A Report by a Panel of the

NATIONAL ACADEMY OF PUBLIC ADMINISTRATION

for the Congress and the Department of Defense

Integration of Missile Defense

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Integration of Missile Defense

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The views expressed in this report are those of the Panel. They do not necessarily reflect the views of the Academy as an institution.

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Foreword

The US Department of Defense (DOD) is charged with defending against an extensive set of threats requiring effective collaboration and extraordinary precision among not only its internal components, but among allied nations, many scientific and research organizations, and a myriad of corporations in the defense industrial base as well. Missile defense is an important component of a broader response to threats that also includes air offensive capabilities of our adversaries. Thus, integrated Missile Defense (MD) is a part of the DOD's broader task of ensuring the integrated air and missile defense mission of US and allied forces worldwide.

Section 1675 of the National Defense Authorization Act for Fiscal Year 2022 charged the National Academy of Public Administration (the Academy) to complete a one-year study to assess several vital elements of DOD's governance and execution of its missile defense function.

Completed on an unclassified basis over one year, this study focuses on organizational behaviors and structures that could help the enterprise more effectively integrate countermeasures against various missile threat types. The report also outlines the current roles and responsibilities of the many DOD components engaged in missile defense.

As a congressionally chartered, independent, non-partisan, and non-profit organization with nearly 1,000 distinguished Fellows, the Academy has a unique ability to bring nationally recognized public administration experts together to help government agencies address challenges. Overseen by a five-member Panel of Academy Fellows and supported by a professional Study Team, this report concludes one year of work which has been actively supported by relevant components of the DOD. We offer earnest appreciation for such sustained and generous collaboration.

I am certain that this report will contribute to a greater understanding of the current roles and responsibilities among the many DOD stakeholders engaged in MD. I also trust that it will result in actions to secure a more cohesive and integrated enterprise to protect our nation and the world. This complex mission is worthy of the urgent comprehensive actions called for in this study

Teresa W. Gerton
President and Chief Executive Officer
National Academy of Public Administration

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
Academy	National Academy of Public Administration
AAF	Adaptive Acquisition Framework
ACAT I	Acquisition Category 1
ACMD-H	Air and Cruise Missile Defense of the Homeland
BMD	Ballistic Missile Defense
BMDS	Ballistic Missile Defense System
C2	Command and Control
CAPE	Cost Assessment and Program Evaluation Office
CCMD	Combatant Command
CJCS	Chairman of the Joint Chiefs of Staff
CMD	Cruise Missile Defense
CPMR	Capability Portfolio Management Review
C-UAS	Counter-Uncrewed Aircraft System
DAF	Department of the Air Force
DOD	Department of Defense
DODD	Department of Defense Directive
DODI	Department of Defense Instruction
DOT&E	Director of Operational Testing and Evaluation
IAMD	Integrated Air and Missile Defense
INDOPACOM	US Indo-Pacific Command
JIAMDO	Joint Integrated Air and Missile Defense Organization
JCIDS	Joint Capabilities Integration and Development System
JCO, or Joint C-sUAS	Joint Counter-small Unmanned Aircraft Systems Office
JFCC-IMD	Joint Functional Component Command for Integrated Missile Defense

JIPPL	Joint IAMD Portfolio Prioritized List
JS	Joint Staff
JROC	Joint Requirements Oversight Council
MD	Missile Defense
MDA	Missile Defense Agency
MDEB	Missile Defense Executive Board
MDR	Missile Defense Review
MTA	Middle Tier of Acquisition
NDAA	National Defense Authorization Act
NDS	National Defense Strategy
O&S	Operations and Sustainment
OMB	Office of Management and Budget
OSD Policy	Office of the Secretary of Defense for Policy
OUSD (A&S)	Office of the Under Secretary of Defense for Acquisition & Sustainment
OUSD (R&E)	Office of the Under Secretary of Defense for Research and Engineering
PPBE	Planning, Programming, Budgeting, and Execution
SDA	Space Development Agency
SecDef	Secretary of Defense
R&D	Research and Development
RDT&E	Research, Development, Test, and Evaluation
STRATCOM	US Strategic Command
TA	Technical Authority
UAS	Uncrewed Aircraft System
USD	Under Secretary of Defense
WIP	Warfighter Involvement Process

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Executive Summary

This report of a five-member Panel of Fellows of the National Academy of Public Administration (the Academy) focuses on the challenges and opportunities related to improving the integration of missile defense of the US homeland, US forces abroad, and our allies. It addresses overriding issues of how to move more quickly and effectively to meet the rapidly evolving threat posed by our adversaries.

In Section 1675 of the National Defense Authorization Act (NDAA) for Fiscal Year 2022 (see Appendix B), the Academy was charged to complete a one-year study to:

1) outline the roles and responsibilities of the various DOD components as they pertain to the full range of missile defense activities;

2) identify gaps in component capability for performing its assigned missile defense roles and responsibilities;

3) identify opportunities to deconflict mission sets, eliminate areas of unnecessary duplication, reduce waste, and improve efficiency across the full range of missile defense activities;

4) develop a timetable for implementation of opportunities identified; and

5) develop recommendations for legislative action.

The starting point in this analysis is Integrated Air and Missile Defense (IAMD), which is a term DOD uses with the following meaning: "the integration of capabilities and overlapping operations to defend the homeland, Allies and partners, protect the Joint and combined forces, and enable freedom of action by negating an adversary's ability to create adverse effects with air and missile capabilities."[1] According to the 2022 Missile Defense Review, IAMD is a broad effort that melds all missile defense capabilities—defensive, passive, offensive, kinetic, non-kinetic—into a comprehensive joint and combined construct.[2] IAMD, as articulated above, arguably encompasses an enormous portion of the what DOD does across the globe on a 24/7/365 schedule in the modern defense threat environment.

In consultation with congressional requesters and bearing in mind the expansive scope represented by IAMD, this report focuses on a narrower portion of IAMD - the defensive kinetic elements of IAMD termed Missile Defense (MD). MD is doctrinally defined as "defensive measures designed to destroy attacking enemy missiles, or to nullify or reduce the effectiveness of such attack."[3] This research focuses on the active defense elements facing off against four threat missile types (ballistic missiles, hyper sonic systems, cruise missiles, and uncrewed aircraft

[1] "2022 Missile Defense Review" (Washington, DC: Department of Defense, 2022), 8.
[2] Ibid.
[3] "Counter Air and Missile Threats, Joint Publication 3-01" (Washington DC: Department of Defense, 2023), GL-11.

systems). While more limited in focus, MD is nonetheless an intricate enterprise enveloped within IAMD.

The decision to include uncrewed aircraft systems (UAS) as a missile threat type in this MD report is shaped by a recognition that not all UAS categories (there are five categories of UAS based on size) deliver missiles. Inclusion of UAS in this analysis is guided by an official definition of the subset of UAS considered to be a missile threat. A UAS can be thought of as a "missile threat" when it is employed as delivery mechanism to launch an air-surface missile at the intended ground target or when it is employed as a "suicide drone" which is similar in operational employment to a guided missile, to conduct a one-way attack. While UAS is considered a missile threat type in this study, it is recognized that not all UAS are large enough to deliver missiles.

This study was conducted on an unclassified level. As such it focuses broadly on organizational behaviors and structures. The research was informed by documentary means and interviews with over 150 individuals, including current and retired DOD officials, congressional staff, and subject matter experts. DOD components provided strong support to this research.

This report presumes that adversaries are dedicated to identifying vulnerabilities in the MD enterprise and are actively considering how and when to exploit them. Given the technological advances of our opponents observable by the DOD and intelligence communities, the complex nature of the missile threat environment cannot be overstated.

Besides the current threat environment, today's MD mission is further complicated due to several other factors. The operational systems required to sense, track, and destroy missile threats are expensive. As threats are dynamically changing, it is increasingly complicated to acquire and deploy effective countermeasures. Finally, MD depends on rapid and effective communications across various DOD operating components (and often across foreign allied armed services) to ensure an integrated response.

After providing project information in Chapter 1 and high-level background information on the various elements constituting the MD enterprise in Chapter 2, the report proceeds to provide a review of the roles and responsibilities of DOD components for each major missile threat type in Chapter 3. Component roles and responsibilities are presented in the form of three separate grids based on the four missile threat types depicting component roles and responsibilities. Each is divided into three main processes of developing a missile defensive system: setting requirements (i.e., engaging with warfighters to understand threats); acquisition, which includes research and development; and operational support. The grids were completed with substantial assistance from various DOD components.

