategic Command published the Force Preparation Campaign Plan,

which laid out a framework designed to help manage risk to the combatant commands' operations by identifying the information combatant commands need about BMD operational capabilities and limitations. For instance, the plan describes the need for designing BMD tests around combatant command operational plans and testing against validated scenarios and threats,[39] since the integrated BMD system level performance is heavily threat, environment, and scenario-dependent. U.S. Strategic Command stressed that combatant commands need this information to develop flexible operational plans and assess BMD capabilities for supporting a command's missions.

MDA has also taken steps to revise its testing program to incorporate combatant command needs, but testing continues to be driven by collection of data points needed to verify the models and simulations used to characterize BMD performance.[40] MDA has integrated many combatant command testing needs into the Integrated Master Test Plan. For instance, MDA has added three Operational Test periods, each aligned with the first three phases of the phased adaptive approach, which, according to U.S. Strategic Command officials, allow the combatant commands to use the BMD system configuration unique to the particular phase for training and operational system evaluation. These ground tests[41] are based on combatant command-developed architectures and the relevant validated threats. EUCOM has been involved in the test design process, including providing input regarding where BMD assets should be located for EPAA. According to EUCOM officials, the test designs were then vetted through EUCOM intelligence and operations experts. Officials also said that the results of the tests will be used by the command to inform its EPAA planning.

[39]The Defense Intelligence Agency is responsible for validating threats and combat scenarios for DOD.

[40]Models and simulations are tools used by DOD to represent potential BMD configurations, scenarios, and missile threats which are difficult to live test because of numerous possible combinations of BMD system configurations. Models and simulations allow demonstration of BMD system performance and communications without the need to expend interceptors and targets. However, to work effectively these models and simulations need to be anchored to data from ground and flight tests and validated by independent evaluators—the BMDS Operational Test Agency—in order to have confidence in their results.

[41]Ground tests are tests designed to demonstrate element and BMD system-level capabilities in a lab environment or assess element communication networks between fielded assets. According to MDA officials, MDA obtains the vast majority of its information on BMD performance through ground tests.

Combatant Commands Lack Visibility into Key Operational Capabilities and Limitations of the BMD System That Is Important for EPAA Operational Planning

Although combatant commands are increasingly involved in BMD testing, they have expressed the need for additional metrics that can be used to assess the durability (how long it can defend) and effectiveness (how well it can defend) of the BMD system, which are important for planning the phased adaptive approach. For instance, one of MDA's metrics for effectiveness[42] is based on a "one-on-one" engagement between a given element or group of elements and a single threat missile. According to DOD officials, it therefore has limited applicability to a more realistic operational scenario where combatant commanders employ an integrated BMD system against multiple threat missiles.

The combatant commands have concluded that they need to understand BMD system effectiveness and durability in quantitative terms so that, as they prepare their operational plans, they understand BMD's contribution to the overall mission and appropriately balance it with other options. BMD is part of the defensive capabilities, and in combat operations, it alone cannot achieve or maintain effective defense against an adversary ballistic missile attack. DOD planning doctrine emphasizes that integrated and interoperable military forces improve the ability to not only defend against a ballistic missile attack with defensive counterair, such as BMD, but also ensure that offensive counterair can strike potential ballistic missile threats.[43]

As more ballistic defense assets are deployed into the EUCOM area of responsibility, creating a more complex BMD system, insight into the capabilities and limitations of the system and its overall contribution to

[42]One of MDA's effectiveness metrics is the Probability of Engagement Success (P_{es}), which is the probability that the BMD system will prevent an adversary warhead from carrying out its mission.

[43]Joint Chiefs of Staff, Joint Publication 3-01, *Countering Air and Missile Threats* (Washington, D.C.: Feb. 5, 2007). According to Joint Publication 3-01, defensive counterair is defined as all defensive measures designed to detect, identify, intercept, and destroy or negate enemy forces attempting to penetrate or attack through friendly airspace. Offensive counterair is defined as offensive operations to destroy, disrupt, or neutralize enemy aircraft, missiles, launch platforms, and their supporting structures and systems both before and after launch, but as close to their source as possible. The goal of offensive counterair operations is to prevent the launch of enemy aircraft and missiles by destroying them and their overall supporting infrastructure prior to employment. This could mean preemptive action against an adversary. The goal of defensive counterair operations, in concert with offensive counterair operations, is to provide an area from which forces can operate, secure from air and missile threats. Although offensive counterair and defensive counterair are considered separate operations, they must be mutually supporting to facilitate unity of effort.

EUCOM's operational plans will become more important. The balance between offensive and defensive options, and therefore the need for a clear understanding of the operational capabilities of the BMD system, is further complicated for EPAA since it requires coordination between two geographic combatant commands—EUCCOM and U.S Central Command—given where the threats may originate. A threat originating from the Middle East, which is primarily U.S. Central Command's area of responsibility, could be directed at Europe, which is in EUCOM's area of responsibility. Therefore, these two commands must work together to balance BMD with other options. Without metrics to credibly quantify BMD system performance, EUCOM, and other combatant commands will not be able to thoroughly analyze performance gaps. Moreover, without the full understanding of their BMD system capabilities and limitations, they will be limited in their ability to develop comprehensive plans that integrate defensive and offensive options.

