TRADOC Pamphlet 525-7-5

The United States Army Concept Capability Plan for

Global Missile Defense

2015-2024

Version 1.0

4 August 2008

Foreword

From the Director
U.S. Army Capabilities Integration Center

In the future, the Army will continue to see an increase in all ranges of technologically advanced ballistic missiles, cruise missiles, long-range rockets, and air to surface missiles available to state and non-state actors. These offer our potential adversaries a means to offset continued U.S. and allied military dominances, especially when coupled with weapons of mass destruction payloads. This problem will affect regional conflicts as well as threaten the U.S. homeland. The defense of the U.S. homeland and operations in forward theaters are no longer separate operational environments, but rather part of a single global operational environment. The future joint force must simultaneously defend the homeland while it executes multiple, distributed and decentralized operations throughout a singular global operational environment—thus the need for global missile defense.

TRADOC Pamphlet 525-7-5, *The United States Army's Concept Capability Plan for Global Missile Defense 2015-2024* identifies the required future global missile defense capabilities during the 2015-2024 timeframe. TRADOC Pamphlet 525-7-5 describes how Army forces will synergistically support operations at all levels to include joint and multinational. In examining the Army's future global missile defense (GMD) capabilities, the concept capability plan (CCP) describes the operational environment, the emerging threats, and the joint interdependences required. This CCP describes GMD as a network-centric, integrated system of multi-tiered measures that include the synchronization of all operations that involve multiple geographic combatant commanders' areas of responsibility.

The identification of these capabilities will provide a coherent way ahead for the further examination for potential doctrine, organization, training, materiel, leadership and education, personnel, and facilities solutions through the support to the joint and Army capabilities based assessment processes. It will also provide technology vector and material development guidance to the Missile Defense Agency on the capabilities that the Army will require to fully support the modular force battle field.

The realization of these capabilities is essential to achieving the Army's capstone concept objective for a strategically responsive, campaign quality force, and countering adversary anti-access operations. As this CCP crosses so many joint and Army functional areas, I strongly encourage its use by other proponents, Services, and joint organizations.

Michael A. Vane
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Director, Army Capabilities
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Executive Summary

Operational Problem

a. The future will continue to see an increase in missile delivery systems available to state and non-state actors. This expanding threat, coupled with the proliferation of weapons of mass destruction payloads, offers a method to potential adversaries to offset continued U.S. and allied military dominance. Technological advances and their propagation will make available to foes all ranges of ballistic missiles, cruise missiles, long-range rockets, and air to surface missiles. This, coupled with potentially catastrophic and disruptive warheads and the cooperation between state and non-state actors, creates even more uncertainty and makes the need for missile defense a high priority. This problem will affect regional conflicts, and in certain circumstances, threatens the U.S. homeland. This latter concern may have an effect on the U.S. ability for power projection and sustainment of deployed forces. The defense of the U.S. homeland and operations in forward theaters are no longer separate operational environments, but rather part of a singular global operational environment. Future joint forces must simultaneously defend the homeland while it executes multiple, distributed, and decentralized operations throughout a singular global operational environment – thus the need for GMD.

b. Current missile defense operations are challenged by inadequate interoperability among weapon systems, sensors, and battle management. Collaborative planning, integrated fire control, and combat identification are constrained by both technical and procedural issues. The potential threat of ballistic missiles, cruise missiles, long-range rockets, and air to surface missiles with weapons of mass destruction munitions will continue to grow as these systems rapidly proliferate; therefore, it is critical that GMD be evolved or developed to counter these enemy capabilities. Weapon inventories may not be adequate to withstand massive swarming attacks from all directions. Separate battle management command, control, and communication for missile and air defense, as well as separate strategic and operational/tactical systems, are not only expensive, but may be inefficient in countering the wide and varied threats. Potential opponents will look for weapon systems, sensors, and battle management seams to exploit. GMD must become what it is not now, a modular, full spectrum, networked, deployable, integrated missile defense capability for global, homeland, regional, and theater defenses.

Scope

a. To achieve the Army's capstone concept objective of becoming a "…strategically responsive, campaign quality force, dominant across the spectrum of conflict and fully integrated within the joint, interagency, intergovernmental, and multinational security framework…," the U.S. must be able to field dominant and fully integrated GMD capabilities for land component operations. Employing a combination of fixed and mobile sensor and shooter capabilities, Army GMD forces, as integral elements of the joint interdependent global missile defense system, will provide protection for the U.S. homeland, allies, friends, and power projection capabilities; will provide protection for deploying and deployed forces; and will ensure sustainable freedom of

maneuver to execute future Modular Force operations throughout the global environment. GMD is achieved through integrated efforts taken by joint, multinational, and Army missile defense forces to defeat any missile threat.

b. GMD consists of four operational elements: attack operations, active defense, passive defense, and command and control. Each element must be used with each other to provide a robust and integrated capability to provide the required capabilities to defeat the threat now and in the future. One element alone cannot provide the required capabilities to deter and if required defeat the enemies capability to employ these type weapons. An example of this integrated action comes from the Gulf War where scud missiles launched from Iraq (Central Command) attacked Israel (Europe Command) and Saudi Arabia (Central Command). Attack operations attempt to destroy proactively missiles before they are launched. Active defense actions detected launches and then intercepted and destroyed the missile or warhead within each GCC. Passive defenses measures were taken to minimize casualties, maintain operational momentum, and restore combat power. Passive defense included integrating capabilities of cover, concealment, deception, and information protection in order to defeat adversarial missile employment. Command and control included the sharing of information within and across all geographic combatant commands.

Department of the Army
Headquarters, United States Army
Training and Doctrine Command
Fort Monroe, Virginia 23651-1047

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Military Operations

THE UNITED STATES ARMY CONCEPT CAPABILITY PLAN FOR GLOBAL MISSLE DEFENSE 2015-2024

FOR THE COMMANDER:

OFFICIAL:

DAVID P. VALCOURT
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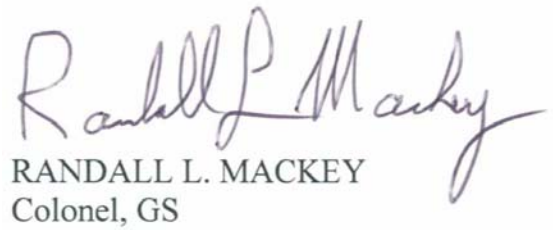

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History. This publication is a new United States Army Training and Doctrine Command (TRADOC) pamphlet developed as part of the Army Concept Strategy for the future Modular Force.

Summary. TRADOC Pamphlet 525-7-5, *The United States Army's Concept Capability Plan for Global Missile Defense 2015-2024* provides a capability plan for integrating Army global missile defense (GMD) capabilities and may result in a missile defense focused capabilities based assessment (CBA). The Army GMD CBA will identify doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) solutions or solution sets for GMD capability gaps during the 2015-2024 timeframe. This pamphlet focuses on the strategic, operational, and tactical application of integrated GMD capabilities across the spectrum of conflict. This plan draws from approved and draft documents addressing the Army's future Modular Force to include the division, corps, and Army Service component commands in addition to emerging joint and Army concepts relevant to Department of Defense (DOD) and Army transformation.

Applicability. This concept applies to all DOD services, agencies, and activities involved in the future Modular Force. It functions as the conceptual basis for developing required solution sets related to the future Modular Force within the domains of DOTMLPF.

Proponent and exception authority. The proponent of this pamphlet is the Director, Army Capabilities Integration Center (ARCIC), Concept Development and Experimentation Directorate (ATFC-ED), 33 Ingalls Road, Fort Monroe, VA 23651-1046. The proponent has the authority to approve exceptions or waivers to this pamphlet that are consistent with controlling law and regulations.

Suggested improvements. Users are invited to send comments and suggestions on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Director, ARCIC, Concept Development and Experimentation Directorate (ATFC-ED), 33 Ingalls Road, Fort Monroe, VA 23651-1046. Suggested improvements may also be submitted using DA Form 1045 (Army Ideas for Excellence Program Proposal).

Distribution. This publication is only available on the TRADOC Homepage at http://www.tradoc.army.mil/tpubs/pamndx.htm.

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Chapter 1
Introduction

1-1. Purpose

a. The purpose of TRADOC Pamphlet (Pam) 525-7-5 is to identify required future global missile defense (GMD) capabilities based on a detailed analysis of joint and Army concepts. The CCP will identify those capabilities needed to build a modular, full-spectrum, deployable integrated air and missile defense (AMD) capability for homeland, global, regional, and theater defenses.

b. The identification of these capabilities will provide a coherent way ahead for the further examination for potential doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) solutions. Implemented solutions will enable Army operations at all echelons across the spectrum of conflict. Responsibility for Army GMD operations requires close coordination and integration across the Army branches and functional components. The GMD function and the systems and enablers using this function are critical enablers to achieving the future Modular Force envisioned in the joint and Army concepts.

c. This CCP provides for the integration of Army GMD operations for the future Modular Force and may result in an Army focused capabilities based assessment (CBA) involving many different proponents. The CCP presents technical and non-technical capabilities, used by a wide range of proponents, that enable the effective application of GMD assets and capabilities in an interdependent, joint, and multinational environment. It describes how expeditionary Army forces integrate the power of adaptable and highly lethal GMD assets with net-centric warfare in a decentralized operational environment to achieve decision superiority and dominance.

d. The plan discusses the application of existing and emerging joint and Army thought and identifies capabilities required for the optimum execution of the GMD function in support of future Modular Force operations. Future Army GMD related CBA efforts will identify DOTMLPF solutions or solution sets for Army GMD operations capability gaps during the 2015–2024 timeframe. Experiments, tests, exercises, model, and simulations are needed to mitigate the risk inherent in developing and fielding these ideas.

1-2. Functional Area

TRADOC Pam 525-7-5 identifies capabilities required to execute Army GMD operations during the 2015–2024 timeframe. This plan reaches across the joint functional areas of protection**,** battlespace awareness**,** command and control (C2), force application, focused logistics, and the net-centric environment. Additionally, this plan is fully nested in the Army concept strategy documents from the Army capstone concept, the two Army operating concepts, and through the six Army functional concepts.

1-3. References

Required and related publications and prescribed and referenced forms are listed in appendix A.

1-4. Explanation of Abbreviations and Terms
Abbreviations and special terms used in this pamphlet are explained in the glossary.

Chapter 2
Army Global Missile Defense (GMD)

2-1. Scope
The scope of Army GMD operations as depicted in this CCP is consistent with current joint and Army concepts, and focuses on the timeframe 2015–2024. The primary basis for analysis are the Capstone Concept for Joint Operations (CCJO), the joint operating concepts (JOC) of Major Combat Operations, Homeland Defense and Civil Support, and Deterrence Operations, Air and Missile Defense Joint Integrating Concept (JIC), the Army's capstone concept, TRADOC Pam 525-3-0, The Army in Joint Operations: The Army Future Force Capstone Concept, TRADOC Pam 525-3-1, The Army Operating Concept for Operational Maneuver 2015-2024 and TRADOC Pam 525-3-2, The Army Concept for Tactical Maneuver 2015-2024, and the six Army functional concepts.

2-2. GMD Concept

a. GMD consists of integrated systems and multi-tiered measures that include the synchronization of all geographic combatant command (GCC) missile defense priorities and the apportionment of resources that spans all operational environments and operations that cross multiple GCC areas of responsibility (AOR). These measures are designed and integrated with space, airborne, sea, and ground sensors, weapons, and C2 systems to destroy, nullify, or reduce the effectiveness of enemy missile attacks. GMD is inherently joint in that no single Service can solve the entire missile defense threat alone. Each Service provides unique capabilities and all contributions are required to achieve complete joint force protection. Service contributions are dynamic in location and time. For example, littoral operations will likely require a greater naval missile defense contribution, especially early in deployment. The GMD CCP addresses the Army's contribution to missile defense in support of all joint force commanders (JFCs).

(1) Army GMD operations focus on active defense operations and the required C2 system, but also must address the other operational elements of Army (and joint) air defense operations—attack operations and passive defense operations. At the strategic level, the integration of active defense and attack operations is known as offensive-defensive integration.

(2) As a practical matter, the AMD sensor, shooter, and C2 system capabilities must be integrated. This integration sets the conditions to provide layered, 360 degree protection during the 2015-2024 timeframe and enables JFCs to achieve efficiencies across the joint operations areas (JOA) while executing full spectrum operations.

(3) TRADOC Pam 525-7-5 does not include counter-rocket, artillery, and mortar; except for long range rockets (LRR). Counter-space capabilities are also not part of this CCP as only threat objects moving ballistically through space in their mid-course flight path are included.

This CCP also does not include air breathing track, target or threat, or unmanned aerial system (UAS) or the unmanned aerial vehicle (UAV).

b. TRADOC Pam 525-7-5 is intended to support the family of Army concepts by providing greater detail to the concepts for defense against the entire range of missile threats. Unless otherwise noted, the term missile when used in this CCP refers to ballistic missiles (BM), LRR, cruise missiles (CM), and air to surface missiles operating in support of threat missile attack operations.

Chapter 3
The Military Problem

3-1. Why this CCP is Needed

There is a need to provide a more detailed description of future force GMD required capabilities with specificity beyond that provided by the family of Army concepts within the Army Concept Strategy. Identifying required capabilities for the future Modular Force during the 2015-2024 timeframe will enable the integration of GMD capabilities across the full range of Army and joint operations. This capability description aligns future Army GMD CBA efforts with the nationally mandated Department of Defense (DOD) capabilities development program and presents visualizations of Army employment of GMD in vignettes in order to illustrate missions and functions. This CCP sets the stage for follow-on CBA efforts enabling DOTMLPF solutions throughout the DOD. Additionally, this document provides a future capability needs framework for Army Program Executive Offices, the Missile Defense Agency (MDA) developed systems and the Joint Theater Air and Missile Defense Organization (JTAMDO) developed architectures.

3-2. Operational Environment

a. In 2002 the President of the United States (U.S.) provided missile defense policy by making the following statements.

(1) The defenses we will develop and deploy must be capable of not only defending the U.S. and our deployed forces, but also friends and allies.

(2) The distinction between theater and national defenses was largely a product of the Anti-ballistic Missile Treaty and is outmoded. For example, some of the systems we are pursuing, such as boost-phase defenses, are intended to be capable of intercepting missiles of all ranges, blurring the distinction between theater and national defenses.

(3) The terms "theater" and "national" are interchangeable depending on the circumstances, and thus are not a meaningful means of categorizing missile defenses. For example, some of the systems being pursued by the U.S. to protect deployed forces are capable of defending the entire national territory of some friends and allies, thereby meeting the definition of a "national" missile defense system."[1]

[1] NSPS-23, SUBJECT: National Policy for Ballistic Missile Defense, dated December 16, 2002.

b. The global Operational Environment

(1) Demographic trends indicate that the world will become increasingly unstable. At the same time that the population of the world increases in economically impoverished nations, the availability of off-the shelf advanced technology is also increasing along with the rapid growth in information availability. Among developed nations there will be increased competition for resources (such as, energy and food) while growing populations of developing nations demand a larger share of the world's resources and more control of their own resources. These factors will put advanced, but relatively inexpensive technology in the hands of both nation states and growing number of non-state and transnational actors. As technology becomes more sophisticated, it tends to become more user friendly; therefore, relatively untrained personnel can effectively use advanced weapons with little training.

(2) The U.S. needs to remain globally engaged. The country will likely continue to be in conflict with many state and non-state actors. The U.S. military's ability at conducting decisive operations will remain pre-eminent in the world for the foreseeable future; therefore, those seeking to challenge the U.S. must look to asymmetric capabilities to provide the means to counter the use of U.S. military forces around the world. It is likely that countries and non-state entities will rely on asymmetric capabilities as a substitute for, or complement to, the creation of large conventional forces that could not hope to match the U.S. forces on the battlefield. High on the list of the potential adversary's list of technologies to counter U.S. use of force are those related to BM, LRR, air-surface missile (ASM), and CM that are capable of being launched from a wide variety of platforms. These limit access into forward theaters, cause significant casualties during operations, support targeting with other means, and undermine the will of coalition partners. The proliferation of weapons of mass destruction (WMD) when combined with these threats creates a very dangerous environment for the U.S. and its allies around the world.

(3) The U.S. homeland is the strategic center of gravity and will be increasingly targeted by asymmetric means for both direct and indirect attack. This could be in the form of attacks against domestic military targets as well as attacks designed to influence public opinion and weaken national will. It also means that potential adversaries will attempt to develop means to defeat our expeditionary operations before they start by impeding our force projection capabilities, staging areas, industrial and network centers, and lines of communication. The threat by hostile nations to launch missile attacks against U.S. assets could be a means to prevent or slow friendly actions in forward theaters unless there is a viable capability to counter them. There are two important missions within homeland defense that have special requirements. These are integrated air and missile defense of the National Capital Region and temporary defense of National special security events (NSSE). Examples of the later are international conferences of world leaders like a G-8 conference and major sporting events like the Olympics and Super Bowl. More than one NSSE could be occurring at the same time.

c. Threat and Proliferation

(1) Threat. The future security environment presents four types of complex, interrelated, persistent, and emerging security challenges - traditional, irregular, catastrophic, and disruptive. Many of these new threats, non-state actors, will not be deterred by our overwhelming military

superiority, and in fact, are motivated by that superiority. The four persistent and emerging challenges capture many of the issues in the future security environment. However, their boundaries are neither precise nor discrete, and thus, in most situations, will overlap, occur simultaneously, or offer no easily discernible transition from one challenge to another:

(a) Traditional challenges**.** Traditional threats of aggression from regional adversaries or an adversarial coalition remain the most dangerous, demanding, and intensive missions for military forces. States will continue to resort to strategies based on the use of military power to achieve their goals, in conflicts that range in size from small scale contingencies to theater war, and occur in unforeseen locations and conditions. Other challenges include the following.

- Low intensity conflict may escalate at any time, and with little warning, into larger scale hostilities that cannot be ignored.
- Regional aggressors will continue to modernize conventional forces and invest in capabilities that dominate their neighbors. Evolving regional and international powers harnessing near-peer capabilities will threaten U.S. GMD capabilities. For example, they could attempt to disrupt communication and coordination involving networks and sensors that are ground, sea-borne, aerial, and space-based.
- Adversaries are fully aware of our dependence on commercial satellite communications to support our network-centric operations and will attempt to deny our access through technical and other means.
- Simultaneously, viewing the U.S. or a U.S.-led coalition as the main threat to the achievement of regional ambitions, future adversaries are expected to adopt anti-access strategies, involving several integrated lines of operation aimed at preventing or limiting U.S. involvement in regional crises.
- Anti-access capabilities readily available through global arms proliferation, hybridization, and careful investment will include theater ballistic missiles, inexpensive cruise missiles, long-range rockets, and WMD.
- Deliberate efforts to create mass casualties are additional likely components of an anti-access strategy aimed at eroding U.S. public will to remain engaged. Prudent aggressors will seek to accomplish initial objectives as quickly as possible, leaving ample time to deny or prepare for external intervention.

(b) Irregular challenges. The immediate threat the U.S. faces is the irregular challenge. General characteristics of irregular warfare include protracted struggle, reliance on sanctuaries and outside support, gradual escalation in number and size of tactical actions, and the predominance of close combat as the means of engagement. Other challenges include the following.

- Irregular forces could arise in any future insurgency or operation. Among irregular forces, the gravest threat is from global transnational terrorists, who showed on 9/11 that even irregular actions can have strategic consequences.
- Terrorists enthusiastically embraced new technologies (communicating through the internet, using satellite telephones, manipulating populations' perceptions via the use of adversary or enemy information operations, and others). These technologies, along with relatively low-cost weapons, such as cruise missiles, UAS, and long-range

rockets, have contributed to the increased lethality and impact of the individual terrorist or group.
- Unlike states which use asymmetric methods on an as-needed basis, for terrorists and irregulars, asymmetric warfare is almost always the only means to achieve their goals.
- Irregular non-state actors may operate in a coalition with regional state actors. This support can include more sophisticated ballistic missiles and WMD.
- The protection of GMD facilities and hardware will require a synchronized and coordinated approach among all Services and their subordinate commands to ensure adequate force protection, area security and physical security.

(c) Catastrophic challenges. At least 25 countries, as well as non-state groups, are working on developing or acquiring WMD as either a possible weapon or for leverage or deterrence against potential U.S. pre-emptive action, which makes the possibility of WMD attack truly catastrophic. Other challenges include those below.

- Thresholds for use of WMDs will also decrease as availability grows. Terrorists will likely acquire some WMD capability in the timeframe of the document and try to use it against the U.S.
- WMD will also become a more dangerous issue with the spread of better delivery systems, in particular the proliferation of ballistic and cruise missiles.
- As the catastrophic nature of this challenge, the U.S. military must work with domestic and coalition authorities to fully address this complex threat, not only through response measures to WMD incidents, but also through strategic deterrence, and development of defense systems to prevent or diminish these threats.

(d) Disruptive challenges. Few nations will shape their forces or acquisition strategy to directly confront the U.S., because they understand the power of U.S. capabilities and leadership. Disruptive challenges are listed below.

- Faced with a looming conflict with the U.S., possible adversaries will seek to buy the latest technology in niche areas to counteract key U.S. capabilities, including, for example, air defense systems, ballistic and other missile systems, WMD munitions, and C2 systems.
- Adversaries will seek acquisitions, which could include breakthrough technology that they believe will be most effective against perceived U.S. strengths, particularly U.S. reliance on digital technologies, space, and communications.
- These disruptive systems may be indigenously developed, purchased, and modified from off-the-shelf weapons or the most advanced components, or bought from proliferators (some of whom may be our allies).
- In specific areas, potential adversaries may acquire this innovative technology sooner than the U.S. forces.
- Even the most primitive military adversaries will potentially be ‘space capable’ as a result of the commercial sector’s provision of such products as high-bandwidth satellite communications, imagery, navigation signals, and weather data.

- Adversaries will make extensive use of information operations to include electronic warfare, computer network operations, and the use of radiofrequency weapons in order to disrupt, delay and/or degrade U.S. forces C2 and active defense measures.

(2) Proliferation. Various studies and panels provide an insight into the proliferation of BM, CM, ASM, and LRR threats, as well as their potential launch platforms in the next 10-20 years. These findings add greater emphasis for the need for a GMD capability.

(a) An obvious driver of the future threat environment is the set of capability opportunities available to potential adversaries. Given the relative cost of manned and unmanned attack systems and given the proven U.S. capability to deal with enemy manned systems, it is expected that adversaries will move away from the more expensive manned fighter and attack aircraft and focus on developing or buying cruise missiles, unmanned aerial vehicles, and short and medium-range ballistic missiles. There is compelling evidence of a growing proliferation of medium range ballistic missiles (MRBM) and CM technology.

(b) In 2005 there were nearly eighty foreign ballistic missile launches around the world. Nearly sixty launches involved short-range BM, approximately ten involved medium and intermediate-range missiles, and about ten involved long-range BMs.[2]

(c) The proliferation of land attack CMs will expand in the next decade. At least nine countries will produce these weapons.[3] The majority of new land-attack CMs (LACM) will be very accurate, conventionally armed, and available for export. The high accuracy of many LACMs will allow them to inflict serious damage on important targets, even when the missiles are armed only with conventional warheads. U.S. defense systems could be severely stressed by low-flying stealthy CMs that can simultaneously attack a target from several directions.[4] One market analysis predicted that 6,000 to 7,000 LACMs could be sold by 2015—excluding U.S., Russian, and Chinese sales.[5] To avoid Missile Technology Control Regime restrictions, many countries either produce CMs which just fall under the regime's parameters or modify missiles proscribed by the regime to produce a "less capable" variant such as the "SCALP EG" or "Storm Shadow" named CM which is a version of the French "APACHE" stealthy CM[6].

(d) The number of countries that develop or deploy BM, CMs, LRR, ASM, and UAS (with standoff munitions, electronic countermeasure (ECM) packages or for reconnaissance, surveillance, and target acquisition (RSTA) that could attack our GMD assets) will continue to grow though the 2020 timeframe. The similar growth in supporting dual-use technologies to support or enhance these systems is of near equal importance. There is no consensus among the signatories of the Missile Technology Control Regime on which UAS technologies or end items need to be controlled. The total number of UAVs, including those that have the potential to be used against U.S. interests, is proliferating exponentially on an international basis.[7]

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[2] Congressional Testimony, Lt Gen Obering - Missile Defense Program and Fiscal Year 2007 Budget.
[3] CRS Report to Congress, Cruise Missile Proliferation, updated July 28, 2005.
[4] Ballistic and Cruise Missile Threat (Unclassified), National Air and Space Intelligence Center(NASIC), August 2003, p. 25.
[5] Robert Wall, "Cruise Missile Threat Grows," Aviation Week & Space Technology, July 27, 1998, p. 24.
[6] CRS Report to Congress, Cruise Missile Proliferation, updated July 28, 2005.
[7] Michael Sirak, US Air Force Aims Points, "Air Force studies how to counter hostile UAVs," February 8, 2006.

