Missile Defense Agency

Fiscal Year 2009 (FY 09)

Budget Estimates

Overview

Approved for Public Release
08-MDA-3199 (23 JAN 08)

Missile Defense Agency (MDA)

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Overview

Outline

This budget overview summarizes our FY 09 budget submission to the Congress. It also may serve informed readers as a stand-alone, top-level description of the Ballistic Missile Defense System (BMDS). The overview describes the Agency's program priorities for FY 09 and the period of the Future Years Defense Program (FYDP) and a number of key initiatives.

I. Introduction
- a. Key Accomplishments to Date
- b. The Way Ahead
- c. Threat Update
- d. New Block Structure

II. Program Highlights
- a. Engagement Sequence Group
- b. Blocks 1.0 through 5.0
- c. Capability Development
- d. Sustainment
- e. Mission Area Investment
- f. MDA Operations
- g. Significant Changes (President's Budget FY 08 to FY 09)

III. Special Topics
- a. International Participation
- b. Transition and Transfer
- c. Concurrent Test, Training, and Operations (CTTO)

IV. Enhanced Oversight of MDA

V. MDA Management Initiatives and Performance Improvements
- a. Organizational Reengineering
- b. Base Realignment and Closure (BRAC)
- c. Defense Agencies Initiative (DAI)
- d. Strengthened Systems Engineering Process
- e. Missile Defense Agency Engineering and Support Services (MiDAESS)
- f. Performance Improvement Initiative

VI. President's Budget Submission and Organization

VII. Summary

VIII. Acronyms

I. Introduction

The Missile Defense Agency continues to make significant progress in developing and fielding a Ballistic Missile Defense System (BMDS) to defend the United States, its deployed forces, friends, and allies against all ranges of enemy ballistic missiles in all phases of flight. Over the past six years, we have delivered an initial defensive capability to the war fighter while continually developing a more technically sophisticated system to stay ahead of the evolving threat. In the next few years and beyond, the Agency intends to deliver a significantly more integrated, robust, and global BMDS. Our program is focused on the threat from North Korea and Iran but remains flexible to address emerging threats given the wide and dangerous proliferation of ballistic missile technologies.

This introduction also describes a key initiative designed to enhance the transparency, accountability, and oversight of the BMDS program—a new block structure. This initiative is an important starting point in understanding the Agency's FY 09 budget request submission.

Key Accomplishments to Date

The American taxpayers' investments in missile defense have yielded very tangible results. From its establishment in early 2002 through the end of calendar year 2007, MDA has fielded an initial BMDS capability consisting of 24 Ground-Based Interceptors; 17 Aegis BMD warships capable of long-range surveillance and tracking, of which 10 are also capable of missile intercepts; 21 Standard Missile-3 interceptors for Aegis BMD warships; an upgraded Cobra Dane radar; two upgraded early warning radars; a transportable X-band radar; a command and control, battle management, and communications (C2BMC) capability, and a sea-based X-band radar. None of this capability existed as recently as June 2004. Over the same time period, the Agency continued to develop and test new interceptor, sensor, and C2BMC technologies to improve the depth, range, and reliability of our defenses and provide options to address uncertainty and surprise in the future. For example, MDA matured the Terminal High Altitude Area Defense (THAAD) system to the point where our deployed forces and allies can begin fielding these capabilities in 2009. Also, with the Airborne Laser (ABL) program, we completed three successful flight tests of the targeting system and verified a key knowledge point—acquiring, tracking, and performing atmospheric compensation in a mission-representative environment.

The Way Ahead

The threat can never be predicted with certainty, so MDA has used a flexible "capabilities-based" strategy to exploit technological opportunities and place capability in the war fighters' hands far more quickly than could have occurred under a traditional acquisition approach. The Agency has focused on adding capabilities with demonstrated military utility to meet current threats rather than meeting static requirements defined years earlier. With this more agile approach, we are making a more *integrated, robust, and global* BMDS a reality.

Integrated. While the BMDS already includes fielded assets operated by Air Force, Army, and Navy units under the integrated control of Combatant Commanders, increasing levels of integration are critical to the effectiveness of the BMDS. The BMDS already includes fielded assets operated by Air Force, Army, and Navy units under the integrated control of Combatant Commanders. To demonstrate the long-range BMDS capability, for example, MDA will conduct an integrated flight test in the Spring of 2008 involving a target launched from Kodiak, Alaska tracked by the Beale upgraded early warning radar in northern California and the forward-based radar temporarily located in Juneau, Alaska. An Aegis BMD ship and the sea-based X-band radar in the North Pacific will observe the test as well. The target will be intercepted by a Ground-Based Interceptor launched from an operationally configured silo in Vandenberg Air Force Base in central California. Much of the data needed to calculate a fire control solution for the Ground-Based Interceptor will be provided by the C2BMC system. Overall, this single test will include numerous components separated by thousands of miles and managed by four executing organizations within MDA (Ground-Based Midcourse Defense, Aegis BMD, BMDS Sensors, and C2BMC)--called "elements."

Robust. Our current, limited homeland defense against long-range ballistic missiles from North Korea will soon add a capability against enemy launches from the Middle East because MDA is fielding additional Ground-Based Interceptors at Fort Greely, Alaska and upgrading an existing fixed-site radar in Greenland. The defense of deployed forces, allies, and friends against short- to medium-range ballistic missiles in one region/theater will be buttressed by additional Standard Missile-3 interceptors, more Aegis BMD engagement-capable warships, two THAAD fire units, and up to 100 modified Standard Missile-2 sea-based terminal interceptors. Tying these assets together is a global C2BMC capability. Recent flight tests are confirming technological progress for short-, medium-, and long-range defensive capabilities. Since February 2007, MDA and the military services have executed a successful long-range ground-based intercept, six Standard Missile-3 intercepts of separating and unitary targets, and two THAAD intercepts of unitary targets. In the near future, MDA's research and development program is expected to yield enhanced capabilities to discriminate between enemy warheads and countermeasures and options for "multiple kill" capabilities to solve future discrimination challenges.

Global. The BMDS continues to expand globally, and international cooperation with allies and friends is dramatically increasing. MDA is globally expanding the BMDS by upgrading and integrating fixed-site radars in the United Kingdom and Greenland to address the threat of Iranian long-range ballistic missiles against the U.S. homeland. Also, assuming agreements with Poland and the Czech Republic are concluded followed by congressional approval, MDA intends to begin site construction for additional Ground-Based Interceptors and a fixed-site radar in Europe to defend allies and deployed forces in Europe and expand the U.S. homeland defense against limited Iranian long-range threats. A robust C2BMC capability enables these global assets to operate effectively together with assets in the United States. Guided by its *International Strategy 2007-2009*, MDA has undertaken substantive cooperative efforts with European, Middle Eastern, and Asian nations. International cooperation with the Japanese government is evidenced by its purchase of Aegis BMD and Patriot Advanced Capability-3 assets as well as the fielding of a BMDS radar at Shariki Air Base, Japan. Further, with MDA's support, the Department of Defense (DoD) participated with Israel to develop an

Israeli BMD Architecture that can meet threats expected in the next decade. MDA also held three meetings with senior Russian technical experts to discuss both threat perceptions and missile defense cooperation, including the potential for using Russian early warning assets.

Threat Update

The security of the U.S. homeland, deployed forces, allies, and friends are threatened to varying degrees by the proliferation of increasingly sophisticated ballistic missile systems and associated technologies and expertise. Some 30 nations have now deployed a ballistic missile capability, compared to only eight in 1972, and foreign ballistic missiles were launched more than 100 times around the world in 2007.

North Korea and Iran are already capable of using short- and medium-range ballistic missiles[1] to attack our deployed forces in Asia and the Middle East, respectively, as well as our allies. They are also developing new medium- and intermediate-range ballistic missiles that can be armed with different types of warheads. Iran has received technical assistance, such as missile guidance systems and solid-fuel missile technology, from nations seeking revenue gain and diplomatic influence.

Currently, North Korea has hundreds of deployable short- and medium-range ballistic missiles and is developing a new intermediate-range ballistic missile and a new short-range, solid-propellant ballistic missile, which it test-launched in June 2007. Iran has the largest force of ballistic missiles in the Middle East (several hundred short- and medium-range ballistic missiles), and its highly publicized missile exercise training has enabled Iranian ballistic missile forces to hone wartime skills and new tactics.

In terms of long-range threats to the U.S. homeland and our European allies, Iran continues its efforts to develop and acquire ballistic missiles capable of striking Israel and central Europe, and with continued foreign assistance, could have an intercontinental ballistic missile capable of reaching the U.S. homeland before 2015. North Korea, given ongoing development efforts, could also demonstrate its intercontinental ballistic missile capabilities before 2015.

New Block Structure

MDA has established a new block structure to describe our program of work. The Agency has made this change to address concerns about transparency, accountability, and oversight and to better communicate to Congress and other key stakeholders MDA's plans and baselines and our continuing improvements in BMDS capabilities.

[1] Ballistic missile threats are grouped by ranges: less than 1,000 kilometers (km) for short-range ballistic missiles; 1,000 to 3,000 km for medium-range; 3,000 to 5,500 for intermediate-range; and greater than 5,500 for long-range.

The new approach has several key tenets:

- Blocks will be based on fielded BMDS capabilities—not, as before, on biennial time periods--that address particular threats. Each block will represent a discrete program of work.
- When MDA believes a firm commitment can be made to the Congress, the Agency will establish schedule, budget, and performance baselines for a block.[2] Schedule delays, budget increases, and performance shortfalls will be explained as variances.
- Once baselines are defined, work cannot be moved from one block to another.

Based on the above tenets, MDA has currently defined five blocks.

- Block 1.0: Defend the United States from Limited North Korean Long-Range Threats
- Block 2.0: Defend Allies and Deployed Forces from Short- to Medium-Range Threats in One Region/Theater
- Block 3.0: Expand Defense of the United States to Include Limited Iranian Long-Range Threats
- Block 4.0: Defend Allies and Deployed Forces in Europe from Limited Iranian Long-Range Threats and Expand Protection of U.S. Homeland
- Block 5.0: Expand Defense of Allies and Deployed Forces from Short- to Intermediate-Range Threats in Two Regions/Theaters

Future blocks (Block 6.0, etc.) will be added when significant new capabilities are expected to be fielded based on a consideration of technological maturity, affordability, and need. For example, a new Block 6.0 might include enhanced defense of the United States against complex countermeasures, drawing on multiple kill capabilities from the multiple kill vehicle (MKV) program and discrimination and system tracking capabilities through upgraded hardware and software on weapon systems, sensors, and C2BMC.

MDA's budget is organized for FY 09 and through the period of the Future Years Defense Program (FYDP) based on the new block structure. Also, BMDS program funding that does not fit into Blocks 1.0 through 5.0 or Capability Development is assigned to three general categories:

- Sustainment - operations and support of weapon systems, sensors, and C2BMC components
- Mission Area Investment – activities that support multiple blocks and capability development activities and cannot be reasonably assigned to a specific block or capability development program (e.g. intelligence and security; modeling and simulation; systems engineering and testing cores; safety, quality, and mission assurance)
- MDA Operations – activities that support the Agency, such as Management Headquarters and Base Realignment and Closure (BRAC)

[2] The initial budget baselines for blocks will include funding plans for FY 08-13. In 2008, MDA intends to identify pre-FY 08 funding for Blocks 1.0 through 5.0. This information will be provided to the Congress.