Issues with respect to identifying unnecessary duplication, waste, inefficiencies, and gaps are addressed in Chapter 3 as well. While research into duplication and waste did not reveal substantive challenges, there are opportunities to address inefficiencies and to close identified gaps, it is likely that the increasing complexity of defending against multiple missile threat types will create the conditions for unnecessary duplication that should be monitored.

An important conclusion to be made is that the MD enterprise does not currently operate in a fully integrated manner. Considering the growing missile threat environment, and the current patchwork of roles and responsibilities that make up the MD system today, it is likely to be substantially challenged if a determined adversary unleashes a complex missile attack.

A second important conclusion is: as the missile threat environment becomes increasingly acute, DOD must make changes in its MD operational, budgetary, and acquisition structures to enhance flexibilities to accelerate effective responses to the ever-evolving, ever-more-lethal threats of our determined adversaries. The MD enterprise must become more integrated. In short, the missile defense enterprise as it operates presently places forces and the homeland at increasing risk.

There are opportunities to better leverage existing flexibilities in acquisition policies and processes to effectively tap new defensive technologies faster so that warfighter requirements can be better and more rapidly addressed. Many DOD interviewees describe the current system as piecemeal and cobbled together. The figures describing roles and responsibilities found in Chapter 3 are ample evidence of the current fractured state of the MD enterprise.

Greater integration of the nation's MD is the result of a multistep process that includes requirement setting, research and development that leads to the acquisition of complex defensive systems, and finally providing the end products to operators in the field to support and improve upon them. The current state does not represent a viable architecture for the longer-term future integrated MD of our territory and armed forces worldwide.

Three themes are clear. First, there is an avid commitment within the DOD MD enterprise to explore what changes could be introduced to enhance a more integrated and accountable management of the missile defense enterprise. Second, there is also recognition that efforts to enhance integration within this complex sphere require a focus on flexible budgetary resources commensurate with legal authorities to develop and field defense systems in each missile threat sphere; operational focus of each of the Services and combatant commands; and allowances for accelerated acquisition flexibilities to keep pace with the threats. Finally, it is important that military leaders have ready access to civilian DOD officials to shorten decision-making times and allow for greater flexibility needed to enhance effective integrated MD.

Chapter 4 explores specifically what actions might be taken to enhance integration across the MD enterprise, starting with an expansive discussion of the requirements and acquisition flexibilities required. The chapter urges establishment of an enterprise-level integrator with the responsibility, and thus the accountability, to oversee and direct acquisition efforts to defend against missile threats. The chapter concludes with a list of features that describe how the integrator role should operate to enhance a more cohesive and coherent governing regime to serve the country's aims to defend against missile attacks.

Missile threats are dynamically changing, and their lethality is ever more catastrophic. The time for action is now.

The following summary of findings and recommendations distill the report's main points.

Finding 3.1: The lack of clarity around roles and responsibilities in the integrated missile defense enterprise produces confusion over ownership, funding responsibilities, and accountability for progress toward meeting enterprise objectives.

Recommendation 3.1: The Deputy Secretary of Defense, or the component designated as missile defense integrator, should regularly document through an instruction regarding missile defense roles and responsibilities to provide transparency to Congress.

Finding 4.1: DOD's recent decision to partially roll back MDA's acquisition flexibilities to mitigate risk may undermine its ability to deliver missile defense capabilities needed to meet the rapidly evolving missile threat. Current DOD processes, including the Joint Capabilities Integration Development System (JCIDS) and failure review boards, are universally viewed as slow. While it is too early to tell due to their recent implementation, there is anecdotal evidence that the rollback of MDA's flexibilities has caused program delays and the new CPMR process could further erode MDA's requirements generation flexibilities.

Recommendation 4.1: The Department should be prepared to take on more acquisition risk and the Deputy Secretary of Defense should consider further restoring (beyond the February 2023 A&S/R&E agreement) MDA's flexibilities within standard processes for acquisition that were in place prior to the Directive Type Memorandum (DTM) 20-002. In addition, the Deputy Secretary of Defense should examine other processes, such as testing, failure review boards, and the CPMR that could cause delays.

Finding 4.2: The nation's adversaries are developing missile technologies at a rapid pace and the current governance and acquisition structures and processes DOD has in place could prevent it from meeting the threat with equal speed and agility. There is no missile defense integrator organization with the responsibility or the necessary authorities, budget, and talent to acquire capabilities to defend against the four missile threat types. As a result

- Acquisition authorities are fragmented across the multiple components with missile defense responsibilities;
- Not all components with missile defense acquisition responsibilities have the flexibilities MDA is afforded;
- There is no effective top-down technical authority to achieve joint interoperability;
- The complicated organizational structure creates seams that can be difficult to work across;
- CCMDs and Services do not always have the ability to provide early and consistent input to requirements development and acquisition;
- The Services are not incentivized to prioritize integrated missile defense; and
- No one is responsible for setting enterprise-wide investment priorities based on a global, integrated view of missile defense.

This situation causes confusion; slows decision making, acquisition of capabilities, and innovation; and increases the potential for gaps, seams, and unnecessary duplication.

Recommendation 4.2: The Deputy Secretary should designate an existing organization or create a new one to serve as an enterprise-level missile defense integrator for the purposes of improving speed and agility, coordination, and clarity and unity of purpose. To achieve these desired outcomes, the missile defense integrator should have the following resources, authorities, and characteristics:

- Requirements generation and acquisition processes with sufficient flexibility to keep pace with the threat;
- Technical authority for missile defense to lead systems engineering and other activities to achieve joint interoperability of MDA and Service systems;
- Lead acquisition authority for defense against ballistic and cruise missiles, hypersonic systems, and Uncrewed Aircraft Systems (UAS) and the necessary authorities and resources (including talent) to address all four threat types;
- Formal and informal mechanisms for cross-component collaboration and communication;
- New or strengthened mechanisms to ensure (1) continued, robust warfighter and Service input and buy-in, (2) balance between considerations from these two sets of stakeholders, and (3) flexibility by avoiding a consensus-based process;
- Proximity to the senior civilian leaders who need to make timely decisions and help ensure coordination across relevant DOD components; and
- A four-star leader with a global view of missile defense and the ability to set enterprise-wide investment priorities and drive top-down integration.

Several of these changes (e.g., installing a four-star leader) would require legislative action, including appropriations, by Congress. Given the immediate nature of the threat, these changes should be included in the Fiscal Year 2024 National Defense Authorization Act (NDAA) and full implementation should be completed within two years.

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Chapter 1: Introduction, Scope, and Methodology

Describing the array of missile threats that the US Department of Defense (DOD or Department) defends against is laden with superlatives. The threats are lethal and defensive systems are expensive. Technologies incorporated in these weapons are complex and always advancing. A missile attack could originate in any geographic region or altitude, including deep space. Defending against these threats requires extensive collaboration and elaborate precision among all DOD components, allied nations, many scientific and research organizations, and a myriad of corporations in the defense industrial base.

This report from a Panel of Fellows of the National Academy of Public Administration (the Academy) focuses on the vital work of DOD to mobilize all the nation's military assets to provide an integrated missile defense across all missile threat types. Appendix A includes short biographical information of the Panel and members of the Study Team.

President Joseph R. Biden has observed that the United States is living in a "decisive decade," one stamped by dramatic changes in geopolitics, technology, economics, and the environment.[1] On October 27, 2022, in issuing the National Defense Strategy, DOD placed a focus on integrated deterrence, campaigning, and building an enduring advantage. Concurrently, when issuing the Missile Defense Review, the Secretary of Defense Lloyd J. Austin underscored a commitment to "develop, combine, and coordinate our strengths to maximum effect."[2] In this ever-changing lethal environment represented by missile threats, Secretary Austin also stressed that "business as usual at the Department is not acceptable."[3]

In this decade of opportunity and challenge, DOD must focus on greater integration of DOD components focused on specific functional building blocks in the nation's missile defense and incentivize a new and creative approach to addressing the nation's committed adversaries. It is within this context that this report seeks to contribute to these efforts.

1.1 Scope of Work

The Fiscal Year 2022 National Defense Authorization Act (NDAA) Section 1675 called for the Department to enter into an agreement by which the Academy should carry out a one-year study regarding the roles and responsibilities of the various DOD components as they pertain to missile defense (see Appendix B for the NDAA language). The Academy was charged to complete a one-year study to

1) outline the roles and responsibilities of the various DOD components as they pertain to the full range of missile defense activities;

2) identify gaps in component capability for performing its assigned missile defense roles and responsibilities;

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The study was completed on an unclassified level. As such it focuses broadly on organizational behaviors and structures.