(e) Routine access by both state and non-state actors of commercial space products and global positioning systems for targeting, virtually unlimited use of internet and cellular phones for information gathering and communications, availability of precision attack means, and the spread of WMD give future adversaries the ability to match, degrade, or negate U.S. advantages unless capabilities to counter are developed and fielded. By 2020, potential adversaries will also become far more adept at the use of camouflage, cover, concealment, denial, and deception in order to minimize the effectiveness of our attack operations.

(f) This combined with increasingly mobile BM, LRR, ASM, and CM launchers and support systems, requires effective GMD systems receive additional emphasis. The spread of ballistic missile technology has accelerated in recent years. Ballistic missile proliferation is difficult to control, and more countries, some hostile to American interests, have developed sophisticated missile designs, including missiles capable of reaching the U.S. Great danger also lies in the existence of chemical, biological, and nuclear weapons that can be paired with ballistic missiles for use against the U.S., our troops abroad, our allies, and our friends.[8]

3-3. Problem Statement

a. The future will continue to see an increase in air, ground, and sea missile delivery systems available to state and non-state actors. This expanding threat, coupled with the proliferation of WMD payloads, offers a method to potential adversaries to offset continued U.S. and allied military dominance. Technological advances and their propagation will make available to foes all ranges of ballistic missiles and cruise missiles, as well as their sensors and launch systems (air, sea, and ground) and supporting infrastructure. This, coupled with potentially catastrophic and disruptive warheads and the cooperation between state and non-state actors, creates even more uncertainty and makes the need for missile defense a high priority. This problem will affect regional conflicts, and in certain circumstances, threatens the U.S. homeland. This latter concern may have an effect on the U.S. ability for power projection and sustainment of deployed forces.

b. The defense of the homeland and operations in forward theaters are no longer separate operational environments, but rather part of a singular global operational environment. Future joint forces must simultaneously defend the homeland while it executes multiple, distributed, and decentralized operations throughout a singular global operational environment – thus the need for global missile defense. Current GMD operations are challenged by inadequate interoperability among weapon systems, sensors, and battle management. Collaborative planning, integrated fire control, and combat identification are constrained by both technical and procedural issues. The potential threat of BM, LRR, and CM, with WMD munitions, will continue to grow as these systems rapidly proliferate; therefore it is critical that GMD be evolved or developed to counter these enemy capabilities.

c. Threat actors are also becoming more sophisticated in orchestrating large-scale attacks with redundant C2; ground, air, sea, and space –based RSTA; and electronic warfare (EW) support. Weapon inventories may not be adequate to withstand massive swarming attacks from all directions, especially if the enemy has success either in degrading our battle command

[8] MDA, BMDS Booklet (3rd edition), 2005.

systems or sensors, or, attacking seams or gaps. Separate battle management command, control, and communication (BMC3) for missile and air defense, as well as separate strategic, operational, and tactical systems, are not only expensive, but may be inefficient in countering the threats. Potential opponents will look for weapon systems, sensors, and battle management seams to exploit. GMD must become what it is not now, a modular, full spectrum, networked, deployable missile defense capability that is fully integrated with air defenses across all operational environments.

Chapter 4
Solution

4-1. Solution Synopsis

a. Employing a combination of fixed and mobile sensor and shooter capabilities, Army GMD forces, as integral elements of the joint interdependent GMD system, will provide protection for the homeland, allies, and power projection capabilities. It will provide protection for deploying and deployed forces; and will significantly contribute to sustainable freedom of maneuver to execute future Modular Force operations throughout the global environment. GMD is achieved through integrated efforts taken by joint, multinational, and Army missile defense forces to defeat any missile threat.

b. To achieve the Army's capstone concept objective of becoming a "…strategically responsive, campaign quality force, dominant across the range of military operation and fully integrated within the joint, interagency, and multinational security framework…," the U.S. must be able to field dominant and fully integrated GMD capabilities for land component operations.

c. Operational elements of GMD. GMD consists of four operational elements: attack operations, active defense, passive defense, and C2. These elements must be seamlessly integrated to provide a robust capability and will be used in this CCP. An example of the integration of the four elements would be Scud launchers that were attacking Israel (EUCOM) and Saudi Arabia (CENTCOM) from Iraq (CENTCOM) during the Gulf War. Attack operations attempt to proactively destroy missiles before they are launched. Active defense is the ability to detect launches, then intercept and destroy the missile or warhead within each GCC. Passive defense includes measures taken to reduce the probability of and to minimize the effects of damage caused by hostile action without the intention of taking the initiative; with a goal to minimize casualties, maintain operational momentum, and restore combat power. Passive defense includes integrating capabilities of cover, concealment, deception, and information protection in order to defeat adversarial missile employment. C2 includes the sharing of information within and across the GCCs.

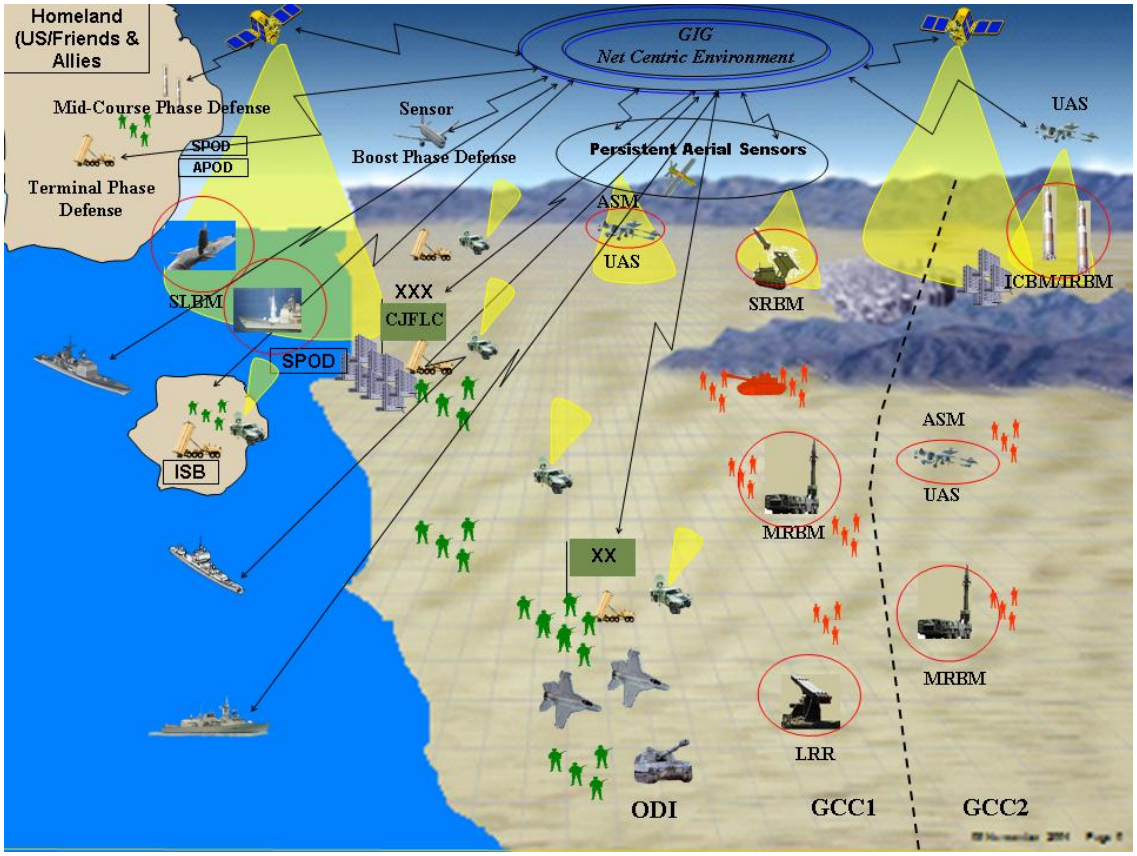

Figure 4-1. GMD operational Environment Graphic

4-2. High-Level Concept Graphic

a. The GMD operational environment is global, encompassing multiple GCCs as well as the homeland. The GMD operational environment graphic (fig 4-1) describes two GCCs as well as the U.S. and allied homelands. Within this joint environment are intermediate staging bases (ISBs), critical infrastructure, fort to port to the foxhole, allies and friends. A global information grid (GIG) supports U.S. and allied operations. Missile threats vary significantly in locations, numbers, ranges, and technical sophistication. GMD support as described in this CCP is a layered construct combining the expertise, skills, and capabilities of Army, joint, and allied GMD forces.

b. GMD is shown as one seamless Army and joint integrated force. Battlespace awareness, automated battle management (ABM), and integrated fire control (IFC) are integrated across all operational levels. GMD relies on the layers of space, high altitude, air, ground communications, intelligence, surveillance, and reconnaissance (ISR) and C2 systems.

c. GMD utilizes advanced engagement concepts.[9] Sensors, C2, and weapons are fully interoperable to protect the JFC's priorities.

d. The missile defenses provide for 360-degree coverage and defense in depth across all operational levels as well. Advanced combat identification and continuous sensor coverage support early and continuous engagements throughout all phases of threat missile flight. Reliable combat identification also assures friendly use of airspace.

e. GMD forces are an integral part of the GIG. They support information dominance through the data they provide to the global network as well as benefit from the knowledge they receive.

4-3. Vignettes

a. Army operations within a joint campaign framework. The Army future Modular Force will conduct operations fully integrated within the joint operational or campaign framework across the spectrum of conflict. Army operations will enable the JFC to seize the initiative early, transition rapidly to decisive operations, and sustain operations to achieve strategic objectives and maintain stability thereafter. The GMD key imperatives that allow the Army to support the JFC include one seamless integrated force; advanced engagement concepts; defense in depth; 360-degree defense; early and continuous engagements; assure friendly use of airspace; and, support information dominance. These key imperatives weave through the vignette.

b. Within the context of the joint campaign framework, the Army future Modular Force will apply adaptive combinations of seven key operational ideas: shaping and entry operations, operational maneuver from strategic distances, Intra-theater operational maneuver, decisive maneuver, concurrent and subsequent stability operations, distributed support and sustainment, and network-enabled battle command. This plan will concentrate on the Army's seven key operational ideas to facilitate the scenario's interconnected vignettes-based description of Army GMD operations in support of the future Modular Force.

c. Scenario Operational Setting

(1) The Eastern Theater-General (fig 4-2)

(a) A-Land. A-Land has growing ties to the west and is friendly to the U.S. It has a large, young, and rapidly growing population with strong tribal tradition and lacks central government or national identification. The government is democratic but weak. Its economy is growing rapidly fueled by the recent discovery of a field of off-shore oil and gas deposits. This field is shared with C-Land and D-Land. A-Land's climate is arid and is drought sensitive and water stressed. The U.S. GCC-1 and several other western country militaries provide small but growing military training missions.

[9] Examples are (1) engage-on-remote which uses an external sensor to detect and track a threat missile and additionally enables a GMD element to launch its interceptor before its own organic fire control sensor detects the target, and (2) Forward Pass which could use land based radars to detect, track, and control missiles from the sea for the intercept.

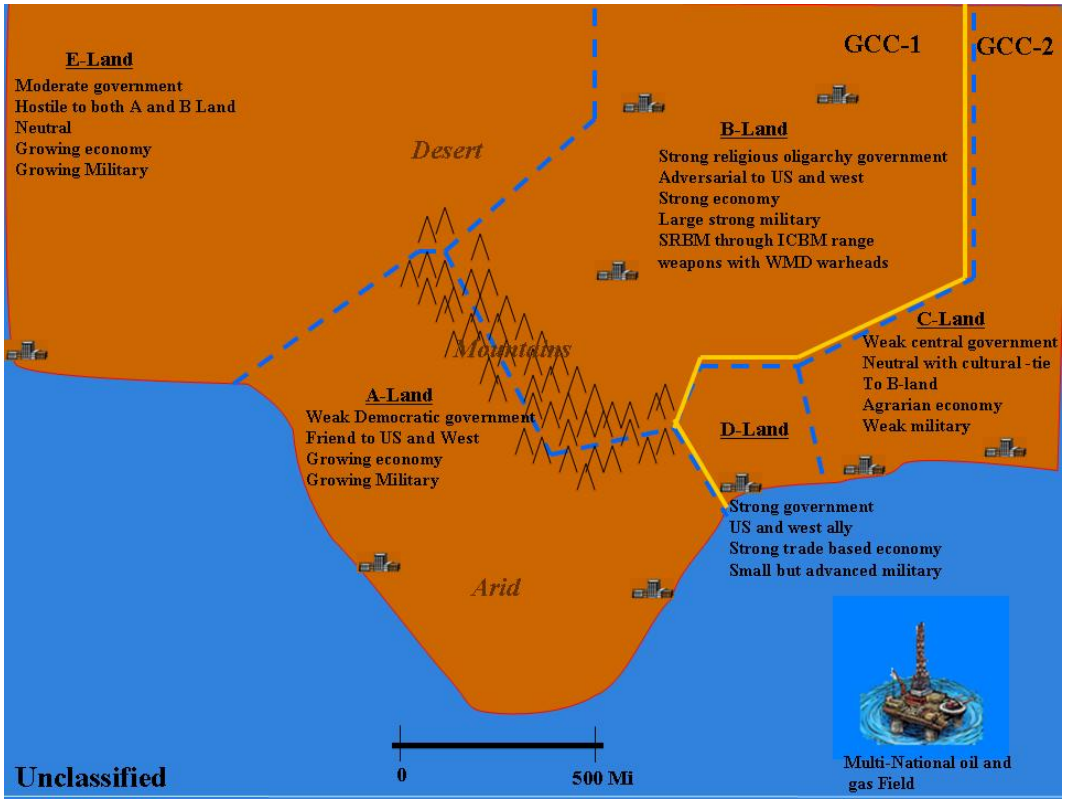

Figure 4-2. Eastern Theater

(b) B-Land. B-Land is unfriendly to the U.S. and hostile to western culture in general. It is an old country with a large, young, educated, and rapidly growing population with strong religious tradition. It has a strong religious oligarchy type of government. Large well-equipped military and political police ruthlessly crush any internal dissent. The country has many large urban centers and possesses significant natural resources–including mineral, energy, and food–to support a large military infrastructure. The border between A-Land and B-Land is mountainous. Military development is heavily subsidized by countries unfriendly with U.S. to include modern technology including BM, LRR, CM, UAS, ASM, and WMD development. B-Land has significant ability to intimidate region for strategic and operational exclusion of western military operations. It has a robust anti-access capability and possesses CMs, UASs, LRR, and short range ballistic missiles (SRBM) through intercontinental ballistic missile (ICBM) range weapons with WMD warheads. It has close military and technological ties with Y-Land and a formal alliance is suspected.

(c) C-Land. C-Land is a neutral country and has a small, weak central government. It has close tribal and cultural ties to B-Land. It has a predominately tribal culture that is largely agrarian. Its growing economy is fueled by recent discovery of off-shore oil and gas deposits shared with A-Land and D-Land; however, little of the new wealth is distributed outside the capital city except through tribal leaders. Areas outside cities are tribally controlled and military manpower is mostly supplied through tribal levees. There are a number of very important religious shrines of global significance at several locations throughout the country.

(d) D-Land. D-Land is a long time friend of the U.S. and the west. It has an urban, multinational culture with significant colonial roots. Trade is historically the main economic driver. Capital city is the region's largest port with refineries and petroleum, oil, and lubricants storage now supporting off-shore oil and gas deposits shared with A-Land and D-Land and regional major transshipping capability. It has a small but relatively modern military. The use of D-Land port and transportation infrastructure is important to any significant military operations in A-Land and B-Land border areas or throughout the region. U.S. GCC-2 maintains a large training mission in D-Land and it is a frequent port of call for both GCC-1 and GCC-2 U.S. Navy ships.

(e) E-Land. E-Land is a neutral country traditionally hostile to both A-Land and B-Land. The border lands between E-Land and its neighbors are desert with few inhabitants and resources.

(2) Eastern Theater–Specific

(a) The border area between A-Land and B-Land is mountainous where a primarily tribal culture exists. Tribes have family ties on both sides of the border. The population is a mix of religious and ethnic groups. The border itself is vague. The transportation infrastructure in the area is poor on both sides of border with exception of A-Land rail lines that connect mineral mines and nearby towns with capital city and the port of D-Land. A-Land towns near border built up around area's mineral resources and provide a majority of area employment. Availability of local workers exceeds demand for minerals that were mined there due to rapidly growing population combined with increased mining automation. There is high urban unemployment.

(b) Both A-Land and B-Land could become failed or failing states. National, religious, and ethnic tensions have existed between A-Land and B-Land for many centuries. B-Land has been the dominant regional power in area and sees the growing economic power of A-Land along with its growing western ties as a direct threat to its dominance and culture. The ruling oligarchy does not believe its culture can compete or survive, let alone continue to dominate the region, if A-Land becomes economically powerful. B-Land is covertly supporting large, well armed, technically advanced A-Land insurgency from terrorist bases on its side of border. It is aimed at overthrowing the weak democratic A-Land government to eliminate western influence in the region, reassert its regional dominance, and gain control of the oil and gas field to support its economy and military spending. It has likely promised favorable trade deals to countries providing it advanced technological support.

(c) A-Land has requested United Nations (UN) assistance in dealing with the terrorist bases. The UN was willing to support A-Land because these same terrorist bases have been increasingly used to support attacks throughout Europe, North America, and Asia. B-Land has refused to allow any UN presence in the border area. After many UN resolutions were ignored by B-Land, the UN authorized military intervention to deal with the terrorist bases. The U.S. takes the lead in forming a coalition of allies and friends to execute the U.N. mandate. B-Land and Y-Land immediately dispersed and hid their mobile BM, LRR, CM, UAS, WMD, ASM and air forces. Cargo ships and several submarines carrying concealed BM, CM, and UAS departed

both B-Land and Y-Land. B-Land and the terrorists have significant computer network attack capacity and it begins to probe U.S. and allied military networks.

(3) Western Theater–General (fig 4-3)

(a) Z-Land. Z-Land is a strong ally of the U.S. and unfriendly with Y-Land. It possesses a large, technologically sophisticated population and a strong democratic government. Z-Land possesses a market economy and is a major U.S. trading partner. Z-Land has a modern, technologically advanced military and has partnered with the U.S. on many research, development, testing, and evaluation (RDT&E) efforts to include ballistic missile defense systems (BMDS). Z-Land has a strong military to military relationship with GCC-3. The U.S. has a modest military presence in the country.

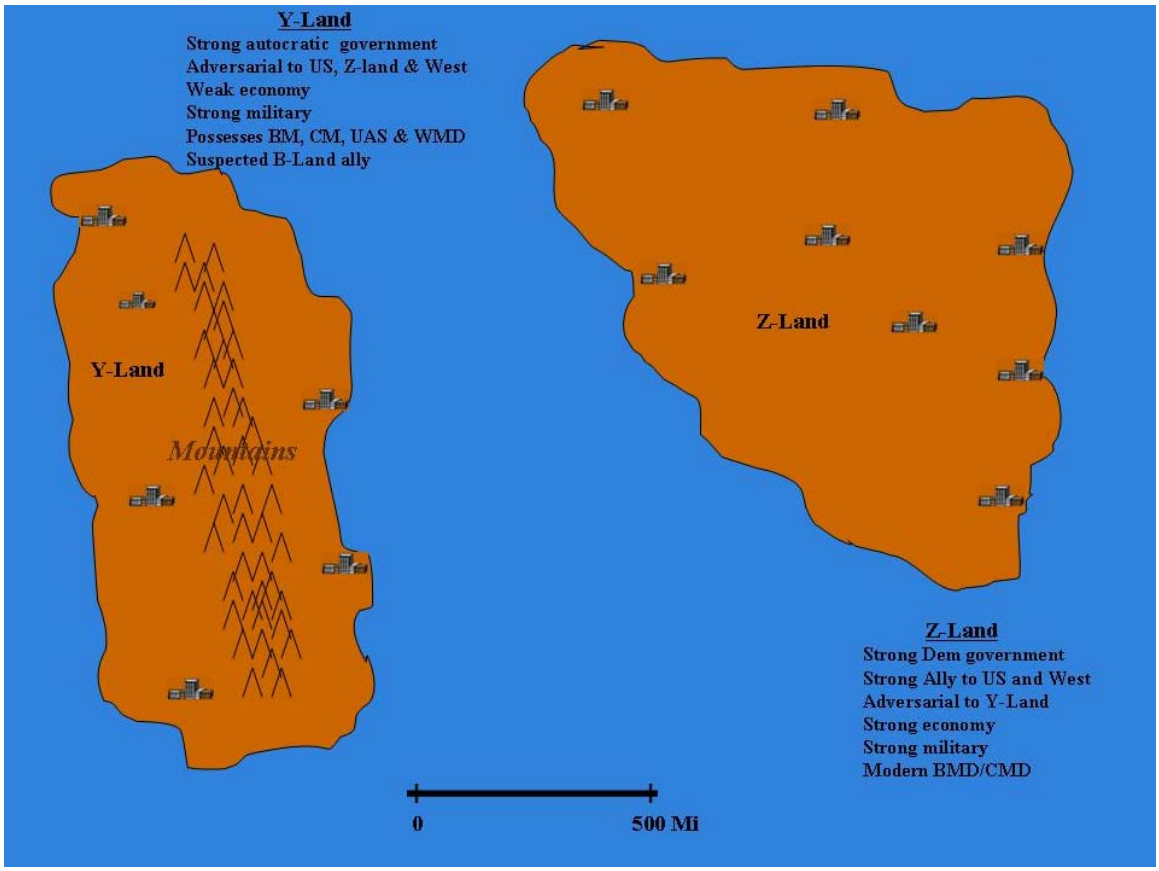

Figure 4-3. Western Theater

(b) Y-Land. Y-Land is unfriendly to U.S., Z-Land, and the western democracies in general. It has a strong, repressive, insular central government. The population is large, young, and poorly educated with strong support of the central government. There is no significant internal dissent. Y-Land has several large urban centers but the rural areas are poorly developed and agrarian. The terrain is mountainous and coastal and its natural resources are poorly developed with most resources going to support a large military. Military technology sale and transfer is used as primary source of foreign capital.

(4) Western Theater–Specific

(a) Y-Land is heavily subsidized (food and energy) by countries unfriendly with the U.S. The military receives selective modern technology transfers as well as complete, sophisticated end-items including BM, LRR, CM, UAS, antiradiation missiles (ARM), EW items, and equipment for WMD development. It has SRBM through ICBM range weapons with WMD warheads. Additionally, Y-Land possesses several submarines capable of launching BMs or CMs. This gives it significant ability to intimidate the region as well as friends and allies outside the region.

(b) Y-Land has significant cyber-electronic or computer network attack, and EW capacity. The enemy will focus on achieving its objectives by any means necessary—if improved or advanced implements are not available to support the transport or delivery of their payloads, they will find other suitable means. While they may seek modern hardware to support their efforts, they are not reluctant to pursue cover and assistance from any possible item. Y-Land has close military and technological ties with B-Land and openly barters resources and economic support for military technology and advice. An alliance with B-Land is suspected.

c. Shaping and Entry Operations

(1) As written in TRADOC Pam 525-3-0, during the *prepare and posture* phase, a joint task force forms and planning commences, to include development of force and sustainment flows, predeployment positioning of forces and logistical support, and integration of coalition forces. At the same time as the U.S. prepares for operations, B-Land and the terrorist organizations attempt strategic preclusion and operational exclusion to deter the U.S. and allies from intervention in the region. A significant element of the adversary's strategy is to threaten the U.S. homeland, friends and allies offering support to the U.N. resolutions, and region with possible pre-emptive use of BM, LRR, CM, and ASM with WMD.

(2) The U.S. and allies increase the readiness of GMD systems worldwide (including the western theater and Z-Land) and plan for significant GMD capabilities to arrive early in the eastern theater. These are not just for the protection of U.S. and allied forces but for the operational shielding of allies and friends in accordance with (IAW) the National Security Presidential Directive (NSPD)-23[10] as well as countries in the region. Protection of the friends in the region is diplomatic precondition for access to D-Land facilities and infrastructure as well as C-Land and E-Land over flight permission in support of the UN resolutions. The Army GMD forces are strategically responsive - modular, self-sufficient, rapidly deployable and able to integrate across Army, joint and allied forces designed to counter anti-access threats—so this is not a difficult problem. The threat of B-Land BM, LRR, ASM, or CM delivered WMD; or, terrorist organization CM or LRR delivered WMD or precision munitions requires simultaneous entry locations be dispersed throughout A-Land. This counters enemy plans of access limitation. Many of these entry locations along the coast of A-Land will be unimproved but still require a high degree of protection.