II. Program Highlights

In this section, we will describe, block by block, how BMDS capabilities are being delivered to the war fighter. This section will discuss program accomplishments for FY 07, along with anticipated highlights for FY 08 and FY 09. The last part of this section will discuss other program activities by budget category and significant changes from the FY 08 budget submission.

Engagement Sequence Group (ESG) – The ESG conceptual framework is used to describe the capability delivered by each block. In addition to identifying the hardware and software delivered with each block--such as interceptors, sensors and command and control capability--the ESG provides a means of conveying to the war fighter the capabilities that can be provided by this hardware and software.

As depicted in the "Kill Web" shown in Figure 1, the successful intercept of a threat ballistic missile includes several steps. In the highlighted example, the launch of a long-range enemy ballistic missile is detected; the sensors are cued to track the threat reentry vehicle (RV); the RV is discriminated from surrounding debris or countermeasures; the aimpoint of the threat RV is calculated; the engagement is planned for launch and flyout of the BMD interceptor; updates are sent to the kill vehicle (KV) as it enters endgame to engage the threat RV; and, finally, the threat RV is intercepted along with an assessment of the success of the engagement.

There are several potential paths through the Kill Web. Each path links together different combinations of BMDS components that function together as an ESG.

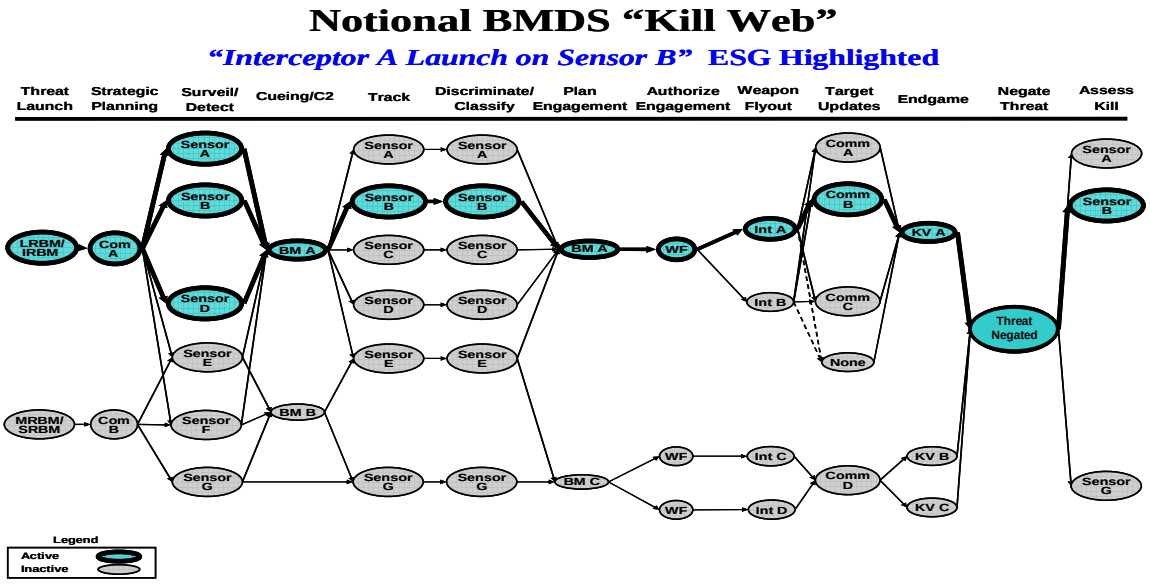

Figure 1
Notional BMDS "Kill Web"

The Kill Web is also useful for illustrating the importance of integrating the various components of the BMDS into one system. Some ESGs, such as "SM-3 Engage on AN/SPY-1" will describe a path in which the SM-3 interceptor, in this case launched from an Aegis BMD ship, will use organic sensor data from the same platform–in this case, the same Aegis BMD ship that launched the interceptor. However, most ESGs involve components from more than one program element (e.g. GMD and Aegis BMD). For example, "GBI Launch on AN/SPY-1" describes the launch of a GBI based on information provided by a component (the AN/SPY-1 radar) from an entirely separate element (an Aegis BMD cruiser or destroyer). In fact, most of the 50-plus ESGs that we have currently identified involve components from several different elements, all of which must be fully integrated in order to achieve a successful intercept of a threat RV. The ESGs will become considerably more complex as more interceptors and sensors are added. They will rely on the successful development of the C2BMC system to provide a fully integrated system that allows multiple, network-enabled kill chains, not just a single kill chain provided by individual elements.

Block 1.0 – Block 1.0 provides an initial capability to protect the United States from a limited North Korean long-range ballistic missile attack. The block is comprised of 30 GBIs, fielded at Ft. Greely, Alaska and Vandenberg Air Force Base (VAFB), California, combined with an array of sensors including the Beale Upgraded Early Warning Radar (UEWR) and Cobra Dane (CD) radar, the Sea-Based X-Band (SBX) radar, the AN/TPY-2 (Forward Based (FB)) radar, and the AN/SPY-1 radars from the 15 Aegis BMD destroyers and three Aegis BMD cruisers, integrated by the C2BMC system.

As noted above, the delivery of blocks of capability to the war fighter relies on the ESG as a conceptual framework for describing the content within that block. The ESGs that have been mapped to Block 1.0 are shown in Table 1.

Block 1.0: Defend U.S. from Limited North Korean Long-range Threat	GBI Launch on CD/UEWR GBI Engage on CD/UEWR GBI Launch on AN/SPY-1 GBI Engage on AN/SPY-1 GBI Launch on AN/TPY-2 (FB) (S&T only) GBI Engage on AN/TPY-2 (FB) (S&T only) GBI Launch on SBX GBI Engage on SBX

Table 1
Block 1.0 Engagement Sequence Groups

The new block structure is organized in a roughly chronological order. In other words, Block 1.0 represents a capability that is more "near-term" than Block 5.0. Also, in many cases the capability delivered by later blocks depends on capability provided by previous blocks. This does not mean, however, that the capability represented in each block must be delivered sequentially. For example, as will later be shown, Block 4.0, which includes the European Interceptor Site (EIS) and European Midcourse Radar (EMR), could be delivered after Block 5.0,

since Block 4.0 depends on external factors such as agreements between the government of the United States and the governments of Poland and the Czech Republic, respectively. On the other hand, Block 1.0 represents the foundation of the capability to protect the United States from long-range ballistic missiles from rogue nations, and is closely related to the capabilities in Blocks 3.0 and 4.0. Block 1.0 is, therefore, the most mature capability and will be the first block of capability fully delivered to the war fighter.

In 2007, we continued to have success in fielding missile defense capability in Block 1.0. The past year saw an unprecedented pace of fielding, deployment and support of an integrated missile defense capability–much of it related to Block 1.0. We emplaced 10 additional GBIs and transitioned the Forward-Based X-Band Radar (AN/TPY-2(FB)) and supporting C2BMC at Shariki Air Base, Japan from the interim site to the permanent location, achieving partial mission capability for that radar. In 2008 we will expand the Block 1.0 capability by emplacing up to 6 more GBIs. Also, we have now upgraded a total of 17 Aegis BMD ships (14 destroyers and 3 cruisers) with Long Range Search and Track (LRS&T) capability to provide tracking information to the GBIs with their AN/SPY-1 Radars.

We have also completed key system-level ground and flight testing in support of Block 1.0. In September 2007, we completed Integrated Ground Test-02 (GTI-02) in a lab environment to assess the ability of the BMDS to simultaneously execute multiple ESGs, followed in November 2007 by Distributed Ground Test-02 (GTD-02), in which we assessed the ability of hardware-in-the-loop assets to simultaneously execute multiple ESGs using actual BMDS operational elements. On September 28, 2007, we also successfully completed Ground-Based Midcourse Flight Test-03a (FTG-03a)--a repeat of FTG-03, which was not completed due to a target failure. In FTG-03a, a GBI launched from VAFB successfully engaged a target launched from Kodiak Island, Alaska using sensor information from the Beale UEWR in California.

The Sea-Based X Band Radar (SBX) completed crew training and testing off the coast of Hawaii and transited to the North Pacific to conduct a cold weather shakedown off Adak, Alaska. After successfully completing a cold weather shakedown, the SBX returned to Hawaii and completed the first of two planned maintenance periods to conduct planned upgrades to the system. Several ongoing studies may dictate future work. The SBX continues to participate in key system flight tests, including FTG-03a and a joint U.S-Japanese test of the Aegis BMD system, and is scheduled to participate in FTG-04 in the Spring of 2008.

The C2BMC system serves several functions and is the backbone for the integration of the BMDS system. The C2BMC system provides the capability to conduct collaborative BMDS planning among the Combatant Commanders, it provides a common BMD situational awareness to all levels of the BMDS decision-makers, it provides the capability to coordinate BMD weapon-system engagements, and finally, it provides sensor netting to maximize the capability to detect and track ballistic missile threats. All of these functions are essential to effectively operate a system that covers multiple time zones across the globe. The C2BMC system will provide the BMDS with the capability to rapidly identify and track multiple ballistic missile threats, dynamically adjusting BMDS resources to maintain the ability to engage those multiple ballistic missile threats in all phases of flight.

The improvements to the C2BMC system are being fielded incrementally through a series of planned software and hardware spiral upgrades–beginning in Block 1.0. A review of the Block 1.0 ESGs provides an indication of the importance of the C2BMC system in integrating the capabilities of the hardware and software delivered with Block 1.0. For example, the C2BMC system allows sensor information from an Aegis BMD cruiser or destroyer deployed in the western Pacific Ocean to support the launch of GBIs in Ft. Greely, Alaska, by sending its track information to fire control. Additionally, C2BMC enables the remote operation of the Shariki, Japan AN/TPY-2 (FB) from Hawaii, as well as processing the radar's data for distribution to Aegis BMD ships and the Ground Based Missile Defense (GMD) Fire Control.

In FY 07, C2BMC completed the fielding of Spiral 6.0 to enable Japan to receive data from the AN/TPY-2 radar deployed at Shariki. It also began fielding Spiral 6.2, which is a major upgrade to the BMDS planner and battle management system. In addition, C2BMC completed the move of communications equipment and shelters supporting the AN/TPY-2 radar at Shariki from the interim site to its permanent location, along with the installation of a second server suite at U. S. Pacific Command (USPACOM). The C2BMC planning and situational awareness equipment was installed to support the combatant commanders at USPACOM, U.S. Northern Command (USNORTHCOM), U.S. Central Command (USCENTCOM) and U.S. Strategic Command (USSTRATCOM). We have also installed the Parallel Staging Network at USNORTHCOM, USPACOM, and USSTRATCOM as a part of the Concurrent Test, Training, and Operations (CTTO) capability, which is discussed in Section III of this Overview in more detail. Without impeding the operational readiness of the system, CTTO will allow the war fighter to conduct training and MDA to continue with spiral upgrades, testing and development.

The Block 1.0 capability is largely fielded, but additional system ground and flight tests remain to support a Full Capability Delivery (FCD)[3] for Block 1.0. The major remaining Block 1.0 initiatives are:

- Emplace six more GBIs at Fort Greely, Alaska and Vandenburg Air Force Base (GBIs 25-30)
- Complete fielding of C2BMC Spiral 6.2 for operational use
- Complete ground and flight testing needed for FCD of Block 1.0 ESGs.