The study has a broad scope to both describe roles and responsibilities for the various missile threat types as well as to enumerate how key steps in developing requirements, systems acquisition, and operational sustainment are carried out within the MD enterprise. Consideration is given to how these processes might be enhanced to bolster warfighter input, maintain sound

[4] "2022 Missile Defense Review" (Washington, DC: Department of Defense, 2022), 8.
[5] Ibid.
[6] "Counter Air and Missile Threats, Joint Publication 3-01" (Washington DC: Department of Defense, 2023), GL-11.

civilian oversight of the planning and execution of the enterprise, and maximize the ever more effective and efficient development of these systems. Finally, recommendations offer how the Department might better harness and synchronize the Department's integration of MD capabilities.

1.2 Methodology

The Study Team used unclassified DOD documents sources and interviews to perform this review. Documentary sources included public DOD policies and other documents covering MD and the Departmental components involved. Furthermore, the study benefits from literature reviews on topics such as: public administration, operations of complex organizations, enhancing collaboration across and among organizations, and characteristics of successful organizations and their leaders that convene and synchronize across a broad operational landscape. Finally, the Study Team reviewed documents connected with setting requirements, acquisition, research and development, and operations and sustainment processes of integrated MD.

The Study Team benefited greatly from ongoing, active support and guidance from the Office of the Secretary of Defense for Policy (OSD Policy). The analysis that follows is the result of hundreds of hours of interviews (all interviews were conducted on a not-for-attribution basis) with more than 150 military and civilian personnel from a long list of Department components involved in the missile defense enterprise (a list of components and others supporting the work is found in Appendix C). It is important to stress that this study was afforded unprecedented access to senior leaders of the most important DOD components that play critical missile defense roles. Furthermore, retired military and civilian staff with missile defense enterprise experience also contributed to this work. Several congressional staff members from authorizing committees (House and Senate Armed Services Committees) met with the Study Team, as did Think Tank members and others who work with defense contracting companies. Several Study Team members had a site visit to the Joint Functional Component Command for Integrated Missile Defense located at Schriever Space Force Base in Colorado Springs, Colorado.

1.3 Report Structure

The report is organized into five chapters. In addition to the introductory chapter, the report contains the following four chapters.

Chapter 2 offers important background information on the MD enterprise addressed in this report, including various types of missile threats; important steps required in MD, such as requirement setting, acquisition and operational support; high-level description of key steps in the process of countering a missile attack; and the key components of DOD involved in MD.

Chapter 3 describes roles and responsibilities of the various components involved with establishment of requirements, research and development, system acquisition, and operations and sustainment. It also identifies gaps in component capability to carry out assigned defense roles and responsibilities, and identifies opportunities to deconflict mission sets, eliminate areas

of unnecessary duplication, reduce waste, and improve efficiency across the full range of MD activities.

Chapter 4 focuses on governance of MD with a focus on two key characteristics: flexibilities and integration.

Chapter 5 summarizes key points in the report and offers final remarks.

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Chapter 2: Missile Defense Background

The integrated MD enterprise managed by DOD is both complex and expansive with respect to each of its dimensions. This chapter provides background information on missile threat types and the US defenses against them. While the adversarial threat and US countermeasures are much more extensive than what is summarized below, an understanding of these missile threats conveys the complexity of the problem, the number of stakeholders involved, and the importance of using efficient and effective processes to develop missile defense systems.

2.1 Growing Threat

The US missile defense employs a variety of strategies. These include offensive measures (shooting the archer, or the adversary's offensive system), active defensive measures (shooting the arrow, or the adversary's missile), or passive defensive measures (hiding the target and building a resilient target). This report focuses on the active defense portion of missile defense with its three processes of detection of a threat, command and control of defensive systems, and engagement of the threat using defensive systems. The US counters ballistic missiles, hypersonic systems, cruise missiles, and certain categories of uncrewed aircraft systems with this active defense.

Missile defense is complex and challenging. First, the threat is lethal and affects each geographic theater in which the US operates. US fleets and armies as well as allies and partners depend on effective missile defense for security from peer adversaries, rogue nations,[7] and non-state actors.

These threat types are also not used in a vacuum. Adversaries may deploy multiple threats at once to confuse and overwhelm missile defense systems. Finally, the threat technology is advancing and evolving at a rapid pace. The development of highly maneuverable hypersonic weapons and the use of uncrewed aircraft systems (UAS) in the War in Ukraine offer a glimpse into the future of the missile threat.

Defending against the threat requires a technologically complex system of systems: sensors, command and control (C2) systems, and engagement systems working together to identify and defeat these air and missile threats. This system of systems, operating as a layered defense, provides multiple opportunities for the warfighter to identify, track, and defeat a missile threat. For example, different radars belonging to different Services can feed into the same C2 system, which can coordinate an appropriate response with an engagement system at different phases of

[7] According to MDA's FY 2022 Budget Estimates Overview document, the US identifies Iran and North Korea as rogue states. The US develops homeland BMD systems to counter the nuclear missile threats from rogue states since the US does not consider nuclear deterrence as a sufficient option. In contrast, the US does not develop and deploy capabilities, "designed to counter nuclear intercontinental-range missile threats from near-peers Russia and China." Instead, it depends on nuclear deterrence.
Missile Defense Agency, "Fiscal Year (FY) 2022 Budget Estimates Overview," p. 1, May 20, 2021,

a threat's flight. To keep pace with this threat, the US must rapidly update this system of systems' individual capabilities and integrate them into the existing architecture.

The rapid development and sustainment of capabilities require the combined efforts of several stakeholders both internal and external to DOD including international allies and partners. Each of these entities may have different priorities, technology, levels of security regarding information sharing, and incentives. An effective response requires all parties to work together despite these differences because an adversary will seek to exploit any gaps and seams.

The missile defense enterprise must also be constantly monitoring for new missile threats including different flight paths, speeds, and any other variables an adversary may employ for its advantage. Once new threats are identified, the enterprise must work quickly to incorporate and deploy capabilities to counter them. This constant evolution of the threat combined with the complexity of the missile defense enterprise requires the US to operate flexibly and in an integrated fashion. This study identifies opportunities for the nation's armed forces to better synchronize its many components to address the expanding and dynamically changing missile threat environment.

Military leaders recognize how the continued evolution of the missile threat could affect the US in the immediate future. Marine Corps Lt. Gen. Stephen D. Sklenka, Deputy Commander of US Indo-Pacific Command (INDOPACOM) in 2022, characterized the IAMD system of Guam, a strategic part of the US homeland located in the Pacific region, as "only sufficient to protect against yesterday's threats." He continued by saying that Guam requires "an architecture that fuses the most capable integrated air missile defense programs of record today and those that are developing into the future."[8] Issues connected with the defense of Guam against missile threats are addressed in more depth in Chapter 4.

To be sure, the missile defense enterprise is not broken. It must, however, evolve to meet future threats.

2.2 Missile Threat Types

Congress charged this study with focusing on four missile threat types, ballistic missiles, hypersonic systems, cruise missiles, and UAS. Each type varies in range, speed, and size. Missile defense operators must distinguish between individual missile threats to track and engage them. When an adversary integrates a variety of offensive measures simultaneously, there is an increased likelihood of exploiting gaps and seams within our missile defense.

[8] C. Todd Lopez, "Time for Guam Missile Defense Build-Up Is Now," December 8, 2021, https://www.defense.gov/News/News-Stories/Article/Article/2866855/time-for-guam-missile-defense-build-up-is-now/ (accessed May 25, 2023).

Ballistic Missiles are rocket-propelled vehicles that deliver nuclear or conventional weapons.[9] Ballistic missile ranges vary. Some can affect US regional areas of operation and others are able to reach the US homeland:

- Short-range: Less than 1,000 km (620 miles)
- Medium range: 1,000-3,000 km (620-1,860 miles)
- Intermediate range: 3,000-5,000 km (1,860-3,410 miles)
- Long-range (Intercontinental): greater than 5,000 km (greater than 3,410 miles)

Ballistic missiles tend to be less accurate than other types of air and missile threats and are often used to deliver strikes with wider affecting payload. Ballistic missiles have three phases of flight: Boost Phase (the ascent of the missile), Midcourse Phase (the exoatmospheric travel of the missile after it has used its booster), and Terminal Phase (the reentry of the missile into the atmosphere).[10]

Cruise missiles are shorter ranged than ballistic missiles and fly at a lower altitude, allowing them to hide behind the curvature of the Earth. As Figure 1 shows, Russian cruise missiles, for example, pose a threat to strategic assets on the East Coast of the US even from 2,000 km off the coast, well away from US territorial waters. Other countries may pose a similar threat to the US.

Figure 1. Russian Cruise Missile Threat to the East Coast

[9] RAND Corporation, "Ballistic Missiles," https://www.rand.org/topics/ballistic-missiles.html (accessed May 25, 2023).
[10] Missile Defense Agency, "A System of Elements," December 15, 2022, https://www.mda.mil/system/elements.html.