[10] NSPD-23 SUBJECT: National Policy for Ballistic Missile Defense. This presidential directive required the U.S. to develop and field a missile defense system(s) to protect the U.S. homeland, deployed forces, and our friends and allies.

(3) In preparation for deployment into the eastern theater, both homeland defense and forward based Army GMD forces participate in joint collaborative planning and the military decisionmaking process (MDMP). This is done IAW the JFC priorities and defended asset list (DAL), development of the theater airspace control plan, finalization of rules of engagement (ROE), refinement of existing homeland defense plans, and force allocation determinations. As plans are approved, they are distributed across the network to all effected air and missile defense forces so rehearsals and training can commence as soon as possible. Allied missile defense forces are included in all phases of the MDMP and training across multiple security levels. The Allied forces included in the planning and training includes both the forces they are deploying into theater and their homeland defense forces.

(4) U.S. forces will leverage a myriad of sensory capabilities utilizing every conceivable platform to obtain the latest information. For example, sophisticated sensory collection may spawn from satellites, and other high-altitude means of sensory detection that can be achieved by manned and unmanned sorties. Other surveillance and sensory can be accomplished using submarines and other off-shore collection methods. In an immediate sense, in-theater personnel using vehicular and man-packed assets can achieve ground sensory. Army GMD receives a constant flow of knowledge as data and information is acquired and fused. This knowledge is used to continually refine plans, and tactics, techniques, and procedure (TTP), as well as both home station and in-theater training. This knowledge is also provided to coalition partners. The GMD integrated ABM aid provides effective battle management recommendations at every level for weapon system placement, sensor coverage, and engagement zones. The ABM data is seamlessly distributed across the GMD through secure networks to its integrated model and simulation capability for the wargaming of plans (both joint and Army) at every level with their branches and sequels as well as predeployment training of personnel.

(5) At the Army modular GMD unit level, home station training on the various systems continues up to unit departure. This includes integrated training and refinement of plans in conjunction with modular force battle command elements through the Army's common integrated battle command system. This integrated training and plan refinement includes GMD forces en route or already in theater through the GMD system's concurrent operations and test/training capability. This capability also allows for mission rehearsals at all levels.

(6) Eastern theater (fig 4-4). Army GMD forces have two overarching missions in support of entry operations. First, shape the regional security environment by countering adversary operational exclusion through regional intimidation and anti-access operations. Second, shape the operational environment to permit rapid buildup and transition to decisive operations. GMD provides operational shielding for the uninterrupted flow of land power into the operational environment as well as its sustainment. Adversaries will use their own ISR capabilities to attempt to continually adjust and take advantage of any asymmetric conditions. This will maximize the effective employment of their weapons of mass destruction delivered by tactical BMs, LRR, ASM, and CMs though RSTA via ground, sea, and air assets (for example, UAS); precision strike technology; and ground and air ECM.

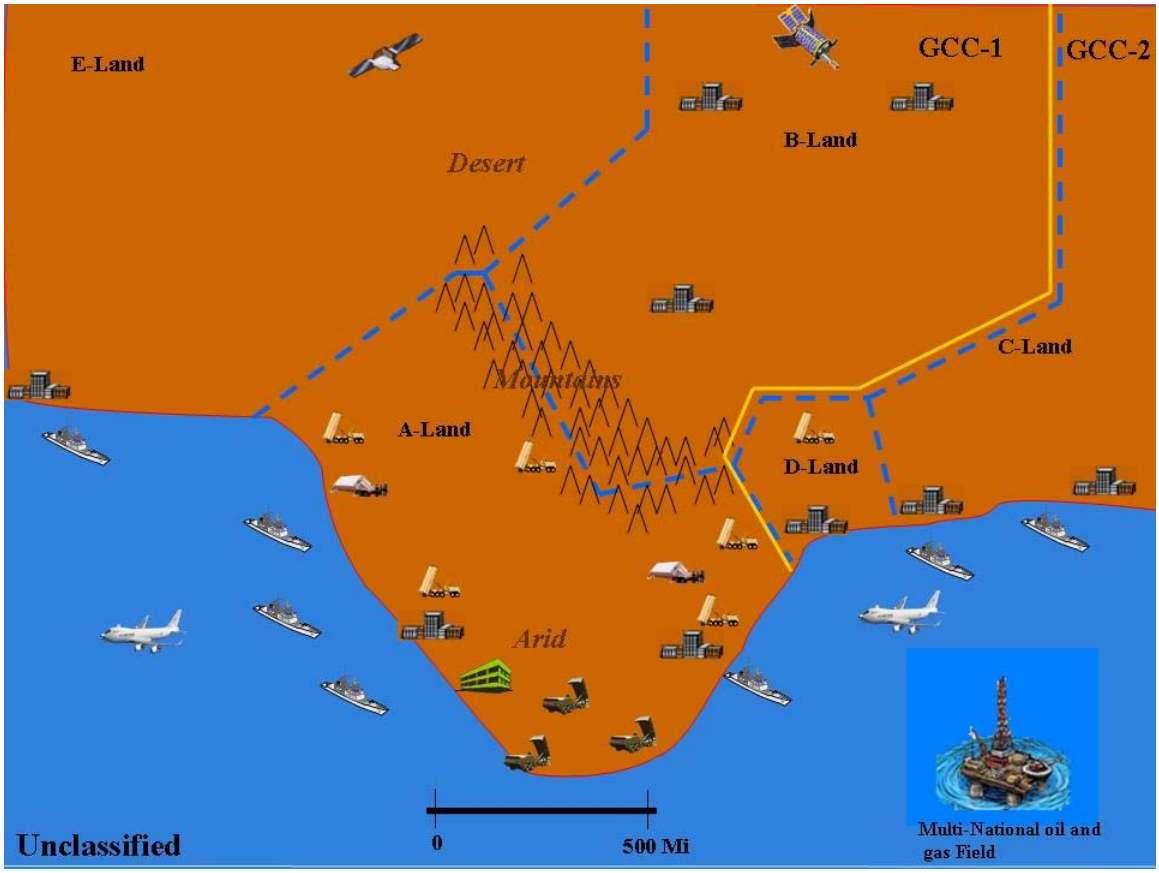

Figure 4-4. Eastern Theater Shape and Enter

(7) The threat uses their capabilities for WMD or precision high value attack on symbolic targets to cause the U.S. to weigh the value of involvement in B-Land versus its risks. Homeland defense supporting GMD forces counter adversary attempts to deter U.S. operations in support of the UN mandate and undermine political will. These Army GMD forces also support the forward theater by protecting staging bases, lines of communication (LOCs), and aerial ports of embarkation (APOE) and sea ports of embarkation (SPOE). Homeland defense GMD forces are prepared to counter other threats such as SRBM, sea-launched ballistic missiles (SLBM), and CM launched from ships or submarines off-shore. These forces are not only integrated with forward theater supporting GMD, but also with other homeland defense capabilities, such as the North American Aerospace Defense Command (NORAD) air and maritime defense forces. Homeland defense plans are updated to include several NSSE that may be occurring during our operations in the eastern theater.

(8) Of similar concern is the threat posed by Y-land in the western theater. Adversaries could seek to take advantage of U.S. preoccupation in the eastern theater to attack Z-Land or the U.S. homeland in support of their B-Land friend and possible ally. Any ICBM attacks from Y-Land must over fly Z-Land. U.S. GMD forces in the western region have a long standing relationship with Z-Land ballistic missile defense (BMD) and are operationally integrated with them. There are Army GMD sensors and shooters located within Z-land, U.S. GMD ships in the region, and sensor data is shared between U.S. and Z-Land. It is decided that the eastern theater

will have the priority for joint and Army GMD forces, homeland is second, and the western theater third as the Z-Land BMD capability is robust and U.S. GMD forces are already present there in significant strength (fig 4-5).

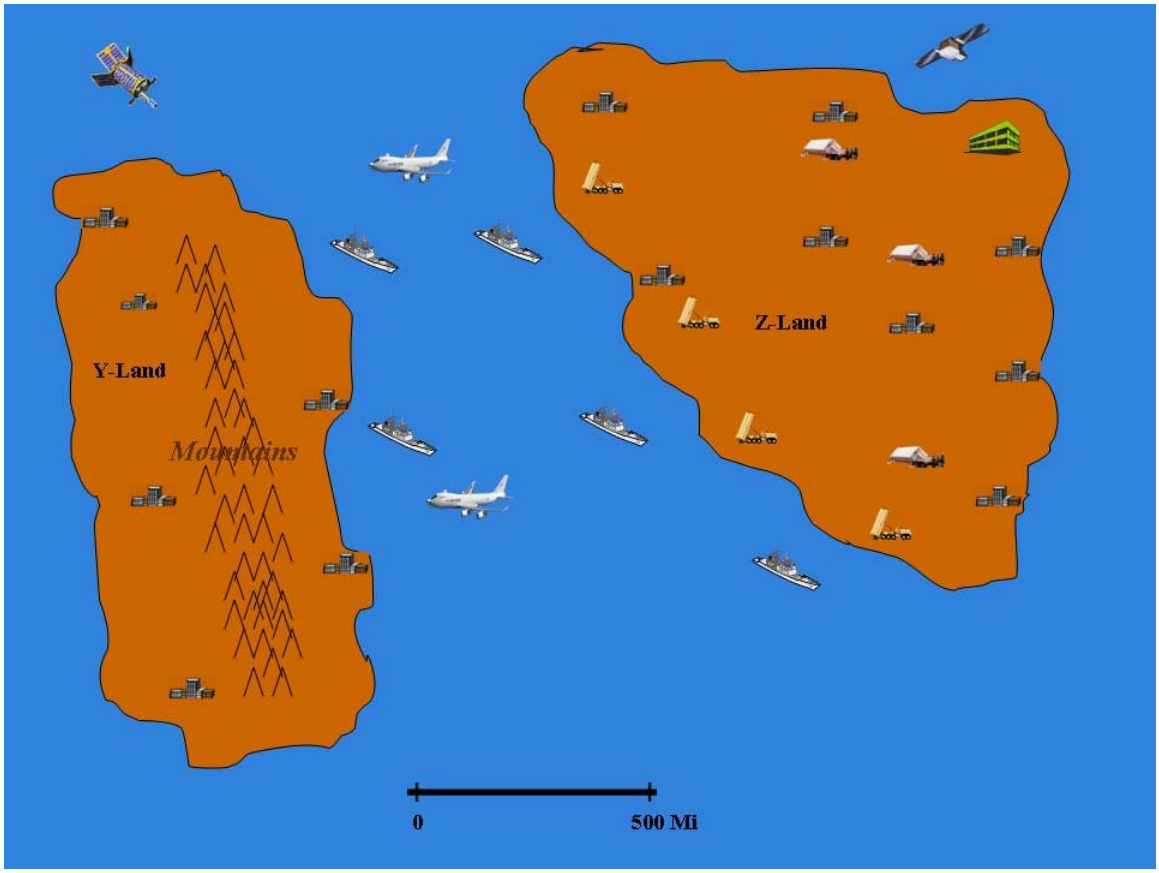

Figure 4-5. Western Theater Shape and Enter

(9) U.S. friends and allies supporting the U.N. resolution are also part of the worldwide planning for eastern theater operations. Not only are many of them providing forces as part of the U.S. led coalition, but they also provide ISBs for U.S. forces, logistic support for forward theater operations, and political, diplomatic, and economic support to A-Land. For example, D-Land is not part of the U.S. led coalition but has agreed to provide use of its extensive port facilities and logistic infrastructure. Significantly, protection from air and missile attack was a precondition to U.S. use of these facilities. The U.S. includes all potentially threatened friends and allies in planning and sharing of ISR information. They receive and provide global common operational picture (COP) data across multiple security levels.

(10) Joint (especially aerial and naval) GMD units are the first to arrive in the eastern theater and immediately establish intratheater and intertheater protection of the littoral APOE and SPOE, regional logistic infrastructure, and political, economic, and cultural centers of gravity. Army GMD forces rapidly arrive in theater by air and fast sea lift to reinforce the air and naval forces as well as to begin to provide protection inland. Other Army GMD forces arrive at various ISB locations and immediately integrate with other U.S. and allied GMD and air

defense forces at those locations. Allied GMD forces also arrive in theater shortly thereafter and integrate with U.S. and host nations' GMD and air defense forces. The rapidly expanded GMD protection in theater dislocates many aspects of the adversaries' anti-access plans and provides confidence to the friendly nations in theater.

(11) Relationship to Army Functional Concepts

(a) Battle command. As they arrive in the eastern theater, Army GMD modular forces seamlessly integrate into both the Army, joint and coalition command system. This includes not only the Army GMD forces that will be supporting UN mandated operations and are part of GGC-1, but also the GMD forces that are protecting our access to D-land facilities within GCC-2. There is real time visibility of any force flow perturbations. As these occur, the adaptive GMD, joint and Army C2 processes and structures rapidly adjust – defense plans and weapon systems placements are modified, friendly COP updated, and sensor coverage and sensor task plans changed. GMD forces en route and upon arrival in all GCCs receive a continuous update on friendly and enemy COP ensuring a high degree of situational awareness with no gaps in time or space. As various Army GMD weapon systems and sensors forward deployed, they are immediately integrated (plug and fight) into a common battle command post such that they are rapidly operational regardless of defense plan and weapon sensor location changes that may have occurred while en route. This common battle command post is likewise seamlessly integrated into Army, joint, and allied command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) upon arrival. As more and more battle command posts, weapons and sensors arrive in the theater and coverage is expanded throughout the region, these elements are likewise merged into adaptive C2 processes and structures with continuous adjustments made to plans. U.S and allied battle command networks are well protected against attempts to attack them or gain information.

(b) Protect. The combination of Army global ground and high altitude sensors fused with data from joint and allied ground, sea, and space sensors provides continuous, layered, and 360-degree coverage to the nonlinear, noncontiguous operational environment throughout the region and world. Within the region, redundant sensors provide single integrated air picture (SIAP) clarity in a high clutter, low signature environment, and protection against countermeasures. Sensors can be removed from the network with little to no degradation in overall coverage. Army GMD sensors are especially important to the naval force protecting the littoral areas and the multinational oil and gas field as terrain masking can significantly reduce their reaction time to CM attacks. The ABM merges sensor information from all sources into a single high confidence track. Reliable, redundant cooperative and noncooperative combat identification combines with this track information to eliminate any chance of either unengaged targets or fratricide. All combat identifications are provided across the common integrated battle command system (GMD, joint, Army, and allied) and continually updated. The sensor network also provides immediate and localized early warning to all friendly forces and nations throughout the region.

(c) Move. The highly mobile Army GMD forces move as easily through the unimproved air ports of debarkation (APODs) and sea ports of debarkation (SPODs) as though port facilities. These forces are self-sufficient and once deployed globally put little additional stress on the

transportation supporting the force flow. They have reliable visibility of GMD forces and sustainment in transit to support operational and logistic planning.

(d) See. Sensors provide real time data and information into ISR networks for the development of knowledge and feeding of the theater, regional and global COP. The GMD sensors operate effectively in the low signature, high clutter environments and support situational awareness across all domains and functions, anywhere in the network. Similarly the automated information management and intelligence assessment tools provide near real time intelligence back to GMD to support plans and operations.

(e) Strike. Army GMD provides continuous sharing and updating of data for use in intratheater and intertheater fires planning as well as offensive and defensive integration at the strategic level. The multifunctional GMD and fire support sensors provide redundancy. Fires planning are automatically updated in airspace control planning and vice versa.

(f) Sustain. GMD forces ensure sustainment flows are uninterrupted by adversary use of BM, LRR, CM, ASM, and WMD. This protection encompasses all logistic movements from national support bases; through ISBs and the D-Land logistic and port facilities; transition to theater; and movement to forward units. APOEs, SPOEs, APOSs, SPODs, and other logistic choke points across the region are high priority assets for the defense. GMD ensures mobility of logistic support elements providing sustainment distribution.

d. Operational maneuver from strategic distances; intratheater operational maneuver; decisive maneuver—eastern theater.

(1) B-Land and the terrorist organizations are pre-empted from executing their planned coherent anti-access strategy by the swiftness of the U.S. and coalition entry operations, the movement through multiple - and in many cases unimproved - entry points, and the rapid establishment of the operational GMD shield throughout the theater (fig 4-6). The terrorist organizations are the first to react using in-place cells to conduct ground and airborne ISR and RSTA, but B-Land soon followed suit with their own ground and airborne ISR and RSTA assets in order to gain targeting knowledge for BM CM, LRR and ASM strikes. Army multifunctional ground based and high altitude sensors supporting air and missile defense detect these attempts as they are designed to operate in low signature, high clutter environments. These sensor systems perform combat identification, feed the data to the SIAP and IFC, and perform engagements as required in conjunction with other joint and coalition forces. Airborne RSTA launch locations are provided through the COP to both the ISR and fires portions of the network.

(2) The joint force commenced decisive operations into the border area of B-Land quickly upon arrive in theater with Army modular maneuver forces. B-Land withdrew its conventional forces from the region rather than risk their sure destruction by the Army forces, but left behind large quantities of technological equipment for use by the terrorist organizations. Simultaneous, distributed operations focus on the destruction of the many terrorist base camps in the border area in order to fulfill the UN mandate and directly attack the sanctuaries, maintain pressure throughout the JOA, and destroy terrorist infrastructure. The terrorist organizations attempt to slow modular force operations by use of large numbers LRR and CMs. B-Land

begins BM, LRR, and CM attacks from concealed, dispersed locations throughout their country. These attacks not only target combatants, infrastructure and populations within A-Land, but also a number of targets outside the theater to include logistic facilities in D-Land, religious site in E-Land, and ISB that are within the range of their MRBM and IRBM class missiles. Many of these weapons have chemical or biological warheads, although B-Land did not use their nuclear capability at this time. Most weapons have precision guidance. ARM and ECM are employed to counter GMD effectiveness. Computer network attacks commence against U.S. and allied GMD battle management systems around the world from within B-Land as well as from undisclosed locations outside that country. These intratheater and intertheater attacks intended to cause catastrophic U.S., coalition, and civilian casualties, slow the tempo of military operations, overload battle management, disrupt in-theater LOCs, APODs, SPODs, and destroy economic centers of gravity.

(3) Destroying high value political and economic targets throughout the region, especially sensitive cultural or religious targets, have a very high priority in B-Land's information operations plan to fracture the coalition and shape the perceptions of diverse audiences. GMD weapon and sensor locations are high priority targets as well. Normally C2 locations would also be a very high priority but they are dispersed and their redundant nature makes attacking them impractical. Typically, large salvoes of both terrorist and B-Land LRRs supported by ground-, sea-, and air-borne EW precede the main BM and CM attacks by a short time with the intent to deplete GMD available munitions and saturate BMC3. B-Land and the terrorist organization employ jammers installed in vehicles and infiltrated into A-Land and D-Land before hostilities commenced. The use of a large number of preplanned vehicle improved explosive devices against military and civilian targets is planned to further complicate the defenses.

(4) The main missile attacks also occur in high density waves, from many different directions at a small number of targets simultaneously throughout the region with the intent to maximize defense penetration probability. The LRRs, ASMs, and CMs focus on heavily attacking the GMD systems while the main BM and CM attack goes against the A-Land cities to cause massive casualties and damage to maximize the effect of the media reports to demonstrate that the U.S. and coalition are helplessness to protect the countries in the region. Many launch locations are from within B-Land cities; others are located in heavily defended remote regions. D-Land and C-Land are also subjected to heavy attacks. B-Land's attacks against D-Land are intended to punish it for allowing its facilities to be used by the U.S. lead coalition; the attacks against C-Land are against the religious sites there to put pressure on the UN to cease hostilities. Longer range missiles are directed against population centers near ISBs. The cargo ships and submarines carrying concealed BM and CM from B-Land and Y-Land move to within launch range of the ISBs and U.S. homeland. Other cargo ships move within range of major U.S. allies that are acting in support of the UN resolution and U.S. led coalition. Many of these ships are intercepted but some are not detected.

(5) In the security vacuum spawned by the hasty withdrawal of B-Land's conventional forces, tens of thousands of dislocated civilians (displaced persons, refugees, evacuees, stateless persons, war victims) are left in the wake and lack minimum means of protection in maintaining minimum personal safety or property protection; they are gratuitously victimized. In this lawless

environment, rogue-criminal, and terrorist factions routinely target their homes and limited possessions—looting and denying them of basic life support requirements such as food, water, medicine. The insurgent elements exploit, extort, and abuse the dislocated civilians—with the overall intent to intimidate their allegiances, shake their will, and cause them to lose hope and eventually, convert to their cause. While setting out to expand the protection umbrella to accommodate the flow of friendly forces into the expanding JOA, friendly GMD forces (along with their supporting organizations) discover numerous facilities, i.e., industrial complexes and agriculture processing centers that contain suspicious containers of various substances—some with aerosol, others with liquids, and still others with powdery ingredients—with unintelligible markings. Some of the GMD forces and their supporting units report Soldiers experiencing inexplicable symptoms and mild illnesses. Efforts to identify these contaminants are inconclusive.

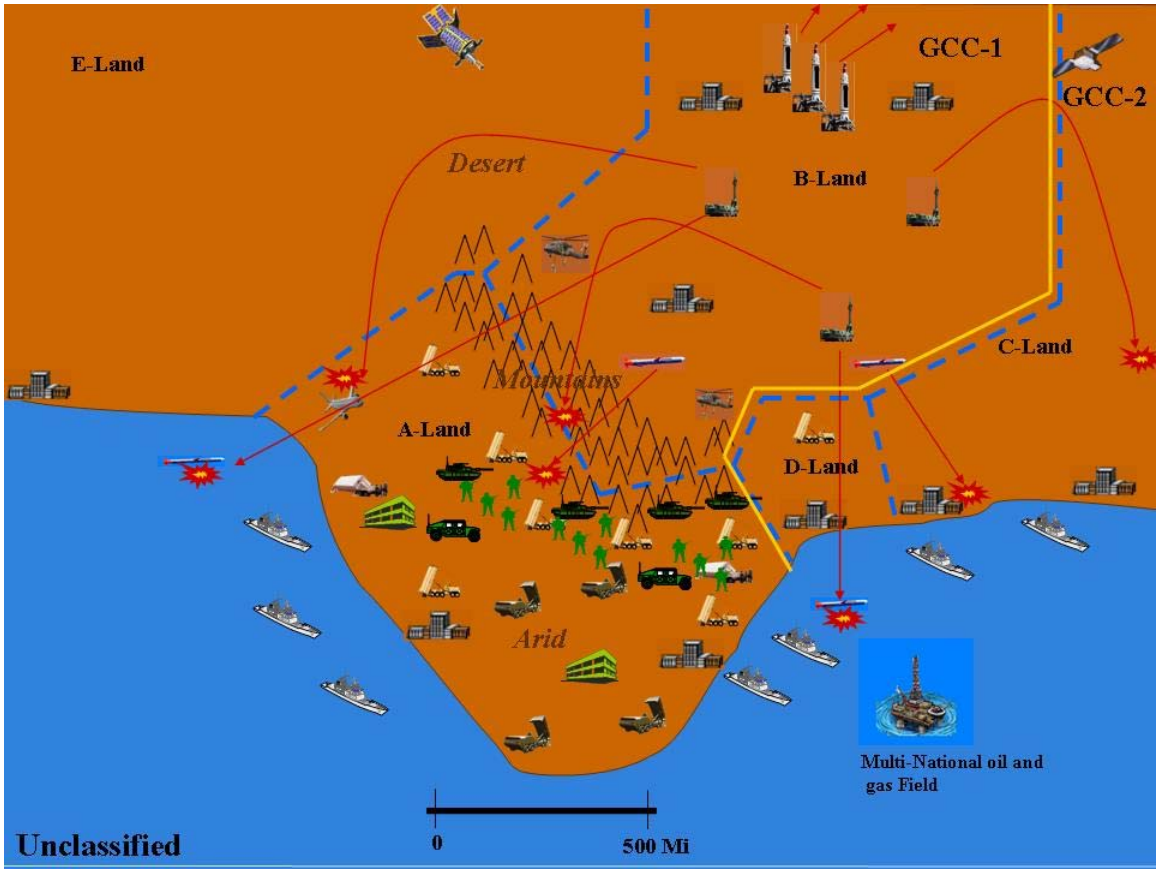

Figure 4-6. Eastern Theater Decisive Operations

(6) Relationship to Army Functional Concepts

(a) Battle command. Despite their volume, low signature, and heavy use of ECM and ARMs, all attacks around the world are rapidly detected and tracked. Combat identification occurs at long range and is timely enough to ensure all Army and joint GMD weapons are used at maximum potential ranges. The combat identification is continuously updated and is reliable enough to eliminate any chance of fratricide. The SIAP is continuously fed with updated information on all targets. The SIAP is also common across the entire network. In all cases

there is only a single track per target promulgated across the system due to automatic correlation and fused sensor data. The redundancy of sensor coverage as well as the employment of elevated and airborne sensors that can look down on targets ensures that all targets is continuously tracked from detection through kill assessment. The redundancy of sensor coverage also effectively counters threat attempts at jamming. Persistent aerial sensors coverage is particularly valuable as the Army modular forces move into the mountain areas of B-Land as they eliminate the effects of terrain masking. They also serve as redundant communications relays for ensuring GMD forces are always operating within the single global network as they lose significant effectiveness when operating autonomously.