The combatant commands, led by U.S. Strategic Command, created a process in 2006 to provide them with additional understanding of the operational utility of the BMD system but this process does not provide the specific performance information the combatant commands seek. Specifically, this BMD assessment process was initially intended to enhance visibility into BMD element capabilities by using subjective assessment criteria expressed in terms of yes or no judgments rather than quantified performance parameters. For example, the effectiveness criteria for the AN/TPY-2 radar includes whether that sensor possesses the ability to detect, classify, track and discriminate ballistic missile threats targeting U.S. defended areas. Thus, rather than assessing the extent to which a capability can perform a certain mission-essential function, the assessment focuses on whether or not a BMD component can perform a certain task. When the combatant commands first implemented this process, they concluded they would need to later introduce quantifiable mission-essential performance goals that would enable more complete operational assessments of BMD system capability in relation to their operational needs.

To address the effort of developing quantifiable mission-essential performance goals, the combatant commands, led by U.S. Strategic Command, are currently attempting to introduce quantifiable operational performance metrics into the testing program through an effort called "Assess-to." The combatant commands are defining metrics to measure BMD system effectiveness (how well it can defend) and durability (how long it can defend) against threats projected by the intelligence and operational communities. More specifically, as defined in a draft Assess-to

criteria document, the metric used to measure effectiveness of a BMD system is expressed mathematically as the ratio of threats defeated to total threats launched. As such, this metric is designed to allow assessment of BMD system effectiveness against multiple ballistic missile threats. Durability, on the other hand, is defined as the length of time that an established BMD system can provide and sustain defensive capability at a specific level of protection against projected threats.

U.S. Strategic Command officials agree that developing Assess-to criteria would help to quantify BMD system capabilities and limitations and thereby provide better data to the combatant commands as they develop their operational plans. The combatant commands have articulated the need for BMD system effectiveness and durability metrics since 2008 and developed a draft Assess-to document that describes them, but there are two main barriers that have prevented DOD from adopting Assess-to. First, various DOD officials stated that MDA is reluctant to have Assess-to metrics established due to concerns that these types of metrics could effectively turn into requirements to which MDA will be held accountable. As stated previously, MDA is exempt from formal acquisition requirements and the BMD elements it developed were not built to operational requirements. U.S. Strategic Command officials and documents describing Assess-to are sensitive to this concern and characterize Assess-to criteria in terms of communicating testing needs to MDA as well as goals to "build towards" rather than strict requirements. Second, an additional obstacle to Assess-to implementation is that current limitations in system-level modeling may limit DOD's ability to test against the identified metrics. Assess-to metrics are geared towards system-level assessment, and currently ground tests—the primary venue for such assessments—rely on models and simulations, many of which continue to lack operational realism. Although MDA is working to validate models and simulations, they currently have technical limitations associated with their ability to represent system-wide operationally realistic scenarios. However, MDA officials told us that, while there are challenges associated with coming to agreement on how to quantify BMD effectiveness and durability, MDA believes that it is possible to do so. While various DOD officials told us that MDA and U.S. Strategic Command are collaborating to develop solutions to these issues, until quantifiable operational metrics for BMD system-level assessment are in place, the combatant commands will lack key information they need to plan for the phased adaptive approach and so may face operational risks should a conflict arise.

Conclusions

DOD's revised approach to BMD in Europe reflects the Administration's desire to focus on threats currently facing the United States and allies while maintaining the flexibility to adapt the approach as threats change and new missile defense technologies become available. Since the September 2009 announcement of EPAA, DOD has taken steps to implement this policy, including considering options for the deployment of assets, requesting forces, preparing for testing, analyzing infrastructure needs, and gaining NATO support for BMD in Europe. However, this approach creates significant planning and implementation challenges that—if left unaddressed—could result in significant management issues and unforeseen costs. First, as a result of the lack of guidance on EPAA's desired end states, including its priority compared to other BMD missions, the department faces uncertainty in planning and implementing its revised approach, particularly in how it will allocate limited assets among multiple geographic regions. Second, without cost estimates for the life cycle of EPAA, DOD will be unable to judge whether it is meeting its goal that EPAA be fiscally sustainable and affordable. The department will also have difficulty in monitoring the implementation of the program and ensuring that adequate funding is available to execute the program according to plan if it does not develop life-cycle cost estimates. Third, DOD does not have an EPAA schedule that integrates key acquisition, infrastructure, and personnel activities. As a result, the department does not have the information it needs to assess whether the EPAA schedule is realistic and achievable, identify potential problems, or analyze how changes will impact the execution of this effort, and therefore is exposed to increased schedule, performance, and cost risks. Finally, without incorporating operationally quantifiable metrics—such as how long the system can defend (durability) and how well the system can defend (effectiveness)—into its test program, DOD will not be able to fully understand the capabilities and limitations of the BMD system and EUCOM will not have the most relevant performance data it needs to thoroughly assess the extent to which BMD capabilities support its mission objectives and judge how to best plan for and employ BMD assets. Unless the department addresses these challenges, DOD will likely face implementation risks that ultimately may increase the cost for this approach in Europe and potentially beyond as it expands this BMD approach to other regions of the world.

Recommendations for Executive Action

We recommend that the Secretary of Defense take the following four actions:

- Direct the Under Secretary of Defense for Policy and Chairman of the Joint Chiefs of Staff to provide guidance on EPAA that describes desired EPAA end states in response to concerns raised by key stakeholders.
- Direct the Missile Defense Executive Board to oversee and coordinate the development of:
  - life-cycle cost estimates that would provide for the management and oversight of EPAA and allow the department to assess whether its plans for EPAA are affordable and determine if corrective actions are needed, and
  - an integrated EPAA schedule to include acquisition, infrastructure, and personnel activities that would help identify EPAA implementation risks that need to be considered.
- Direct U.S. Strategic Command, in coordination with the Missile Defense Agency, to adopt BMD operational performance metrics for durability and effectiveness and include these metrics into the BMD test programs.