Source: Center for Strategic and International Studies[11]

Hypersonic systems combine the range of ballistic missiles with the maneuverability of cruise missiles. These systems can glide through different altitudes and have a trajectory that is less predictable and harder to track. As its name suggests, these systems are also hypersonic and thus much faster than other threat types. While hypersonic systems are used with ballistic missiles today, it is reasonable to expect adversaries to develop hypersonic cruise missiles and hypersonic UAS in the future.

Uncrewed Aircraft Systems (UAS) are used by adversaries to collect intelligence and conduct offensive operations. There are five categories of UAS that divide systems by speed, size, and travel distance among other factors[12].

- Category 1, 2, and 3 systems are considered "low, slow, small systems." They weigh less than 1,320 pounds and operate underneath 18,000 feet.
- Categories 4 and 5 weigh more than 1,320 pounds and can operate above 18,000 feet.

Compared to the other threat types, UAS, especially category 1-3 UAS, tend to be lower cost, smaller, more maneuverable, and operate at lower altitudes. These characteristics can make it more difficult for traditional detection systems to identify and track UAS.[13] There are many uses for UAS including reconnaissance and command and control functions. For the context of this report, a UAS can be thought of as "missile threat" when it is employed as a delivery mechanism to launch an air-surface missile at the intended ground target or when it is employed as a "suicide drone" which is similar in operational employment to a guided missile, in order to conduct a one-way attack.

These threats produce an environment that utilizes a wide range of altitude, speed, capability, and size of system to attempt to confuse and overwhelm an integrated MD architecture.

2.3 Stakeholders

The National Defense Strategy (NDS) states that "the challenges the US faces are interconnected, formidable, and complex and cannot be met alone. Mutually-beneficial alliances, stakeholders and partnerships are our greatest strategic advantage—and they are at the center of gravity for the defense strategy at the US and international levels."[14]

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[11] Center for Strategic and International Studies, "Missiles of Russia," August 10, 2021, https://missilethreat.csis.org/country/russia/.

[12] The five categories of UAS include: 1) Micro/Mini UAS, 2) Small Tactical, 3) Tactical, 4) Persistent, and 5) Penetrating.
Department of the Army, "Counter-Unmanned Aircraft System Techniques," April 2017, https://irp.fas.org/doddir/army/atp3-01-81.pdf (accessed May 25, 2023).

[13] Congressional Research Service, "Department of Defense Counter-Unmanned Aircraft Systems," IF11426, May 31, 2022, https://sgp.fas.org/crs/weapons/IF11426.pdf (accessed May 25, 2023).

[14] Department of Defense, "2022 National Defense Strategy."

While there are many stakeholders that support the defense strategy, there are four main DOD stakeholders that play a key role in the missile defense enterprise: the Joint Staff, Missile Defense Agency (MDA), Combatant Commands, and Services. Each of the stakeholders has varying missions, objectives, and authorities and has supporting or leading roles in the requirements, acquisition, and research and development processes. What follows are high-level descriptions of each stakeholder's mission.

Office of the Secretary of Defense (OSD). OSD is responsible for policy development, planning, resource management, and program evaluation of DOD. OSD includes the office of top civilian defense decision-makers with regard to personnel, weapons acquisition, research, intelligence and fiscal policy, as well as offices the Secretary establishes to assist in carrying out assigned responsibilities.

The Secretary of Defense oversees the Defense Department and acts as the principal defense policymaker and adviser. He is supported by the Deputy Secretary of Defense and the major elements of OSD including:

- Acquisition and Sustainment
- Budget and Financial Management
- Intelligence and Security
- Policy
- Reform, and
- Research and Engineering

The SecDef, DepSecDef, and OSD elements are considered the top level, civilian decision-makers for DOD.

Joint Staff.[15] The Joint Staff (JS) supports the Chairman of the Joint Chiefs of Staff (CJCS) who serves as the principal advisor to the President, the Secretary of Defense, and the National Security Council (NSC). The JS supports different entities within the CJCS including:

- Vice Chairman of the Joint Chiefs of Staff
- Chief of Staff of the Army,
- Commandant of the Marine Corps,
- Chief of Naval Operations,
- Chief of Staff of the Air Force,
- Chief of Space Operations, and
- Chief of the National Guard Bureau.

The Vice Chairman oversees the Joint Requirements Oversight Council (JROC), a requirements-setting body for joint operations including missile defense related to Title 10 responsibilities. The purpose of the JROC is to "conduct requirements analyses, validate mission needs, analyze the

[15] The Joint Staff, About, https://www.jcs.mil/About/ (accessed May 25, 2023).

requirements development process (JCIDS), and develop joint priorities." JROC consists of voting members as well as advisors. JROC voting members include:

- Vice Chief of Staff of the Army
- Vice Chief of Naval Operations
- Vice Chief of Staff of the Air Force
- Vice Commandant of the Marine Corps
- Vice Chief of Space Operations

JROC advisors include:

- Under Secretary of Defense for Research and Engineering (USD R&E);
- Under Secretary of Defense for Acquisition and Sustainment (USD A&S);
- Under Secretary of Defense for Policy;
- Under Secretary of Defense (Comptroller)/CFO;
- Under Secretary of Defense for Intelligence and Security;
- Director, Cost Assessment and Program Evaluation; and
- Director of Operational Test and Evaluation (DOT&E).

The Joint Integrated Air and Missile Defense Organization (JIAMDO). JIAMDO is a part of the Joint Staff and supports the Chairman in matters related to air and missile defense. JIAMDO is an advocate for the warfighter and processes input from the warfighter to inform and develop joint requirements. JIAMDO also analyzes capabilities and technology development within IAMD to support decisions in the JS.[16]

Missile Defense Agency (MDA). The MDA mission is to "develop and deploy a layered Missile Defense System to defend the United States, its deployed forces, and allies from missile attacks in all phases of flight."[17] MDA executes its work through flexible acquisition authorities granted by Congress. MDA also has had the role of IAMD Technical Authority (TA) since May 8, 2013.[18] MDA manages, directs, and executes the development of the Ballistic Missile Defense System (BMDS), the system of systems ballistic missile defense network. MDA also works "with the combatant commanders to ensure [the development of] a robust missile defense system technology and development program to address the challenges of an evolving threat."[19] MDA reports directly to the Under Secretary of Defense for Research and Engineering (USD(R&E)).

[16] Department of Defense, "Fiscal Year (FY) 2017 Request for Additional Appropriations," March 2017, (accessed May 25, 2023). https://comptroller.defense.gov/Portals/45/Documents/defbudget/FY2017/budget_justification/pdfs/2017MarchAmended/03_RDT_and_E/TJS_FY17_RDTE_ABS.pdf

[17] "Our Mission," Missile Defense Agency, December 15, 2022, https://www.mda.mil/about/mission.html.

[18] Acquisition Decision Memorandum (ADM) titled, "Ballistic Missile Defense System Acquisition Decision Memorandum" and singed by Mr. Frank Kendall USD."

[19] "Agency in Brief," Missile Defense Agency, December 15, 2022, https://www.mda.mil/about/about.html.

Joint Counter UAS Office (JCO): In November 2019, the Secretary of Defense designated the Secretary of the Army (SECARMY) as the DoD Executive Agent (EA) for Counter-small Uncrewed Aircraft Systems (C-sUAS). In his capacity as EA, the SECARMY established the Joint C-sUAS Office (JCO), to perform as the lead Doctrine, Organization, Training, materiel, Leadership, Personnel, Facilities-Policy (DOTMLPF-P) integrator in order to synchronize and direct C-sUAS activities for sUAS groups 1-3 and facilitate unity of effort across the Department.

Joint C-sUAS Executive Steering Committee. This committee assists the SecDef in "assessing joint military C-sUAS military capabilities; identifying, approving, and prioritizing gaps in such capabilities; reviewing and validating proposed C-sUAS capabilities; and endorsing joint performance requirements. It is chaired by the Vice Chief of Staff of the Army and Co-chaired by the USD (A&S).[20]

Missile Defense Executive Board (MDEB). The MDEB is a senior deliberative body that provides oversight to MDA, missile defense programs, and policies. Makes recommendations and advises leadership. The MDEB is chaired by USD R&E and co-chaired with :[21]

- Recommends and oversees implementation of strategic policies and plans, program priorities, and investment options;
- Promotes the continued improvement of ballistic missile defense capability; and
- Applies the BMDS Life Cycle Management Process and overseeing the annual preparation of a BMDS portfolio.