(b) Battle management networks are well protected from all computer network attacks and electronic warfare attempts. During lulls in the adversary's attacks, plans are updated across the entire force to accommodate changes in enemy TTP. As additional forces arrive from the homeland they are immediately plugged into the GMD and other defensive adjustments made. The GMD system's concurrent operations and test/training capability support the rapid training and certification of individuals and crew to replace casualties. Engagement data and system performance information is automatically logged and transmitted across the network to the training and materiel developers back in the homeland.

(c) Protect. The enemy attacks on A-land and D-Land come in large swarms from all directions to swamp the defense. The integrated ABM quickly passes engagement recommendations across the network that optimizes weapons and sensors locations and available munitions. The IFC combined with multifunctional sensors data from across the network frees any particular GMD weapon from dependency on its organic fire control and sensor. In one case, enemy air launched CMs attacking the oil and gas field are detected and tracked by joint sensors as they over fly portions of A-land, fire control is provided by Navy ships, and the CMs are engaged by Army missiles or directed energy in D-Land. The air launch platforms were engaged by U.S. and allied air defenses with engagement results being instantly known across the network. In another case, detection is by space platforms, tracking and fire control is by Army systems in D-Land and the missiles are from Navy ships in close to shore. In a third case, detection and tracking are accomplished by Army high altitude sensors, fire control is by Air Force airborne platform, and the missiles are allied from within E-land. In another case, a large salvo of SRBMs and LRRs attack the main D-Land port. These are rapidly detected by multiple Army, Navy, and Air Force sensors, the tracks instantly fused, and the attack defeated by cooperative Army and Navy IFC and weapons from within both A-Land and D-Land.

(d) In the case of long range attacks, the GMD is similarly integrated. One attack against an out of theater ISB by B-Land MRBMs was detected by multiple space and high altitude sensors, the tracks rapidly fused, boost phase engagements were done by ground, sea, and aerial weapons; and terminal engagements were done by U.S. and allied systems firing with from forward theater provided data. In yet another inter-theater case, a B-Land intermediate-range ballistic missile (IRBM) salvo against a coalition population center was defeated by theater and space-based sensors, Navy mid-course, ship based weapons, and U.S. terminal defenses. In all cases, if a GMD weapon or sensor is taken off-line due to battle damage or maintenance failure of a critical component, IFC and ABM automatically recommend adjustments such that any coverage loss is minimized. Similarly, if a target is missed by a long range weapon, the ABM

identifies this to the IFC for re-engagement by another weapon across all missile flight phases (boost, mid-course, or terminal). The GMD sensors provide positive kill information to the IFC so that no weapons are wasted. Areas under attack receive rapid, localized early warning so that there is sufficient time to take all necessary protective measures. The GMD and other multifunctional sensors also rapidly identify and localize jammers effecting A-Land and D-Land for the vectoring of counter-fire or local security forces (in the case of ground mounted jammers).

(e) All joint and Army GMD systems possess high munitions availability and the IFC ABM optimizes this munition capacity. In nearly all cases, massing of fires and defense in depth is achieved and the enemy wave attacks are defeated. In the rare case when an enemy attack is successful the sensor network provides data to the network for consequence management planning and operations. This knowledge is fed directly to local governments if required. The success of GMD in defeating enemy attacks prompts the adversaries to make GMD ground locations throughout the world very high priority target for terrorist ground attacks. This enemy adaptation was anticipated and force protection measures were implemented to counter. The GMD systems concurrent operations and test and training capability supports in-theater training during lulls in enemy attacks so that new TTPs can be tested and validated (including horizontally and vertically) even while the system is fully operational. Similarly, system testing and installation of software changes can continue with no operational degradation. In the event an enemy attack occurs during testing or training, the system automatically defaults to the operational mode with no loss of capability.

(f) Move. As Army modular forces move deeper into the B-Land border area mountains to destroy the terrorist infrastructure, Army GMD capability moves forward with them. This capability stays integrated and networked with inter-theater forces (for example, D-Land and the ISBs) as well as throughout the world. GMD forces are capable of rapid movement both intratheater and intertheater. In some cases, GMD forces are moved from homeland bases directly into the fight. In other cases, they are rapidly repositioned either intratheater or between theater and out of theater locations (for example, forward based GMD forces.) The redundant, continuous communications network and adaptive C2 structures automatically accommodate the mobile Army GMD as it moves forward into theater or to other locations around the world. Army GMD is mobile, survivable, and self-sufficient enough to keep pace with the maneuver forces, as well as reinforce critical inter-theater locations (for example, ISBs) as it is easily deployable by either ground or air.

(g) See. Adaptive operations at all levels are completely dependent upon timely receipt, processing and distribution of accurate threat information. As information is received by GMD sensors, it is immediately provided to the network for sustainment of intratheater and intertheater situational awareness (SA). The automated assessment tools receive the GMD sensor information and provide near real time information management and analysis back across the system. This near real time knowledge is resident for anywhere, anytime access across the network as well as fed into the GMD IFC ABM. This knowledge permits the GMD to adjust rapidly to adversary strategies and TTP changes; thus the GMD remains at optimum effectiveness despite the threat constantly seeking to create asymmetric advantage. The ability of the GMD sensors to provide positive kill data supports automatic updating of enemy order of

battle information also across the network. The large volumes of near real time data become knowledge that supports predictive intelligence supporting prediction of enemy adaptations to joint and Army forces decisive operations. This knowledge is then fed back across the entire network to include U.S. allies, friends, and members of the coalition.

(h) Strike. The integration of fires and GMD optimizes the effectiveness of both systems. Multifunction ground and high-altitude GMD sensors provide real time information to fires networks for counter-strike on BM, CM, ASM, and LRR attack launch locations. Swift counterfire resulting from this real time launch point data destroy enemy launchers and thus supports GMD. This same swift counterfire disrupts or destroys threat EW assets in enemy territory before they can move. Multifunction fires sensors provide similar information to GMD IFC ABM for use in planning and engagement operations. This information is also provided to homeland-based strike assets. Fires and GMD force location information is fused and merged real time into airspace control planning and plans. Fires and GMD friendly force combat identification is likewise shared and rapidly updated across all U.S. and allied forces to prevent fratricide by either fires or GMD. This fused and continuously shared information eliminates fires response gaps. Fires battle damage assessments of enemy BM, LRR, ASM, and CM launch locations is also automatically updated within the GMD ABM for subsequent planning use.

(i) Sustain. At the strategic, operational, and tactical levels, sustainment is continuous. GMD capabilities prevent logistic flow interruption that can sub-optimize combat power despite changing lines of communication, shifting operational priorities, surge requirements, and a noncontiguous battle space by negating the enemy's use of BM, LRR, ASM, and CM with WMD to dislocate sustainment flow. The munitions capacity available to GMD forces in theater minimize the need for inter-theater cross-leveling and this reduces strain on inter-theater transport. GMD forces have been designed to have small logistics "footprints" to minimize their impact of the logistics flows. By preventing the damage or destruction of U.S. and allied equipment, they further minimize impacts to logistic flows.

(7) Illustrative Example of GMD Integration with Army Functional Concepts

(a) During an early BM and CM wave attack by B-Land, a number of BM launches occurred in proximity to a B-Land suspected chemical storage site. Intelligence automated assessment tools assessed those incoming BMs as likely having chemical warheads and this data was immediately provided to the GMD ABM. The GMD IFC assigned a higher priority to those engagements and they were engaged by missiles defenses in both A-Land and D-Land.

(b) Simultaneously, the launch points were distributed across the common integrated command system to the fires network for immediate strike. Counterfire was striking the launch areas before the first incoming BM could hit allied forces in A-Land near its border with D-Land. Similarly early warning was provided across the entire network of the potentially threatened areas in both countries. The GMD forces were able to destroy all incoming BM except one and this result was immediately passed throughout the network for SA. This BM was missed despite the several engagement attempts permitted by the layered defenses. The impact point was on an A-Land main supply route up wind of a D-Land village and a GMD launch site. The impact point was provided near real time by GMD to force protection elements for

immediate consequence management and a nuclear, biological, and chemical survey; D-Land was alerted to a possible chemical threat to the village; and logistics C2 was alerted to route the A-Land LOC around the location.

(c) Once chemical contamination was confirmed, a decision was made to move the D-Land GMD unit away from the potentially hazardous area. The GMD ABM automatically made defense adjustment recommendations for when the GMD unit was moving, where the best location was for the new unit location and defense readjustments when the GMD unit operations were restored. Munitions replenishment and logistic support arrived at the new location at the same time as the repositioning GMD unit. Force protection plans, air space control plans, and theater friendly force location data were also updated near real time. The confirmation of the chemical nature of the strike was quickly sent through the network and added to the knowledge data base where it was further distributed to the fires network and to the GMD ABM.

e. Operational maneuver from strategic distances; intratheater operational maneuver; decisive maneuver, western theater and homeland.

(1) As soon as the undetected cargo ships and submarines carrying concealed BM, CM, and UAS from B-Land and Y-Land move to within launch range of the U.S. and allied homelands, the decision is made to launch them in coordination with WMD ICBM and SLBM attacks on the U.S. homeland and allies from both countries. The cargo ship weapons with precision warheads are planned to attack key elements of the GMD system – radars, weapon sites, communication nodes, and C2 locations. The submarine launched weapons attacked allied capitals, the National Capital Region and an NSSE in the western U.S. These are immediately followed by the ICBM attacks with WMD against both strategic and economic targets of national importance as well as military targets such as domestic and coalition APOEs and SPOEs, logistics nodes and ISBs. Other enemy prime targets areas include the following – historical and symbolic institutions, centers offering commerce, transportation, spectator, and educational interests. Other targets might include hospitals, infrastructure centers, and religious structures.

(2) Maritime homeland and allied defense operations significantly reduce the weight of the ship-based and submarine attacks. The GMD system protecting the homeland and allies is at a high state of alert. The GMD ground, high altitude, and space sensor network rapidly detect, acquire, and track all incoming attacks. NORAD aircraft defending the homeland is able to intercept many of the incoming CMs with terminal phase ground based GMD destroying most of the remainder. A few CMs penetrate despite all efforts, but the redundant homeland defense GMD automatically adjusts for any battle damage with little to no lost capability.

(3) The first warning of an attack from Y-Land is the high altitude detonation of a nuclear device over Y-Land. This was an attempt to blind U.S. and allied sensors to the follow on attack as well as allows Y-Land to claim they were attacked first. GMD system blinding fails due to the electromagnetic pulse-hardened design of GMD systems. Y-Land immediately launches very heavy MRBM and IRBM attacks against Z-Land and still other IRBMs against more distant GMD assets (fig 4-7). These Y-Land attacks are supported by ECM packages on small fishing vessels off the Z-Land coast. Z-Land has a large technically sophisticated BMD system that was developed with U.S. assistance and is fully integrated with U.S. GMD.

(4) The Y-Land ECM is not effective. The U.S. and Z-Land sea-based and U.S. aerial GMD systems are immediately alerted to the massive launches and engage the missiles while in boost phase. Simultaneously, early warning is distributed throughout Z-Land and to the U.S. homeland. The terminal defenses of Z-Land are very robust and possess the same net-centric aspects of their U.S. counterparts. The combined U.S. and Z-Land sensors rapidly fuse data and provide it to the ABMs which provide engagement recommendations to the respective IFCs. As the missiles attacking Z-Land do not go exo-atmospheric, decoys are not an issue; however, the warheads are technically advanced and capable of some terminal maneuver. Positive kill data is immediately provided by whatever country sensor detects it to the entire shared network. Similarly any missed or unengaged targets are instantly identified and re-engaged by the weapon with the highest probability of success. As the threat missiles pass through the engagement battlespace of the longer range GMD systems, the layered defense hands off the surviving tracks to the shorter range, fast response terminal defense GMD systems. Y-Land's attack on Z-Land fails.

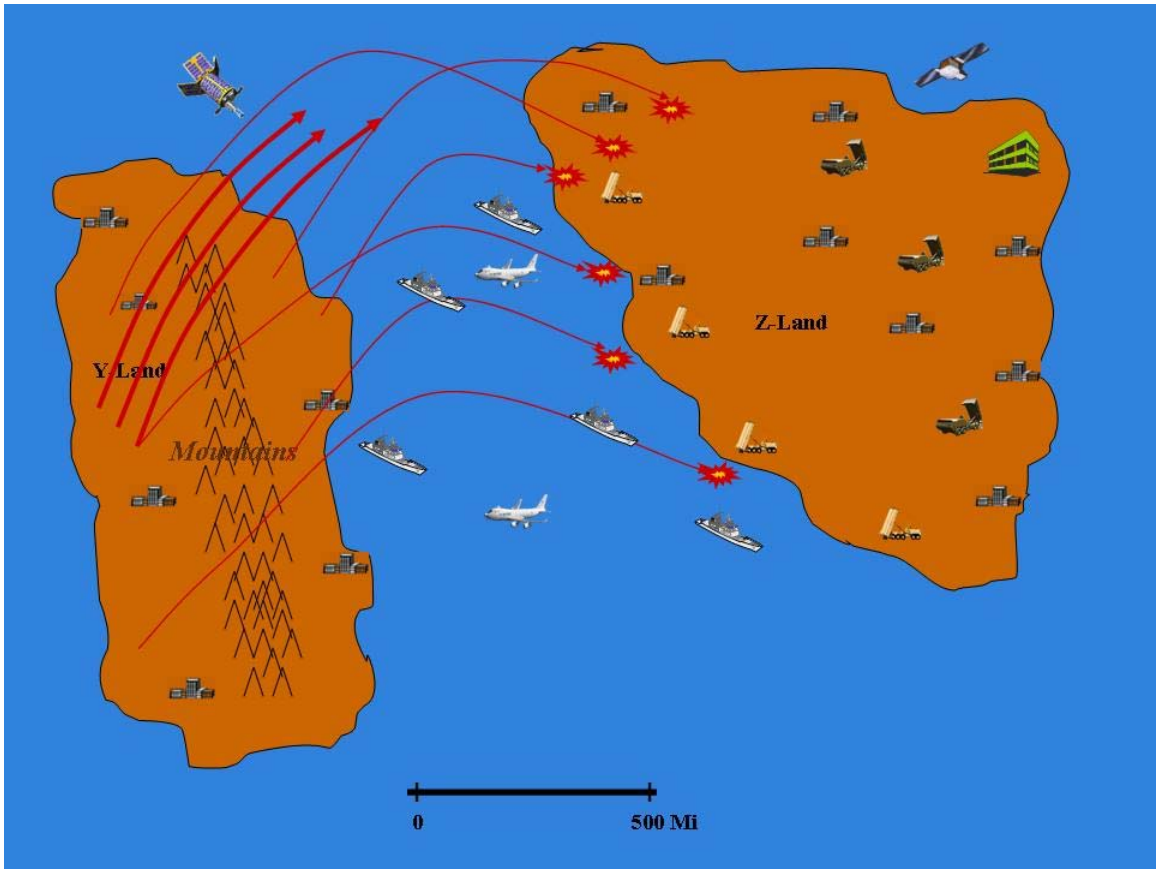

Figure 4-7. Western Theater Decisive Operations

(5) The ship-based weapons had to be launched prior to the ICBM and IRBM attacks against the U.S. homeland and more distant allies if they were to clear the way through the GMD for those ICBMs, but this provided the global network with additional warning of those ICBM and IRBM (against allies in the UN mandated eastern theater operation) attacks (fig 4-8). The layered capabilities of the GMD begin to attrite the ICBMs and allied attacking IRBMs while

they are still in boost phase with sea, air and ground based weapons in both eastern and western theaters. Both B-Land and Y-Land anticipate this and salvo launch all available weapons to maximize the possibility of defensive penetration. They also time their ICBM and IRBM attack with the heaviest SRBM, MRBM, CM, LRR, and ASM attacks they can muster supported with all the remaining EW to attempt to over load the GMD systems. The GMD theater system is severely stressed but not to the point of failure due to its high processing capacity, redundant communications, and layered systems.

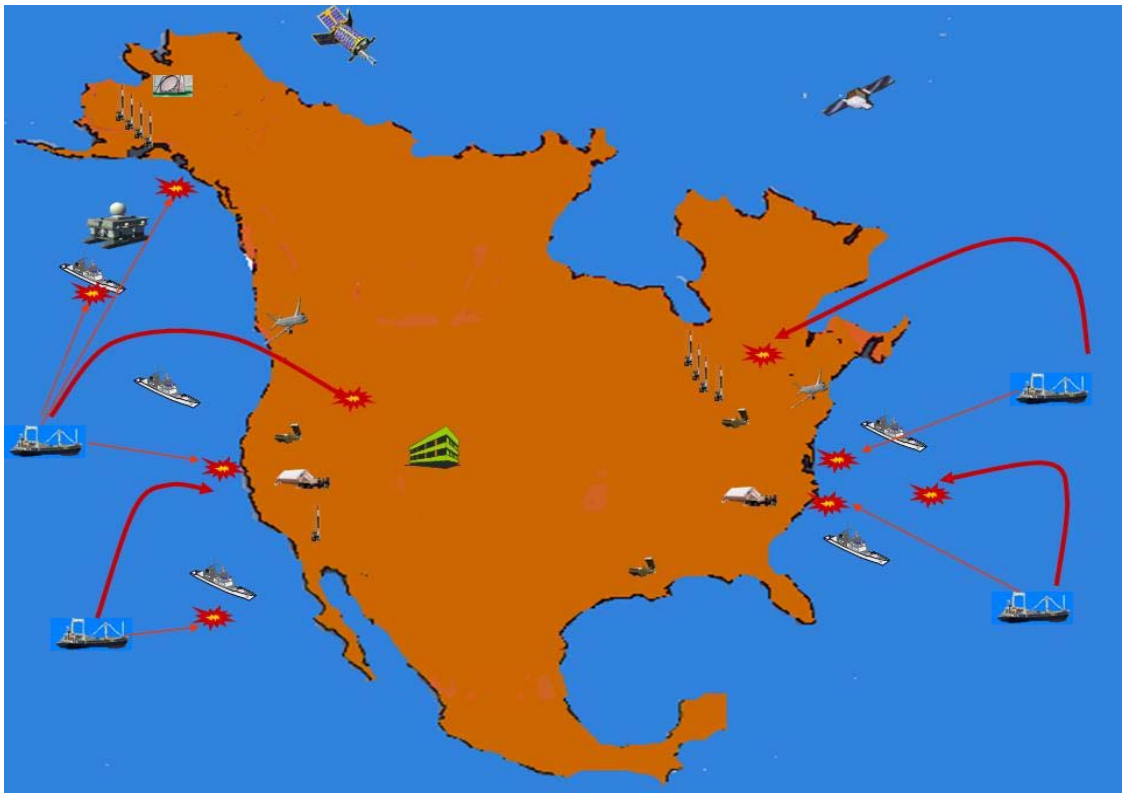

Figure 4-8. Homeland Decisive Operations

(6) As the B-Land and Y-Land ICBMs and IRBMs enter the mid-course phase of their (homeland and allied) attack, the redundant global sensor network provides continually updated track information to the mid-course GMD systems. Forward located ground-based interceptors (GBI) are the next portion of the GMD to engage. These are launched at earliest opportunity to maximize available battlespace and preserve re-engagement options that are available to them due to positive kill information provided by the global sensors to the ABM. Some of these GBIs engage homeland threats while others engage allied ones. Their sensors also provide a high degree of target discrimination that is able to separate threats from decoys so that only warheads or re-entry vehicles are engaged. Homeland located long range GBIs are the next portion of the GMD to be employed. These destroy most of the remaining warheads with the few missed targets destroyed by the terminal defense GMD component. The B-Land and Y-Land attack on the homeland also fails.

(7) Relationship to Army Functional Concepts

(a) Battle command. Western theater and homeland defense. As with the eastern theater GMD operations, the integrated ABM quickly passed engagement recommendations across the network that optimized weapons and sensors locations and available munitions; however, in the western theater, the network is shared with Z-Land. All engagements are accomplished IAW the previously approved combined DAL which is common in both countries IFC ABMs. This bi-national IFC combined with joint, Army, and Z-Land multifunctional sensors also eliminate the need for any particular GMD weapon to use its own organic fire control and sensor. The GMD networks are all electromagnetic pulse protected. Weapon and sensor battle damage or maintenance failures are automatically accommodated by the IFC ABMs. These recommend coverage adjustments across all effected systems. The ABM identifies missed targets to the IFC for re-engagement by another weapon. This does not only refer to weapons within the theater. Many of the threat missiles are only passing through Z-Land airspace to attack more distant targets to include the U.S. homeland.

(b) The ABM notifies the inter-theater elements of the GMD of missed targets requiring their attention at the same time. The sensors network provides positive kill information to all IFCs (intratheater and intertheater) so that no weapons are wasted. Early warning is injected instantly into both the military force protection and national civil defense systems. As targets fly toward the homeland continuous track is maintained. As the tracks are handed off from sensor to sensor, there is always only a single track number. The ABM is continuously updated with refined track information and discrimination results are rapidly fed into the system so that only lethal tracks and warheads will be engaged. These constantly refined tracks, high confidence discrimination, and positive kill assessments permit the maintenance of very high situational awareness to operators, virtual staffs at all levels, and national command throughout the engagement cycle. The battle manager also continually updates consequence management estimates as tracks are killed or remain to be successfully engaged. These are seamlessly provided across the network to joint, combined, and inter-agency organizations like the U.S. Northern Command (USNORTHCOM), the NORAD, and the Federal Emergency Management Agency, as well as being provided to allies. GMD engages attacks against their countries.

(c) Protect. Western theater and homeland defense. The layered protection of Z-Land has a full-spectrum common C4ISR that is shared by the U.S. and Z-Land. The common C4ISR is also shared with other allies across multiple security levels. All U.S. and Z-Land sensors and weapons are integrated and support the defense. The AMD forces of both countries are interdependent, just as the Army GMD forces are interdependent with joint ones. The C2 is integrated, doctrine is common, and TTPs have been repeatedly refined. The defense of the western theater (as well as the eastern theater) is actually the first line of defense for more distant targets in other theaters to include the homeland. Many GMD capabilities (sensors and shooters) are forward deployed either at sea or on allied territory to provide defense in depth to the homeland in addition to the support they provide forward theater operations and protection of allies. There is a prioritized global DAL that is common across all ABM to ensure that cross theater engagement priority conflicts do not occur. Global sensor task plans have also been integrated, prioritized, and deconflicted.

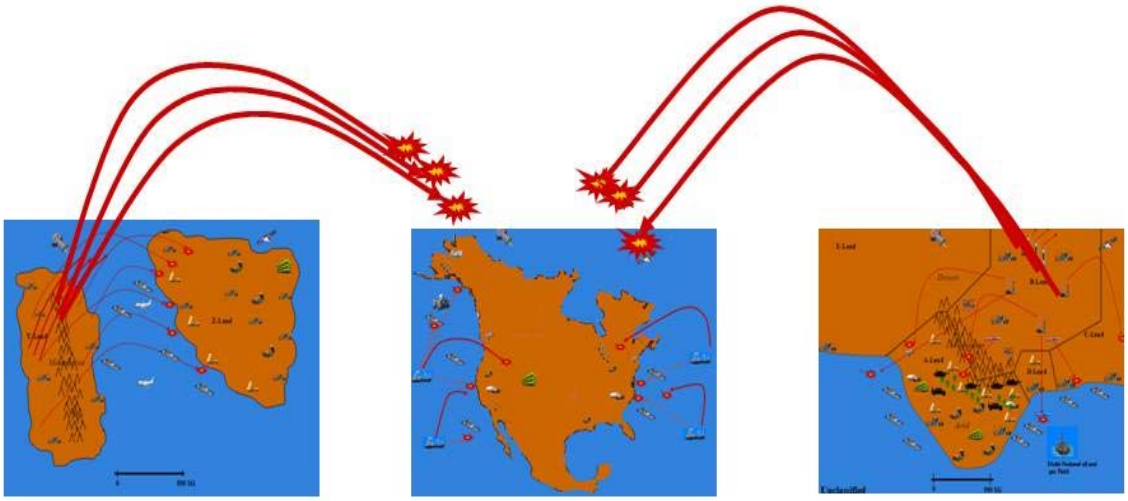

Figure 4-9. Homeland Decisive Operations–Global

(d) Move. Western theater and homeland defense. The operational and strategic agility of GMD forces are essential to the ability of all JFCs to rapidly shift forces intratheater and intertheater to meet changing threats and combat attrition. GMD forces protect the ability to continuously move across ground, sea, and air LOCs that stretch all the way back to the continental U.S. (CONUS) base.