Agency Comments and Our Evaluation

In written comments on a draft of this report, DOD concurred with two of our recommendations and partially concurred with two others. The department's comments are reprinted in appendix V. DOD and the State Department also provided technical comments, which we have incorporated as appropriate.

DOD partially concurred with our recommendation to provide guidance on EPAA that describes desired end states in response to concerns raised by key stakeholders. In its comments, DOD stated that it recognizes the need to provide policy guidance on the decision to pursue the EPAA. The department also noted that it has taken steps to provide guidance in the 2012 Guidance for the Employment of the Force and that this would provide detailed guidance to the Joint Staff, combatant commanders and other DOD components on end states, strategic assumptions and contingency planning, including for EPAA. However, since this guidance has not yet been approved by the Secretary of Defense, we cannot determine if the concerns raised by key stakeholders will be addressed. Additionally, since EPAA is a flexible approach, DOD will need to continue to refine its guidance over time.

DOD partially concurred with our recommendation that the Missile Defense Executive Board oversee and coordinate the development of life-cycle cost estimates that would provide for the management and oversight of EPAA and allow the department to assess whether its plans for EPAA

are affordable and determine if corrective actions are needed. In its comments, DOD stated that EPAA is an approach, not an acquisition program, and that it is designed to be flexible and match resources to the combatant commander's requirements. The department believes a more effective approach is to prepare BMDS program element-specific life-cycle cost estimates and use them to inform the management of ongoing acquisition programs and senior-level oversight of the phased adaptive approach as BMDS systems are applied to the defense of Europe. We recognize that life-cycle cost estimates for individual elements will provide decision makers with information on DOD's BMD efforts; however, we believe that DOD should also develop life-cycle cost estimates for its overall EPAA effort and that doing so will not impede flexibility. Without cost estimates for the life cycle of EPAA, DOD will be unable to judge whether EPAA is affordable and sustainable. The department will also have difficulty in monitoring the implementation of EPAA and ensuring that adequate funding is available to execute the program according to plan.

In its response to our third recommendation, DOD concurred that the Missile Defense Executive Board oversee and coordinate the development of an integrated EPAA schedule to include acquisition, infrastructure, and personnel activities that would help identify EPAA implementation risks that need to be considered. DOD stated that MDA includes the anticipated phased adaptive approach requirements into the broader BMDS acquisition program and uses an integrated BMDS schedule for the emerging EPAA requirements, ensuring they are included in appropriate detail and timing within the BMD element-level schedules. DOD further indicated that MDA has a strict process to manage and integrate the acquisition of discrete BMDS elements which make up the capability to be delivered in each of the EPAA phases. While the department has an integrated BMDS acquisition schedule comprised of element-level acquisition schedules, we found that the schedules for the individual elements are highly optimistic. Additionally, DOD has not developed an integrated schedule specifically for EPAA so that EPAA-related acquisition activities as well as EPAA-related infrastructure and personnel activities can be synchronized directly within that schedule. As a result, we continue to believe that the department does not have an important management tool with which to assess whether the EPAA schedule is realistic and achievable, identify potential problems, or analyze how changes will impact the execution of this effort.

DOD concurred with our recommendation to adopt BMD operational performance metrics for durability and effectiveness and include these

metrics into the BMD test programs. In its comments, DOD stated that it recognizes the inherent value of measurable BMDS performance metrics and that, once provided with the warfighter's operationally defined metrics, DOD will crosswalk these metrics to the BMD System specification values assessed to be achievable, and determine whether the specifications meet the operational requirements. Taking such actions would meet the intent of our recommendation.

We are sending copies of this report to the Secretary of Defense; the Secretary of State; the Director, Missile Defense Agency; the Chairman, Joint Chiefs of Staff; the Commander, U.S. Strategic Command; and the Chiefs of Staff and Secretaries of the Army, Navy, and Air Force. In addition, this report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3489 or pendletonj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix VI.

John H. Pendleton
Director
Defense Capabilities and Management

Appendix I: Scope and Methodology

During our review of the Department of Defense's (DOD) plans for implementing the European Phased Adaptive Approach (EPAA), we reviewed relevant documentation and met with representatives from numerous agencies and offices. To assess the extent to which DOD has provided guidance for the force structure requirements, identified costs, and established an integrated schedule for EPAA we reviewed relevant documentation and spoke with cognizant DOD, State Department, and North Atlantic Treaty Organization (NATO) officials. The documents we reviewed relating to guidance for force structure requirements included the 2010 Ballistic Missile Defense Review, the President's announcement from September 2009, and testimony from senior DOD officials. We also reviewed U.S. Strategic Command's 2010 Military Utility Assessment and 2009 Prioritized Capabilities List. We spoke to senior-level officials from the Office of the Secretary of Defense, the Missile Defense Agency (MDA), and the Joint Staff about the presence or absence of a firm architecture for EPAA, any guidance that would be provided to the services, and how force structure for EPAA would be determined. Officials from U.S. Strategic Command, U.S. European Command, and U.S. Northern Command informed us about the typical processes for determining ballistic missile defense (BMD) force structure. We spoke to service representatives from the Army and Navy, including the Army Space and Missile Defense Command and the Naval Air and Missile Defense Command, about the kind of guidance they will need to prepare cost and force structure estimates for EPAA. We also reviewed intelligence documents and threat assessments and met with intelligence officials from the Office of the Director of National Intelligence, the Defense Intelligence Agency, and the National Air and Space Intelligence Center to become familiar with the threats that EPAA is intended to defeat and the type of force structure that might be required to accomplish this mission. To determine the extent to which DOD has identified the costs of EPAA, we reviewed the budget requests for some of the elements DOD stated would be part of EPAA and also met with representatives from the Office of the Secretary of Defense (Cost Assessment and Program Evaluation). In evaluating whether DOD has an integrated schedule that considers the factors that may impact EPAA, we relied on policy documents such as the 2010 Ballistic Missile Defense Review and the statements made by the President and the Secretary of Defense about the timelines for EPAA. We reviewed MDA's Integrated Master Test Plan and the President's budget requests and justifications for BMD elements. We also met with service representatives to discuss the kinds of schedules they typically follow when preparing infrastructure, training personnel, and preparing force structure to be fielded. For example, the Army Corps of Engineers provided information related to the efforts involved with constructing facilities in foreign