The MDEB advises the USDs (R&E, A&S) on decision-making, including:

- Recommending to the Secretary of Defense when RDT&E assets are available for emergency or contingency use;
- Implementing the BMDS Life Cycle Management Process; and
- Determining the applicability of the DOD Acquisition process [DODD 5000.01 (Reference (j)) and DOD Instruction (DODI) 5000.02 (Reference (k))] to the acquisition management of the BMDS by MDA. MDEB overseas MDA's acquisition of individual systems within a ballistic missile defense network.

MDEB membership includes the following components:

- Under Secretary of Defense for Policy
- Under Secretary of Defense for Intelligence and Security
- Vice Chairman of the Joint Chiefs of Staff
- Vice Chief of Naval Operations

[20] US Department of Defense, "US DOD Counter-Small Unmanned Aircraft Systems Strategy," (accessed May 25, 2023). chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://media.defense.gov/2021/Jan/07/2002561080/-1/-1/1/DEPARTMENT-OF-DEFENSE-COUNTER-SMALL-UNMANNED-AIRCRAFT-SYSTEMS-STRATEGY.PDF

[21] "DOD Directive 5134.09: Missile Defense Agency (MDA)," Director of Administration & Management, September 17, 2009, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/DODd/513409p.pdf.

- Commander of US Strategic Command
- Director of Operational Test and Evaluation
- Deputy Under Secretary of the Air Force for Space Programs
- Assistant Secretary of the Army for Acquisition, Logistics, and Technology
- Director of the Missile Defense Agency
- Director of Program Analysis & Evaluation

Services. The five Service branches play a role in MD. Each specializes in a specific defensive and offensive capability towards threats. The Army is the largest and oldest Service in the US military and provides the ground forces that protect the US. The Navy maintains a global profile that, in conjunction with our allies, maintains freedom of the seas, and support international law. The Marine Corps provides land-based capability and air defense for deployed forces and US allies. The Air Force "is responsible for aerial military operations, defending US air bases, and building landing strips" Is tasked to "conduct offensive and defensive operations, to include appropriate air and missile defense, to gain and maintain air superiority, and air supremacy as required, to enable, the conduct of operations by US and allied land, sea, air, space, and special operations forces." Space Force provides space capabilities to the joint force including domain awareness systems for MD."[22]

US Department of Defense Combatant Commands.[23] The Combatant Commands consist of eleven unified commands (see Figure 2) with either a geographic or functional mission to provide command and control of military forces. Reviewed and updated every two years by the Joint Chiefs of Staff for official use only, the Unified Command Plan (UCP) assigns missions; planning, training, and operational responsibilities; and geographic areas of responsibilities (AOR) to Combatant Commands.[24]

Figure 2. Combatant Commands

CENTCOM- US Central Command	SOCOM- U.S. Special Operations Command
AFRICOM- U.S. Africa Command	TRANSCOM- U.S. Transportation Command
EUCOM- U.S. European Command	CYBERCOM- U.S. Cyber Command
NORTHCOM-U.S. Northern Command	STRATCOM- U.S. Strategic Command
INDOPACOM- U.S. Indo-Pacific Command	
SOUTHCOM- U.S. Southern Command	
SPACECOM- U.S. Space Command	

[22] "Learn About the Military," USA.gov, November 10, 2022, https://www.usa.gov/join-military.
[23] "Combatant Commands," U.S. Department of Defense, https://www.defense.gov/About/Combatant-Commands/.
[24] Congressional Research Service, *The Unified Command Plan and Combatant Commands: Background and Issues for Congress*, R42077, updated January 3, 2013, https://crsreports.congress.gov/product/pdf/R/R42077.

2.4 Steps in Actively Countering a Missile Threat

As noted in the most recent Missile Defense Review in 2022, through an effective missile defense strategy, the US increases deterrence and strives to:

- "Add resilience to overall defense strategy;
- Complicate adversary plans and induce doubt about the success of offensive missile use;
- Raise the threshold for conflict by reducing incentives to conduct small-scale, coercive attacks;
- Reassure allies and partners that the US will not be deterred from fulfilling its global security commitments; and
- In crisis or conflict, offer military options that may be less escalatory than employing offensive systems."[25]

There are a variety of ways for the US to achieve this missile defense strategy including offensive measures like destroying adversary missile launch sites and passive measures like increasing the resilience of key US assets. This analysis focuses only on active kinetic missile defense. The following sub-section covers the aspects of the active missile defense strategy related to acquisition, especially as they relate to detection, command and control (C2), and engagement.

Detection involves the coordinated effort of space-based and Earth-based radars and sensors to provide domain awareness to the Command-and-Control system. Sensors must be able to discriminate between a missile threat and decoys, debris, and other materials. Each threat type requires specific capabilities from a sensor. Some of these sensors can detect and identify multiple threat types.[26] Some example sensors include the AN/TPY-2 Radar and the Sea-based X-band radar.[27]

Command and Control (C2) is the coordination of detection and engagement systems to provide an outcome to the threat. MDA's Command and Control, Battle Management, and Communications (C2BMC) system is an example C2 system in the current MD layered defense.[28]

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[25] "2022 NDS Fact Sheet | 2022 Missile Defense Review (MDR)," U.S. Department of Defense, October 27, 2022, https://media.defense.gov/2022/Oct/27/2003103921/-1/-1/1/MISSILE-DEFENSE-REVIEW-MDR-FACTSHEET.PDF

[26] "The Missile Defense System," Missile Defense Agency, December 15, 2022, https://www.mda.mil/system/system.html.

[27] "The AN/TPY-2 (Army-Navy Transportable Radar Surveillance) is a high-resolution, X-band radar built specifically for missile defense. Developed alongside the THAAD ballistic missile defense system, the AN/TPY-2 is capable of tracking targets at long range and cueing other U.S. missile defense systems." CSIS, AN/TPY-2 Radar.
"The Sea-Based X-band Radar (SBX) is a unique radar housed on a decommissioned North Sea oil rig. The SBX produces very high-resolution images of incoming threat clouds, which helps BMD interceptors discriminate between lethal objects and debris." CSIS, Sea-based X-band Radar. June, 2021. https://missilethreat.csis.org/defsys/sbx/

[28] C2BMC "is a hardware and software interface for the ballistic missile defense system (BMDS) that integrates of data from multiple sensors and fire control units. This integration helps to build a common

Engagement, the culmination of the MD process, involves the disruption of the missile threat. Engagement systems include both kinetic weapons like an SM-3 missile or non-kinetic weapons like electronic jamming Counter UAS systems.[29]

Although the detection, command and control, and engagement steps may look differently for the defense against each missile threat type, they are critical to countering each. Ballistic Missile Defense (BMD) and hypersonic defense may especially look different. A multi-layered architecture is used to stop these threat types, meaning there may be multiple cycles of detection and engagement (see Figure 3). An integrated assault with multiple threat types will complicate these steps even further and will require integration among the systems to identify each specific threat and coordinate an appropriate response.

picture of the battlespace for operators across the BMDS and enables the warfighter to select optimal firing solutions based on the BMDS status, system coverage, and ballistic missile tracks." CSIS, C2BMC. June 2021, https://missilethreat.csis.org/defsys/c2bmc/

[29] "The Standard Missile-3 (SM-3) is an exo-atmospheric missile defense interceptor used for theater ballistic missile defense. Part of the Aegis Weapon System, it uses a hit-to-kill kinetic kill vehicle to intercept ballistic missiles during the midcourse of their flight path. SM-3s are unique due to being the only Standard Missile designed to operate in the vacuum of space." CSIS, Standard Missile-3 (SM-3). March, 2023. https://missilethreat.csis.org/defsys/sm-3/.
"The Missile Defense System," Missile Defense Agency, December 15, 2022, https://www.mda.mil/system/system.html.
"Department of Defense Counter Unmanned Aircraft Systems," IF11426, Congressional Research Service, May 31, 2022, https://sgp.fas.org/crs/weapons/IF11426.pdf.

Figure 3. In-Service Active Missile Defense System

Source: Missile Defense Agency[30]

2.5 Key Processes Supporting Missile Defense

Addressing the joint response to the current missile threat environment requires an effective weapons system able to produce capabilities that can detect, track, and destroy missiles and other intrusive threats with precision and accuracy.

There are three principal processes in the prescribed scope of this study that play an essential role in missile defense effectiveness: requirements, resources, acquisitions (including research and development), and as a subset, operations and support (sustainment). It is within these processes that key stakeholders jointly identify, develop, innovate, and deliver future defense capability solutions.

[30] Missile Defense Agency.