(e) See. Western theater and homeland defense. The same integrated ability to have awareness across all domains and functions to build and maintain SA is present in the western theater as in the eastern theater and within the homeland and global defense of friends and allies. In fact, it is the same architecture. Theater and homeland (including space) based GMD sensors provide data and information to the network that when processed through automated assessment tools becomes knowledge. This near real time information management permits rapid adjustments to GMD plans and operations. The ability to make on the fly changes to firing doctrine is critical, as ICBM flight times are 20 minutes or less. Rapid assessment and knowledge is crucial to making these decisions to optimize system effectiveness during engagements.

(f) Strike. Western theater and homeland defense. The integration of fires and GMD is similar to that in the eastern theater. This includes the continuous sharing of data between GMD and fires, the rapid notification of launch locations, and the highly reliable combat identification permit near elimination of counterfire response gaps. Successful GMD of the homeland against WMD attacks give options for global strike response to senior leadership that might not otherwise be available. A highly effective GMD also make our need for pre-emptive strike less urgent with obvious international relations benefits.

(g) Sustain. Western theater and homeland defense. The GMD forces are continuously sustained across ground, sea, and air LOCs that stretch all the way back to the CONUS base. As munitions are consumed, replenishment is immediately moved forward. The same is true of all other classes of supply. The network provides reliable visibility of all sustainment in transit—fort to port to ISB to forward operating base to unit.

f. Concurrent and Subsequent Stability Operations

(1) The transition to stability operations occurs almost immediately as the decisive operations gain control over terrain in the B-Land border area. This is to deny the terrorists sanctuary, deprive them of resources, and diminish support from the local population. Specific tasks for the GMD forces are protect the population of the area, protect critical infrastructure, and enforce a UN mandated no-fly zone over the JOA. Failure to protect the population and infrastructure is a precondition to undermining popular support for the terrorist and will allow the terrorist organizations to successfully reoccupy and dominate the area over time. Even after the terrorists' more conventional forces are defeated in the JOA, they will retain a degree of tactical initiative unless and until their irregular forces and cells are destroyed. This requires a measure of support by the population. The GMD will also continue to protect Army modular, as well as joint and allied, forces conducting the stability operations in the area; however, GMD forces are needed to support the UN no-fly zone and to protect the population after many of the Army modular maneuver forces redeploy to home stations.

(2) Battle command and protect. As the U.S. and allied forces gain control over the B-Land border area, UN and other nongovernmental organizations (NGOs) also move into the area to provide humanitarian aid and support. They use private and commercial aircraft and helicopters to move around the area, most of which are not part of the airspace control plan. Nor do they have cooperative combat identification in many cases, yet accidentally shooting one of them down would have significant political consequences. The terrorists continue to use their greatly diminished stocks of LRR and CM in the same areas where the UN and NGOs private and commercial aircraft and helicopters operate. As great as the problems an accidental shoot down would cause, the political damage by a WMD armed terrorist LRR or CM hitting friendly population would be likely worse in terms of regional stability. Commercial airports around the world are a particularly important target for threat LRRs and CMs. Additionally, the UN and NGOs are not subject to coalition control and establish their own operating bases throughout the region that are outside of protected military bases. This requires the DAL be updated constantly and the defenses adjusted. These LRR and CMs may have relatively short flight times. In this environment, reliable, redundant noncooperative combat identification and high friendly and enemy SA is even more critical to preserving GMD freedom to engage. GMD also contributes concise rapid, unambiguous, localized early warning to civilian populations. In the mountainous border area, GMD's high altitude multifunction sensor platforms are very valuable in providing coverage that is persistent and not terrain masked.

(3) Move. Operations similar to decisive operations.

(4) See. As the terrorist organizations throughout the region transition from conventional to irregular warfare with the rapid destruction of their base camps and

infrastructure, our ability to acquire data and information and transform that into useful knowledge also transitions. The GMD multifunction sensors feed all available data to the intelligence architecture and this is merged with all other data to create near real time knowledge to build SA across all domains and functions. Because the terrorists are now operating in much smaller, more mobile organizations, rapid intelligence for strike and force protection is crucial.

(5) Strike. During the transition to stability operations, GMD sensors contribute to the strike function in two key areas. First, the continuous sharing of sensor data with fires organizations to eliminate response gaps due to the fleeting nature of the irregular forces as targets, and second, prevention of fratricide with the seamless fusion of GMD and fires networks, C2, and knowledge.

(6) Sustain. Operations similar to decisive operations.

g. Distributed Support and Sustainment

(1) The Army GMD forces are fully integrated into the global integrated logistics C2. At all operational phases, maintenance requirements are known immediately throughout the system, either because the predictive fault detection system identifies a future need or faults or battle damage occurs. In either case, needs are identified by the GMD system, those needs are automatically sent to the centrally managed distribution system, and the needs are tracked until arrival and installation at the requesting unit. Simultaneously, maintenance issues are identified to the ABM system so that resulting operational issues can be adjudicated plans and coverage changed etc. The common, integrated battle command system is also notified of any significant logistic or personnel issues both horizontally and vertically. When the issue is resolved, similar data is provided back to the battle command system.

(2) Software and data base upgrades to the collaborative planning, ABM, integrated fire control, situation awareness, and combat identification functions continue to be automatically distributed across GMD systems worldwide as required. The GMD operators are alerted to these as they occur but much of this software maintenance is transparent to the operators. For those upgrades that have operational impact, training packages are also sent automatically to each operator with the system tracking their successful completion. Final maintenance on the systems prior to departure includes replacement of items or modules identified as potential problems by the individual GMD systems predictive fault detection capability. This is done to ensure the highest possible operational ready rate upon arrival in theater for every GMD component. Any tests that could take system's off-line are curtailed. This is very rare due also to the concurrent operations and test and training capability.

(3) Globally integrated logistics management is continually updated throughout all phases. Battle damage, ordnance expenditures, munitions availability, and predictive faults in the GMD system are known immediately across the network. Reordering is automatic from unit location all the way back to the CONUS base if required. The transparent and centrally managed distribution system gives complete shipping visibility of all items from point of origin back to the requesting GMD element. Personnel management issues are also being continually updated across the network. Just as system components are cross-leveled to maximize operational

availability, so also are personnel cross-leveled in response to battle or nonbattle casualties. Battle rosters are continually and automatically updated with both personnel availability and their training status. In-theater and out-of-theater medical treatment of personnel is tied to the network so that the chain of command is constantly aware of the status of their assigned personnel. They are also automatically notified when personnel are available to return to duty.

(4) The concurrent operations and test and training capability that is built into all systems supports the rapid training, certification, and integration of individuals and crews needed to support casualty replacement cross-leveling during lulls in combat operations. Engagement data and system performance information is automatically logged and transmitted across the network to the combat developers and materiel developers back in the homeland for use across the DOTMLPF spectrum.

(5) Relationship to Army functional concepts is primarily to *Sustain* as stated above.

h. Network-enabled Battle Command

(1) The conduct of multinational noncontiguous, high tempo operations simultaneously across both decisive operational and tactical maneuver with concurrent stability operations place very high demands on battle management. GMD contributes to network-enabled battle command in three distinct ways: Information superiority; protection of battle command nodes; and freedom of action.

(2) Relationship to Army Functional Concepts

(a) Battle command. Effective battle command depends heavily upon horizontal and vertical integration of sensors. GMD provides multiple and redundant sensor coverage of the third dimension of the battlefield. They provide data into the GMD ABM that in turn provides fused and reliable information across the network. This third dimension knowledge as part of the multi-echelon collaborative information environment enables actionable intelligence on enemy actions, blue and red force combat identification, and provides a more complete situational awareness for the commanders or decisionmakers. This requires a robust communications network to support operations in a wide variety of operational environments.

(b) Protect. The destruction or disruption of battle management command, control, communications, computers, and intelligence places unnecessary strains on the battle command. Even the most redundant and agile battle management can still be effected adversely by attack. GMD provides physical protection to battle command and prevent dislocation by BM, LRR, CM, and ASMs with precision guidance and WMD.

(c) Move. Freedom of maneuver is the means by which the Army dislocates and destroys enemy forces in the field. Conversely, any disruption to the Army's ability to maneuver favors the enemy defense and delays can cause unnecessary friendly losses. GMD preserves freedom to maneuver in the face of attacks by enemy BM, LRR, CM, and ASMs. Just like maneuver forces, battle command must also be protected while on the move as this is when it is highly vulnerable.

(d) See. As previously stated, GMD multifunction sensors feed all available data to the intelligence architecture. This is in turn merged with all other data to create near real time knowledge and a more complete picture or SA across all domains and functions. The intelligence created in turn provides knowledge to the GMD operators and planners on means to optimize the active defense. In particular, GMD benefits from having advanced warning of impending use.

(e) Strike. GMD provides direct and synergistic support to the fully integrated Army and joint integrated fires control. GMD sensors provide the information that enables near real time fires against threat BM, LRR, CM, and ASM launch locations. These joint and Army fires in turn reduce the number of possible launches against our GMD active defense.

(f) Sustain

- The Army GMD forces are fully integrated into the global integrated logistics C2. At all operational phases, maintenance requirements are known immediately throughout the system, because either the predictive fault detection system identifies a future need or faults or battle damage occurs. In either case, needs are identified by the GMD system, those needs are automatically sent to the centrally managed distribution system, and the needs are tracked until arrival and installation at the requesting unit. Simultaneously, maintenance issues are identified to the ABM system so that resulting operational issues can be adjudicated plans and coverage changed etc. The common, integrated battle command system is also notified of any significant logistic or personnel issues both horizontally and vertically. When the issue is resolved, similar data is provided back to the battle command system.
- Software and data base upgrades to the collaborative planning, ABM, integrated fire control, situation awareness, and combat identification functions continue to be automatically distributed across GMD systems worldwide as required. The GMD operators are alerted to these as they occur but much of this software maintenance is transparent to the operators. For those upgrades that have operational impact, training packages are also sent automatically to each operator with the system tracking their successful completion. Final maintenance on the systems prior to departure includes replacement of items or modules identified as potential problems by the individual GMD systems predictive fault detection capability. This is done to ensure the highest possible operational ready rate upon arrival in theater for every GMD component. Any tests that could take system's off-line are curtailed. This is very rare due also to the concurrent operations and test and training capability.
- Globally integrated logistics management is continually updated throughout all phases. Battle damage, ordnance expenditures, munitions availability, and predictive faults in the GMD system are known immediately across the network. Reordering is automatic from unit location all the way back to the CONUS base if required. The transparent and centrally managed distribution system gives complete shipping visibility of all items from point of origin back to the requesting GMD element. Personnel management issues are also being continually updated across the network. Just as system components are cross-leveled to maximize operational availability, so

also are personnel cross-leveled in response to battle or nonbattle casualties. Battle rosters are continually and automatically updated with both personnel availability and their training status. In-theater and out-of-theater medical treatment of personnel is tied to the network so that the chain of command is constantly aware of the status of their assigned personnel. They are also automatically notified when personnel are available to return to duty.

- The concurrent operations and test and training capability that is built into all systems supports the rapid training, certification, and integration of individuals and crews needed to support casualty replacement cross-leveling during lulls in combat operations. Engagement data and system performance information is automatically logged and transmitted across the network to the combat developers and materiel developers back in the homeland for use across the DOTMLPF spectrum.
- Relationship to Army functional concepts is primarily to *Sustain* as stated above.

4-4. Summary

The success of the future Modular Force depends significantly upon our ability to dominate globally threats in order to maintain our ability to decisively maneuver and sustain while protecting the homeland. The rapid proliferation of BM, LRR, CM, and ASMs with precision guidance and WMD can place our forces at extreme risk without dominant GMD capabilities that ensure our strategic, operational, and tactical freedom of maneuver.

Chapter 5
Required Capabilities

5-1. Introduction

a. The Army's functional concepts provide both explicit and implicit descriptions of the GMD functions necessary to achieve the objective state of the future Modular Force. These required capabilities are not ends unto themselves but integral components of a larger joint and Army capability goal. The influence of a single GMD capability is rarely confined to a single functional concept but frequently has impacts across multiple ones. Furthermore, multiple GMD capabilities have a synergistic impact when applied simultaneously.

b. This listing of required capabilities should be interpreted as optimum capabilities during the 2015-2024 timeframe. The Army GMD required capabilities listing is presented in relationship to the Army functional concepts. The listing is not all inclusive and will be further refined and developed as the Army GMD concepts mature and as the CBA and Joint Concepts Integration Development System (JCIDS) analysis is executed as well as future non-JCIDS analysis by MDA.[11] The required capabilities are not constrained by budgets or technology. The time period is outside planned programs and will reflect new capabilities.

[11] MDA is JCIDS exempt until Milestone C.

5-2. Battle Command GMD Required Capabilities

a. TRADOC Pam 525-3-3 provides a visualization of how Army future Modular Force commanders will exercise C2 of Army operations in a joint, interagency, intergovernmental, and multinational environment. The battle command function is a blend of the cognitive and the technical. Central to the technical component is the concept of a common, integrated Army battle command system enabled by an ubiquitous, redundant, and continuous communications network.

b. Many of the key ideas within the battle management functional concepts relate to or are enabled by GMD. Among those include the centrality of the commander, role of the commander, mission command, self synchronization, collaborative planning and accelerated MDMP, decision superiority, and common integrated Army battle command system.

c. Full achievement of the capabilities described in TRADOC Pam 525-3-3 will require the integration of a wide range of DOTMLPF solutions. The following GMD capabilities will contribute to achieving the Army's future Modular Force battle command capability requirements:

(1) The future Modular Force requires integrated AMD and GMD capabilities to detect, act, warn, and cue systems from land, sea, air, and space in a joint protection environment in order to act against, and defeat a myriad of threats to include ballistic and tactical missiles, cruise missiles, armed unmanned aircraft, aircraft, and their delivery processes and nodes.

(2) GMD forces require the capability to structure, identify, or articulate the problem in a joint, interagency, and multinational (JIM) environment to allow them to visualize the conduct of full spectrum operations.

(3) GMD forces require the capability to rapidly provide and update all combat identifications across a common, integrated GMD, joint, Army, and allied battle command system in both homeland defense and joint operational environments to maximize early engagement opportunities, minimize fires response gaps, and eliminate all possibilities of fratricide.

(4) GMD forces require the capability to self-synchronize their actions without direction from higher headquarters or their commander in a joint and multinational environment to allow missile defense units to provide rapid and accurate engagements on a global scale.

(5) GMD battle management systems require the capability to automatically track and adjust to battle damage and maintenance failures in both homeland defense and joint operational environments in order to ensure no gaps or seams occur in the defense supporting on-going operations.

(6) GMD fire units require the capability to utilize other systems' ABM, weapons, fire control, and sensors in support of the JFC to eliminate the impacts of a system component loss.

(7) GMD forces require an organic capability to plan collaboratively with JIM battle command nodes at home station, en route, and in theater. Collaborative planning will allow planning cells at widely distributed locations to use common or compatible planning software and databases to exchange concepts, overlays, and analysis of options. It will also enable planners at all echelons to contribute to the planning process, even when en route to battlefield operational areas.

(8) GMD forces require the capability to have an integrated view of the operating environment that combines accurate knowledge of self, knowledge of the environment, and knowledge of the enemy in a JIM environment in order to plan, decide, and execute missions.

(9) GMD sensors require the capability to be unconstrained by terrain masking in both homeland defense and joint operational environments to provide continuous and long range track for use in combat identification and early engagement.

(10) GMD forces require the capability to have uninterrupted, high reliability, secure, high-capacity, and jam resistant communications in both homeland defense and joint operational environments to ensure GMD forces do not lose effectiveness by operating autonomously.

(11) GMD forces are required to conduct a spectrum supportability assessment for all spectrum dependent systems and obtain approval prior to the development or acquisition (to include rapid acquisition) of such systems.

(12) GMD forces require the capability to rapidly update plans and TTP based on near real time ISR in both homeland defense and joint operational environments to maximize continued effectiveness against an enemy that thinking and reacting enemy.

(13) GMD forces require the capability to conduct concurrent training and operations in support of the Joint Force Commander to support training and certification of individuals and crews to replace casualties while continuing operations.

(14) GMD forces require the capability of integrated Army battle command system(s), joint interoperable to all echelons, fully compatible with DOD net-centric architectures and provide a common method of sharing information to enable decision and information superiority for higher and subordinate commands to support missile defense operations.

(15) GMD forces require the capability to conduct integrated/collaborative planning as a member of a joint or combined task force and IAW the JFC priorities and DAL in order to facilitate rapid and sustained force projection.

(16) GMD forces require the capability to provide effective automated battle management recommendations for weapon system placement, sensor coverage, and engagement zones at every operational level during joint force operations in order to maximize the effectiveness of all systems.

(17) GMD forces require the capability to conduct integrated training and mission rehearsals in conjunction with modular force battle command elements at all operational levels at home station, during deployment, and in theater in support of the JFC to maximize force preparedness for forward theater operation.

(18) GMD sensors require the capability to provide positive kill determinations on all target engagements in both homeland defense and joint operational environments to ensure the best possible use of available munitions by not engaging targets that are no longer threats as well as real time updating of enemy order of battle.

(19) GMD forces require the capability to conduct wargaming of Army and joint force plans with the modular force at home station, during deployment, and in theater in a joint environment to provide refined and optimized plans in accordance with the joint force commander's concept of operations during all operational phases.

(20) GMD forces require the capability to integrate seamlessly into joint and Army battle management upon arrival in theater in a joint environment to provide seamless and expanded protection of arriving U.S. and allied forces.

(21) GMD forces require the capability to rapidly adapt and adjust defense plans, weapon and sensor placements and coverage, and update friendly force locations in a joint operational environment to preclude enemy actions to interrupt friendly force flows.

(22) GMD forces require the capability for a single joint capable logistics operating picture that is in concert with and in support of the operational commander. It must enable real time collaborative planning vertically, and horizontally; accelerate and streamline the MDMP; present information in a real-time, which supports course of action analysis and automated decision support systems. It must support centrality of the commander; decision superiority; and uses a common integrated Army battle command system(s), joint capable at lower levels in the context of a joint operational environment (JOE), to provide distributed sustainment in future sustainment operations.

(23) GMD forces need the capability to rapidly transition RDT&E capabilities and systems to partial or full-operation status to provide needed support to JFC operations.

5-3. See GMD Required Capabilities

a. TRADOC Pam 525-2-1 describes how the future Modular Force will acquire and generate knowledge of itself, the enemy, and the operational environment at all levels. The Army is incapable of decisive operations without the ability the create and use this knowledge. Many of the key ideas within TRADOC Pam 525-2-1 relate to or are enabled by GMD. Among those are acquire, transform, provide, and data exploitation.

b. Full achievement of the capabilities described in TRADOC Pam 525-2-1 will require the integration of a wide range of DOTMLPF solutions. The following GMD capabilities will contribute to achieving the Army's future Modular Force see capability requirements.

(1) GMD forces require the capability to obtain data about itself, the environment, and the enemy in a JIM environment to develop relevant information, knowledge and ultimately, support understanding for missile defense operations.

(2) GMD forces require the capability to operate effectively and provide SIAP clarity in the context of a high clutter, low signature, heavy countermeasure environment in a joint, Army, and allied forces environment to ensure optimum protection to without any degradation in operational effectiveness.

(3) GMD forces require the capability to receive, correlate, and fuse external track information from JIM sources with local sensor data from both the AMD unit and the supported force to provide a scalable and filterable local SIAP that will be used to provide third dimensional inputs to the COP and thus facilitate force wide understanding of the battlespace.

(4) The future Modular Force requires the capability for persistent surveillance of the battlespace and detecting, acquiring, tracking, classifying, discriminating, and identifying potential targets before conducting precision strike operations, in support of GMD forces and in the context of a joint fires operational architecture for attacking time-sensitive targets.

(5) GMD forces require the capability to rapidly receive and process enemy and friendly BDA in both homeland defense and joint operational environments to facilitate operational planning.

(6) GMD forces require the capability to receive and utilize near real time ISR support as they support the JFC for the adjustment of GMD plans and operations.

(7) GMD forces require the capability to rapidly merge all available sensor information into single high, confidence tracks in both homeland defense and joint operational environments in order to facilitate reliable, redundant cooperative and noncooperative combat identification that eliminate any chance of either unengaged targets or fratricide.

(8) GMD forces require the capability to fuse and analyze data in a JIM environment to convert vast amounts of data into knowledge to support missile defense operations.

(9) GMD battle management systems require the capability to provide rapid predictive intelligence of potential enemy courses of action in both homeland defense and joint operational environments to negate the thinking enemy from adversely affecting joint and Army force operations.

(10) GMD sensors must be capable of operating within a net-centric architecture. When operating in this architecture, GMD sensors must be capable of sharing unprocessed data with other network sensors to facilitate joint composite tracking of aerial objects.

(11) GMD sensors must be dynamically tailorable by being designed with a modular open systems approach architecture. Sensors from one unit must be capable of being

repositioned and or reaffiliated with any other common battle command element when mission requirements change.

(12) GMD forces require the capability to integrate all missile defense sensor data into the future Modular Force COP in a joint and multinational environment to provide commanders with all enemy locations and capabilities.

5-4. Move GMD Required Capabilities

a. TRADOC Pam 525-3-6 focuses on strategic force projection and operational agility in support of the JFC. Operational maneuver from strategic distances, shaping and entry operations, and intratheater operational maneuver are heavily reliant upon the joint force commander retaining freedom of maneuver across all operational environments.

b. Many of the key ideas within TRADOC Pam 525-3-6 relate to or are enabled by GMD. Among those are prompt and sustained framework, prompt response, sustained response and operational agility, tactical movement and mobility and relevance across the range of military operations (ROMO).

c. Full achievement of the capabilities described in TRADOC Pam 525-3-6 will require the integration of a wide range of DOTMLPF solutions. The following GMD capabilities will contribute to achieving the Army's future Modular Force move capability requirements.

(1) The future Modular Force requires a ground based capability to defeat enemy missile anti-access capabilities in a global missile defense system in order to protect the introduction of early entry and follow-on forces into the theater.

(2) GMD forces require the capability to be organized into lighter, smaller, but more capable modular formations operating in a joint and multinational environment to allow rapid movement by all available air and sea lift, both military and commercial.

(3) GMD forces require the capability to move effectively through multiple unimproved entry locations in support of the JFC to minimize the effectiveness of anti-access threats and help ensure uninterrupted flow of land power into the operational environment.

(4) GMD forces require the capability to provide missile defense for multi-modal entry operations in a JIM environment to shield friendly forces from enemy attack that may be local, wide area, theater-wide, or global in scope.

(5) GMD forces require the capability to conduct rapid operational maneuver from strategic distances as a member of a joint task force in order to provide prompt and sustained force projection, counter threat anti-access plans, deter conflict, preclude early enemy success, and provide access to austere environments in support of stability operations.

(6) GMD forces require the capability for tactical movement commensurate to the capabilities they provide and modular forces they are protecting to ensure continuous protection at all operational phases.

(7) GMD forces require the capability to develop operational, tactical, and strategic capabilities that provide complete freedom of movement both into theater and within the theater; rapidly deploy forces, equipment, and materiel from strategic distance. The capability must then support these forces across the JOE; distribute sustainment from National level to widely dispersed locations down to Soldier level, using ground, air, airdrop and sea platforms; capable of operating in austere locations (with limited infrastructure) in the JOE, to provide distributed and continuous sustainment in future sustainment operations.

5-5. Strike GMD Required Capabilities

a. TRADOC Pam 525-3-4 addresses future Modular Force fires and effects at the strategic, operational, and tactical levels. TRADOC Pam 525-3-4 requires the seamless integration of fires and sensors across all operational environments. Many of the key ideas within TRADOC Pam 525-3-4 relate to or are enabled by GMD. Among those are continuous integration and employment of networked strike from strategic to tactical levels; seamless integration of lethal and nonlethal fires; attack all target types in all environments and terrains with unprecedented effectiveness; maintain routine access to space capabilities; and, guarantee responsiveness and scaled lethality through joint interdependence.

b. Full achievement of the capabilities described in TRADOC Pam 525-3-4 will require the integration of a wide range of DOTMLPF solutions. The following GMD capabilities will contribute to achieving the Army's future Modular Force strike capability requirements.