[3] In fielding the BMDS, MDA uses a three-tier capability delivery decision process. The Director designates ESGs as Full Capability Delivery, Partial Capability Delivery, and Early Capability Delivery to differentiate between levels of integration, test, and evaluation. These terms are more fully defined in Section III of this Overview.

Block 1.0 Defend the U.S. from Limited North Korean Long-Range Threats ($millions, then year)							
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
Development	1,368.7	23.3	-	-	-	-	1,392.0
Integration	52.8	27.9	-	-	-	-	80.7
Fielding	113.0	7.6	-	-	-	-	120.6
Total	**1,534.5**	**58.8**	-	-	-	-	**1,593.4**

Table 2
Block 1.0 Funding

Block 2.0 — Block 2.0 provides the capabilities to defend U.S. allies and deployed forces from short- to medium-range ballistic missile threats in one region or theater. The block is comprised of 71 Aegis SM-3 Block I/IA missiles, 15 Aegis BMD Engagement Destroyers, three Aegis BMD Engagement Cruisers, two Terminal High Altitude Area Defense (THAAD) Fire Units with 48 operational THAAD interceptors, and associated fire control and communications equipment. Block 2.0 ESGs are shown in Table 3.

Block 2.0: Defend Allies and Deployed Forces from Short- to Medium-Range Threats in One Region /Theater	SM-2 Engage on AN/SPY-1 SM-3 Engage on AN/SPY-1 SM-3 Launch on Remote (AN/SPY-1) THAAD Interceptor Engage on AN/TPY-2 (T**)**

Table 3
Block 2.0 Engagement Sequence Groups

Highlights and Accomplishments: In 2007 we delivered 12 SM-3 Block IA interceptors to the U.S. Aegis BMD force and nine SM-3 Block IA missiles to Japan, and upgraded four Aegis BMD LRS&T cruisers to BMDS engagement capable ships that can employ SM-3 interceptors. We completed 5 Aegis BMD intercept flight tests including, in November, the test of the Aegis SM-3 Engage on AN/SPY-1 ESG in which an Aegis BMD Cruiser successfully engaged and conducted hit-to-kill intercepts against two unitary short-range targets simulating a raid environment. The THAAD program also completed three intercept flight tests against short-range unitary targets in the atmosphere and in space at the Pacific Missile Range Facility.

The major remaining Block 2.0 initiatives are:

- Deliver 42 additional SM-3 Block IA interceptors for a total of 71 (Block I/IA)
- Upgrade eight Aegis BMD Destroyers to Engagement Destroyers for a total of 15 Aegis BMD Engagement Destroyers and three Engagement Cruisers
- Complete first installation of Near-Term Sea-Based Terminal capability BMD 3.6.1 with up to 100 operational SM-2 Block 4 interceptors
- Deliver THAAD Fire Units #1 and #2 with 48 operational THAAD interceptors

- Deliver C2BMC Spiral 6.4
- Complete ground and flight testing needed for FCD for Block 2.0 ESGs

Block 2.0 Defend Allies & Deployed Forces from Short- to Medium- Range Threats in One Region/Theater ($millions, then year)							
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
Development	957.6	871.9	240.5	14.1	12.9	12.9	2,109.9
Integration	35.2	28.3	4.0	-	-	-	67.5
Fielding	415.3	384.0	251.3	84.9	7.8	-	1,143.3
Total	1,408.2	1,284.2	495.8	99.0	20.7	12.9	3,320.8

Table 4
Block 2.0 Funding

Block 3.0 – Block 3.0 builds on the foundation established by Block 1.0 to expand the defense of the United States against limited Iranian long-range ballistic missile threats. Block 3.0 includes 14 additional GBIs with two key radars needed for defense of the U.S. from an Iranian threat--the UEWRs at Fylingdales in the United Kingdom and at Thule in Greenland. Block 3.0 also provides the ability to address more sophisticated countermeasures in the midcourse phase of flight, a critical aspect of our plan to improve the effectiveness of the BMDS against the evolving threat. We are pursuing two parallel and complementary approaches to counter complex countermeasures: more sophisticated sensors and algorithms to discriminate the threat RV from associated countermeasures, and a volume kill capability to intercept the objects identified by the discrimination systems as potential threat RVs. Block 3.0 will focus on the first of these approaches, and therefore includes upgrades to the GBIs, sensors, and the C2BMC system to allow discrimination of the threat RV. The full implementation of this approach will be conducted in phases, with the first phase referred to as "Near Term Discrimination" and the second phase as "Improved Discrimination and System Track."

Block 3.0 will also incorporate essential C2BMC functions enabling network centric fire control and launch on remote capabilities that will be demonstrated during ground and flight testing. These functions include the ability to correlate threat tracks from multiple sensors via the tactical control network, creation and distribution of an engageable system track, and engagement planning/processing that optimizes our interceptors by selecting ESGs best suited to a specific threat. Additionally, C2BMC capabilities will interoperate with NATO command and control functions to ensure situational awareness information is interchangeable. The ESGs associated with Block 3.0 are shown in Table 5.

Block 3.0: Expand Defense of the U.S. to Include Limited Iranian Long-Range Threats	GBI Launch on CD/UEWR Mod 2 (Thule) GBI Engage on CD/UEWR Mod 1 (Fylingdales, AN/TPY-2 (FB)) GBI Engage on CD/UEWR Mod 3 (Thule) GBI Launch on AN/SPY-1 Mod 1 (Fylingdales, SBX) GBI Launch on AN/SPY-1 Mod 2a (AN/TPY-2 (FB)) GBI Launch on AN/SPY-1 Mod 3 (Thule) GBI Engage on AN/SPY-1 Mod 1a (AN/TPY-2 (FB)) GBI Launch on AN/TPY-2 (FB) Mod 1a (Hercules 1) GBI Engage on AN/TPY-2 (FB) Mod 1a (Hercules 1) GBI Launch on AN/SPY-1 Mod 2b (AN/SPY-1 Mod) GBI Engage on AN/SPY-1 Mod 1b (AN/SPY-1 Mod) GBI Launch on AN/TPY-2 (FB) Mod 2 (Thule, Hercules Enhancements) GBI Engage on AN/TPY-2 Mod 2 (FBM) (Thule, Hercules Enhancements) GBI Launch on SBX Mod 2 (Thule, Hercules 1, Hercules Enhancements) GBI Engage on SBX Mod 2 (Thule, Hercules 1, Hercules Enhancements) GBI Engage on BMD System Track

Table 5
Block 3.0 Engagement Sequence Groups

Highlights and Accomplishments: We have completed integration of the Fylingdales UEWR and declared Early and Partial Capability for this radar and started the upgrades to the Thule UEWR.

The remaining major Block 3.0 initiatives are:

- Deliver 14 GBIs
- Deliver Thule UEWR
- Deliver C2BMC Spirals 8.0 and 10.0
- Develop and field a near-term discrimination capability[4]
- Completion of ground and flight testing needed for FCD for Block 3.0 ESGs

[4] Accomplishments in near-term discrimination cannot be discussed here because they are classified.

Block 3.0 Expand Defense of the U.S. to Include Limited Iranian Long-Range Threats ($millions, then year)							
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
Development	101.6	1,276.8	1,092.8	192.1	150.7	102.3	2,916.3
Integration	38.2	74.2	89.9	68.9	47.0	49.1	367.2
Fielding	510.2	347.4	233.6	63.5	46.4	21.4	1,222.6
Total	650.0	1,698.4	1,416.3	324.5	244.1	172.9	4,506.2

Table 6
Block 3.0 Funding

Block 4.0 - Block 4.0 builds on the foundation established by Blocks 1.0 and 3.0 to expand the defense of the United States against limited Iranian long-range ballistic missile and to extend this defense to allies and deployed forces in Europe. Block 4.0 includes

- Ten GBIs equipped with the two-stage Orbital Boost Vehicle (OBV) configuration rather than the three-stage OBV configuration used on the interceptors deployed at Fort Greely and VAFB. These GBIs are scheduled for deployment at the European Interceptor Site (EIS) in Poland pending an agreement with the Polish government and fulfillment of certain test requirements.
- The European Mid-course Radar (EMR) currently located at the Kwajalein Atoll, modified and relocated to a site in the Czech Republic pending an agreement with the Czech government. It will provide critical midcourse tracking data for the European Interceptor Site.
- A forward-based AN/TPY-2 radar. The site for this radar has not been selected, but its placement should enable it to provide information early in the flight of a potential ballistic missile launch and help discriminate threat RVs from associated countermeasures.
- The C2BMC infrastructure and expanded network enabling capabilities required to support the EIS in Poland and provide sensor management of the EMR in the Czech Republic and the forward-based AN/TPY-2 radar.

MDA has revised its FY 09 budget submission to include MILCON funding to construct the proposed European Interceptor Site in Poland, European Mid-course Radar site in the Czech Republic, and forward-based X-band radar site.

The ESGs associated with Block 4.0 are shown in Table 7.

Block 4.0: Defend Allies and Deployed Forces in Europe from Limited Iranian Long-Range Threats; Expand Protection of U.S. Homeland	GBI Launch on CD/UEWR Mod 3 (EMR) GBI Launch on AN/TPY-2 (FB) Mod 3 (EMR, MSK) GBI Engage on AN/TPY-2 (FB) Mod 3 (EMR, MSK) GBI Launch on SBX Mod 3 (EMR) GBI Launch on EMR GBI Engage on EMR

Table 7
Block 4.0 Engagement Sequence Groups

Highlights. The U.S. missile defense system in Europe will protect NATO allies from long-range ballistic missile attack from the Middle East. There are several countries, particularly in Southern Europe, that are not at risk from a long-range ballistic missile attack from Iran because they are too close to its long-range missile launch sites. However, those same countries are vulnerable to attack from short- to medium-range missiles, a capability that Iran has demonstrated. Block 4.0 is focused only on the long-range threats. Providing protection of these countries from the shorter-range threats can be covered by NATO-deployed systems, which could be integrated with the BMDS.

The booster used for the GBIs in Europe is a two-stage configuration of the three-stage booster currently employed at Ft. Greely and VAFB. A two-stage booster has less burn time than the three-stage version, and therefore accommodates the shorter engagement timelines expected from a ballistic missile threat originating from the Middle Est. The modifications required to design, develop and produce a two-stage variant are not extensive, nor are they unprecedented. In fact, the first ten GMD Integrated Flight Tests, conducted between January 1997 and December 2002, successfully utilized a two-stage variant of the standard three-stage Minuteman booster. Additionally, the current three-stage GBI booster was derived from Orbital Sciences four-stage Minotaur launch vehicle. The risks involved with modifying the Orbital Booster are of a similar scale.

The components used in the two-stage booster are nearly identical to those already tested and fielded in the three-stage booster. In fact, the two-stage interceptor has fewer components than its three-stage predecessor. MDA has placed the two-stage booster on contract, and the preliminary analysis and design work is complete. A rigorous component qualification, integration, ground and flight testing program for the two-stage interceptor has been planned, and will include two flight tests prior to completion of the first two-stage interceptor for deployment, one of which will be a booster verification test and the other an EKV intercept of a threat-representative target.