countries and the types of challenges they face with such construction. Further, State Department officials provided us with information about the activities and schedule involved in establishing government-to-government agreements for hosting U.S. BMD assets. We also spoke with NATO representatives about that organization's schedule for adopting the territorial missile defense mission and the process of making assets interoperable with U.S. missile defense assets. We also relied on our recent work dealing with the acquisition risks related to the EPAA schedule, contained in GAO-11-179R.

To assess the extent to which the combatant commands are involved with testing for EPAA-related assets and understand the capabilities and limitations of the BMD system, we reviewed the Integrated Master Test Plan as well as U.S. Strategic Command's 2010 Military Utility Assessment, and the Force Preparation Campaign Plan. We also spoke to officials at U.S. Northern Command and U.S. European Command about their understanding and confidence in the BMD system as a whole and the individual assets that comprise it. Officials from these same commands provided information about efforts to establish "Assess-to" criteria for durability and effectiveness of the BMD system. We met with officials from the office of the Director, Operational Test and Evaluation and the Ballistic Missile Defense System Operational Test Agency to discuss the status of models and simulations for the BMD system and elements.

To understand DOD's and the State Department's plans for cooperation and coordination with NATO, friends, and allies in implementing EPAA, we conducted site visits to numerous installations both in the U.S. and in Europe. We met with State Department officials to discuss their ongoing efforts to negotiate agreements with countries that may host U.S. BMD assets and received updates on the progress of negotiations. We interviewed officials from the Office of the Under Secretary of Defense for Policy to discuss DOD's role in negotiating these agreements. We also met with MDA officials to discuss the efforts to make EPAA interoperable with the Active Layered Theater Ballistic Missile Defense system of NATO. We also attended the Nimble Titan 2010 wargame in Suffolk, Va., where we talked to the representatives of foreign governments and militaries and learned about the efforts already under way that may affect the collaboration and coordination amongst allies, as well as points of conflict that could hinder cooperation. In Europe, officials with the U.S. mission to NATO informed us of the process whereby NATO would decide whether or not to adopt the territorial BMD mission, the likelihood of such an adoption, and next steps following adoption of the mission. We also met with the European representatives from U.S. Naval Forces Europe and

U.S. Air Forces in Europe to discuss their perspective on the efforts and challenges to cooperating with NATO and foreign allies on BMD.

We conducted this performance audit from December 2009 to January 2011, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Potential BMDS Elements for EPAA

BMDS element	Projected for operational availability in EPAA phases	Element description
Aegis Ballistic Missile Defense (Aegis BMD)	1, 2, 3, 4	A system that (1) provides a forward deployed capability to search, detect, and track ballistic missiles of all ranges and transmit track data to the BMDS and (2) employs its own sensors and interceptors or exploits off-board sensors to protect deployed forces, large regions, and population centers. The element is based on a modification to existing Navy Aegis ships to provide these capabilities. The interceptors include the Standard Missile-3 (SM-3), designed to defend against short- to intermediate-range ballistic missile threats in the midcourse and ascent phases, and a modified Standard Missile-2 (SM-2) designed to defend against short-range threats in the terminal phase.
Command, Control, Battle Management, and Communications (C2BMC)	1, 2, 3, 4	A networked computer and communications element developed by MDA to integrate the BMDS by providing deliberate planning, situational awareness, sensor management, and battle management capabilities.
Army Navy/Transportable Radar Surveillance - Model 2 (AN/TPY-2)	1, 2, 3, 4	A transportable, land-based radar, similar in design to the THAAD radar, which provides advance warning of ballistic missile launches to the BMDS from forward-based locations.
Terminal High-Altitude Area Defense (THAAD)	1, 2, 3, 4	The THAAD element employs the THAAD Interceptor and the Army Navy/Transportable Radar Surveillance - Model 2 (AN/TPY-2) (THAAD Mode) to engage ballistic 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 BMDS.
PATRIOT Advanced Capability-3 (PAC-3)	1, 2, 3, 4	PAC-3 provides simultaneous air and missile defense capabilities as the Lower Tier element in defense of U.S. deployed forces and allies against short-range ballistic missiles.
Aegis Ashore	2, 3, 4	Land-based element designed by MDA to provide capability to detect, track, and intercept threats. Aegis Ashore will leverage the Aegis BMD capability and deploy it at shore-based sites in Europe starting in 2015. DOD intends for it to employ the SM-3 for exoatmospheric defense against short- to medium- and some intermediate-range ballistic missile threats in the later stages of flight. Use of the SM-3 at shore-based sites will broaden the BMDS use of the SM-3 from its current sea-based applications and DOD plans for Aegis Ashore to employ SM-3 IIB in Phase 4 against intercontinental ballistic missiles.