(1) GMD forces require the capability to employ missile defenses in a JIM environment to allow the JFC to shape the operational environment, seize and maintain the initiative, maintain continuous pressure, disintegrate, disorient, and destroy the enemy, support stability operations, and protect friendly forces conducting full spectrum operations.

(2) The future Modular Force requires the capability to conduct rapid strike operations in support of GMD and in the context of a joint fires operational architecture for attacking time-sensitive targets to destroy mobile missile launchers and support equipment prior to them targeting friendly forces.

(3) GMD multifunctional sensors require the capability to provide near continuous, real time data and information in support of joint and Army fires planning for use in time sensitive targeting against enemy launch locations.

(4) GMD forces require the capability to employ missile defenses to overcome enemy anti-access capabilities in a JIM environment to allow friendly strike forces to enter contested areas protected from enemy capabilities.

5-6. Protect GMD Required Capabilities

a. TRADOC Pam 525-3-5 describes how the future Modular Force will protect people, physical assets and information against the full spectrum of threats. Each of the seven enabling tasks contained in TRADOC Pam 525-3-5 (detect, assess, decide, act, and recover) are enhanced by GMD forces and systems. Many of the key ideas within TRADOC Pam 525-3-5 relate to or are enabled by GMD. Among those are Soldier protection, platform protection, unit protection, fixed, semi-fixed, and mobile protection, information protection, active protection, multipartner protection, sensitive site protection, and protection of noncombatants and displaced civilians.

b. Full achievement of the capabilities described in TRADOC Pam 525-3-5 will require the integration of a wide range of DOTMLPF solutions. The following GMD capabilities will contribute to achieving the Army's future Modular Force protect capability requirements.

(1) GMD forces require the capability to provide immediate and localized early warning of attack in both homeland defense and JOEs in order to protect friendly forces and populations and prevent unnecessary casualties.

(2) GMD forces will require freedom of maneuver, area access, and area protection.

(3) GMD forces will require protection of their facilities.

(4) GMD forces will require all means of early detection and identification.

(5) GMD forces will require robust protection and security to mitigate the host of symmetrical and asymmetrical threats.

(6) GMD forces will require freedom of maneuver to otherwise manage and mitigate displaced civilians and other noncombatants located in the JOA.

(7) GMD forces will require robust intelligence and information gathering to support protection efforts.

(8) GMD forces will require first responder capabilities to mitigate consequence response and consequence management that may spawn from a variety of threats including WMD.

(9) GMD forces require the capability to provide near real time information to airspace control planning and operations in support of the JFC to minimize fratricide and maximize airspace control and utilization.

(10) GMD forces require the capability to negate large volume, precision threat BM attacks without completely depleting available munitions in support of the JFC to minimize threat ability to cause significant civilian casualties and compromise our freedom of maneuver at all operational levels.

(11) GMD forces require the capability to conduct high reliability combat identification at maximum range in support of the joint force to maximize early engagement opportunities.

(12) The future Modular Force division and above requires the capability for a fully modular, full spectrum, deployable integrated missile defense capability for global, homeland, regional and theater defenses, in order to defeat enemy missile threats.

(13) The future Modular Force requires the capability to conduct air and missile defense (space, air, sea, and land based elements) in a fully networked, interdependent, joint theater environment to provide very high confidence protection beyond the JOA to include regional coalition forces against threat WMD effects.

(14) GMD forces require the capability to protect equipment and personnel in fixed, semi-fixed, and mobile environments, and during maneuver operations in a JIM environment to survive enemy attacks and provide assured missile defense capabilities.

(15) GMD forces require the capability to integrate sensor to shooter assets throughout the future Modular Forces to allow for preemptive actions in a JIM environment to identify and defeat enemy threats prior to employment thus conserving missile defense assets.

(16) GMD forces require the capability to integrate joint interdependencies for missile defense in a JIM environment to provide the JFC a holistic defensive umbrella on a global scale.

(17) GMD forces require the capability to fuse all joint, Army, and allied sensor data in the context of both homeland defense and joint operational environments in order to provide continuous, layered, and 360-degree coverage to the nonlinear, noncontiguous operational environment.

(18) GMD forces require the capability to counter anti-access threats during shaping and entry operations in support of the JFC in order to protect U.S. and allied forces during force projection as well as provide operational shielding for countries in the theater.

(19) GMD forces require the capability to counter ship launched missile threats in support of NORTHCOM and NORAD defenses and maritime forces in order to support homeland defense operations.

(20) GMD sensors and battle management require the capability to provide a robust and independent flow of prompt information of successful threat attacks for use by consequence management organizations.

(21) GMD forces require the capability for protection of sustainment operations, ensuring freedom of movement and uninterrupted sustainment, including protection of (sustainment) platforms, logistical installations, ISBs, FOBs, and air, sea and ground lines of communication against adversarial threats including: surveillance, operational compromise, improvised explosive devices, snipers, rocket propelled grenades, directed energy, and WMD in combat, to provide distributed sustainment in future sustainment operations.

(22) GMD forces require the capability to detect, identify, warn, and react to explosive hazards from safe distances while traveling at various rates of speed to ensure adequate protection of the force and to preserve combat power, momentum, and lines of communication needed for sustainment.

(23) GMD forces require the capability to detect and identify CBRN hazards from great distances - sufficient to avoid contamination or exposure - to ensure protection of the force and to preserve combat effectiveness.

(24) GMD forces require the capability to identify (or confirm) the identity of detainees from the moment of capture, which, within the context of an asymmetrical threat, can occur at any location within the JOA - to safe guard and expedite the hasty evacuation and transfer of detainees linked to strategic interests (high value, and others).

(25) GMD forces require the capability to identify (or confirm) the identity of dislocated civilians from the moment of initial contact, which, within the context of an asymmetrical threat or environment, can occur at any location within the JOE - to instantly contrast their known identity with intelligence repositories extrapolating the joint, intergovernmental, and interagency domains.

(26) GMD forces require the capability to protect friendly forces, unarmed civilians, and dislocated civilians from collateral damage resulting in the destruction of a projectile while in flight - or resulting from its detonation on impact - to protect life, property, and equipment.

(27) GMD force will require planners in computer network operations and EW to develop C2 warfare and information protection plans and integrate them into operations thus protecting GMD networks from adversary/enemy computer network attack or electronic warfare attack.

(28) GMD forces will require information protection doctrine that helps planners created integrated computer network operations and EW defense plans.

(29) GMD forces will require an in-depth understanding and appreciation of the culture of joint operational areas to support information operations plans supporting protection efforts.

(30) GMD forces require the capability to fuse intelligence information on WMD with threat launch point locations and access likelihood of WMD payloads to support engagement prioritization.

5-7. Sustain GMD Required Capabilities

a. TRADOC Pam 525-4-1 describes future Modular Force logistics as a single, coherent system that senses and interprets the operational environment and responds through network capabilities. The ability to execute a sustainment system from homeland support base to the point of effect is preserved by GMD forces. Many of the key ideas within the TRADOC Pam 525-4-1 relate to or are enabled by GMD. Among those include a single joint capable network-enabled logistics system; high-speed, precision, accuracy, visibility, and centralized supply chain

management capabilities; an interdependent, capabilities based, modular, network-enabled organizations with increased commonality, highly mobile systems, advanced distribution platforms, precision delivery systems and state-of-the-art C2, and continuous support through global integrated management and sourcing of joint, Army, and combined partnerships.

b. Full achievement of the capabilities described in TRADOC Pam 525-4-1will require the integration of a wide range of DOTMLPF solutions. The following GMD capabilities will contribute to achieving the Army's future Modular Force sustain capability requirements.

(1) GMD forces require the capability to be self sufficient during entry operations though multiple improved and unimproved entry locations in support of the JFC to minimize impacts on logistics and transportation supporting the force flow into theater.

(2) GMD forces require the capability to automatically log and transmit across the network all system performance and engagement data in both homeland defense and joint operational environments for use by training and materiel developers in the homeland.

(3) GMD forces require the capability to prevent enemy dislocation of logistic flows in support of the JFC despite noncontiguous operational environment, surge requirements, changing priorities, and shifting lines of communication to ensure continuous sustainment of friendly forces.

(4) GMD forces require the capability to utilize predictive fault detection of all GMD systems in both homeland defense and joint operational environments to ensure the maximum possible operational ready rates and minimize system failures during engagement operations.

(5) GMD forces require the capability to update automatically system software during operations in both homeland defense and joint operational environments to minimize operational impact and maximize system availability.

(6) GMD forces require the capability to train on updated system hardware and software during operations in both homeland defense and joint operational environments to minimize operational impact and maximize system availability.

(7) GMD forces require the capability to conduct system testing during operations in both homeland defense and joint operational environments to minimize operational impact and maximize system availability.

(8) GMD forces require the capability to reorder automatically repair parts and expended munitions in both homeland defense and joint operational environments to minimize operational impact and maximize system availability.

(9) GMD forces require the capability to automatically update personnel battle rosters as well as recommend cross-leveling options during operations in both homeland defense and JOEs to minimize operational impact and maximize system availability.

(10) The future Modular Force requires the capability for a single joint capable logistics C2 headquarters with improved C2 and logistic information systems that provides GMD forces a continuously updated logistics COP from Soldier to the highest level of command, including National. This capability enables real time collaborative planning; provides asset and resource visibility; combat power; force health status; material readiness and consumption, coordinates distribution operations and presents information on a real-time COP, which supports course of action analysis and automated decision support systems in the context of a JOE, to provide distributed sustainment in future sustainment operations.

(11) GMD forces require the capability for increase reliability and maintainability of materiel systems in the context of two-level maintenance and sustainability, decreases consumption rates and volume, incorporates ultra-reliable, intelligent, embedded diagnostic and prognostic technologies with an anticipatory sense and respond equipment monitoring system into all major weapons and systems to provide distributed support in future sustainment operations.

Chapter 6
DOTMLPF Implications and Questions

6-1. Introduction

a. There are profound implications for the Army and the joint community as we evolve the GMD CCP. Synchronization across the DOTMLPF domains is essential. Many study issues transcend the specific area of GMD and should be examined fully as the Army, and the joint community moves to fully integrated GMD. There is one unifying idea: the Army must become a learning organization to a greater extent than ever before and must better understand the cognitive processes as they apply to GMD. Army CCPs normally include a discussion of the DOTMLPF implications. Those implications should be explicit enough to generate some action for change within the DOTMLPF domains by Service proponents and combat developers.

b. The *primary* implications arising from the GMD CCP, vice an exhaustive list, are described below. However, many of the items cited below will require additional analysis before comprehensive actionable recommendations emerge.

(1) What are the identified joint and Army GMD capability gaps?

(2) What are the identified GMD capability shortfalls?

(3) How much GMD redundancy is enough?

(4) What are the current critical GMD capability shortfalls for near-term, mid-term, and far-term?

(5) What is the most cost effective mix of active defense, passive defense, and attack operations?

(6) How are JCIDS and non-JCIDS GMD programs best integrated?

(7) What technologies are so compelling as to warrant immediate prototyping? What prototypes are under development and what are their capability implications?

(8) How will interoperability be achieved in a coalition environment?

6-2. Doctrine

a. Emerging doctrine will focus on the necessary capabilities to engage adversaries across the full range of operations with a joint force that shares common systems, TTPs, and doctrine. As the objective Modular Force nears operational readiness, doctrinal documents will evolve. The Army system of doctrine production and dissemination will become more responsive.

b. The degree of modularity envisioned requires doctrine that is more synergistic and adaptive. Standardization of information management procedures is necessary to execute effectively network-centric operations. At the same time, tactics and operational doctrine must stress the art of war—flexible and adaptive solutions that depend upon human creativity. Doctrine principles provide an authoritative guide for leaders and Soldiers, but still provide freedom to adapt to circumstances. The evolution of organizations is driven by concepts and doctrine. New doctrine and TTPs will be required to effectively plan and manage battles collaboratively and must seamlessly integrate with joint doctrine to optimize planning and execution of warfighting operations at all levels. Doctrine questions include, but are not limited to the following.

(1) How are GMD operations executed? What are the required tasks? Who communicates with whom or what in joint GMD missions? What challenges would GMD have across all mission sets?

(2) What constitutes a sufficient level of GMD knowledge and information to enable freedom of maneuver operations?

(3) What are the limits to interdependence among branch and Service functions?

(4) What is the proper balance of decentralized versus centralized C2 at the different levels of command? How might this be different between regional and homeland defense?

(5) How much SA of theater operations is required for maintenance of global SA?

(6) What are the global TTP requirements to ensure integration and synchronization across operational environments?

(7) How can regional ROEs differences integrate into a single globally integrated system? Should they be integrated?

(8) How detailed should doctrine be? What is the right balance between flexible battle command and the ability of rapidly deployable modular units to be highly effective and integrated upon arrival in theater?

(9) How should information be managed and disseminated to maximize a shared level of situational awareness among all echelons?

(10) How can the lessons learned - the TTP loop - be made more responsive? How can potential GMD doctrinal and TTP changes be validated rapidly prior to dissemination throughout the Army and joint force?

(11) How should information be protected so that adversary computer network attack or EA is defeated? What additional critical information infrastructure is required to secure the GMD networks? How do we optimize the performance of GMD networks while protecting data in transit?

(12) What are the policy and legal issues associated with an integrated GMD strategy?

6-3. Organizations

a. To effectively support future operations, organizations must transform into a more modular, scalable, mission-tailorable organizations with multifunctional capabilities. They must become more versatile and agile to support joint operations and to adequately support the operations of maneuver and support forces. Joint mutual support becomes the key factor in determining Service roles and missions and mission context will determine the apportionment of Army headquarters (HQ) and forces. The range of missions assigned to Army forces will force an alignment change from the traditional command echelons. Army HQ will support the combatant commander with the command structure appropriate for land operations. The rank of the commander and the functions of the HQ will not necessarily correspond to the numbers of forces assigned to it.

b. Higher HQ will be organized and equipped to exercise GMD over highly flexible task organizations. In many operations, the number and composition of subordinate units will differ dramatically from industrial age warfare echelons. As each operation unfolds, the makeup of the deployed Army force will evolve, shifting in composition, as the mission and circumstances require. While units that are stationed with the HQ may align for training and readiness, actual operational groupings will be based upon mission requirements. Organizational questions include, but are not limited to, the following.

(1) What is the best organizational architecture to conduct GMD across all operational environments? How much of the organizational structure should be fixed versus plug and play?

(2) What are the new organizational solutions required to manage the complex activities comprising GMD?

(3) What is the impact of network-centricity, Army and joint collaborative planning, automated battle management tools, integrated fire control, and positive combat identification on span of control and organizational structure?

(4) What is the optimum level of command to integrate active defense, passive defense and attack operations?

(5) What new organizational force structure is required to secure GMD critical information infrastructure, information systems and information?

6-4. Training

a. In past operations, ad hoc task forces, whether multinational or joint, usually relied on inventiveness and adaptability during operations to overcome a lack of prior collective training. Battle staffs should routinely engage in exercising varying force packages in difficult and demanding tasks that they will perform in war in order to identify and correct weaknesses and gaps in protection. As new military occupation skills are required and technologies emerge the Army must be flexible enough to train, incorporate new technologies as they mature, and become available. The Army must adopt a joint and expeditionary mindset. The point is to build synergy and synchronization across disparate force packages that potentially could be mixed to accomplish ever changing national objectives. To ensure that a lean deployed staff is effective with ever changing force structures, it must be continuously trained in complex joint and multinational operations at the operational and tactical levels. This training is essential to build the basis for trust and rapport, leader development, and to build cohesive and responsive capability against emerging against adversary actions.

b. Training plans will incorporate the implications to support future Modular Force evolution. Implications include the implementation of a lifelong training paradigm; the continued refinement of the train-alert-deploy approach; the linkage of training strategies between force stabilization and readiness within the managed readiness system; and the accommodation of training tasks emerging from expanding mission for Army forces in the future joint operational environment, without a corresponding increase in time. As a means to frequently train the skills and techniques associated with C2 of tailored force packages, the future force battle command system must provide embedded training modules supported by low-cost, low-overhead, simulations and operationally validated models of systems' performance.

c. Army embedded training modules shall support and enable new equipment training, battle staff training, home station sustainment and deployment preparation training, mission rehearsal, and institutional training and approach the quality and standards of the combat training centers. Embedded training shall also provide the tools to assess operations and evaluate individual and collective task performance based on mission training plans so that lessons are captured and focused retraining may occur. Embedded training will also support the rapid training and certification of casualty replacement personnel in theater. Small unit training will remain the

bedrock of readiness and effectiveness and will be supported by Army applications in their operational mode. Training questions include, but are not limited to, the following.

(1) What advanced training tool sets are required to support adequate Soldier training and development for GMD missions during sustained combat?

(2) What is the training impact of each new system and equipment, to include short-term transformation and long-term sustainment?

(3) How can new equipment training best be accomplished in forward theaters during deployments and sustained combat?

(4) How can realistic collective training be routinely integrated with joint forces? With allied forces across multiple security levels?

(5) What model and simulations need to be embedded into GMD battle command systems for both stand alone and distributed use?

(6) Is the fidelity of models and simulations used for individual and collective training sufficient to permit accurate lessons learned assessments?

(7) How is GMD concurrent training, testing, and operations capability best utilized?

(8) What is the best mix of resident and nonresident training for GMD personnel that ensures high quality training while minimizes time away from their organizations? How do embedded models and simulations, distributed training capabilities, and robust networks change this mix over time?

(9) How can training developers best work with materiel developers to support the deployed force during both sustained combat and rapid technical change?

6-5. Materiel

a. Resources are always limited. Lack of materiel restricts the unit's ability to execute missions. Modernization and sustainment ensure that baseline capabilities are maintained and future capabilities are pursued within funding and resourcing levels. Unit sustainment and the supporting logistics structure must be planned in detail. Realization of the future Modular Force GMD concept is dependent upon the development and incorporation of advanced technology on the battlefield. GMD materiel solutions must proceed along a top-down, joint-driven path. In a networked, distributed operational approach to warfare, the optimization of the entire system is more important than the strict optimization of a single weapon, staff element, or past program. The potential operational benefits of these advancements in technology will be profound.

b. Expanded SA and multi-echelon collaboration will facilitate the use of mission orders and expand span of control, enabling greater decentralization and simultaneity. Access to a common operating picture or common information environment will enable subordinate commanders to

self-synchronize their actions during GMD operations and make adjustments in response to changing situations. The sum of these technological advancements will enable leaders and Soldiers on the battlefield to anticipate more reliably and apply force more precisely and effectively, simultaneously shaping the future battle while conducting current GMD operations, across the spectrum of conflict. Materiel questions include, but are not limited to, the following:

(1) What are future Modular Force vulnerabilities to GMD technology failures?

(2) What is the appropriate mix of joint and Army GMD technological capabilities?

(3) What technologies are so compelling as to warrant immediate prototyping? What prototypes are under development?

(4) How can GMD capabilities be exported to allied forces across multiple security levels?

(5) How will program executive offices integrate their programs to achieve optimum horizontal integration?

(6) How can system trades be best accomplished across JCIDS and non-JCIDS systems? Integrated system testing? What are the roles for the Operational Test Agency (OTA) and the Army Test and Evaluation Command?

6-6. Leadership and Education

a. Leaders and staffs who can perform effectively across a complex, uncertain, and dynamic operational environment are one of the keys in enabling effective GMD. Leaders must be educated, trained, and developed to be self-aware, innovative, and adaptive throughout training and operations. They must think strategically as well as tactically, possess a joint and expeditionary mindset, and successfully apply the joint operational art across the range of GMD operations. Leaders will also need JIM education and experience early in their careers. Doctrine will provide intellectual foundation, educational opportunities will prepare leaders for how to think, and robust and realistic training coupled with operational experience will convert knowledge into operational competence.

b. Leader development must focus on the human qualities of initiative, mature judgment, flexibility, trust, and teamwork to realize the full benefit of GMD. The Army must instill audacity in our leaders and condition them away from passivity in the absence of certainty. Staffs must also be educated, trained, and developed if they are to fully support their commanders. Consequently, changes that impact the mix and capabilities of staff specialists and generalists are significant. The rapid evolution of automated systems and capabilities require a change in leader development to ensure future leaders can leverage these new tools. Emerging technology will help leaders focus on critical decisions, highlight opportunities for initiative, and facilitate teamwork.

c. Future Modular Force leaders must be trained to aggressively manage information and develop trust in the output of decision support tools that automated systems provide. Other major implications include adoption of a lifetime of education paradigm and the creation of knowledge centers configured to support professional leader education. Leader development questions include, but are not limited to, the following.

(1) What are the primary implications of noncontiguous, high-tempo, distributed, networked GMD operations for battle command?

(2) How do integrated GMD capabilities provide sufficient near real-time situational understanding to support self-synchronization during operations across all operational environments?

(3) How do we develop leaders ready to deal with the complexity of the GMD operating environment, threats, joint, and interagency implications?

(4) How can we develop more adaptive leaders, versatile in GMD operations?

(5) How are leaders empowered to understand the operational environment as well as, or better than, the threat in order to execute GMD active defense, passive defense, and attack operations functions?

(6) What is the best mix of resident and nonresident leader and staff training?

6-7. Personnel

a. Soldiers are the Army's greatest resource and the most important factor in maintaining and effecting unit readiness. Implementing force stabilization policies that reduce personnel turbulence better supports a lifetime training and education paradigm, and reduces the redundancy that occurs in some training cycles is also important. The personnel management system must adapt to force stabilization and undergo analysis regarding continuing in its current form to ensure that it provides the career paths needed to fully prepare leaders for the future Modular Force. The dependence on reserve component mobilization and deployments to meet operational requirements also force the inclusion in the analysis and adaptation of the personnel management system.

b. The modular and distributed nature of the GMD capabilities proposed will require new combinations of uniformed and non-uniformed personnel. New organizational constructs will rely on experienced civilian personnel to provide the expertise needed to support training readiness, logistic sustainment, and global operations. The right combinations of Active and Reserve components, Army civilian and contractor attendants can only be determined through research and exercise. Personnel questions include, but are not limited to, the following.

(1) How do units share and integrate critical and selected operational data (platform level) required to support the commanders human resources requirements to build, generate, train, and sustain combat power during GMD operations?

(2) What is the best mix of unit and individual GMD replacement options during sustained combat?

(3) How is personnel readiness impacted by network-centric operations? How many GMD military occupational specialties or additional skill identifiers are needed to be able to provide the right person with right skills to units before, during, and after deployment?

6-8. Facilities

a. Improving strategic response will require upgrades of Army facilities infrastructure. The facilities and infrastructure of the Army will require significant investment of resource to train, sustain, mobilize, and deploy forces in accordance with future force concepts. These facilities will have varying capabilities of training, projection, reach, and knowledge. Installation information facilities will enable distributed information sharing among the sustaining base and deployed forces during all phases of operation.

b. Prior to deployment, fixed facilities on the installation can collect, process, and analyze large volumes of data such as terrain databases that must be pre-positioned down to platform level. Installations will require suitable facilities for skilled civilian personnel supporting a military staff to leverage supporting GMD operations. Installations will also need to consider facilities needed to co-locate GMD enablers in order to cultivate necessary live fire and field training relationships that supplement virtual battlefield training sessions. Additionally, the future Modular Force must support the concept, train-as-you-fight, and strive to create a realistic training environment for leaders, Soldiers, and their organizations. Specific implementation resources, plans, and procedures must be initiated with sufficient lead to reach maturity with the future Modular Force. At any given time, installations may be preparing units for deployment, sustaining forward deployed forces, and recovering/refitting units recently returned from forward theater. Facilities questions include, but are not limited to, the following.

(1) Are there adequate facilities available to Soldiers, leaders/battle staffs, non-uniformed personnel and units sufficient to allow, attain, and maintain acceptable levels of training effectiveness for GMD operations?

(2) Do multi-Service installations create opportunities for joint GMD training?

(3) What infrastructure is required at installations to adequately support GMD missions in both training and operational constructs consistent with Army, joint, and multinational concepts and specified joint national training center (JNTC) attributes?

(a) What infrastructure is required in theater to support GMD missions?

(b) What is the impact of distributed, embedded individual and collective training on installation training base requirements?

(c) Does the ability to have a virtual JNTC environment substitute for actual JNTC installations?