The major Block 4.0 initiatives are:

- Complete delivery of 10 two-stage GBIs for deployment in Europe
- Complete modifications to the EMR and transfer the radar to a designated site in Europe

- Deliver one AN/TPY-2 X-band radar and complete construction and transfer of this radar to forward site at location to be determined
- Deliver EIS, EMR, and AN/TPY-2 C2BMC support infrastructure to support the European site
- Deliver European communications test gateway
- Complete ground and flight testing needed for FCD of Block 4.0 ESGs.

Block 4.0 Defend Allies & Deployed Forces in Europe from Limited Iranian Long-Range Threats Expand Protection of U.S. Homeland ($millions, then year)							
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
Development	67.7	96.0	130.9	622.1	306.7	661.5	1,884.9
Fielding	175.7	382.6	476.3	630.5	326.7	68.1	2,059.9
MILCON	-	241.2	596.3	-	-	-	837.5
Integration	-	-	-	-	-	-	-
Total	243.4	719.8	1,203.5	1,252.6	633.4	729.6	4,782.3

Table 8
Block 4.0 Funding

Block 5.0 – Block 5.0 builds on the foundation established by Block 2.0 by expanding the defense of allies and deployed U.S. forces from short- to intermediate-range ballistic missile threats and increasing the number of regions or theaters from one to two. Block 5.0 includes 23 SM-3 Block IA interceptors, 53 SM-3 Block IB interceptors, two THAAD Fire Units with 48 interceptors, one AN/TPY-2 radar for forward deployment, all tied together with associated C2BMC support. Block 5.0 makes both quantitative and qualitative improvements by increasing the number of SM-3 and THAAD interceptors that can be deployed to a region or theater, and by improving and upgrading the Aegis Weapons System and the SM-3 Block IA interceptor to the Block IB. The Aegis Weapons System will be upgraded with the BMDS Signal Processor (BSP), a key enabling technology that will improve radar resource utilization and track resolution for closely spaced objects, expand the detection range, and enhance discrimination. There are three primary differences between the Block IA and IB interceptors. The Block IB will provide a two-color seeker (not the one-color seeker employed on the SM-3 Block IA) and a Throttleable Divert and Attitude Control System (TDACS). It will also include the Advanced Signal Processor to improve the ability of the seeker to distinguish between threat RVs and countermeasures. These improvements will expand the battle space and allow for detection, acquisition and intercepts against more diverse and longer-range threats up to Intermediate-Range Ballistic Missiles (IRBMs).

Block 5.0 ESGs are shown in Table 9.

Block 5.0: Expand Defense of Allies & Deployed Forces from Short- to Intermediate-Range Threats in Two Regions/Theaters	SM-3 Engage on AN/SPY-1 Mod 1a (AN/TPY-2 (FB)) SM-3 Engage on AN/SPY-1 Mod 1b (AN/SPY-1 Mod) SM-3 Engage on AN/SPY-1 Mod 2 (SM-3 Blk IB Mod) SM-3 Launch on Remote (AN/SPY-1) Mod 1a (AN/TPY-2 (FB)) SM-3 Launch on Remote (AN/SPY-1) Mod 1b (AN/SPY-1 Mod) SM-3 Launch on Remote (AN/SPY-1) Mod 2 (SM-3 Blk IB Mod) SM-3 Launch on AN/TPY-2 (FB) SM-3 Launch on AN/TPY-2 (FB) Mod 1 (SM-3 Blk IB Mod) No new THAAD Interceptor ESGs

Table 9
Block 5.0 Engagement Sequence Groups

Highlights and Accomplishments: The continued design and testing of the SM-3 Block IB components remains the focus of Block 5.0. We have completed the design efforts for the Advanced Signal Processor and continued development of the TDACS and testing of the two-color seeker. Additionally, we have verified, via C2BMC Spiral 6.2, the ability to downselect and forward tracks to Aegis BMD ships for cueing the AN/SPY-1 radar. This is the first step in enabling the SM-3 Launch on Remote ESGs. The primary focus in FY08 will be the successful completion of the Critical Design Review with the goal of completing the design and testing for the two-color seeker and TDACS and commencing the element integration of the SM-3 Block IB missile in FY 09. The AN/TPY-2 radar has been delivered to VAFB in order to conduct verification testing and integration of discrimination algorithms, and testing against Targets of Opportunity flights from VAFB. In FY 08, this radar along with critical C2BMC interfaces will be sent to Juneau, Alaska to participate in a GMD system-level flight test (FTG-04) and then returned to VAFB for further testing.

The remaining major Block 5.0 initiatives are:

- Delivery of 23 SM-3 Block IA and 53 SM-3 Block IB interceptors
- Delivery of upgrades to the Aegis Weapons System including Aegis BMD 4.0.1 and 5.0
- Delivery of THAAD Fire Units #3 and #4 with 48 operational interceptors
- Delivery of one AN/TPY-2 radar and site construction for forward deployment at a location to be determined
- Completion of ground and flight testing needed for FCD of Block 5.0 ESGs
- Delivery of additional C2BMC infrastructure to support the Block 5.0 capability.

Block 5.0 Expand Defense of Allies & Deployed Forces from Short- to Intermediate-Range Threats in Two Regions/Theaters ($millions, then year)							
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
Development	573.0	451.9	393.9	434.3	398.7	471.6	2,723.4
Fielding	71.1	336.3	837.6	834.4	696.1	452.7	3,228.2
MILCON	-	29.6	-	-	-	-	29.6
Integration	9.6	17.7	31.5	41.2	68.1	64.0	232.1
Total	653.7	835.6	1,263.0	1,309.9	1,162.9	988.3	6,213.3

Table 10
Block 5.0 Funding

Production Rate - As required by Section 223 of the National Defense Authorization Act of 2004 (PL 108-136), the estimated production rate capacity of the facilities that will produce the assets being fielded is one GBI per month, two SM-3s per month, three THAAD interceptors per month, and two AN/TPY-2 radars per year.

Capability Development - We have continued to fund a robust Capability Development program to add capabilities to address future challenges and uncertainties. These programs involve technologies that are still under development and are not yet ready for fielding. However, they represent potential candidates for inclusion in future blocks. Major initiatives in the Capability Development program include our boost phase efforts (Airborne Laser and Kinetic Energy Interceptor), our efforts to discriminate and engage increasingly sophisticated threats employing complex countermeasures (Project Hercules and Multiple Kill Vehicle), our upgrades and improvements to sea-based defenses (Aegis SM-3 Block IIA and Far-Term Sea-Based Terminal programs), and our Space Tracking and Surveillance System(STSS).

Boost Phase Programs. The BMDS is designed to reflect the President's 2002 direction to provide a layered protection against ballistic missile threats in all phases of flight. The systems we have fielded so far, or will soon field, are designed to intercept missiles in their midcourse and terminal phases. However, if we can destroy ballistic missiles in their boost phase, we can reduce the number of targets faced by our midcourse and terminal defenses, and preempt a threat missile's ability to deploy multiple reentry vehicles, submunitions, or countermeasures. Boost phase defenses are designed to destroy an enemy ballistic missile when it is most vulnerable and, when combined with midcourse and terminal phase defenses, add to the effectiveness of the BMDS. We therefore, are developing a boost phase capability through the Airborne Laser (ABL) and Kinetic Energy Interceptor (KEI) programs.

- ABL is the primary boost phase defense element under development. ABL is designed to engage and destroy threat ballistic missiles of any range using a High Energy Laser beam fired from a modified Boeing 747 aircraft. In 2007, we completed an important system knowledge point with the in-flight test of the Tracking Illuminator Laser, demonstrating the critical atmospheric compensation portion of the system. The ABL program also

completed low power systems integration testing, successfully demonstrating the first atmospheric compensation with a non-cooperative target. The completion of the low power systems integration testing was of particular significance because it demonstrated the programs readiness to install the High Energy Laser on the aircraft and enter into the next phase of testing–high power systems integration. Installation of the High Energy Laser has commenced and is expected to be completed in FY 08. We plan to intercept a threat-representative boosting target in FY 09.

- KEI is being developed to provide the BMDS with a strategically deployable, tactically mobile land-based capability to defeat medium- to long-range ballistic missiles during the boost, ascent or midcourse phases of flight. Despite challenges related to development of the high acceleration booster, significant progress was made in FY 07 towards the booster flight test with the completion of hypersonic wind tunnel testing of the booster, two static fire tests of the Stage 1 rocket motor, and integration of the Stage 2 rocket motor in preparation for a static fire test. We will conduct two Stage 2 static fire tests in FY 08. In FY 09, the program is focused on the first booster flight test as the final demonstration of readiness to proceed with the overall development and test program.

*Countering Complex Countermeasures – Sensors and Multiple Kill***.** A critical aspect of MDA's program to improve the effectiveness of the BMDS against the evolving threat is addressing more sophisticated countermeasures in the mid-course phase of flight. The Agency is pursuing parallel and complementary approaches to counter complex countermeasures: more sophisticated sensors and algorithms to discriminate the threat RVs from associated countermeasures and debris; and a multiple kill capability to engage and destroy the objects identified by the discrimination process as potential threat RVs.

- The Multiple Kill Vehicle (MKV) program is developing a capability to counter complex ballistic missile threats during their midcourse phase of flight with multiple kill vehicles launched from a single interceptor missile. The rapidly evolving and emerging threat drives all midcourse defense weapon systems to pursue multiple kill capability as soon as practical. Multiple kill capability increases the probability of destroying the lethal objects within a threat cluster. We develop all future kill vehicle payloads under a single program office, using a parallel path approach with two payload providers. They may pursue different technologies and design approaches, but both will adhere to our goal of delivering common, modular multiple kill vehicle payloads for integration with all BMDS midcourse interceptors. In FY 07, we developed and tested a liquid fuel divert and attitude control system (DACS). We also focused payload development efforts on engagement management capability, sensor, and DACS components. In FY 08 and FY 09, the program will continue developing and testing these payload components with the goal of demonstrating multiple kill capability in FY 11.

- Project Hercules is a program to develop a series of algorithms that will be employed in sensors (such as the SBX, AN/TPY-2, and Aegis SPY-1 radars and the STSS), kill vehicles (such as the EKV and MKV), and the C2BMC system to improve sensor and weapon element tracking and discrimination and improve integration of sensor data. Project Hercules exploits physical phenomenology associated with threat RVs and

countermeasures to develop more sophisticated algorithms that can be used in existing hardware to not only support existing ESGs, but can also enable new ESGs. For example, the list of Block 3.0 ESGs shown above in Table 5 includes several ESGs that have been added as a consequence of enhancements developed by Project Hercules.

*Improvements to Sea-Based Defenses – Aegis SM-3 Block IIA and Far-Term Sea-Based Terminal programs***.** The Aegis BMD weapons system provides a forward-deployable, mobile capability to detect and track threat ballistic missiles of all ranges. The existing deployment of Aegis SM-3 Block IA missiles and the future deployment of SM-3 Block IB missiles are intended to provide a capability to engage short-, medium-, and intermediate-range ballistic missiles in the midcourse phase of flight. The SM-2 Block IV interceptor, soon to be deployed as a part of BMDS Block 2.0, provides protection against short-range ballistic missiles in the terminal phase of flight.