The task of developing and fielding missile defense systems is a highly complex problem set. The 2022 Missile Defense Review indicates that to address the rapidly evolving threat, components "must continue to exploit adaptive acquisition approaches to ensure the timely and cost-effective development, procurement, sustainment, and improvement of [missile defense] systems."[31]

This section of the chapter provides a brief, high-level description of the Defense Acquisition System and its key processes which serve as a building block for describing component roles and responsibilities provided in Chapter 3.

Defense Acquisitions

According to DOD Directive 5000.01 the objective of the Defense Acquisition System (DAS) is "to support the National Defense Strategy, through the development of a more lethal force based on U.S. technological innovation and a culture of performance that yields a decisive and sustained U.S. military advantage."[32] It further states that "the acquisition system is designed to acquire products and services that satisfy user needs with measurable and timely improvements to mission capability, material readiness, and operational support, at a fair and reasonable price."[33]

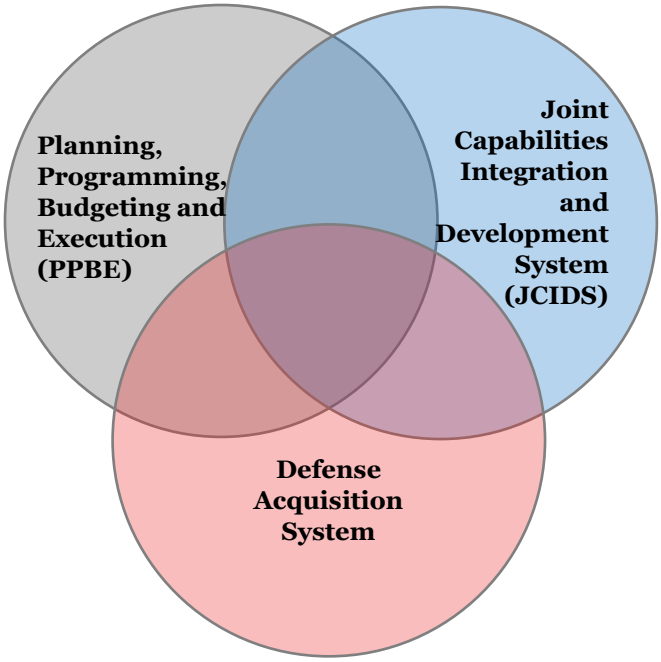
Be it a cruise missile, ballistic missile, or hypersonic missile, from concept to deployment, every weapon system in the US arsenal is (1) intended to satisfy a specific military need (often referred to as a requirement), (2) must be paid for by the federal budget, and (3) is designed and built within an acquisition system. Within this concept to deployment time horizon, there are multiple paths and frameworks for stakeholders to pursue for resolving defense capability gaps.

Requirements, Resources, and Acquisitions

Referred to as "BIG 'A'" (see Figure 4), the DAS comprises three core processes: requirements, resources, and the acquisitions. The BIG A represents DOD's standard approach to acquisitions. These three processes, when executed together and effectively, enable the Department to determine, validate, and prioritize capability requirements and associated capability gaps and risks. The processes also allow the Department to be timely in funding, developing, fielding and sustaining solutions for the Combatant Commands.

[31] *2022 Missile Defense Review*, Department of Defense, p. 8, October 27, 2022, https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF.
[32] "DOD Directive 5000.01: The Defense Acquisition System," Office of the Under Secretary of Defense for Acquisition and Sustainment, p. 4, updated July 28, 2022, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/500001p.pdf.
[33] "DOD Directive 5000.01: The Defense Acquisition System," p. 4.

Figure 4. The Defense Acquisition System



Source: National Academy of Public Administration

The requirements, resources, and acquisition processes have broad application across internal stakeholder operations. Depending on the capability sought, each process can vary according to special authorities, flexibility, and roles and responsibilities of the stakeholders as described in Chapters 3. In general, each term is defined as follows:

- Requirements: Requirements are the "capabilities needed to meet an organization's roles, functions, and missions in current or future operations to the greatest extent possible."[34]
- Resources: Pertains to the funding that is allocated through a planning, programming, budgeting and execution (PPBE) process.[35]
- Acquisition: Encompasses more than just purchasing an item or service but includes design, engineering, construction, and testing of weapons or related items purchased from a contractor.[36] It also includes Operations and Sustainment, which focuses on deployment and operational support over the life cycle of a system, including disposal.[37]

[34] JROC Charter, October 2021
[35] Congressional Research Service, *DOD Planning, Programming, Budgeting, and Execution (PPBE)L: Overview and Selected Issues for Congress,* R47178, July 11, 2022, https://crsreports.congress.gov/product/pdf/R/R47178.
[29] Congressional Research Service, "Defense Acquisitions: How DOD Acquires Weapon Systems and Recent Efforts to Reform the Process." May 23, 2014, https://crsreports.congress.gov/product/pdf/RL/RL34026.
[37] Ibid.

Requirements

The first of three processes in the DAS is requirements. The requirements process is a needs-driven process that focuses on what capability is being bought and why. It is driven by the warfighters need and addresses a specific threat and capability gap. The requirements process helps to determine when the capability is needed and provides a proposed solution.

The JROC and Vice Chairman of the Joint Chiefs of Staff (VCJCS) have ownership of the Joint Capabilities Integration and Development System (JCIDS) requirements process and provide oversight through the JROC Charter to manage the implementation.[38]

JCIDS supports the statutory responsibility of the JROC to validate joint warfighting requirements. It plays a key role in identifying the capabilities required by the warfighters to support the National Defense Strategy (NDS) and the National Military Strategy (NMS).[39] The primary objective of the JCIDS process is to ensure the capabilities required by the joint warfighter are identified, along with their associated operational performance criteria (requirements), in order to successfully execute the missions assigned.[40]

A critical aspect of JCIDS is to allow the JROC and its subordinate boards the ability to manage and prioritize capability requirements within and across capability portfolios of the Joint Force.[41]

JCIDS was created out of necessity in 2003. Created by Secretary of Defense Donald Rumsfeld "the JCIDS approach aimed to foster greater efficiency, flexibility, creativity, and innovation in the acquisition process and fundamentally changed the way DOD developed requirements."[42] It was believed that this concept of jointness and joint integration was seen as a solution to the siloed requirements approaches taken on by the Services to respond to threats; creating their own independent weapons separately. However, building threat-based capabilities did not prove

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[38] CJCS Instructions, https://www.jcs.mil/Library/CJCS-Instructions/?udt_46626_param_page=2 (accessed May 25, 2023).
[39] *Joint Strategic Planning System*, Chairman of the Joint Chiefs of Staff Instruction 3100.01E, May 21, 2021, https://www.jcs.mil/Portals/36/Documents/Library/Instructions/CJCSI%203100.01E.pdf?ver=H90hq7r7eGlYzL40AeUp0w%3D%3D.
[40] *Joint Strategic Planning System*, CJCSI 3100.01E, May 21, 2021.
[41] "Charter of the Joint Requirements Oversight Council and Implementation of the Joint Capabilities Integration and Development System,"
DEVELOPMENT SYSTEM, CJCSI 5123.01I, October 30, 2021, https://www.jcs.mil/Portals/36/Documents/Library/Instructions/CJCSI%205123.01I.pdf.
[42] Charles Davis and K. Smith. "The Psychology of Jointness", September 10, 2020. https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2340620/the-psychology-of-jointness/#:~:text=Jointness%20is%20a%20psychological%20state,to%20accomplish%20a%20shared%20mission.

fruitful. As reflected in the literature, this resulted "in redundancies and capabilities that failed to meet the combined needs of all US military Services."[43]

As a result, the JCIDS ushered in a new era of a capabilities-based requirements process to identify the needs of the warfighter. Under the premise of the JCIDS, rather than threat-based scenarios being the driver, the warfighter needs would be driven by a capabilities-based approach. This shift focused on developing, producing, and fielding systems that meet the strategic direction and priorities of high-level strategy, notably the National Military Strategy, National Defense Strategy and Quadrennial Defense Review. As a result, weapon systems were expected to be developed jointly among Services.[44]

Multiple subordinate boards, such as the Joint Capabilities Board (JCB), support the JROC in its duty to assess joint military capabilities. The JCB is comprised of general or flag officers, or government civilian equivalent, from the Services. The JCB advises the JROC on issues within and across DOD's capability requirements portfolios. Six Functional Capabilities Boards (FCBs) manage those portfolios.[45] Services are represented at each FCB, which have lower-level working groups that feed into the assessments.[46]

Missile defense requirements generation and acquisitions are both governed by a mix of standard (DOD 5000/JCIDS) and nonstandard processes. MDA has applied an alternate requirements process. Such is the case with the Warfighter Involvement Process (WIP). The WIP is the normalized process, distinct from the standard DOD JCIDs process, used to advocate for missile defense warfighter needs to the developers of missile defense systems. The purpose of the WIP is to advocate for required missile defense characteristics and capabilities on behalf of the warfighter. Beginning in 2023, this function will be performed by the JS. The JS will collect, validate, and prioritize warfighter required capabilities in the JIPPL.. In response to criticism regarding the lack of integration with the standard JCIDS requirements process, the Missile Defense Executive Board (MDEB) was established. The MDEB provides for participation by Combatant Commands and the Services and includes representation by participants in the JROC.