6-9. Wargames and Experimentation Requirements

a. Introduction

(1) The Army is pursuing the most comprehensive transformation of its forces since the early years of World War II, a transformation that is happening while the nation is at war. The urgency of supporting the current fight blurs the usual dichotomy between the current and future Modular Forces. The Army must seek to accelerate inculcation of select future Modular Force capabilities into the current Modular Force to support today's fight, while simultaneously ensuring that today's lessons learned are applied to future Modular Force developments, and timing. This transformation encompasses more than materiel systems. Adaptive and determined leadership, innovative concept development and experimentation, and lessons learned from recent operations produce corresponding changes in the DOTMLPF domains.

(2) Exercises, experimentation, wargames, and experience are the methods the Army uses to mitigate risk while considering and improving capabilities for the future Modular Force. Each have their uses, advantages and disadvantages, but when used together provide the most effective identification of future opportunities, risks, gaps, and needs.

(a) Exercises focus on the current and near term threats with current or soon to be fielded DOTMLPF solutions. A primary use of exercises is for operationally validating the ability of organizations to accomplish their wartime missions. Training of personnel is their warfighting tasks is also an important use of exercises. In the context of the GMD CCP, exercises are useful to baseline current GMD capabilities and begin to identify gaps for future concept consideration. Exercise lessons learned and after action reports are a valuable outcome of exercises. Exercises are complex and expensive events; increasingly models and simulations are being used to replicate for unit and Soldier participation. GMD can either be the primary focus of exercises (for example, MDA- or JTAMDO-led events) or just one aspect of it (as in combatant command (COCOM) major exercises).

(b) Wargames are future focused and less constrained by "what is." Wargames are very valuable to the GMD CCP in that they provide opportunities for broad analysis and assessment of concepts and possible DOTMLPF solutions within future scenarios and threat. Wargames rely heavily on models and simulations to drive the event. Operational architectures do not exist and must be artificially replicated. Wargame sponsors frequently have more participants wanting to use their event than any single event can support. Model and simulation needs and scenario requirements to drive GMD events require very early coordination with the sponsors.

(c) Experiments are focused events than can focus on either the near, mid or long term. Experiments are especially required for concept development and prototyping process as they provide an empirical methodology to explore new capabilities to refine concepts and to validate new prototypes for Army and joint force implementation. During concept refinement, experiments quantify the extent to which proposed capabilities solve military problems. Experiments can also examine capability redundancies and tradeoffs and reveal capability limitations, friction points, and gaps. Experiments can be accomplished within exercises and wargames to minimize cost. They can provide detailed, quantifiable answers to questions that

are not possible otherwise. Frequently, these questions initially arise in wargames, but they are not possible to be answered there. Experiments can be stand alone or be part of a "campaign of experiments." There are three types of experiments: discovery, hypothesis testing, and demonstration. The GMD objective in *discovery experiments* is to find out how the innovation is best employed and whether it appears to have military utility. In a GMD context, h*ypothesis testing experiments* can be used to determine C2 software behaviors by using a large number of "hands off" scenario runs or determine optimum human factors designs for fire control software (such as, variables of timeliness and accuracy of operator response). *Demonstration experiments*, in which known truth is recreated, are GMD technology demonstrations used to show operational organizations such as COCOMs that some DOTMLPF concept or innovation can, under carefully orchestrated conditions, improve the efficiency, effectiveness, or speed of a military activity. These types of experiments are further described in the glossary.

(d) Military experience is included as a risk mitigation means as it offers a wealth of knowledge to support GMD transformation. It also has inherent dangers as sometimes there is not common agreement on what the best future approach should be; the "lesson learned" is trapped by current doctrinal paradigms; and sometimes the "expert" answer may not be the best. For example, prior to World War II most experts agreed that aircraft carriers should be used for long range surveillance to support battleship tactics. The actual events of World War II, starting with Pearl Harbor, came to different conclusions. Subject matter experts can be very useful in crafting the right questions for subsequent analysis or experimentation.

b. Requirements

(1) GMD requires a strategy for introducing and validating new concepts through exercises, wargames, and experiments to identify gaps and their possible solutions; identify and anticipate negative repercussions to avoid those repercussions or minimize their impacts; recognize and take advantage of unexpected opportunities; and, balance the risks associated with the failure to achieve GMD CCP objectives.

(2) GMD exercises, wargames, and experiments needs must include joint, Army, and allied participation if the President's vision in NSPD-23 are to be achieved. Events that only focus on the GMD functional area are very valuable, but GMD capabilities must also be operationally validated in higher level joint, Army, and allied events to fully demonstrate their ability to support the Army Modular Force and joint forces.

c. Challenges

(1) *Modeling and simulations (M&S).* GMD exercises, wargames, and experiments are very dependent upon M&S to provide the driver for these events. While much cheaper than attempting to accomplish events with operational forces, they are not free, and they require long lead times to create and validate prior to use. Event outcomes and lessons are a function of the underlying assumptions that are used to build the M&S. Outcomes and lessons must be known and understood.

(2) The timeframe for the GMD CCP is 2015-2024. Exercises are near term events, so projecting exercise lessons into the GMD CCP timeframe must be done very carefully. Future oriented wargames will rarely encompass the exact same timeframe making data correlation and lessons learned application difficult.

(3) *Integration*. GMD innovations need to be seen and organized as a single, coherent, holistic capability, not as a patchwork of individual, separable systems or organizations. Indeed, many of the key changes involved in GMD transformation will fail or have very little impact if undertaken in isolation. It is difficult to replicate the needed degree of integration with other joint and Army functional concepts in most experimental constructs.

(4) *Geography*. GMD requires a global scenario in order to validate fully all capabilities and concepts. Most exercises and wargames scenarios are focused either at a single theater or within a single GCC AOR. This is also true of the validated, standard scenarios.

(5) *Threats*. The existence of a threat country(s) with significant GMD capability has an impact on the overall scenario. Event sponsors are sometimes reluctant to incorporate a full range of GMD threats, especially when coupled with WMD, as these could prevent other objectives as being achieved.

(6) *Documentation*. Exercises and wargames require data collection and analysis plans and experiments require detailed limited objective experiment plans if the results of the efforts are to be maximized. These are significant efforts that must be planned for in the event participation planning.

(7) *Event planning*. It is desirable to integrate GMD capability experiments into higher level wargames. This capitalizes on existing event architectures and support infrastructure for cost saving and the participation of joint and Army senior leaders for demonstration of GMD future capabilities. Coordination for participant (for the reasons above) must be started very early in the event planning cycles, usually well before the event's initial planning conference.

6-10. Plan for Assessment

a. Joint. The following experiments will further assist in defining the GMD CCP through the following experiments: Vigilant Shield (USNORTHCOM); Terminal Fury (U.S. Pacific Command (USPACOM)); the global" series (Thunder, Lightning, Storm) (U.S. Strategic Command (USSTRATCOM)); Juniper Cobra (U.S. European Command); Nimble Titan (JTAMDO); Joint Air Defense Operations – Homeland Joint Test and Evaluation (USNORTHCOM, NORAD); Ulchi Focus Lens (USPACOM); Unified Engagement (U.S. Air Force); Schriever "x" series (U.S. Air Force); and Future Epoch (MDA).

b. Army. The following experiments will further assist in defining the GMD CCP: Unified Quest; TRADOC integrating event series of events (for example, Omni Fusion); and, the Future Combat System (FCS) and future brigade combat team validation events

Chapter 7
Risks

7-1. General

Adopting this concept for Army global missile defense operations, as opposed to another, carries with it certain potential risks. The GMD CCP assumes the availability of certain materiel solutions as well as joint and Service-level interoperability decisions. It must also be stated that there are risks to only partially implementing this CCP, as a major purpose behind the GMD CCP is to determine required capabilities that will then support the identification and elimination of gaps.

7-2. Risks

a. Doctrine

(1) The GMD assumes that the high degree of automation required for high intensity, short duration battles will be permitted to function without an excessive amount of human-in-control required. If this automation is not permitted to operate or will not operate without this significant human-in-control, its effectiveness will be sub-optimized. For example, current joint doctrine for just the BMDS-portion of GMD is arguably insufficient to support highly automated engagements across COCOM boundaries. Well defined inter-theater and intratheater joint, COCOM, and Service operational plan, doctrine, TTPs, and training manuals are necessary even with a high degree of automation but absolutely critical in case of automation shortfalls.

(2) There is a risk in assuming the ability to leverage other Services and organizations. The GMD CCP assumes a very high degree of joint, other Service, and allied doctrinal and technical interoperability and integration. Without this integration, IFC and ABM will not function as effectively. For example, any sensor, any shooter capabilities are impacted if all systems do not type classify and discriminate threats the same. STRATCOM, MDA, JFCOM, and JTAMDO must assume a leading role in driving these requirements.

(3) The GMD CCP assumes a high level of COCOM-to-COCOM integration. Any limits or degradation of multi-COCOM integration will negatively affect effectiveness of engagement of cross-theater threats. A global concept of operations must define these global missile defense responsibilities before any threat action occurs.

(4) Without the ability to integrate and share time-sensitive data via systems and software with friends and allies, their ability to be integrated into the GMD system is compromised. The use of liaison officers equipped with secure communications can mitigate some issues of data system incompatibilities, but this will not be as timely.

(5) There is a risk in how GMD is integrated into existing defense in depth schema, for both intratheater and transtheater threats; and how is GMD integrated with existing C2 constructs (NATO, and others) during a transitional period. This will require careful and dynamic planning to avoid gap creation.

b. Organization

(1) It is unknown how network-centric operations will impact joint and Army GMD organizationally during the 2015-2024 timeframe. Although the GMD CCP does not describe the functioning of different levels of command, it assumes that the numbers of levels is optimized to support efficient operations. Well written and rehearsed joint and Army C2 TTPs can provide some efficiency in advance of organizational changes.

(2) During the transition to network-centric GMD, operational control and COCOM relationships, supporting and supported, and others, will evolve. Command and staffs must be prepared to be flexible and adaptable to ensure GMD optimization.

c. Training

(1) Much of the training for GMD organizations depends on the development of high fidelity models and simulations that can be seamlessly integrated across all joint and Army systems. Existing lower fidelity models can provide some benefit as long as their short comings are thoroughly understood by all so that incorrect lessons are not learned.

(2) The establishment of Army and joint training standards will be critical to effective training. These standards must be very high as we will have to assume WMD-armed threats, especially for longer range missiles.

(3) GMD also depends upon embedding concurrent training, testing, and operations capabilities into all fielded systems, as well as having operational and system architectures that supports these capabilities. As new software and capability is developed and integrated, the Army needs a way to do a shakeout soak without affecting the operational system (and it gives a robust redundancy to mitigate operational outages). This architecture needs to be integrated internal to GMD as well as external as we look at defense in-depth across the different layers (boost, midcourse, terminal) as well as across the spectrum of threats (short, medium, intermediate and long-range). Without this ability, training and testing as described in the CCP will be impacted significantly.

(4) The training requirements to train commander, Soldiers, and staffs to fight GMD effectively will be significant and possibly outside the ability of Army institutional training schools to completely support with resident training. Military occupational specialty assignment oriented training and training reach back are cornerstones for delivering properly trained Soldiers to the field. For individual and crew proficiency to remain high, training must be continual and distributed for nonresident use due to the spiral development of most of the systems. These may be issues for less than full-time reserve component organizations. Without constant individual and collective training, GMD will not be effective. Predeployment training can provide some relief but at the cost of rapid, little-to-no notice deployability.

(5) Training must be broader than just the Soldiers operating Army GMD, but also increasingly include the Army's responsibility for integrating above element training (especially at joint levels, but also include other Services).

d. Materiel

(1) Effective GMD is completely dependent on a joint and Army ability to move and process large amounts of very time sensitive data real time or near real time. GMD is also dependent on near real-time or real-time combat identification. The missile defense battle will be one of short duration and high intensity. Integrated fire control assumes all sensors, shooters, and battle managers have all required information that is constantly updated, assessed, and distributed. If the currently anticipated network is not fielded or if the information requirements of all users exceed the ability to distribute time-sensitive information, GMD will not function efficiently and effectively. This could in turn then require a larger number of systems to provide the same level of required protection.

(2) Likewise, the need for a large amount of commercial satellite communications availability for network-centric operations implementation of across the army and joint community create risks to reliable bandwidth availability until other military bandwidth resources are available. Less than optimum bandwidth can provide utility, but only if GMD requirements have a very high priority within the COCOMs. This high priority must also be similar across multiple COCOMs (for cross COCOM engagements).

(a) GMD is dependent upon fielding an effective, transparent joint C2 system from unit to strategic level that supports a reliable COP. The implementation of this will be incremental. Operational capabilities and risks must be continually reassessed as pieces are added and integrated.

(b) MDA is not required to comply with JCIDS until Milestone C. It is not clear how to best integrate the Service JCIDS and MDA non-JCIDS parts of the GMD program in the predevelopmental phases. Failure to plan adequately MDA program transfers to Service control could result in Service budget shortfalls as well as combat development gaps. MDA and STRATCOM must lead an effort to obtain a higher level of Army staff (just not Army Service component command) involvement prior to Service transition and transfer of systems.

(c) There is a risk in the Army not effectively engaging with MDA early enough in the developmental process to effectively influence the development of capability, the deployment of capability, and the transition and transfer of capability (to include the program objective memorandum). The current STRATCOM Instruction 538-3, Warfighter Involvement Process, states that service involvement is important, but acknowledges that the processes for this are not yet mature.

(d) MDA, the Army, and the other Services understand individual system testing very well. The challenge is in developing high fidelity methodologies for rigorous joint and Service integration and interoperability testing of the entire systems of systems that support both technical validations but also operational ones. This must be accomplished on a regular basis to ensure continued reliability as new systems are added to GMD or upgraded. MDA appears to be moving in this direction with the BMDS testing. Comprehensive, full architecture testing is likely expensive and impact GMD availability unless a robust concurrent test, training, and

operations capability is in place[12]. Without this testing it may not be possible to validate the full operational functionality and value of the GMD system. Effective TTPs for fighting GMD can not be developed unless the strengths and weaknesses of the system at all levels are fully understood. STRATCOM, JFCOM, and OTA should assume a much larger role with MDA for testing oversight per their responsibilities for ensuring interoperability and integration.

(e) Configuration management of numerous systems software operating with and within GMD is a very significant challenge. Software upgrade to one system has the potential to adversely affect GMD without adequate configuration control and testing across the network and on other systems. Rigorous, holistic testing is the obvious answer but that has significant cost and timeliness issues. A single operational agency must rigorously execute configuration management responsibilities of all deployed systems to ensure continued interoperability.

(f) There are technical challenges that must be met in order for GMD to operate as described in the CCP. For example, the GMD CCP assumes the ability to rapidly fuse information from multiple joint, Army, and allied sensors into a single high confidence track. It also assumes the ability to identify and discriminate tracks quickly and accurately. MDA and the Services must continually assess their progress toward critical technologies and provide that information to senior operational decisionmakers.

(g) Lack of complete implementation of network-centric operations within and across joint and Army GMD organizations could create exploitable gaps. There must be a constant "red teaming"[13] to assess potential exploitable gaps as the Army migrates to total network-centricity.

e. Leadership and education. GMD needs highly trained leaders at all levels. Services do a good job of training their leadership in managing their individual systems. To fight effectively GMD, each Service's leaders must be expert on integration with other Services systems as well. Currently, some of the training on GMD is done by MDA. This should eventually be transferred to joint community and Service control, but with MDA retaining a significant involvement due to the spiral development of systems being under MDA control in most cases.

f. Personnel. The technical challenges to maintaining and upgrading GMD may require a high degree of contractor support on the battlefield. Without adequate technical support forward, the high operational readiness rates required may not be attained. The alternative to this is a much higher degree of initial and continual training being provided to the uniformed technical support

g. Facilities

(1) Each elements of GMD has unique garrison facility requirements for fielding, operations, security, and training. These facilities must be both physical as well as virtual as

[12] At the 2007 Space and Missile Defense Conference in Huntsville, Maj Gen Anzalone, Deputy For Test, Fielding, And Integration Missile Defense Agency, listed the challenges in testing as: Balancing DT / OT testing during spiral development; Addressing multiple combatant issues; Scoping DT / OT testing to support transition to Services; Synchronizing OT events with DT flight tests; Transitioning between concurrent test and operations; and, Integrating coalition partners into future block test programs as system matures.

[13] Red teaming is a structured, iterative process executed by trained, educated and practiced team members that provides commanders an independent capability to continuously challenge plans, operations, concepts, organizations and capabilities in the context of the operational environment and from our partners' and adversaries' perspectives.

they must support forward deployed forces. Lack of funding for adequate facilities may affect individual systems; and, therefore, may affect the effectiveness of GMD as a whole.

(2) Fixed GMD facilities are likely targets for an adversary's preemptive attacks. The disruption or destruction of interceptor, sensor, or C2 capabilities will degrade missile defense response. A 360-degree hemispheric physical and cyber protection capability is required. Designs and planning for this security are an integral part of development of these capabilities.

Appendix A
References

Section I
Required References
ARs, DA pamphlets, and DA forms are available at http://www.usapa.army.mil/. TRADOC publications and forms are available at http://www.tradoc.army.mil/publications.htm.

Capstone Concept for Joint Operations.

Deterrence Joint Operating Concept.

Homeland Security Joint Operating Concept.

Integrated Air and Missile Defense Joint Integrating Concept (SECRET).

Joint Publication 3-0
Joint Operations.

Joint Publication 3-01
Countering Air and Missile Threats.

Joint Publication 3-01.1
Aerospace Defense of North America.

Joint Operational Environment.

Major Combat Operations Joint Operating Concept.

NSPD-23
SUBJECT: National Policy for Ballistic Missile Defense.

TRADOC Pamphlet 525-3-0
The Army in Joint Operations: The Army's Future Force Capstone Concept 2015-2024.

TRADOC Pamphlet 525-3-1
The Army Operating Concept for Operational Maneuver.

TRADOC Pamphlet 525-3-2
Operating Concept for Tactical Maneuver.

Section II
Related References
A related publication is a source of additional information. The user does not have to read a related reference to understand this publication.

Battlespace Awareness Joint Functional Concept.

Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3010-02B
Joint Operations Concepts Development Process.

CJCSI 3170-01F
Joint Capabilities Integration and Development System.

CJCSI 5120-02A
Joint Doctrine Development System.

Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3170-01C
Operation of the Joint Capabilities Integration and Development System.

CJCSM 3500-4D
Universal Task List.

CJCSI 6212-01D
Interoperability and Supportability of Information Technology and National Security Systems.

Command and Control Joint Integrating Concept.

Department of Defense Code of Best Practice–Experimentation.

Focused Logistics Joint Functional Concept.

Force Application Joint Functional Concept.

Force Management Joint Functional Concept.

Global Strike Joint Integrating Concept.

Joint Command and Control Functional Concept.

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DOD Dictionary of Military and Associated Terms.

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TRADOC Pamphlet 525-2-1
The United States Army Functional Concept for See 2015–2024.

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The United States Army Functional Concept for Battle Command 2015-2024.

TRADOC Pamphlet 525-3-4
The United States Army Functional Concept for Strike 2015–2024.

TRADOC Pamphlet 525-3-5
The United States Army Functional Concept for Protect 2015–2024.

TRADOC Pamphlet 525-3-6
The United States Army Functional Concept for Move 2015–2024.

TRADOC Pamphlet 525-4-1
The United States Army Functional Concept for Sustain 2015-2024.

TRADOC Regulation 71-20
Concept Development, Experimentation, and Requirements Determination.

Appendix B
Joint Interdependence

B-1. Introduction

a. The proliferation of WMD and missile technology requires a global missile defense (GMD) capability for defense of the homeland and overseas theaters. The Unified Command Plan tasks each combatant commander with, "…deterring attacks against the U.S., its territories, possessions and bases, and employing appropriate force should deterrence fail." Each combatant commander becomes the "supported" commander for all operations aimed at defeating BM threats to the respective AOR. For tactical BM defense, a combatant commander may control all elements involved.

b. However, as the range of a threat missile increases, so does the potential to impact across-AORs. The links from sensors to decisionmakers to shooters must occur rapidly and reliably, often across traditional geographic and AOR boundaries. For example, a missile launch that crosses AOR boundaries complicates C2 of defensive assets and requires coordination amongst multiple combatant commanders. The Unified Command Plan established the commander, USSTRATCOM as the coordinating authority for planning and integrating GMD operations. All combatant commanders (and their subordinate JFCs as applicable) coordinate their GMD planning and support with the commander, USSTRATCOM (Joint Functional Component Command (JFCC) integrated missile defense (IMD).

c. Joint Publication 3-01, Countering Air and Missile Threats

(1) The synchronized employment of land, air, sea, space, and special operations forces provides the commander with the widest range of strategic, operational, and tactical options. Joint interdependence is achieved through the deliberate reliance of each Service on the capabilities of others to maximize its own effectiveness, while minimizing its vulnerabilities. Key joint interdependencies include joint battle command; joint force projection; joint AMD; joint sustainment; joint fires and effects. The Army's capstone, operational and functional concepts recognize and address each of these dependencies. SOF core tasks should be considered when planning counterair operations. SOF can aid counterair operations by providing information or by destroying or disrupting air and missile assets, bases, logistic sites, and C2 facilities.

(2) Information operations can also provide significant capabilities against targets sets such as C2 systems, air defense nodes, missile sites, airfields, and operating bases. Space forces provide ballistic missile launch warnings, cueing, and attack assessments, (launch locations, headings, and impact areas), global and theater-wide communications, current and forecast weather information, space-based ISR), global positioning system, and theater -wide identification systems support. The intelligence system is vital to the decision-making cycle and must support the status, assessment, planning, warning, and joint intelligence preparation of the operational environment and intelligence preparation of the operational environment functions, as well as target prioritization and engagement decisions. SA relies on joint force ISR capabilities.

(3) GMD operations are inherently joint, and joint interdependence is essential for the conduct of all GMD operations. This interdependence is even more complex in that it extends beyond the traditional Service capabilities to include the MDA and across individual GCC AOR. It is critical that the subject matter expertise, roles, and unique capabilities provided by each Service, agency and branch or proponent be leveraged in the conduct of day-to-day operations in order to globally coordinate joint homeland and theater defense operations and integrate GMD capabilities. GMD architectures must remain flexible and responsive to meet the needs of all JFC.

B-2. Services

a. The Army

(1) The Army has the Title 10 responsibilities inherent to all Services, that of organizing, training, and equipping forces. Within the JOA the commander, Army Air and Missile Defense Command (AAMDC), is the Army forces operational lead for ground based AMD operations. The AAMDC provides a significant capability for countering adversary offensive air and missile capabilities, especially the TM threat. The commander, AAMDC, is normally designated the theater Army AMD coordinator in support of the theater Army commander or the joint force land component commander, if one is established. When approved by the JFC, the Area Air Defense Commander (AADC) may designate the commander, AAMDC as a deputy area air defense commander for AMD for defensive counter-air (DCA) operations. If an AAMDC is not available to support the JOA, the senior air defense commander in the JOA could be designated to fulfill these roles.

(2) The U.S. Army Space and Missile Defense Command (SMDC) Army Forces Strategic Command is the Army Service component command to USSTRATCOM. *General Orders 5*[14] and *General Orders 37*[15] direct SMDC's missile defense responsibilities. SMDC conducts missile defense operations and provides planning, integration, control, and coordination of Army forces and capabilities in support of USSTRATCOM missions; serves as proponent for ground-based midcourse defense and as the Army operational integrator for GMD. The TRADOC capability manager for BMDS is assigned to SMDC as the manager and integrator for BMDS elements under development by MDA for which the Army has been designated lead Service with the exception of the terminal high altitude area defense and PATRIOT,[16] which remains the responsibility of the U.S. Army Air Defense Artillery School.[17]

b. The Air Force

(1) The U.S. Air Force has the standard Title 10 responsibilities of organizing, training, and equipping aviation, space, and strategic missile forces for war. Specifically, the Air Force is responsible for the preparation of the air and space forces necessary for the effective prosecution of war and military operations short of war, and for the expansion of the peacetime components

[14] *General Order Number 5, U.S. Army Space and Strategic Defense Command—Redesignation,* March 1, 1998.
[15] *General Order Number 37, Designation of the United States Army Space and Missile Defense Command/Army Strategic Command as an Army Service Component Command,* dated October 16, 2006.
[16] The patriot is the phased array tracking radar intercept on target.
[17] TRADOC Capability Manager Charter, *BMDS,* dated December 14, 2006.

of the Air Force to meet the needs of war. These functions include organizing, training, equipping, and providing forces for strategic air and missile warfare and to provide launch and space support for the DOD, except as otherwise assigned.[18]

(2) Air Force forces in the JOA have offensive and defensive counterair as a primary function during joint operations.[19] Counterair integrates and exploits the mutually beneficial effects of offensive and defensive operations by fixed- and rotary-wing aircraft, surface-to-air and air-to-air missiles, antiaircraft guns, artillery, and electronic warfare to destroy or neutralize enemy aircraft and missile forces both before and after launch. The Air Force can make available sensor systems, C2 systems, and weapon systems and is capable of providing one or more regional air defense commander (RADC) or sector air defense commanders (SADCs) throughout the foreign JOA and for homeland defense. The Air Force operates a number of air and space operations centers worldwide. For joint operations, one of these with suitable joint augmentation is capable of being used as a joint air operations center. The commander, Air force forces maintains centralized control of air operations through the Air Force air and space operations center and the daily air tasking order.

c. The Navy

(1) The U.S. Navy has an inherent mission within the Navy forces to provide fleet AMD in accordance with their composite warfare command doctrine in addition to its inherent Title 10 responsibilities. DCA for maritime high value assets is the responsibility of the air defense commander (ADC) who is normally deployed on an Aegis-equipped cruiser or destroyer. The Navy has an integrated AMD capability that is capable of integrating with Army land based AMD forces, and when directed, an ADC can function as a SADC or the RADC.