We are developing important upgrades to both programs. The SM-3 Block I interceptors will be upgraded with the SM-3 Block IIA, developed in cooperation with Japan, to significantly extend the battle space and allow engagement of long-range ballistic missiles. The SM-2 Block IV program, referred to as Near-Term Sea Based Terminal, was developed as an interim solution in response to the war fighter's request for a mobile, sea-based terminal phased capability. We are developing a more long-term integrated program, referred to as Far-Term Sea Based Terminal, that will provide a much more robust and capable Sea Based Terminal capability.

- In 2006, the United States and Japan signed a Memorandum of Understanding for the co-development of an upgraded, 21-inch diameter SM-3 missile (SM-3 Block IIA). Under the SM-3 Cooperative Development project, the United States and Japan are equitably sharing cost to develop and flight test a missile that will include a significant increase in velocity and range provided by a 21-inch diameter rocket motor, and increased seeker sensitivity and divert capability incorporated in an advanced kinetic warhead. In FY 07, we initiated the first phase of the three-phase project and completed a System Concept Review for the SM-3 Block IIA interceptor. Concurrent with design of the interceptor we will implement upgrades to the Aegis Weapons System to accommodate the Block IIA missile. In FY 08 and 09, we will conduct the Systems Requirement Review and the System Design Review, with the first flight test currently scheduled for late FY 12.

- The Far-Term Sea Based Terminal (FTSBT) program will expand on the Near-Term Sea Based Terminal capability developed and delivered in BMDS Block 2.0, providing a more robust system that expands the battle space and enables engagement of longer-range threats. The FTSBT program will be developed to be compatible with the Navy's Open Architecture program to ensure it remains compatible with future upgrades to the Aegis Weapons System. We will begin FTSBT weapons system requirements definition work in FY 08, continuing into FY 09. The FTSBT program has a projected fielding date of 2014.

Space Sensor Program – STSS. We are developing the STSS because terrestrial-based sensor systems have inherent limitations--in particular, their inability to acquire and track missiles around the curvature of the earth. STSS is intended to provide a persistent identification and

global tracking and discrimination capability that would significantly increase the effectiveness of the BMDS. The system is designed to both support current ESGs and enable new ESGs. The sensors on the STSS satellites are intended to provide fire control data to allow engagements of threat RVs and, when combined with radar data, will provide information that enable the discrimination of countermeasures. In FY 07 and FY 08, the program has been focused on the delivery of two STSS Demonstration Satellites with a common ground station to demonstrate, in FY 09, key functions of the STSS system. The Demonstration Satellites are currently scheduled for launch in late FY 08. Once launched, the plan is to use dedicated targets as well as Targets of Opportunity to demonstrate the capability of the system to acquire, track, discriminate and report ballistic missile and interceptor events from lift-off through midcourse to reentry. Using the knowledge gained from the Demonstration Satellites, we plan to consider an initial space sensor constellation.

Capability Development ($millions, then year)							
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
Future Capability Development	**1,699.6**	**2,052.6**	**2,423.4**	**3,468.7**	**4,238.7**	**4,476.2**	**18,359.3**
ABL	474.8	405.8	384.6	609.5	752.1	937.8	3,564.5
Element Targets	3.3	6.2	59.0	76.3	76.3	76.3	297.5
KEI	326.6	375.7	478.6	666.0	769.2	514.1	3,130.2
STSS	219.3	232.6	253.7	547	714.3	910.2	2,877.1
Space Test Bed	-	10	10.2	24.8	100.2	123.1	268.3
MKV	228.4	344.2	441.7	601.6	658.6	823.8	3,098.2
Aegis BMD Weapon System Dev (BMD 5.1)	10.7	28.7	97.1	125.5	130.5	187.9	580.4
Aegis BMD SM-3 Block IIA Missiles - Long Lead	-	-	-	-	-	74.4	74.4
Far-Term Sea Based Terminal	13.0	38.9	49.6	44.7	163.8	176.7	486.7
Japanese Cooperative	78.6	151.1	193.1	233.9	199.6	146.7	1,003.1
C2BMC Technology	-	12.3	12.6	12.8	12.8	12.8	63.5
Technology	102.9	100.8	96.6	101.6	107.8	111.1	620.8
Sensor Development	163.2	257.6	221.3	300.1	352.8	239.7	1,534.8
Warner Robbins EWR Integration	7.6	-	-	-	-	-	7.6
Clear UEWR Integration	-	-	-	-	37.5	7.0	44.5
Cape Cod UEWR Integration	-	-	-	-	37.5	7.0	44.5
NFIRE	11.8	9.0	-	-	-	-	20.7
MDSEC	4.0	10.0	29.8	29.8	29.8	29.8	133.1
Test Capability Development	5.3	15.5	42.1	40.3	45.4	46.6	195.2
Hercules	50.0	54.3	53.4	54.8	50.4	51.2	314.1
BMDS Special Interest	**354.3**	**421.0**	**386.8**	**621.9**	**908.4**	**877.9**	**3,570.4**
Arrow	108.9	66.3	77.6	78.9	81.3	82.6	495.7
Element Targets (Arrow)	9.0	8.0	-	-	-	-	17.1
David's Sling	36.5	44.9	-	-	-	-	81.4
PAC-3	1.0	10.5	-	-	-	-	11.5
Regarding Trench	2.0	3.0	5.0	5.0	8.9	8.9	32.8
Special Programs	196.9	288.3	304.2	538.1	818.1	786.3	2,932
Total Capability Development	**2,054**	**2,473.6**	**2,810.2**	**4,090.6**	**5,147.1**	**5,354.1**	**21,929.7**

Table 11
Capability Development Funding

Sustainment - Sustaining fielded BMDS capabilities until they are transferred to the Military Services remains one of our highest priorities. As discussed in further detail below, we are working through the Missile Defense Executive Board (MDEB) to establish a set of business rules that will govern the smooth transition and transfer of BMDS capability to the Services. Our goal is to ensure that fielded capability is fully sustained during this transition and to work closely with the Combatant Commanders (COCOMs) and Services to ensure the Services have significant lead time and program information to continue operations and support budgeting requirements for the capabilities they will be responsible for operating.

Sustainment ($millions, then year)							
Program Element	**FY08**	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
Terminal Defense Segment	1.1	21.8	29.6	58.0	67.5	79.8	257.9
Midcourse Defense Segment	279.2	266.6	203.0	230.4	303.1	374.3	1,656.5
Sensors	154.6	296.5	360.5	418.3	412.1	406.9	2,048.8
Aegis BMD	43.8	42.5	45.8	31.2	30.6	29.3	223.1
C2BMC	45.6	44.5	46.5	47.5	48.7	49.7	282.4
Joint Warfighter	5.1	5.4	5.7	6.0	6.4	6.7	35.3
SBX[5]	165.2	-	-	-	-	-	165.2
Test & Targets	41.4	37.7	35.7	33.0	8.9	9.0	165.7
BMDS Annualized Sustainment	**736.0**	**715.0**	**726.7**	**824.3**	**877.3**	**955.7**	**4,835.0**

Table 12
Sustainment Funding

Mission Area Investment - Mission-related costs that cannot be assigned to a specific block but are necessary to operate the Agency while implementing and expanding the BMDS across current and future blocks are placed in this budget category. Mission Area Investments include such activities as Systems Engineering; Modeling and Simulation; Safety, Quality and Mission Assurance; Tests; and Targets. It also includes the Intelligence and Security work done by MDA. The MDA Security effort provides manpower for protection of all MDA personnel, facilities and technology. The MDA Intelligence program utilizes Intelligence Community developed products (such as IC collection and analysis of data on foreign threat missiles) and disseminates the information to the MDA Elements to support architecture design, testing, modeling and wargaming. The Intelligence funding does not support Special Access Programs (SAP). SAPs are managed by Element Program Managers and fall within the Capability Development budget category.

[5] From FY09 forward, SBX sustainment funding is included in the Sensors Program Element.

Mission Area Investment ($millions, then year)							
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
Element Targets	9.8	9.8	9.8	9.8	9.8	9.8	58.8
Joint Warfighter	56.5	58.3	61.2	64.3	66.4	67.3	374.1
Joint Staff/Service Integration Cell	4.0	4.2	4.5	4.8	5.1	5.4	28.0
Test Development Core	275.9	250.6	242.4	249.6	262.5	264.1	1,545.0
Targets & Countermeasures	182.2	219.8	215.2	219.2	233.3	237.3	1,307.1
MDIOC	66.3	70.8	73.6	73.7	75.7	76.7	436.8
Systems Engineering	118.8	124.1	132.2	173.8	164.3	167	880.2
Intel & Security	21.4	23.0	33.6	48.7	46.4	47.2	220.3
Producibility & Manufacturing Technology	29.7	33.3	38.6	47.7	44.9	45.6	239.7
BMD Info Systems	111.7	106.8	127.5	156.9	137.6	139.8	780.2
Modeling & Simulation	91.8	103.6	97.4	119.2	112.1	113.9	638.0
Safety, Quality, & Mission Assurance	26.2	28.9	35.1	42.9	40.3	41.0	214.5
MILCON	-	14.2	8.9	8.5	8.5	8.5	48.3
Mission Area Investment	983.7	1,047.6	1,079.6	1,219.1	1,206.8	1,223.6	6,760.5

Table 13
Mission Area Investment Funding

MDA Operations: The funding needed to operate our Management Headquarters, functional support to the programs (Program Wide Support), and Base Realignment and Closure (BRAC) and other activities are included in this budget category.

MDA Operations ($millions, then year)							
	FY08	**FY09**	**FY10**	**FY11**	**FY12**	**FY13**	**Total FY08-13**
PRMRF	6.0	19.7	5.0	5.3	5.4	5.5	46.9
Management Headquarters	80.4	86.5	70.4	69.9	69.9	69.9	446.8
Program-Wide Support	202.2	236.5	314.4	254.7	255.5	265.6	1,529.0
BRAC	103.2	159.9	61.9	8.7	-	-	333.8
MDA Operations	**391.8**	**502.7**	**451.7**	**338.6**	**330.8**	**340.9**	**2,356.4**

Table 14
MDA Operations Funding

Significant Changes from the President's Budget (PB) 08 Budget Submission: A very significant change to this year's budget submission is the use of the new block structure. The following is a summary of the other important program changes reflected in this year's budget compared to the FY 08 submission.

GMD. We made several adjustments to the GMD program since the FY 08 budget submission. First, in response to a reduction in funding for the European Capability (which includes the European Interceptor site and the European Midcourse Radar), we have realigned the program of work by delaying construction. We also placed military construction funding related to the

European Capability under the MILCON appropriation. To align with the other adjustments, we have delayed the fielding of Missile Field-2 at Ft. Greely by six months and advanced the two-stage Orbital Sciences Corporation Boost Vehicle (OBV) flight test program by one year. With these adjustments, the GMD program will still achieve 54 total emplacements (40 GBIs at Ft. Greely, four GBIs at VAFB, and 10 GBIs at the EIS) by 2013.

Aegis BMD. In the Aegis program we have extended the development of the SM-3 Block IB missile by one year. The program will still deliver a total of 147 SM-3 missiles, but the first 94 will be Block I/IA missiles, not the 75 as proposed in PB 08.