The WIP includes but is not limited to subprocesses with the aim to review, integrate, and prioritize MD capability gaps identified by the Combatant Commands (CCMDs) in Integrated Priority Lists (IPLs), together with input from Services and other stakeholders.[47] It is developed in the context of the flexibility of MDA, the entity that manages the BMDS. With its exemption from JCIDS, MDA uses its authorized flexibilities to pursue rapid and agile development of ballistic missile defense capabilities to support the Warfighter. A discussion of these flexibilities is highlighted in Chapter 3.

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[43] Association of the United States Army, Oct 2004 "A New Look at Requirements: The Joint Capabilities Integration and Development System," https://www.ausa.org/publications/new-look-requirements-joint-capabilities-integration-and-development-system.
[44] Chairman of the Joints Chief of Staff Instruction 3170.01H, JCIDS.
[45] JROC Charter, October 2021.
[46] JROC Charter, October 2021.
[47] "Missile Defense (MD) Warfighter Involvement Process (WIP)," United States Strategic Command Instruction (SI), SI 538-03, July 26, 2020.

And finally, unlike the WIP, the JCIDS requirements process is characterized by both internal and external observers as "slow, inefficient and cumbersome."[48] With ongoing impediments, such as multi-layered levels of boards within its structure, defining and approving requirements through JCIDS simply takes too long for addressing missile threats. With alternative processes in place, DoD's ability to efficiently acquire new weapon systems on time and within cost is that much more probable.

Resources

As a calendar-driven process, the second element in the DAS is resources. Adequate funding is vital for any weapons system. To support this notion, the Joint IAMD Vision issued for 2020 specifically noted that integrated missile defense should not only be driven by a Joint Force that is "versatile, responsive, and decisive, but also by one that is affordable."[49] However, affordability becomes less of an issue if the process for funding requirements is not properly aligned with all the processes represented in the BIG A acquisition system.

The JCIDS instruction emphasizes that the requirements, acquisition, and resource processes "are the most tightly interactive and must work in concert to ensure consistent decision making while delivering timely and cost-effective capability solutions to the Warfighters."[50] These three processes must be in clear alignment to support the Department's decision making and avoid conflicting recommendations.[51]

For instance, if the Joint Force is to be versatile, responsive, and decisive, the (PPBE) process and timeline must align with warfighter requirements. Funding for advanced technology needs used on the battlefield must be executed in a timely fashion. Timeliness of funding can also impact when and the speed at which a capability can be ushered through the acquisition process. All efforts within the PPBE are critical to the outcome of a robust Joint Force within the threat environment. This is the significance of having an effective funding system to support integrated missile defense.

However, there are instances where the comprehensiveness of the PPBE process is not structured to facilitate speed and agility in capability gap development. As a case in point, during study interviews, stakeholders cited alternative research and development (R&D) funds established to spearhead innovation. The Rapid Defense Experimentation Reserve (RDER) is an R&D fund that allows circumventing the PPBE as an incentive for developing new emerging capabilities.[52]

As part of RDER, "organizations across the DoD can propose experiments and compete for RDER funding, with winners determined based on how well they bring in multiple Services and entities

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[48] Report to Congressional Committees, Weapon System Requirements, GAO 22-104432 October 2021
[49] Martin E. Dempsey, Joint Chiefs of Staff, *Joint Integrated Air and Missile Defense: Vision 2020*, December 5, 2013, https://www.jcs.mil/Portals/36/Documents/Publications/JointIAMDVision2020.pdf.
[50] "Joint Capabilities Integration and Development System (JCIDS)," Chairman of the Joint Chiefs of Staff Instruction 3170.01I, p. A-9.
[51] CJCSI 3170.01I, p. A-9.
[52] "Rapid Defense Experimentation Reserve," Under Secretary of Defense for Research and Engineering, https://ac.cto.mil/pe/rder/.

to work on joint concepts."[53] However, this incentive has challenges. While there is a rise in numerous Service-led rapid prototyping, the Services are not necessarily focused on integrating the joint forces together.[54]

Planning, Programming, Budgeting and Execution (PPBE)

The PPBE process is focused on financial management and resource allocation for current and future DoD acquisition programs. The process is established by the Secretary of Defense (SecDef) who provides priorities and goals under the main guidance of DoD Directive 7045.14 "Program Planning Budget & Execution (PPBE)" Process.

The PPBE process facilitates the resources needed to succeed within the threat environment. There are three main characteristics of the PPBE process. It is the:

- DOD system for "allocating resources among the armed Services, defense agencies, and other components"[55]
- Annual process that "serves as the framework for DOD civilian and military leaders to decide which programs and force management requirements to fund based on strategic objectives"[56]
- SecDef's "institutional strategic planning system and the primary decision-making process for translating strategic guidance into resource allocation decisions"[57]

The PPBE process is executed through four distinct but overlapping phases.

Phases of the PPBE Process[58]

1. Planning

The Under Secretary of Defense (USD) for Policy leads the planning phase. The phase involves reviewing the President's National Security Strategy, the SecDef's National Defense Strategy (NDS), and the CJCS's National Military Strategy to align the resulting Defense Planning Guidance with the Administration's policy goals and potential threats, force structure, readiness posture, and other factors. Developed with input from the CJCS, Armed Services, and combatant commanders, the Defense Planning Guidance typically contains guidance on investments.

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[53] Sydney J. Freedberg Jr., "Hicks Seeks to Unify Service Experiments with New 'Raider' Fund," Breaking Defense, June 21, 2021, https://breakingdefense.com/2021/06/hicks-seeks-to-unify-service-experiments-with-new-raider-fund/.
[54] Ibid.
[55] "Defense Primer: Planning, Programming, Budgeting, and Execution (PPBE) Process," IF10429, Congressional Research Service, updated December 15, 2022, https://crsreports.congress.gov/product/pdf/IF/IF10429.
[56] IF10429, Congressional Research Service.
[57] Ibid.
[58] Ibid.

2. Programming

The programming phase is meant to analyze the anticipated effects of present-day decisions on the future force. The Director of the Cost Assessment and Program Evaluation (CAPE) Office leads this phase. The programming phase begins with the heads of each component developing a POM (Program Objective Memorandum), which describes proposed resource requirements (e.g., forces, manpower, and funding) for programs over five years. Each POM prioritizes and adjusts programs in the FYDP (Future Year Defense Program) and describes risks associated with underfunded or unfunded programs. Once each component submits a POM, CAPE leads the reviews of the programs, forecasts the resource requirements for the next five years, and updates the FYDP. As a result of program reviews, the SecDef may direct the components to make changes.

3. Budgeting

The USD Comptroller/Chief Financial Officer leads the budgeting phase, in which the components complete a Budget Estimate Submission for the first year of the FYDP. Using guidance from the Office of Management and Budget (OMB), the Comptroller reviews the budget submissions for funding and fiscal controls, phasing of the efforts over the funding period, and feasibility of execution within the budget year. During this phase, Comptroller analysts collaborate with component analysts to align budget requests with the overall defense budget. As a result of budget reviews, the SecDef may direct the components to make changes. The final product is typically submitted to OMB in December for inclusion in the President's annual budget request to Congress, which is usually submitted in February.

4. Execution

During the execution phase, OSD and the components evaluate the obligation and expenditure of funds, as well as program results. The purpose of execution review is to assess program objectives against outcomes. The components assess compliance with priorities and SecDef guidance, performance metrics, and program results. OSD staff review the assessments and recommend changes, in coordination with the CJCS and the Joint Staff.

Prioritization of Investments for Missile Defense

Making decisions in determining which programs and requirements to fund based on strategic objectives can be complicated. According to stakeholder feedback, the notion of establishing a process that could help prioritize investments across a portfolio of integrated MD capability gaps would be 'a welcomed solution.' The Vice Chairmen of the Joint Staff recognize there are opportunities to improve on organizing priorities. An update to the JROC charter in 2021 seems to be in step with this mindset. As a major policy change, the charter incorporated the Capability Portfolio Management Review (CPMR) into its process.