(2) The Navy can provide a joint force air component commander or an AADC, especially for maritime-centric operations such as an amphibious forcible entry operation. The Navy offensive counter air capability can be employed theater- JOA-wide, but their DCA capability is normally within the maritime area of operations. Naval forces also provide sensors as well AMD forces that can be integrated into a coordinated homeland defense capability.

d. The Marines and Coast Guard. The U.S. Marine Corps and the U.S. Coast Guard are provided GMD support from the Services above when required.

B-3. Joint

a. USSTRATCOM is the global integrator charged with the missions of space operations; information operations; integrated missile defense (IMD); global C2; ISR; global strike; and strategic deterrence. The commander, USSTRATCOM supports the commander, NORAD by providing the missile warning and space surveillance necessary to fulfill the U.S. commitment to the NORAD agreement. The commander, USSTRATCOM also provides integrated tactical warning and or attack assessment of space or missile attacks for CONUS and Alaska to NORAD, should the commander of NORAD be unable to accomplish the assessment mission. The

[18] This is only a partial list extracted from DODD 5100.1.
[19] *United States Code Title 10*, Subtitle D, Part 1, Chapter 807.

commander, USSTRATCOM provides the same warning and attack assessment for BM launches to the commander, U.S. Southern Command for homeland defense of Puerto Rico and U.S. Virgin Islands, the commander, USPACOM for homeland defense of Hawaii and the U.S. Pacific island territories, and to other GCCs worldwide. (See Joint Publication 3-01, *Countering Air and Missile Threats.*) USSTRATCOM has delegated authority to the joint functional component command (JFCC) IMD for planning, coordination, and integration of Global BMD operations to dissuade and deter BM attacks. Should deterrence fail, JFCC IMD will recommend apportionment and allocation of forces to optimize the deployment and employment of GMD in support of the GCCs as well as recommend the employment of strike forces to defeat limited BM attacks in order to defend the U.S., the deployed forces, and allies. The commander USSTRATCOM is also the lead combatant commander for integrating and synchronizing the DOD in combating WMD.

b. USNORTHCOM is responsible to provide C2 of DOD homeland defense efforts. USNORTHCOM conduct operations to deter, prevent, and defeat threats and aggression aimed at the U.S., its territories and interests within the assigned AOR; and as directed by the President or Secretary of Defense, provide defense support of civil authorities including consequence management operations. In particular, USNORTHCOM is the supported GCC for the BM defense of the 50 states. The commander of NORAD (or the commander, U.S. element NORAD) is the supported commander for air and CM defense in accordance with the NORAD agreement, NORAD terms of reference, and others. The commander of USNORTHCOM also commands the NORAD, the bi-national command responsible for aerospace warning and aerospace control for Canada, Alaska, and the CONUS.

c. The JTAMDO, established in 1997, reports to the joint staff's Director for Force Structure, Resources, and Assessment (J-8). Its primary responsibilities are to define required systems interoperability and operational architectures and to validate the developing joint theater AMD capabilities through both simulation and technology demonstrations. The JTAMDO coordinates with the combatant commanders and the military Services to develop joint mission capstone requirements, joint mission architecture, and a joint capabilities roadmap.

d. The MDA mission is to develop and field an integrated BMDS capable of providing a layered defense for the homeland, deployed forces, friends, and allies against BMs of all ranges in all phases of flight. MDA BMDS programs are a subset of GMD when fielded or when RTD&E elements are released for operational use." MDA is exempt from JCIDS through milestone 3.

Glossary

Section I
Abbreviations

AADC	area air defense commander
AAMDC	army air and missile defense command
ABM	automated battle management
ADC	air defense commander
AMD	air and missile defense
AOR	area of responsibility
APOD	aerial port of debarkation
APOE	aerial port of embarkation
ARCIC	Army Capabilities Integration Center
ARM	antiradiation missiles
ASM	air-surface missile
BM	ballistic missile
BMC3	battle management command, control, and communications
BMDS	ballistic missile defense system
C2	command and control
C4ISR	command, control, communications, computers, intelligence, surveillance and reconnaissance
CBA	capabilities based assessment
CCJO	Capstone Concept for Joint Operations
CCP	concept capability plan
CJCSI	Chairman of the Joint Chiefs of Staff instruction
CJCSM	Chairman of the Joint Chiefs of Staff manual
CJFLC	combined and joint force land component
CM	cruise missile
COCOM	combatant commander
CONUS	continental United States
COP	common operational picture
DA	Department of the Army
DAL	defended asset list
DCA	defensive counter air
DOD	Department of Defense
DOTMLPF	doctrine, organizations, training, materiel, leadership and education, personnel and facilities
ECM	electronic counter measure
EW	electronic warfare
FCS	Future Combat System
FM	field manual
GBI	ground based interceptors
GCC	geographic combatant commander
GIG	global information grid
GMD	global missile defense

HQ	headquarters
IAW	in accordance with
ICBM	intercontinental ballistic missile
IFC	integrated fire control
IMD	integrated missile defense
IRBM	intermediate-range ballistic missile
ISB	intermediate staging base
ISR	intelligence, surveillance, and reconnaissance
JCIDS	Joint Capabilities Integration and Development System
JFC	joint force commander
JFCC	joint functional component command
JIC	joint integrating concepts
JIM	joint, interagency, and multinational
JNTC	joint national training center
JOA	joint operating area
JOC	joint operating concept
JOE	joint operational environment
JTAMDO	joint theater air and missile defense organization
LACM	land attack cruise missile
LOC	line of communications
LRR	long range rockets
MDA	Missile Defense Agency
MDMP	military decision making process
MRBM	medium-range ballistic missile
NGO	nongovernmental organization
NORAD	North American Aerospace Defense Command
NSPD	national security presidential directive
NSSE	national special security event
ODI*	offensive-defensive integration
OTA	operational test agency
Pam	pamphlet
RADC	regional air defense commander
RDT&E	research, development, testing and evaluation
ROE	rules of engagement
ROMO	range of military operations
RSTA	reconnaissance, surveillance, and target acquisition
SA	situational awareness
SADC	sector air defense commander
SIAP	single integrated air picture
SLBM	sea-launched ballistic missile
SMDC	space and missile defense command
SOF	special operations force
SPOD	sea port of debarkation
SPOE	sea port of embarkation
SRBM	short-range ballistic missile
TM	theater missile

TRADOC	U.S. Army Training and Doctrine Command
TTP	tactics, techniques, and procedures
UAS	unmanned aerial system
UAV	unmanned aerial vehicle
UN	United Nations
U.S.	United States
USNORTHCOM	United States Northern Command
USPACOM	United States Pacific Command
USSTRATCOM	United States Strategic Command
WMD	weapons of mass destruction

* Note: Found in figures.

Section II
Terms

air breathing threat
A platform which utilizes atmospheric effects to create lift or guidance to achieve flight. This term is synonymous with nonballistic track, target, or threat. (AMD task force concept of operations).

architecture
The structure of components, their relationships, and the principles and guidelines governing their design and evolution over time." (DOD Architecture Framework).

attack operations
Offensive operations intended to destroy and disrupt enemy theater missile capabilities before, during, and after launch. The objective of these operations is to prevent the launch of theater missiles by attacking each element of the overall system, including such actions as destroying launch platforms, RSTA platforms, C2 nodes, and missile stocks and infrastructure. (Field Manual (FM) 44-100).

battle command
The art and science of understanding, visualizing, describing, directing, leading, and assessing forces in operations against a hostile, thinking, and adaptive enemy. Battle command applies leadership to translate decisions into actions, by synchronizing forces and warfighting functions in time, space, and purpose, to accomplish missions. (FM 3-0 Operations).

battle management
The management of activities within the operational environment based on the commands, direction, and guidance given by appropriate authority. (DOD, Joint Publication 1-02).

capability
The ability to achieve a desired effect under specified standards and conditions through combinations of means and ways to perform a set of tasks. It is defined by an operational user and expressed in broad operational terms in the format of a joint or initial capabilities document or a joint DOTMLPF change recommendation. In the case of materiel proposals and documents,

the definition will progressively evolve to DOTMLPF performance attributes identified in the capability development document and the capability production document. (CJCSI 3170.01F).

capability gaps
The inability to achieve a desired effect under specified standards and conditions through combinations of means and ways to perform a set of tasks. The gap may be the result of no existing capability, lack of proficiency or sufficiency in existing capability, or the need to recapitalize an existing capability. (CJCSI 3170.01F).

Capstone Concept for Joint Operations
The CCJO is the overarching concept of the family of joint concepts that guides the development of future joint capabilities. (CJCSI 3010.02B).

chemical, biological, radiological and nuclear
Pertaining to all of the individual aspects of persistent and nonpersistent chemical warfare agent attack, intentional on unintentional toxic industrial chemical release, biological warfare agent or toxin attack, release of nonfissionable radioactive material, and nuclear bursts. (Army).

classification
The systematic arrangement in groups or categories according to established criteria. When you reach the second level of acquisition, you can place the object within a category. For instance you may detect a potential target and know it is a tracked vehicle, but nothing else. (Joint Publication 1-02).

classify
The capability to declare a target a BM or air breathing object. As technology enables accurate target classification as manned or unmanned, future doctrine and established ROE should allow for the authority to engage on classification as an unmanned platform. (FM 44-100).

combatant command
Nontransferable command authority (see title 10—Armed Forces, U.S. Code, section 164, for full authorizations) exercised only by commanders of unified or specified combatant commands unless otherwise directed by the President or the Secretary of Defense. (Joint Publication 1-02).

combat identification
Process of attaining an accurate characterization of detected objects in the operational environment sufficient to support an engagement decision. (Joint Publication 1-02.) The capability to attain an accurate characterization of detected objects in the joint battlespace to the extent that high confidence, timely application of military options and weapons resources can occur. Depending on the situation and the operational decisions made, this characterization may be limited to enemy, friend, or neutral. In other situations, other characterizations may be required—including, but not limited to class, type, nationality, mission configuration, status, and intent. (Air Force Doctrine Document 2-1.9).

concept
A notion or statement of an idea -- an expression of how something might be done. (CJCSI 3010.02B).

concept capability plan
Describes the application of elements of joint and Army concepts to selected mission, enemy, terrain and weather, time, troops available, and civilian conditions. It is typically more illustrative and descriptive than a concept, and more focused in its purpose. Includes one or more illustrative vignette(s) for a specific scenario and a set of distinguishing principles applicable to a particular operation. It may include multiple illustrative vignettes for specific mission, function, or operation from the range of military operations. It has the narrowest focus of all concepts in order to derive detailed required. It includes the required details to initiate the CBA within the JCIDS. (TRADOC Regulation 71-20).

decentralized execution
Delegation of execution authority to subordinate commanders. (JP 1-02) [Decentralized execution of air and space power is the delegation of execution authority to responsible and capable lower-level commanders to achieve effective span of control and to foster disciplined initiative, situational responsiveness, and tactical flexibility.] (Air Force Doctrine Document 1) {Words in brackets apply only to the Air Force and are offered for clarity.}

experiment
Test made "to determine the efficacy of something previously untried," "to examine the validity of an hypothesis," or "to demonstrate a known truth. These three meanings distinguish the three major roles that DOD organizations have assigned to experimentation. (DOD). Three types:

- Discovery experiments involve introducing innovative DOTMLPF solutions, into an environment where their use can be objectively observed and recorded. Discovery experiments usually involve too few cases or trials to support valid statistical inference, but are valuable in weeding out ideas and concepts that do not work. Discovery experiments are also very useful to identify selective areas for more rigid experimentation.
- Hypothesis testing experiments are classic types used to advance knowledge by seeking to falsify specific hypotheses (specifically if…then statements) or discover their limiting conditions. Hypothesis testing experiments are also the most difficult to construct and execute due to the large number of variables inherent in any military context. In a scientific sense, hypothesis testing experiments build knowledge or refine our understanding of a knowledge domain. Usually, no single experiment is sufficient to do more than marginally improve knowledge and help clarify new issues. A series of hypothesis testing experiments built upon each sequentially (otherwise known as an experiment campaign) are needed to gain useful knowledge.
- Demonstration experiments**,** in which known truth is recreated, are used to show operational organizations that some DOTMLPF concept or innovation can, under carefully orchestrated conditions, improve the efficiency, effectiveness, or speed of a military activity. All technologies employed are well-established and the setting (scenario, participants) is orchestrated to prove these technologies can be employed efficiently and effectively under specified conditions. These can be embedded into an ongoing exercise or wargame to minimize costs and capitalize on the attendance of senior leaders. Note that demonstration

experiments are not intended to generate new knowledge, but rather to display existing knowledge to people unfamiliar with it.

experimentation
An iterative process of collecting, developing, and exploring concepts to identify and recommend better value-added solutions for changes to DOTMLPF required to achieve significant advances in future joint operational capabilities. (CJCSI 3180.01).

family of systems
A set or arrangement of independent systems that can be arranged or interconnected in various ways to provide different capabilities. The mix of systems can be tailored to provide desired capabilities dependent on the situation**.** (Army).

freedom of action
The ability of the commander to decisively exercise his will to complete the mission, achieve the objective, affect movement, or to protect the force. (Army).

Future Combat Systems
Its network allows the FCS family of systems to operate as a cohesive system-of-systems where the whole of its capabilities is greater than the sum of its parts. As the key to the Army's transformation, the network, and its logistics and embedded training systems, enable the future Modular Force to employ revolutionary operational and organizational concepts. The network enables Soldiers to perceive, comprehend, shape, and dominate the future battlefield at unprecedented levels. The FCS network consists of four overarching building blocks: the system-of-systems common operating environment; battle command software; communications and computers; and ISR systems. The four building blocks synergistically interact enabling the Future Force to see first, understand first, act first, and finish decisively. (FCS Operational Requirements Document).

global information grid
Globally interconnected, end-to end set of information capabilities, associated processes, and personnel for collecting, processing, storing, disseminating, and managing information on demand to warfighters, policy makers, and support. It includes all owned and leased communications and computing systems and Services, software (including applications), data, security services, and other associated services necessary to achieve information superiority. It supports all DOD, National Security, and related intelligence community missions and functions (strategic, operational, tactical and business), in war and peace. It provides capabilities from all operating locations (bases, posts, camps, stations, facilities, mobile platforms, and deployed sites). The GIG provides interfaces to coalition, allied, and non-DOD users and systems. (DOD).

hemispherical
A 360-degree lateral and 180-degree vertical half sphere of space over a platform or point on the battle space. (FCS Operational Requirements Document).

integrated architecture

Architecture consisting of multiple views or perspectives (operational, systems, and technical standards) that facilitates integration and promotes interoperability across family of systems and system of systems and compatibility among related architectures. An architecture description that has integrated operational, systems, and technical standards views with common points of reference linking the operational and the systems view and also linking the systems and the technical standards views. An architecture description is defined to be an *integrated architecture* when products and their constituent architecture data elements are developed such that architecture data elements defined in one view are the same (same names, definitions, and values) as architecture data elements referenced in another view. (CJCSI 6212.01D).

Integrated Capability Development Team
An integrated team made up of people from multiple disciplines formed to develop a CCP, perform the CBA to identify capability gaps, identify nonmateriel or materiel approaches to resolve those gaps, and develop an initial capabilities document or a DOTMLPF change recommendation when directed. (TRADOC Regulation 71-20).

interdependence
The synchronized employment of land, air, sea, space, and special operations forces (SOF), therefore, provides the joint commander with the widest range of strategic, operational, and tactical options. Although each Service contributes its own unique capabilities to the joint campaign, each dominating its own environment, their operational and even tactical interdependence is critical to overall joint force effectiveness. Joint interdependence is achieved through the deliberate reliance of each Service on the capabilities of others to maximize its own effectiveness, while minimizing its vulnerabilities. Key joint interdependencies include:

- Joint battle command. Integrated joint battle command and C4ISR capabilities to gain information superiority, share a COP, enhance joint integrated information operations, and improve the ability of joint force and component commanders to plan, execute, and assess operations.
- Joint force projection. Advanced strategic and operational lift capabilities and improved automated planning processes to facilitate strategic responsiveness and operational agility within the battlespace.
- Joint AMD. A comprehensive joint protection umbrella, extended to regional allies, that includes AMD, provides security of ports of debarkation, and enables uninterrupted force flow against diverse anti-access threats.
- Joint sustainment. Integrated joint sustainment that reduces redundancies without sacrificing robustness, increases efficiencies, provides strategic-to-tactical distribution, and minimizes the logistical footprint in theater.
- Joint fires and effects. Integrated joint fire control networks that provide more effective application of all source fires and effects, from theater to tactical levels. (TRADOC Pamphlet 525-3-0).

interoperability
The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or Services can be exchanged directly and satisfactorily between them and their users. The degree of interoperability should be defined when referring to specific cases. For the purposes of this instruction, the degree of

interoperability will be determined by the accomplishment of the proposed information exchange requirements fields. (CJCSI 3180.01).

joint experimentation
An iterative process for developing and assessing concept-based hypotheses to identify and recommend the best value-added solutions for changes in DOTMLPF and policy required to achieve significant advances in future joint operational environments.

joint functional concept
Applies elements of the CCJO solution to describe how the future joint force, 8-20 years in the future, will perform a broad military function across the ROMO. Identifies the capabilities required to support joint force operations as described in the JOCs. It identifies the attributes to compare capability alternatives and measure achievement. It provides functional context for JOC and JIC development. (CJCSI 3010.02B).

joint integrating concept
Operational-level description of how a JFC, 8-20 years in the future, will perform a specific operation or function derived from a JOC or joint functional concept. Narrowly scoped to identify, describe, and apply specific capabilities, decomposing them into the fundamental tasks, conditions, and standards required to conduct the CBA. Contains an illustrative vignette to facilitate understanding of the concept. (CJCSI 3010.02B).

joint operating concept
Applies the CCJO solution to describe how a JFC, 8-20 years in the future, is expected to conduct operations within a military campaign, linking endstates, objectives, and effects. It identifies the broad capabilities considered essential for implementing the concept. It provides the operational context for joint functional concept and JIC development. (CJCSI 33 3010.02B).

joint operating environment
The environment of land, sea, or airspace within which a JFC employs capabilities to execute assigned missions. (CJCSI 3170.01F).

lethal
To cause the death of a person or destruction of an object. (GMD CCP).

milestones
Major decision points that separate the phases of an acquisition program. (CJCSI 3170.01F).

modeling and simulation
A model is a mathematical, logical, physical, or procedural representation of some real or ideal system, and modeling is the process of developing a model. A simulation is the implementation of a model in executable form or the execution of a model over time. Taken together, M&S refers to the broad discipline of creating, implementing, understanding, and using models and simulations. M&S facilitates early identification and reduction of the risks associated with complex system acquisition programs; helps to understand what kinds of system requirements and architectures are feasible and affordable given various programmatic and technological

constraints; and provides insight into how to manage system engineering efforts so as to improve the overall likelihood of a successful acquisition effort. (Army Regulation 5-11).

modularity
An organization or piece of equipment designed with standardized sizes or dimensions for flexible usage. The characteristic of the UAS that enables it to attach and detach current, Stryker brigade combat teams or objective subordinate elements without sacrificing operational momentum or flexibility. (Army).

National special security event
Designated event that, by virtue of its political, economic, social, or religious significance, may be the target of terrorism or other criminal activity. Examples include inaugurations, political conventions, G-8 conferences, and Presidential funerals (Appendix 1, National Response Plan).

net-centric
Relating to or representing the attributes of a net-centric environment. A net-centric environment is a robust, globally interconnected network environment (including infrastructure, systems, processes, and people) in which data is shared timely and seamlessly among users, applications, and platforms. A net-centric environment enables substantially improved military situational awareness and significantly shortened decisionmaking cycles. (CJCSI 3170.01F).

nonlethal
Not made to cause death; not intentionally deadly; a term used broadly to describe capabilities which affect targets, temporarily or permanently, without intentionally causing death to personnel or without unnecessary destruction or environmental damage. (TRADOC Pam 525-73).

operational architecture
Descriptions of the tasks, operational elements, and information flows required to accomplish or support a warfighting function. (JP1-02).

operational view
Architecture view that describes the joint capabilities that the user seeks and how they are employed. It identifies the operational nodes, the critical information needed to support the piece of the process associated with the nodes, and the organizational relationships. (CJCSI 6212.01D).

scenario
Graphic and narrative description of area, environment, means (political, economic, social, and military), and events of a future hypothetical conflict. Scenarios provide a framework for assessing the U.S. force capabilities under specified situations; identifying potential improvements to joint, Army, and multinational DOTMLPF; and evaluating proposed concepts and changes to the Army. (TRADOC Regulation 71-4).

see
The see function is not the intelligence warfighting function. Intelligence is one of several categories of knowledge contributing to situational awareness and understanding. In the context of this concept, intelligence constitutes one of the three elements of awareness and understanding - *knowledge of the enemy* in an operationally and environmentally relevant context. (TRADOC Pam 525-2-1).

shaping operations
Create and preserve conditions for the success of the decisive operation. Shaping operations include lethal and nonlethal activities conducted throughout the area of operations. They support the decisive operation by affecting enemy capabilities and forces, or by influencing enemy decisions. Shaping operations use all elements of combat power to neutralize or reduce enemy capabilities. They may occur before, concurrently with, or after the start of the decisive operation. They may involve any combination of forces and occur throughout the area of operations. (FM 3.0).

single integrated air picture
Addresses the need for "one track per target," which will reduce fratricide by reducing operator confusion. SIAP will support the spectrum of offensive and defensive operations by U.S., allied, and coalition partners in the airspace within a theater of operations (such as, attack operations, suppression of enemy air defenses, AMD, intelligence preparation of the battlefield). It is accomplished through a combination of materiel and nonmaterial improvements. SIAP should evolve into a seamless component of the family of interoperable operational pictures, along with a SIAP, the single integrated maritime picture, the single integrated space picture, the COP, and the common tactical picture. (GMD CCP).

situational awareness
The perception of elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the future. In generic terms the three levels of situational awareness are level 1 (perception) level 2 (comprehension) and level (projection). There is both individual and group situational awareness. (Army).

situational understanding
Achieved when a decision maker or other human-in the-loop analyzes the SA and is able to use that information to appreciate and comprehend the state of the battlefield and future adversarial courses of action, branches, and sequels. It is the product of applying analysis and judgment to the COP to determine the relationships among the factors of mission, enemy, terrain and weather, troops and support available, time available, and civil considerations. (FCS ORD).

supportability
A key component of system availability. It includes design, technical support data, and maintenance procedures to facilitate detection, isolation, and timely repair and/or replacement of system anomalies. This includes factors such as diagnostics, prognostics, real-time maintenance data collection, and human systems integration considerations. (CJCSI 3170.01F).

sustainability
The ability to maintain the necessary level and duration of operational activity to achieve military objectives. Sustainability is a function of providing for and maintaining those levels of ready forces, infrastructure assets, materiel, and consumables necessary to support military effort. (CJCSI 3170.01F).

systems view
An architecture view that identifies the kinds of systems, how to organize them, and the integration needed to achieve the desired operational capability. It will also characterize available technology and systems functionality. (CJCSI 6212.01D).

unit protection
Integration of active and passive capabilities and processes, provided to operational or tactical units, across the ROMO to protect unit personnel, assets, and information against traditional, catastrophic, disruptive and irregular; ground, air, CBRN and electronic hostile threats, in order to conserve unit fighting potential so it may be applied by commanders at the decisive time and place. (UP CCP).

vignette
A concise narrative description that illustrates and summarizes pertinent circumstances and events from a scenario. (CJCSI 3010.02B).

Section III
Special Abbreviations and Terms

This section contains no entries.