THAAD. The ground systems for THAAD Fire Units #1 and #2 will be delivered on schedule in FY 09 and FY 10, but the interceptor deliveries will be delayed by six months. We have also deferred the delivery of Fire Units #3 and #4 by one year (Fire Unit #3 and #4 will now be delivered in FY 13 and FY 14, respectively).

KEI. As noted above, we focused the KEI program in PB 08 on the development of a very fast, high acceleration, heavy lift booster needed to successfully execute the boost-phase defense mission. The additional funding provided in the FY 08 appropriation will allow that focus to expand to include the weapon system requirements work, including that for a land-mobile launcher, a mobile fire control and communications system, and integration of the kill vehicle. The plan in PB 08 was to conduct a booster-only System Design Review in FY 09, but the program has been adjusted and it will now be a full KEI Weapons System Design Review.

MKV. We are continuing the development of the critical volume kill capability based on three principles. First, one program office will deliver all future kill vehicles--both unitary and multiple. Second, commonality across the BMDS will be optimized with use of common interfaces, standards, and architecture. Third, and most importantly, we will continue to pursue a parallel path development for the MKV. This approach, instituted in FY 08, has resulted in a competitive environment that has already yielded results. The approaches are fundamentally different with respect to the command and control of the kill vehicles, the most challenging aspect of a successful MKV program. It is not yet clear which path will provide the better solution, but it would not have been possible to investigate both options in a timely and efficient manner without pursuing parallel paths.

Sensors. In addition to grouping all future kill vehicle work under one program office, we have consolidated all radar programs under the Sensor program office. All BMDS radars, including the UEWRs (Beale, Fylingdales, Thule and Cobra Dane), the SBX, and all AN/TPY-2 radars (both forward-based and THAAD Fire Units) will now be managed under one program office. This will allow us to optimize commonality and efficiently leverage industry-wide experience and talent to mitigate risks and costs.

Program Wide Support (PWS). We have redistributed the PWS funding among the various Program Elements so that the amount of PWS funding associated with any element is proportional to the Element's share of the overall MDA budget.

III. Special Topics

Three topics are of special note in this FY 09 budget submission: (1) participation by our allies and friends in the U.S. BMDS and missile defense capabilities; (2) transition and transfer of missile defense capabilities from MDA to the military services; and (3) Concurrent Test, Training, and Operations.

International Participation

Ballistic missile defense is a global effort that often requires the United States to work closely with friends and allies to dissuade potential adversaries from acquiring ballistic missiles and, if necessary, defeat ballistic missile attacks. International participation in missile defense remains a pillar of our nation's counter-proliferation strategy and our missile defense program strategy.

MDA's International Strategy, approved in August 2007, includes the following goals:

- Build relationships to achieve international missile defense goals; communicate the importance of missile defense and promote a global system through information sharing with allies and partners
- Promote missile defense capability and interoperability through appropriate means, such as the international fielding of missile defense assets and the identification and integration of U.S. and partner assets and systems
- Identify and evaluate international technology in support of improved global capabilities
- Identify and execute investment opportunities with allies and partners

With MDA's support, international participation in missile defense has grown substantially, especially against the threat posed by Iranian and North Korean weapon development activities. Japan has been upgrading its four Aegis Destroyers to BMD capability and acquiring the Standard Missile-3 (SM-3), and, in December 2007, achieved a successful missile intercept with the SM-3. It is also upgrading four battalions to Patriot Advanced Capability (PAC)-3 capabilities. The United States and Japan have worked together to establish a site for a forward-based X-band BMDS radar and executing the joint $2.5 billion SM-3 Cooperative Development program that promises to deliver a substantial capability to defeat threats. The United States and Japan have also begun a dialogue with Australia as part of the 2007 Trilateral Missile Defense Forum.

Our long-standing partnership with the United Kingdom has continued to expand as we have increased the capabilities of the Fylingdales Early Warning Radar, improved our combined C2BMC situational awareness, and explored new areas of future cooperation. The United States and Denmark are upgrading the Thule Early Warning Radar to the configuration of other early warning radars. Upgrades at Fylingdales and Thule will significantly enhance our capability to detect and track ballistic missile threats emerging from the Middle East. MDA has also been working with the Government of Israel on the Arrow system improvements and the new David's Sling Short-Range Ballistic Missile Defense effort.

Also, the State and Defense Departments began negotiations with Poland and the Czech Republic to establish agreements for deploying BMDS assets in those countries. The assets to be deployed--GBIs in Poland and mid-course radar in the Czech Republic--will protect the U.S. homeland and most of Europe from long-range missiles launched from the Middle East. In support of the deployments and negotiations, MDA continued its technical analysis of potential deployment sites in both Poland and the Czech Republic.

The North Atlantic Treaty Organization (NATO) continues to examine its missile defense requirements. In the past year, NATO completed a Missile Defense Feasibility Study focused on the protection of NATO population centers and territory against longer-range missile threats, concluding that missile defense for Europe is technically feasible. The study also produced a recommended missile defense architecture that, if deployed, would protect Europe from long-range threats. As follow on to this study, NATO is examining how our BMDS assets in Europe affect the NATO study's recommended architecture.

Transition and Transfer

In establishing MDA in 2002, DoD leadership expected the Agency to be focused on rapidly developing, testing, and fielding near-term capabilities; the military departments would be responsible for long-term procurement and operations and support activities of transferred BMDS elements and components. Given the successful fielding of BMDS assets, DoD has accelerated its planning for the transition and transfer of BMDS elements to the departments. Actions taken include the development of a master BMDS Transition and Transfer Plan to document agreements between MDA and the military departments regarding responsibilities and authorities for BMDS elements and components that (1) have not yet formally entered transition but are providing initial operational capability; (2) have entered transition; and (3) have transferred. This document is updated annually upon approval of the Under Secretary of Defense (USD), Acquisition, Technology and Logistics (AT&L) and in conjunction with the military departments. USD (AT&L) signed the FY 2006 Transition and Transfer Plan in September 2006; the FY 2007 Transition and Transfer Plan is currently in coordination review.

To facilitate the transition and transfer process and clarify MDA's roles in supporting the war fighter's partial and full military capability declarations, the MDA Director issued guidance in May 2007 to define early, partial, and full capability deliveries. Key aspects of these definitions follow:

- *Early Capability Delivery* (ECD) is based on completion of the element-level test campaign and analysis; sufficient confidence that the capability will operate safely, and having logistics support in place for contingency operations of limited duration.

- *Partial Capability Delivery* (PCD) is based on completion of the BMDS-level test campaign and analysis; support of the war fighter's partial military capability objectives; and logistics support in place to achieve defensive operations.

- *Full Capability Delivery* (FCD) is based on completion of an assessment of system performance against technical objectives and goals; fulfillment of the war fighter's

military capability objectives, completion of the BMDS-level test campaign and analysis, and having logistics support in place for a sustained defensive operations.

Table 15 lists the lead military department designations for applicable BMDS elements and components.

BMDS Element/ Component	Designated Lead Service
ABL	Air Force
Cobra Dane	Air Force
EMR	Air Force
SBIRS	Air Force
STSS	Air Force
UEWR	Air Force
AN/TPY-2	Army
GBI GFC	Army
PAC-3	Army
THAAD	Army
Aegis BMD	Navy
SBX	TBD
C2BMC	N/A

Table 15
Designated Lead Services for BMDS Elements and Components

The Missile Defense Executive Board (MDEB) is deliberating on a strategic process for transition and transfer. The MDEB is comprised of senior-level representatives from the Office of the Secretary of Defense, Joint Chiefs of Staff, COCOMs, and the military departments. It is responsible for providing recommendations to the Deputy Secretary of Defense and other senior policy makers on missile defense issues; recommending and overseeing implementation of strategic policies and plans, program priorities, and investment options; facilitating timely and effective delivery of capability to the war fighter community; and enhancing the department's decision-making process by improving information flow among key stakeholders. A detailed description of the Board's organization and activities is discussed in Section IV of this Overview.

The strategic process for transition and transfer may include the extensive involvement of the MDEB in brokering agreements between MDA, the COCOMs, and the military departments over funding responsibilities and in recommending transition and transfer decisions to the Deputy Secretary of Defense. The process being considered links these decisions to MDA-led partial and full capability delivery declarations and U.S. Strategic Command (USSTRATCOM)-led mission capability declarations.

Concurrent Test, Training, and Operations (CTTO)

Addressing a Unified Combatant Command priority requirement, CTTO is critical to the defense of the U.S. homeland and deployed forces by providing geographically dispersed upgrades, testing, training, and sustainment while maintaining operational readiness across the BMDS. While the BMDS is in an operational state or "on alert," CTTO will enable simultaneous training events in the field during testing and sustained operational readiness conditions without degrading protection capability. It will also help to integrate existing BMDS teams; provide leadership and guidance for the planning, execution, analysis, and reporting of BMDS CTTO events to support system verification; increase war fighter confidence in the BMDS; and support the development and evaluation of war fighter tactics, techniques, and procedures at the BMDS level.

The Distributed Multi-Echelon Training System (DMETS) is an essential component of CTTO. DMETS consists of live, virtual and constructive training environments for proficiency training, operator certification, exercises, and tactics, techniques and procedures development, mission rehearsal, review, testing and revision. DMETS will create an exercise like environment for units to gain training task coverage and achieve other learning objectives by presenting standardized, technically accurate threat scenarios and other problems, faults, and situations that elicit the performance of individual and collective tasks. As MDA continues to develop the BMDS to defend the United States, deployed forces, friends and allies, the spiral development of DMETS will keep pace in meeting the continuing need to effectively train the crews, elements, staffs and commanders who execute the evolving BMDS mission.

CTTO accomplishments in FY 07 included creation of 58 training scenarios and provision of 497 training sessions for 9 Unified Combatant Command organizations and establishment of the initial DMETS local area network at the Missile Defense Operations and Integration Center to improve operability and reliability. In FY 08, CTTO operated and sustained training and exercise suites for 50 hours per week; expanded the training audience; improved training availability and effectiveness; and improved realism to include cross-mission functionality and allow for dynamic changes to scenarios. The planned program for FY 09 includes operating and sustaining the DMETS training and exercise suites at 80 hours per week; continuing to expand the training audience; improving training availability and effectiveness and realism; and improving system operability and reliability and the quality of integrated training.

IV. Enhanced Oversight of MDA

MDA is subject to a wide range of oversight mechanisms and activities. These include:

- The MDEB ensures MDA receives senior-level guidance from key stakeholders, including the Department of State, OSD, COCOMs, and the military departments. (See below for a detailed description of the Board.)
- Senior leaders in OSD frequently review MDA's program activities. For example, USD (AT&L) conducts Quarterly Execution Reviews of MDA programs.

- The Director, Operational Test and Evaluation (DOT&E) plays a substantial role in developmental and operational test planning and execution. DOT&E also reports annually to the Congress on the status of BMDS testing.
- MDA annually submits schedule, budget, and performance baselines and goals to Congress for its fielded configurations and reports significant variances in its Statement of Goals (SOG).
- The Government Accountability Office (GAO) conducts selected audits and an annual comprehensive "mandate" review of MDA. A primary source for GAO's mandate review is earned value data provided monthly by MDA.
- DoD's Office of Inspector General performs selected audits.
- MDA senior staff provides over 50 briefings to congressional offices every year. In 2007, more than 75 briefings were presented to congressional Members and staff.