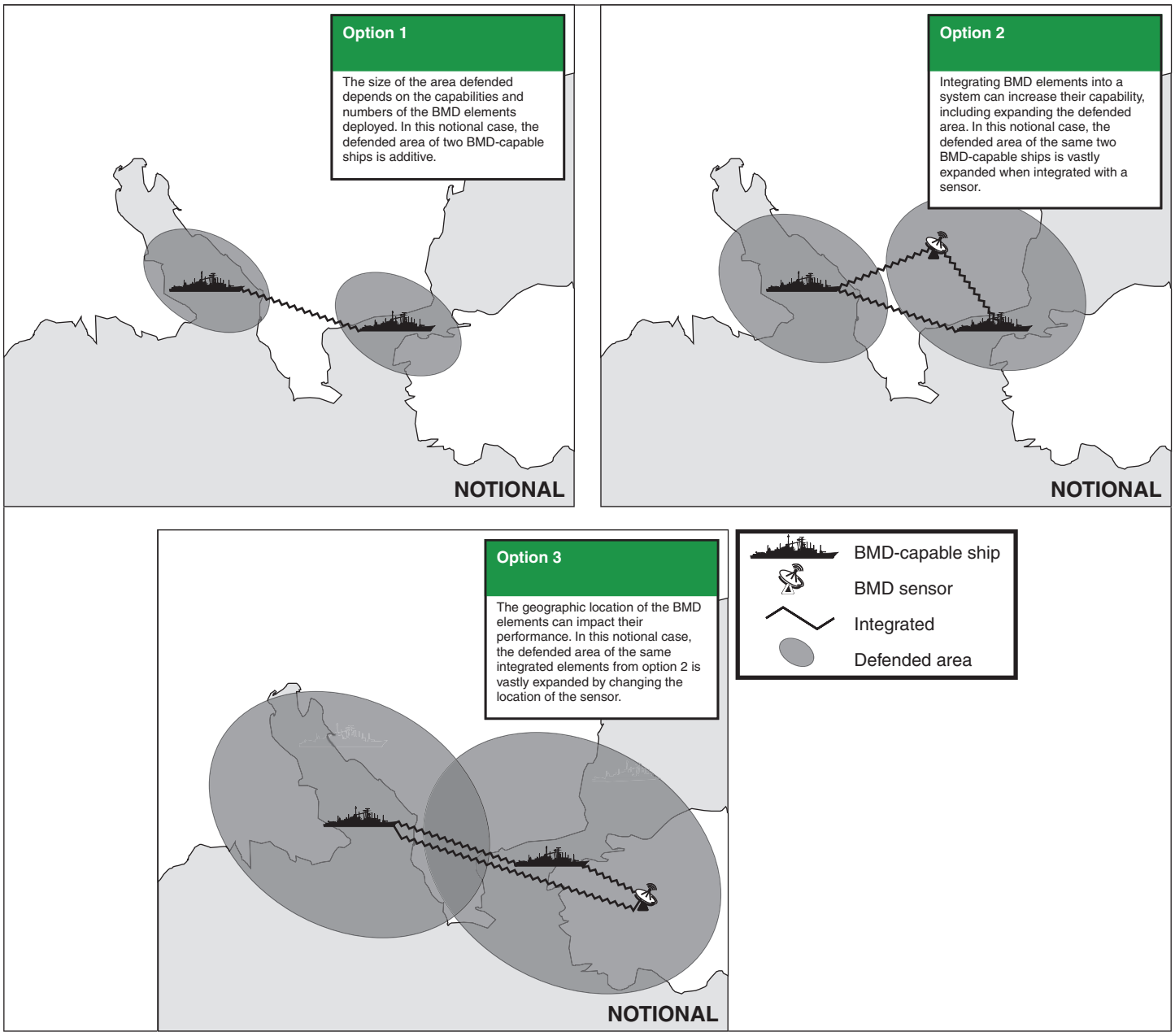
BMDS element	Projected for operational availability in EPAA phases	Element description
Airborne Infrared Radar (ABIR)	3, 4	Unmanned Aerial Vehicle-based sensor in development designed to acquire and track large ballistic missile raid sizes. The sensor is also intended to provide tracking data of high enough quality to be used for launch-on-remote[a] and early intercept[b] engagements.
Precision Tracking Space System (PTSS)	3, 4	Space-based sensor system, in early development, designed to provide end-to-end intercept quality tracking of ballistic missile threats.

Source: GAO summary of DOD data.

[a]Launch-on-remote is a future capability designed to sense a threat remotely, transmit tracking information to the interceptor's flight computer, and launch the interceptor earlier and farther down range than other radars would allow. According to MDA, investments are also being made to develop an "engage-on-remote" technology that includes not only launching on data from a remote sensor track but also the ability to uplink data from assets other than the Aegis radar. This will allow the interceptor to engage the threat missile at greater ranges.

[b]Early intercept is the concept of intercepting missiles early in their flight using currently planned interceptors and sensors. Early intercept is achieved by reducing the timelines associated with early sensor tracking and rapidly developing fire-control solutions so that today's missiles can intercept threat missiles much earlier in their flight. Early intercept should provide an additional opportunity to shoot at incoming threat missiles.

Appendix III: BMD Architecture Performance: Impact of Quantities, Integration, and Location on Defended Areas



Source: GAO analysis of DOD data.

Notes: The defended areas shown are for illustrative purposes only.

Appendix IV: U.S. Progress in Achieving NATO Support for BMD in Europe

Since the President's announcement of EPAA in September 2009, the U.S. has made significant progress in advancing cooperative efforts with NATO allies on BMD in Europe. Increasing international cooperation on BMD is a major focus of the Administration's new approach to BMD. According to the Ballistic Missile Defense Review, a benefit of EPAA is that it offers increased opportunities for allied participation and burden sharing. The U.S. intends to make EPAA its national contribution to a future NATO BMD capability and is therefore not asking NATO for financial support for EPAA assets. However, the U.S. is seeking allied participation and burden sharing for EPAA that may be demonstrated in various ways. According to DOD and the State Department, burden sharing may come in the form of support for EPAA, including adoption of a NATO territorial BMD mission; expansion of NATO's command and control system for territorial missile defense; bilateral agreements for hosting U.S. BMD assets; and contributions of allied BMD assets toward an expanded NATO BMD system capability.

NATO's adoption of the territorial BMD mission at the Lisbon Summit in November 2010 fulfilled a major U.S. goal. NATO's prior BMD mission was limited to the protection of deployed troops and so was focused on defending smaller areas. The shift to a territorial defense mission means that NATO's BMD efforts will now focus on protecting much larger geographic areas, including population centers and countries. Additionally, DOD and State Department officials noted that the agreement at Lisbon will help facilitate cooperation with NATO allies on hosting U.S. BMD assets and provides justification for allies to pursue additional BMD efforts. NATO allies had expressed their support for EPAA prior to the Lisbon Summit. At the December 2009 NATO Foreign Ministers Meeting in Brussels, NATO welcomed the U.S. adoption of EPAA and declared that this approach would further strengthen European missile defense work in NATO. Further, the NATO Secretary General stated in October 2010 that building a missile defense for Europe was important, because missiles are increasingly posing a threat to European populations, territory, and deployed forces.

Although the political endorsement at Lisbon was a significant accomplishment, the U.S. and its NATO allies must now overcome the difficult task of reaching consensus on how to carry out this new BMD mission, including prioritizing what areas to defend and establishing command and control relationships. According to DOD, State Department, and NATO officials, reaching agreement on these issues will be a challenge facing NATO's new territorial missile defense mission. DOD and State Department officials told us that reaching such an agreement on a bilateral

basis can be extremely challenging and time-consuming and that reaching consensus with all 28 NATO member nations is therefore expected to be even more challenging and time-consuming.

The U.S. and its NATO allies have already taken steps to address the political challenges inherent in multilateral BMD operations by beginning to explore and outline potential command and control relationships. One venue in which the U.S. and its allies have been examining BMD command and control challenges is the biennial U.S. Strategic Command-led wargame called Nimble Titan. In 2010, this wargame involved notional ballistic missile attack scenarios occurring a decade in the future against fictional adversaries. Nimble Titan 2010 participants came from around the world including representatives from many NATO member nations, such as Denmark, France, Germany, the Netherlands, and United Kingdom and observers from Belgium, Italy, Romania, Turkey, NATO, and Russia.[1] One of the outcomes of the Nimble Titan 2010 wargame was the development of a document that described notional command and control relationships and established a framework for coalition BMD concept of operations. Additionally, the U.S. has participated in a Dutch-led BMD exercise that, according to EUCOM officials, is also helping them to understand and overcome command and control challenges. EUCOM officials also told us that their command has begun drafting a concept of operations as well. However, they emphasized that NATO agreement on a final command and control concept of operations would remain a challenge and require significant effort.

At Lisbon, NATO also agreed to expand its missile defense command, control, and communications program to incorporate the territorial missile defense mission, thereby fulfilling another burden sharing goal established by the U.S. The NATO system, called Active Layered Theater Ballistic Missile Defense (ALTBMD) is currently designed to link allies' missile defense assets together to protect deployed forces. Prior to the Lisbon Summit, NATO commissioned technical studies that concluded it was feasible to expand ALTBMD capabilities to include the territorial missile defense mission. As a result of the agreement reached at Lisbon, NATO plans to modify ALTBMD to be the command and control backbone into which allied BMD assets will link and through which NATO will conduct

[1]Nimble Titan 2010 participant countries were Australia, Denmark, France, Germany, Japan, the Netherlands, the United Kingdom, and the U.S. Nimble Titan 2010 observers were Belgium, Canada, Czech Republic, EADTF (Extended Air Defense Task Force), Italy, Israel, NATO, Norway, Romania, Russian Federation, Singapore, and Turkey.

territorial BMD planning, tasking, engagement coordination, and share situation assessment. MDA and ALTBMD program officials estimated that an expanded ALTBMD for territorial defense would be operational and interoperable with the U.S. command and control system, C2BMC, by 2018. NATO and DOD officials stated that they do not see major technical challenges in meeting the 2018 operational target date for the territorial missile defense mission and interoperability with C2BMC. However, GAO did not assess the technical feasibility, cost, and schedule of ALTBMD, including interoperability with C2BMC. According to NATO, expanding ALTBMD capabilities to include the territorial missile defense mission would cost less than €200 million or around $260 million over 10 years, to be paid for through NATO common funding. The Secretary of Defense and NATO Secretary General stated that, as such, expansion of ALTBMD to include the territorial missile defense mission is not a significant financial burden to the alliance.

The U.S has made progress in negotiating key bilateral agreements for allies to host EPAA BMD assets. Romania and Poland have each agreed in principle to host an Aegis Ashore facility by 2015 and 2018, respectively. The U.S. must reach agreement with Romania and Poland on a supplemental Status of Forces Agreement and the Ballistic Missile Defense Agreement prior to construction of Aegis Ashore.[2, 3] The U.S. already has supplemental Status of Forces Agreements with Romania and Poland that have been ratified by the host nations and therefore only lacks ratified Ballistic Missile Defense Agreements with both countries. According to State Department officials, the U.S. and Romania are in the process of negotiating the terms of their Ballistic Missile Defense Agreement. Poland, having negotiated a prior Ballistic Missile Defense Agreement for the previously planned European fixed interceptor site, has completed negotiations with the U.S. on an amended agreement that adjusts the existing agreement's language to accommodate the new plan of

[2]Section 223 (a) of the Ike Skelton National Defense Authorization Act for Fiscal Year 2011, Pub. L. No. 111-383 (2011) restricts the obligation or expenditure of funds for Fiscal Year 2011 and beyond for site activation, construction, or deployment of missile defense interceptors on European land as part of the phased adaptive approach to missile defense in Europe until certain conditions are met, including host nation signing and ratification of basing agreements and status of forces agreements authorizing deployment of such interceptors. Section 223(c) allows the Secretary of Defense to waive the restrictions seven days after the Secretary submits to the congressional defense committees written certification that the waiver is in the urgent national security interests of the United States.