In response to increasing congressional expectations, MDA has taken steps to enhance the accountability and transparency of the BMD program. In February 2008, we will report to the Committee on Appropriations, U.S. House of Representatives, on our detailed plan, including the steps related to acquisition program baselines, unit cost reporting, independent cost estimates performed by the Cost Analysis Improvement Group (CAIG), and operational testing. In summary,

- MDA has established a new block structure (described in Section I) that is not tied to biennial time periods. Under its new structure, MDA will establish newly formulated schedule, budget, and performance baselines based on fielded Ballistic Missile Defense System (BMDS) capabilities against specified threats. In the annual Statement of Goals (SOG)[6] that accompanies the President's Budget for FY 2009, we will present these baselines. In each subsequent year's SOG and the annual Selected Acquisition Report (SAR), we will explain any significant variances from expected outcomes. The Agency will also explain changes in year-to-year funding plans for each block over the period of the Future Years Defense Program (FYDP).

- In 2008, MDA will begin establishing unit cost baseline estimates for BMDS capabilities being acquired and delivered to the war fighter. Our approach will be to build estimates from the level of selected components to be fielded (such as the Terminal High Altitude Area Defense—THAAD--Fire Unit) to the element (THAAD) level and eventually to the block level, as appropriate to enhance transparency, accountability, and oversight. Once those estimates are established, we will report significant unit cost growth to the Congress. Our Agency intends to use CAIG resources when establishing unit cost baseline estimates.

- In 2008, MDA will report contract cost variances based on earned value data, including cumulative cost variances and the most likely overrun/underrun at contract completion. This earned value data will be provided quarterly to GAO and will be summarized annually in the BMDS SAR to the Congress.

[6] The Statement of Goals complies with section 223 of the National Defense Authorization Act of 2004 (P.L. 108-136).

- The services Operational Test Agencies (OTAs) and DOT&E play substantial roles in the BMDS' combined Developmental Test/Operational Test Planning, execution, and post-test analysis. Further, MDA's test program is subject to external oversight by the MDEB, which has a standing committee on Test and Evaluation co-chaired by the Principal Deputy Director, OT&E, and the Deputy Under Secretary of Defense, Acquisition and Technology.

Missile Defense Executive Board (MDEB). The MDEB has replaced the Senior Executive Council (SEC) and Missile Defense Support Group (MDSG) as the Executive Branch's senior oversight body for missile defense activity. Chartered by the Deputy Secretary of Defense in March 2007, the MDEB is responsible for providing recommendations to the Deputy Secretary and other senior policy makers on missile defense issues; recommending and overseeing implementation of strategic policies and plans, program priorities, and investment options; facilitating timely and effective delivery of capability to the war fighter community; and enhancing the department's decision-making process by improving information flow among key stakeholders. From its inception, the MDEB has been organized into four standing committees--Policy Oversight; Operational Forces; Program, Acquisition and Budget Development; and Test and Evaluation--to focus attention on areas of particular urgency and sensitivity.

V. MDA Management Initiatives and Performance Improvements

Our Agency is committed to a number of initiatives to achieve a more effective and efficient organization. These include the implementation of organizational reengineering, the Base Realignment and Closure (BRAC) recommendations; the Defense Agencies Initiative (DAI), a strengthened systems engineering process, Missile Defense Agency Engineering and Support Services (MiDAESS), and the Performance Improvement Initiative (PII).

Organizational Reengineering

MDA's reengineering goal is to transform the organization into a single, integrated high-performance team capable of sustaining its development and test successes and maximizing its efficiency and effectiveness in acquiring, fielding, and supporting an integrated, operational BMDS. To accomplish this goal, the Agency's Director has established policies and defined responsibilities for providing qualified matrix support to the program directors/managers (PD/PM) responsible for delivering BMDS capabilities to the COCOMs. Matrixing is an organizational concept that consolidates skills and resources under a functional manager who, in turn, allocates persons and resources among executing organizations needing these skills. Matrixed support includes such functions as engineering, contracts, business/financial management, cost estimating, acquisition management, logistics, test, safety quality and mission assurance, security, administrative services, information assurance, and international affairs. The matrix management process aims to strengthen PD/PM capabilities by assuring their accessibility to all expertise available to MDA; increasing accountability for quality of functional staff work; and allocating personnel resources according to the Agency's needs.

MDA has established the following objectives to focus the reengineering efforts:

- Implement a full matrix management construct to strengthen functional responsibilities at both the BMDS and element level of program execution
- Establish key new or restructured organizations and centers to strengthen the implementation of an integrated system
- Establish key knowledge centers to focus MDA resources on and within critical mission technical areas[7]
- Complete an organizational alignment assessment to improve agency efficiency and effectiveness through elimination of redundancy of functions and infrastructure, multiple layers of management and non-critical functions, and a verification that resources are aligned with MDA priorities
- Relocate MDA offices from the National Capital Region (NCR) to Huntsville and selected other locations to realize the benefits of a centralized control/decentralized execution strategy, facilitate leveraging all resources available in MDA and propagate better cross-flow of expertise and information among program activities at all MDA locations

Base Realignment and Closure (BRAC)

The 2005 Defense Base Realignment and Closure Commission approved recommendations directing the realignment of several MDA directorates from the NCR to government facilities at Fort Belvoir, Virginia, and the Redstone Arsenal in Huntsville, Alabama. Specifically, a Headquarters Command Center for MDA will be located at Fort Belvoir, while most other MDA functions will be realigned to Redstone Arsenal. The transfer of government and contractor personnel from the NCR is already in progress; by the end of 2008, we will have transitioned some 1,100 personnel positions to the Arsenal. Also, construction will start in FY 08 on additional facilities to be opened in two phases in FY 10 and FY 11. Construction of the MDA Headquarters Command Center (HQCC) is also scheduled to begin in late FY 08, with completion and occupancy scheduled for FY 10.

Defense Agencies Initiative (DAI)

The Missile Defense Agency is one of the six "Wave 1" Agencies to implement the Defense Agency Initiative (DAI). MDA is currently scheduled to implement in the second quarter of FY 09.

DAI is a significant initiative within the Department's overall effort to modernize its financial management, including streamlining financial management capabilities, eliminating material weaknesses, and making financial statements easier to audit for the Defense Agencies and field activities across the DoD. The DAI implementation approach is to deploy a standardized system solution that effectively addresses the requirements in the Federal Financial

[7] Knowledge centers for Interceptors, C2BMC, and Sensors were established in January 2008. Centers for Space and Directed Energy will be established later in 2008.

Management Improvement Act and OMB Circular-A-127 by leveraging selected Commercial Off-the-Shelf products. The benefits of DAI include a single Financial System Integration Office certified solution; common business processes and data standards; access to real-time financial data transactions; significantly reduced data reconciliation requirements; enhanced analysis and decision support capabilities; standardized line of accounting with the use of Standard Financial Information Structure; and use of United States Standard General Ledger Chart of Accounts to resolve DoD material weaknesses and deficiencies.

Capitalizing on the combined business acumen of twenty-eight Defense Agencies and/or Field Activities, DAI will implement a compliant business solution with common business processes and data standards for the following business functions within budget execution requirements: procure to pay; order to fulfill; acquire to retire; budget to report; cost accounting; grants accounting; time and attendance; and re-sales accounting. Each Defense Agency is committed to leveraging its resources and talents to build an integrated system that supports standardized processes and proves that the DoD is capable of using a single architecture and foundation to support multiple, diverse components.

Strengthened Systems Engineering Process

Developing and fielding an integrated BMDS requires a collaborative effort that cuts across many disciplines and specialties both within MDA and among our industry partners. As capability is added to the BMDS, the systems engineering process for the development of any new capability must be a top-driven, integrated and collaborative approach that focuses first on the overall BMDS mission objectives and desired performance and then on allocating requirements to the sensor, weapon, and battle management elements. The upfront definition of new capabilities requires a strong corps of BMDS engineers to work concurrently with the individual program elements to produce the most effective strategy for the agency.

For example, developing kill vehicles that will be employed on the various BMDS interceptors within the stovepipe of individual program offices would be inefficient, costly, and reduce overall BMDS performance. Such an approach would not leverage commonality, reduce duplication of effort, or facilitate the effective integration of the kill vehicle into the larger system it serves. With this approach, we would be developing a series of kill vehicles, each with its own unique design specifications and requirements without carefully considering its impact on broader BMDS objectives. Instead, we are using a kill vehicle development process that begins by defining the BMDS' overall desired layered defense capability and making the necessary trades against threats of various complexities and raid sizes. The organizing principle for the development of future kill vehicles, or any new capability, is not how it will integrate with an individual booster but on how any single development fits into the overall BMDS strategy.

Missile Defense Agency Engineering and Support Services (MiDAESS)

Consistent with the Agency's reengineering, MDA has undertaken the task of improving how it procures contractor support services (CSS). The objectives of the change are to improve oversight, enable matrix management so the Agency can benefit more from cross-flow of

information among different offices, enhance efficiency and transparency, and more accurately account for our cost of doing business. MDA has determined that the best path forward is to develop a new Agency-wide procurement; the designation for this procurement is MiDAESS.

MDA currently receives contractor support through a variety of different avenues, such as contracts, other government agencies, and General Services Administration orders. Over the next few years, the MiDAESS procurement will allow MDA to consolidate the various ways it has used to obtain CSS into a more efficient and coherent procurement, focused on the primary functional areas of technical, administrative, financial, and other support that MDA requires.

Beginning in March 2007, the Agency began discussions with its industry partners regarding the MiDAESS. Throughout 2007, MDA has received industry feedback and continues to refine the details of how competition and contracting within MiDAESS will function. The Agency plans to begin initial contract awards under MiDAESS in 2008.

Performance Improvement Initiative (PII)

As a defense agency chartered to conduct capabilities-based acquisition, spiral development and continuous improvement, MDA has always placed considerable emphasis on achieving and sustaining continuous improvement in the performance of its personnel, mission activities, supporting systems and processes. In the past, our efforts in this area were reported under the Budget and Performance Integration Initiative within the President's Management Agenda using the performance measures developed for the Program Assessment Rating Tool (PART) evaluation process.

Since MDA's last PART assessment in 2005, many of our earlier goals and targets have been achieved--and usually, with resounding success. For example, our FY 07 goal for the test program was to conduct 10 major tests of various elements of the BMDS, and over the course of the year, nine were successfully completed. The targets for FY 08 and FY 09 are five and seven major tests, respectively.

However, the number of completed tests is only part of the story. MDA designs tests to evaluate the individual performance characteristics of BMDS component elements as well as the integration and effectiveness of these elements within the total system. We also design test events to be progressively more challenging and complex than previous tests--in line with the increasing complexity of global missile threats.

We realize that many of our earlier measures of performance are no longer viable or appropriate. For example, the introduction of a new block structure requires us to take a much more rigorous and exacting approach to budgeting and cost accounting for program elements. So for FY 2009 and beyond--and consistent with the re-designation of the Budget and Performance Integration Initiative to become the Performance Improvement Initiative (PII)--MDA will place even greater emphasis on achieving continuous performance improvement through the development and application of improved performance measures. Accordingly, MDA will work with the Office of Management and Budget during our 2008 PART assessment to validate and emplace new and improved performance measures that will better support the

long term goals of our agency, as outlined in the *2006 MDA Strategic Intent* and our annual Statement of Goals, which defines schedule, budget, and performance baselines and goals under our new block structure.