[3]The supplemental Status of Forces Agreements supplement the multilateral NATO Status of Forces Agreement, originally signed on June 19, 1951.

establishing an Aegis Ashore facility. This revised agreement is now awaiting Polish parliamentary ratification.[4] The U.S. has not yet reached agreement with a nation to host the AN/TPY-2 radar, which is a significant component of the first phase of EPAA and scheduled to be in place by the 2011 time frame. Although State Department officials expressed confidence that the U.S. could reach agreement with the yet to be determined host country for AN/TPY-2 in 2011, they also acknowledged that the U.S does not have control over how long it will take to reach bilateral agreements with foreign countries or how long it will take foreign countries to bring those agreements into force. Additionally, since the U.S. has not yet identified where other potential EPAA BMD assets will be based, it is unknown what kind of bilateral agreements will be necessary with future BMD asset host countries.

A way in which NATO allies can share the burden in providing territorial missile defense of NATO is by contributing their national BMD assets; however, the U.S. is thus far the only NATO member nation developing BMD assets designed to provide territorial defense. BMD capabilities currently envisioned for a NATO territorial defense mission include point defenses using assets such as Patriot and area defenses such as THAAD and Aegis BMD. BMD assets that provide point defenses are designed to protect a relatively small area, such as an airport or port, primarily against short-range ballistic missiles whereas area defense BMD assets are designed to protect much larger swaths of territory and usually against medium-range or greater ballistic missiles. Territorial defense is thereby provided much more efficiently by area defenses than point defenses. For example, in a 1999 report to Congress,[5] DOD reported the same territorial area could be protected by either 6 THAAD batteries or more than 100 Patriot Advanced Capability-3 (PAC-3) batteries. The report concluded that the Patriot option was impractical for territorial defense. Further, a senior DOD official testified that territorial defense of Europe cannot be done using point defenses and requires area defenses. Several NATO member nations have BMD point defense assets and, should they choose to contribute them to the NATO mission, these could be used to defend strategic assets primarily against short-range ballistic missiles.

[4]The revised Ballistic Missile Defense Agreement was officially submitted by the Polish Prime Minister to the Polish Parliament on December 28, 2010, initiating the ratification process.

[5]DOD, *Report to Congress on Theater Missile Defense Architecture Options for the Asia-Pacific Region* (Washington, D.C.: May 4, 1999).

Additionally, several NATO allies could also contribute sensors to the BMD mission that, if compatible and appropriately interoperable, could provide early warning data to tracking data that enhances the capability of area defense assets.[6] However, the U.S. remains the only NATO member nation with BMD assets designed to provide area defense needed for the NATO territorial BMD mission.

Although NATO has adopted the territorial defense mission, the current fiscal situation of many NATO allies makes it less likely that they will start expensive new BMD development programs for area defense. Many NATO countries are trying to cut down on government spending due to current instability in the European economy, which could cause decreases in defense expenditures. In a June 2010 speech, the NATO Secretary General recognized the major defense cuts being made across NATO nations due to the current fiscal climate and asked allies not to make drastic defense budget cuts that would compromise NATO's collective security missions. The Secretary of State and Secretary of Defense have also expressed their concern about defense budget cuts in NATO nations and the potential impact on NATO. Additionally, NATO and DOD officials stated that European countries are not likely to begin developing new area defense BMD programs in the near future.

[6]We did not assess the technical feasibility of NATO member nation BMD systems or these systems' interoperability with U.S. C2BMC or NATO ALTBMD.

Appendix V: Comments from the Department of Defense

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

ACQUISITION, TECHNOLOGY AND LOGISTICS

JAN 13 2011

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

Dear Mr. Pendleton:

This is the Department of Defense (DoD) response to the GAO Draft Report, GAO-11-220, "BALLISTIC MISSILE DEFENSE: DoD Needs to Address Planning and Implementation Challenges for Future Capabilities in Europe," dated December 14, 2010 (GAO Code 351407).

The DoD concurs with two of the draft report's recommendations and partially-concurs with two. The rationale for our position is included in the enclosure. I submitted separately a list of technical and factual errors for your consideration.

We appreciate the opportunity to comment on the draft report. My point of contact for this effort is Mr. David Crim, 703-697-5385, David.Crim@osd.mil.

Sincerely,

David G. Ahern
Deputy Assistant Secretary of Defense
Portfolio Systems Acquisition

Enclosure:
As stated

GAO DRAFT REPORT DATED DECEMBER 14, 2010
GAO-11-220 (GAO CODE 351407)

"BALLISTIC MISSILE DEFENSE: DOD NEEDS TO ADDRESS PLANNING AND IMPLEMENTATION CHALLENGES FOR FUTURE CAPABILITIES IN EUROPE"

DEPARTMENT OF DEFENSE COMMENTS TO THE RECOMMENDATIONS

RECOMMENDATION 1: The GAO recommends that the Secretary of Defense direct the Under Secretary of Defense for Policy and Chairman of the Joint Chiefs of Staff provide guidance on European Phased, Adaptive Approach (EPAA) that describe desired EPAA end states in response to concerns raised by key stakeholders. (See page 34/GAO Draft Report)

DoD RESPONSE: Partially concur. The Department recognizes the need to provide policy guidance on the decisions reached in the Ballistic Missile Defense Review, including the decision to pursue the European Phased Adaptive Approach (EPAA). The Department has taken steps to provide this guidance in the 2012 Guidance for the Employment of the Force (GEF), which is nearing completion. Once signed by the Secretary, it will provide detailed guidance to the Joint Staff, Combatant Commanders and other DoD components on end states, strategic assumptions and contingency planning, including for EPAA. We expect the Secretary will sign this guidance soon.

RECOMMENDATION 2: The GAO recommends that the Secretary of Defense direct the Missile Defense Executive Board (MDEB) to oversee and coordinate the development of life-cycle cost estimates that would provide for the management and oversight of EPAA and allow the Department to assess whether its plans for EPAA are affordable and determine if corrective actions are needed. (See page 35/GAO Draft Report)

DoD RESPONSE: Partially concur. EPAA is an approach not an acquisition program. The phased adaptive approach is designed to be flexible and match resources to the Combatant Commander's requirements to counter a dynamic threat environment. Although the basic overall architecture of each phase of the approach is well understood, the ultimate regional architecture and force structure, including use of still-in-development assets such as the Precision Tracking Space System, Airborne Infrared system, and advanced Standard Missile-3 interceptors, is still being refined by the Department. Therefore, the Department believes a more effective approach is to prepare BMDS program element-specific lifecycle cost estimates and use them to inform the management of ongoing acquisition programs and senior-level oversight of the phased adaptive approach as BMDS systems are applied to the defense of Europe. The MDEB and its supporting Standing Committees review BMDS development on a regular basis. BMDS programmatic changes are reviewed and approved by the MDEB. Discrete BMDS elements make up the capability to be delivered in each of the EPAA phases and MDA has a strict process to manage each of these component elements through six acquisition baselines (resource (cost), schedule, technical, contracts, test, and operational capacity) as provided to Congress in the BMDS Accountability Report. Lifecycle cost estimates are part of these baselines which are

established for each BMDS element, and they are reviewed quarterly to ensure appropriate execution against the baselines.

To more accurately reflect the intent of the recommendation, DoD recommends that GAO modify this recommendation to read:

"The GAO recommends that the Secretary of Defense direct the Missile Defense Executive Board (MDEB) to oversee and coordinate the development of life-cycle cost estimates of the component BMDS elements making up the EPAA phases as well as oversee the integrated BMDS schedule. This would provide for the management and oversight of EPAA for the Department to assess its plans for EPAA."

RECOMMENDATION 3: The GAO recommends that the Secretary of Defense direct the Missile Defense Executive Board to oversee and coordinate the development of an integrated EPAA schedule to include acquisition, infrastructure, and personnel activities that would help identify EPAA implementation risks that need to be considered. (See page 35/GAO Draft Report)

DoD RESPONSE: Concur. We agree that acquisition schedules are important to managing acquisition programs and agree that the MDEB is instrumental in providing senior-level oversight of the phased adaptive approach.

As stated previously, EPAA is an approach not an acquisition program. The Joint Staff, Combatant Commanders, and Services establish the regional architectures and procurement objectives. MDA has included the anticipated PAA requirements into the broader BMDS acquisition program while at the same time coordinating with the Joint Staff, Combatant Commanders, and Services to refine those requirements over time. MDA uses an integrated BMDS schedule for the emerging EPAA requirements, ensuring they are included in appropriate detail and timing within BMDS element-level schedules. Lead Services and the Combatant Commanders continue to develop operational and fielding schedules to satisfy requirements driven by the dynamic threat environment. This adaptive approach is designed to be flexible and to match acquisition schedules to the lead Service and Combatant Commander's requirements.

MDA has a strict process to manage and integrate discrete BMDS elements which make up the capability to be delivered in each of the EPAA phases through six acquisition baselines (resource (cost), schedule, technical, contracts, test, and operational capacity). The MDEB and its supporting Standing Committees review the BMDS development priorities and progress on a bimonthly basis. BMDS programmatic changes are reviewed and approved by the MDEB. MDA also conducts quarterly (or more frequent if required) Board of Director's meetings with senior Service staff to discuss and coordinate Service and MDA issues.

RECOMMENDATION 4: The GAO recommends that the Secretary of Defense direct the U.S. Strategic Command, in coordination with Missile Defense Agency, to adopt ballistic missile defense (BMD) operational performance metrics for durability and effectiveness and include these metrics into the BMD test programs. (See page 35/GAO Draft Report)

DoD RESPONSE: Concur. The Department recognizes the inherent value of measurable BMDS performance metrics. Provided with the warfighter's operationally defined metrics, we will crosswalk these metrics to the BMD System specification values assessed to be achievable, and whether the specifications meet the operational requirements. The US Strategic Command currently develops operational performance metrics for the warfighter in close coordination with MDA and the BMDS Operational Test Agency Team, which is comprised of Joint and Service test organizations.

Appendix VI: GAO Contact and Staff Acknowledgments

GAO Contact

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

Acknowledgments

In addition to the contact named above, Marie Mak, Assistant Director; Nicolaas Cornelisse, Analyst-In-Charge; David Best; Cristina Chaplain, Laurie Choi; Tana Davis; Gregory Marchand; Wiktor Niewiadomski; Karen Richey; Matthew Spiers; Amie Steele; Alyssa Weir; Erik Wilkins-McKee; Gwyneth Woolwine; and Edwin Yuen made key contributions to this report.

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