VI. President's Budget Submission and Organization

Table 16 presents MDA's total budget by appropriation and for the blocks and other budget categories. Table 17 presents MDA's total budget by appropriation, program element, and year.

PE Title	PE Number	Capability Blocks					Sustainment	Capability Development	Mission Area Investment	MDA Operations	PE Total
		Block 1	Block 2	Block 3	Block 4	Block 5					
RDT&E											
Technology	0603175C							684.3		35.6	**719.9**
Terminal	0603881C		2,106.5	-		1,471.7	257.9	605.7		126.1	**4,567.9**
Midcourse	0603882C	1,412.5		2,992.1	3,149.2		1,656.5		10.5	282.3	**9,503.2**
Boost	0603883C							3,669.1		130.5	**3,799.7**
Sensors	0603884C	11.3	133.7	268.6	637.4	882.9	2,048.8	1,631.4		166.6	**5,780.7**
BMDS Interceptor	0603886C							3,202.7		102.6	**3,305.3**
BMDS Test & Targets	0603888C	68.0	67.5	248.0	92.2	186.2	165.7	195.2	2,910.9	111.6	**4,045.4**
BMD Core	0603890C								2,973.0	94.8	**3,067.8**
Special Program	0603891C							2,932.0			**2,932.0**
Aegis BMD	0603892C		785.5			3,429.8	223.1	2,144.6		183.2	**6,766.1**
STSS	0603893C							2,880.0		94.5	**2,974.5**
Multiple Kill Vehicle	0603894C							3,215.8		94.5	**3,310.3**
Space	0603895C							422.2		13.5	**435.6**
C2BMC	0603896C	101.6	227.6	916.9	66.0	167.2	282.4			49.1	**1,810.8**
Hercules	0603897C							314.1		10.7	**324.8**
Joint Warfighter Support	0603898C						35.3		383.3	14.1	**432.7**
MDIOC	0603904C			70.0		45.9			445.0	19.2	**580.1**
Regarding Trench	0603906C							32.8			**32.8**
SBX	0603907C						165.2				**165.2**
PRMRF	0901585C									46.9	**46.9**
Management Headquarters	0901598C									446.8	**446.8**
MILCON					837.5	29.6			48.3		**915.3**
BRAC	0207998C									333.8	**333.8**
Grand Total		**1,593.4**	**3,320.8**	**4,495.6**	**4,782.3**	**6,213.3**	**4,835.0**	**21,929.7**	**6,771.1**	**2,356.5**	**56,297.6**

Table 16
Funding by Block and Other Funding Categories
FY 08 – 13 ($millions, then year)

PE Title	PE Number	FY08	FY09	FY10	FY11	FY12	FY13	FY08-13 Total
RDT&E								
Technology	0603175C	108.4	118.7	115.2	120.2	127.0	130.4	719.9
Terminal	0603881C	1,045.3	1,019.1	795.7	719.8	548.3	439.8	4,567.9
Midcourse	0603882C	2,243.2	2,076.7	1,748.1	1,385.3	946.4	1,103.5	9,503.2
Boost	0603883C	510.2	421.2	423.9	652.6	799.8	991.8	3,799.7
Sensors	0603884C	586.1	1,077.0	1,116.7	1,099.6	1,077.6	823.6	5,780.7
System Interceptors	0603886C	340.1	386.8	501.0	708.8	815.4	553.1	3,305.3
Test and Targets	0603888C	621.9	665.4	664.4	682.5	700.5	710.7	4,045.4
System Core	0603890C	413.9	432.3	482.9	605.2	561.9	571.5	3,067.8
Special Programs - MDA	0603891C	196.9	288.3	304.2	538.1	818.1	786.3	2,932.0
Aegis BMD	0603892C	1,126.3	1,157.8	1,234.2	1,078.5	1,066.7	1,102.5	6,766.1
STSS	0603893C	231.5	242.4	266.5	560.1	735.7	938.2	2,974.5
Multiple Kill Vehicle	0603894C	229.9	354.5	488.3	649.6	708.6	879.4	3,310.3
System Space Program	0603895C	16.6	29.8	41.6	56.2	133.9	157.5	435.6
C2BMC	0603896C	447.6	289.3	287.2	270.8	256.8	259.2	1,810.8
Hercules	0603897C	52.5	56.0	55.3	56.4	51.9	52.8	324.8
Joint Warfighter Support	0603898C	49.4	70.0	74.0	77.2	80.2	81.9	432.7
MDIOC	0603904C	78.6	96.4	100.4	100.4	101.5	102.8	580.1
Regarding Trench	0603906C	2.0	3.0	5.0	5.0	8.9	8.9	32.8
SBX	0603907C	165.2	-	-	-	-	-	165.2
Pentagon Reservation	0901585C	6.0	19.7	5.0	5.3	5.4	5.5	46.9
Management Headquarters	0901598C	80.4	86.5	70.4	69.9	69.9	69.9	446.8
	RDT&E Total	8,552.1	8,890.7	8,780.1	9,441.4	9,614.6	9,769.4	55,048.4
MILCON								
BMDS European Interceptor Site		-	132.6	528.8	-	-	-	661.4
BMDS AN/TPY-2 #3		-	29.6	-	-	-	-	25.5
BMDS European Mid-Course Radar		-	108.6	67.5	-	-	-	176.1
Unspecified Minor Construction		-	3.5	3.5	3.7	3.7	3.7	3.5
MILCON Planning & Design		-	10.8	5.0	4.8	4.8	4.8	14.9
	MILCON Total	0.0	285.0	604.9	8.5	8.5	8.5	915.3
BRAC								
BRAC	0207998C	103.2	159.9	61.9	8.7	0.0	0.0	333.8
	BRAC Total	103.2	159.9	61.9	8.7	0.0	0.0	333.8
	TOTAL	**8,655.3**	**9,335.7**	**9,446.9**	**9,458.6**	**9,623.1**	**9,777.9**	**56,297.6**
Defense-Wide Resources	0904903D	0.0	0.0	-1,487.8	-1,529.2	-1,561.2	-1,592.5	-6,170.6
MDA Total Less Defense-Wide Resources		**8,655.3**	**9,335.7**	**7,959.2**	**7,929.5**	**8,061.9**	**8,185.4**	**50,127.0**

Table 17
Funding by Appropriation and Program Element by Year
FY 08 – 13 ($ millions, then year)

VII. Summary

The threat to the United States, its deployed forces, allies, and friends from proliferating ballistic missiles remains grave. The United States has demonstrated substantial progress in designing and building defensive weapons to destroy enemy ballistic missiles. MDA has already provided the war fighter with capabilities to defeat some ballistic missile attacks while continuing to develop, test, and field an increasingly capable system of interceptors, sensors, and command and control, battle management and communications systems to improve the depth, range, and reliability of our defenses.

The often-cited question of whether it is possible to intercept a "bullet with a bullet"--both traveling at thousands of miles per hour--has been answered definitively. In fact, missile defense testing has demonstrated time and again that this intercept is quite achievable. With this basic question answered, the technical challenges that remain today lie in predicting the location of the enemy missiles, differentiating the missiles from countermeasures, communicating this information rapidly and accurately to the defensive system, and destroying multiple enemy missiles launched within seconds and minutes of each other.

Our budget submission reflects a careful balancing of needs and resources. With the support of Congress and the American people, the dedicated employees of MDA and its contractors are working hard every day to successfully meet these challenges and provide the war fighter with the means to defeat enemy ballistic missiles.

VIII. Acronyms

ABL	Airborne Laser
AFB	Air Force Base
AT&L	Acquisition, Technology and Logistics
BMDS	Ballistic Missile Defense System
BRAC	Base Realignment and Closure
BSP	BMD Signal Processor
BV+	Lockheed Martin Booster Vehicle Plus
C2BMC	Command and Control, Battle Management and Communications
CAIG	Cost Analysis Improvement Group
CD	Cobra Dane
COCOM	Combatant Commander
CONOPS	Concept of Operations
CSS	Contractor Support Services
CTTO	Concurrent Test, Training and Operations
DACS	Divert and Attitude Control System
DAI	Defense Agencies Initiative
DMETS	Distributed Multi-Echelon Training System
DoD	Department of Defense
DOT&E	Director, Operational Test & Evaluation
ECD	Early Capability Delivery
EIS	European Interceptor Site
EKV	Exoatmospheric Kill Vehicle
EMR	European Midcourse Radar
ESG	Engagement Sequence Group
FBX-T	Forward Based X-Band Radar – Transportable
FCD	Full Capability Delivery
FIAR	Financial Improvements and Audit Readiness
FTG	Flight Test GMD
FY	Fiscal Year
FYDP	Future Years Defense Program
GAO	Government Accountability Office
GBI	Ground Based Interceptor
GFC	GMD Fire Control
GMD	Ground-Based Midcourse Defense
GTD	Ground Test Distributed
GTI	Ground Test Integrated
HQCC	Headquarters Command Center
ICBM	Intercontinental Ballistic Missile
IFT	Integrated Flight Test
IRBM	Intermediate-Range Ballistic Missile
JCIDS	Joint Capabilities Integration and Development System
KEI	Kinetic Energy Interceptor
KM	Kilometers

KV	Kill Vehicle
LRBM	Long-Range Ballistic Missile
LRS&T	Long Range Surveillance and Tracking
M&S	Modeling and Simulation
MDA	Missile Defense Agency
MDEB	Missile Defense Executive Board
MDIOC	Missile Defense Integration and Operations Center
MDSG	Missile Defense Support Group
MiDAESS	MDA Engineering and Support Services
MILCON	Military Construction
MKV	Multiple Kill Vehicle
MRBM	Medium-Range Ballistic Missile
NATO	North Atlantic Treaty Organization
NCR	National Capital Region
NFIRE	Near-Field Infrared Experiment
O&M	Operations and Maintenance
OBV	Orbital Sciences Company Boost Vehicle
OSD	Office of the Secretary of Defense
OTA	Operational Test Agencies
PAC	Patriot Advanced Capability
PART	Program Assessment Rating Tool
PCD	Partial Capability Delivery
PD/PM	Program Directors/Program Managers
PE	Program Element
PII	Performance Improvement Initiative
RDT&E	Research, Development, Test and Evaluation
RV	Reentry Vehicle
SAP	Special Access Programs
SAR	Selected Acquisition Report
SBX	Sea-Based X-Band Radar
SE	Systems Engineering
SEC	Senior Executive Council
SM	Standard Missile
SOG	Statement of Goals
SRBM	Short-Range Ballistic Missile
STSS	Space Tracking & Surveillance System
T&E	Test and Evaluation
TBMD	Tactical Ballistic Missile Defense
TDACS	Throttleable Divert and Attitude Control System
THAAD	Terminal High Altitude Area Defense
UEWR	Upgraded Early Warning Radar
UK	United Kingdom
USD/AT&L	Under Secretary of Defense for Acquisition, Technology and Logistics
USCENTCOM	United States Central Command
USD	Under Secretary of Defense

USEUCOM	United States European Command
USNORTHCOM	United States Northern Command
USPACOM	United States Pacific Command
USSTRATCOM	United State Strategic Command
VAFB	Vandenberg Air Force Base
WIP	Warfighter Involvement Process