The "CPMR will address opportunities, challenges, risk, and trade-space associated with specific portfolios that enable the DOD's strategic objectives."[59] At a minimum it is expected to be

[59] JROC Charter October 2021.

conducted every fiscal year and support the determination of the Joint Staff, Services, and other Department's position for Program Budget Review (PBR) and inform capability development across the department."[60] The PBR is an annual review coordinated by the OUSD (Comptroller) and OSD CAPE to facilitate consolidation of program objective memorandums and budget estimate submissions from the Services and other DOD components. The objective of the PBR is to adjudicate any outstanding issues before presenting DOD input to the President's budget submission. It is an opportunity to ensure that budgetary decisions are fully informed by the priorities of the validated capability requirements of the Joint Force.[61]

The initial cycle for the CPMR is expected to generate a Joint IAMD Portfolio Prioritized List (JIPPL) sometime in Quarter 3 of Fiscal Year 2023. The JIPPL will represent a streamlined list of prioritized requirements for meeting capability gaps at the enterprise level. Stakeholders expressed concerns regarding perceived risks that could surface as a part of this initial process including not having a clear understanding of the JIPPL format and incorporation of unknown and untested technical depth.

To put the CPMR into context, it is presented as a tool within the CJCS Joint Strategic Planning System (JSPS). Along with JCIDS and the JROC, it is executed in the realm of Force Development,[62] which is involves activities that bridge the present and future warfighting concepts.[63] However, stakeholders suggest that the execution of the CPMR could present a few challenges.

For instance, the CPMR is perceived as "more of the same," and even duplicative of current processes. On the other hand, stakeholders have offered alternative uses, in that the process would be best served if focused on a single, specific category of integrated MD, such as cruise missiles, rather than the entire enterprise-portfolio level view of integrated MD .

Additionally, while not every portfolio across the joint force will have a CPMR, there are mixed perceptions of its outcome. There is a sense that the process is too broad an approach to be relevant, will be disruptive to critical lines of communication between MDA and Warfighters in the WIP regarding requirements; and potentially add layers to the requirements process, making it more cumbersome than it needs to be.

DoD expects that not all stakeholders will agree with the resulting JIPPL and priority ranking; and refinements to the process are anticipated. For now, it is too soon to tell what the resulting impact and outcome of the CPMR will be.

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[60] JROC Charter October 2021.
[61] JROC Charter, October 2021.
[62] Force Development is a time horizon where concepts and capabilities are integrated to deliver a lethal force, capable of competing and winning against any adversary.
Joint Strategic Planning System, Chairman of the Joint Chiefs of Staff Instruction 3100.01E, May 21, 2021,
https://www.jcs.mil/Portals/36/Documents/Library/Instructions/CJCSI%203100.01E.pdf?ver=H90hq7r7eGlYzL40AeUp0w%3D%3D.
[63] Joint Staff. Joint Strategic Planning System (JSPS), May 21, 2021.

Acquisition Process

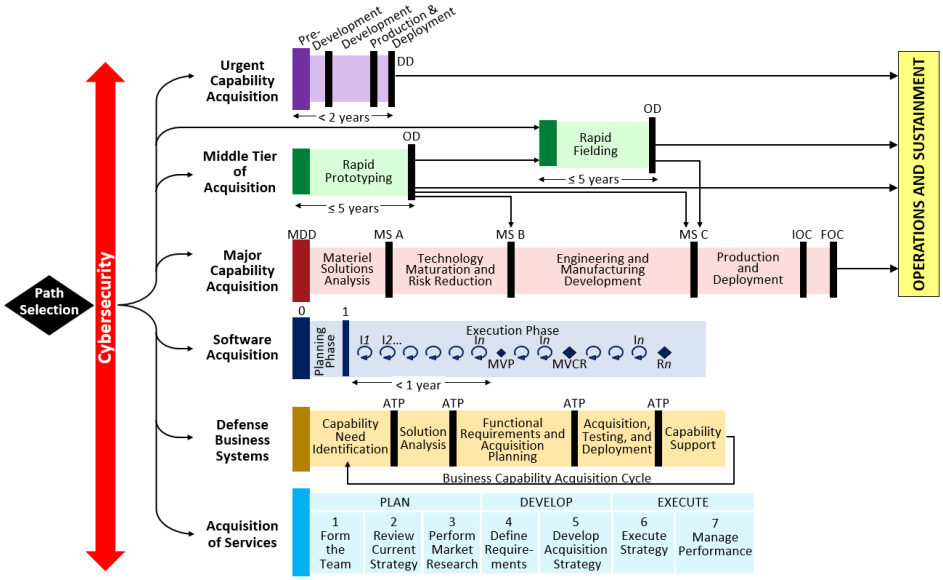
The third element in the DAS is the acquisition process. DOD refers to this element as 'Little a'—an event-based process where a program goes through a series of processes, milestones, and reviews from beginning to end. The acquisition process focuses on how DoD components buy and develop the capabilities needed to keep pace with the threat environment. The process is implemented by the DOD 5000 Instructions which provides the policies and principles that govern the defense acquisition system and forms the management foundation for all DOD programs.[64]

The DOD 5000 policies also support the need for flexibility in developing and fielding capabilities with speed and agility. In addition to the special acquisition authorities afforded to MDA, which is explained further in Chapter 3, the Services also have access to some flexibilities through the Adaptive Acquisition Framework, although these flexibilities are not quite as extensive as those enjoyed by MDA. DoD Instruction 5000.02 "Operation of the Adaptive Acquisition Framework (AAF)" supports the Defense Acquisition System with the objective of delivering "effective, suitable, survivable, sustainable, and affordable solutions to the end-user in a timely manner"[65] (See Figure 5). The instruction also acknowledges that to achieve these objectives, Milestone Decision Authorities (MDAs) and program managers "have broad authority to plan and manage their programs consistent with sound business practice."[66]

Moreso, the AAF acquisition pathways provide opportunities for these programmatic stakeholders to develop acquisition strategies and employ acquisition processes that match the characteristics of the capability being acquired.

[64] "Acquisition Policies," Defense Acquisition University, https://aaf.dau.edu/aaf/policies/.
[65] "DOD Instruction 5000.02: Operation of the Adaptive Acquisition Framework," Office of the Under Secretary for Acquisition and Sustainment, June 8, 2022, p. 4https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500002p.PDF.
[66] Department of Defense, "DOD Instruction 5000.02," p.4

Figure 5. Adaptive Acquisition Framework



Source: Defense Acquisition University[67]

The AAF has six distinct pathways that components can pursue to empower innovation while maintaining discipline in acquisition practices. The more notable pathways include the Middle Tier of Acquisition (MTA). MTA is for (1) use of innovative technologies to rapidly develop fieldable prototypes to demonstrate new capability- Rapid Prototyping and (2) use of proven technologies to field production quantities of new or upgraded systems with minimal development required- Rapid Fielding. MTA is also exempt from JCIDS though streamlined component-level requirements apply.

To maintain technological superiority on the battlefield, DOD "relies on scientific and technical knowledge developed in large measure through research, development, test, and evaluation (RDT&E) funded by the Department and performed by industry, universities, federal laboratories, and others."[68] DOD's commitment to R&D is also reflected in budgets. In Fiscal Year 2023, nearly a third of the RDT&E budget was obligated to work categorized as Advanced Component Development and Prototypes—the second highest portion of R&D activity funding behind operational system development (see the RDT&E Budget Table in Appendix D).

However, a big challenge for industry is balancing the investment in new technology with supplying the needed capacity of existing systems and successfully transitioning from R&D design to a program of record with a supported budget line. According to industry subject matter experts, the government needs to rethink surge capacity of systems, longer funding windows and utilization of nontraditional suppliers to bring the best and most novel ideas to the forefront.

[67] "Adaptive Acquisition Framework," Defense Acquisition University, https://aaf.dau.edu/.
[68] "Defense Primer: RDT&E," IF10553, Congressional Research Service, updated November 10, 2022, https://crsreports.congress.gov/product/pdf/IF/IF10553.

Striking the balance between sustaining existing systems with new, innovative improvements will be needed to address the missile defense threats.

Operations and Support (Sustainment)

Operations and Support (O&S) is a subset of the acquisition process. According to DOD policy documents the O&S phase is where a system is used and supported by users in the field. This phase satisfies materiel readiness and operational support performance requirements including personnel training, and sustains the system over its life cycle, including disposal.[69]

O&S is important because it focuses on sustaining systems in a cost-effective manner throughout the systems' lifecycles. O&S can be the most expensive phase in the acquisition process.

Depending on the system, O&S costs represent a significant proportion of a capability's life cycle cost.[70] Over the program life cycle, the O&S of a system must consider "operational needs, training requirements, technology advances, evolving threats, process improvements, fiscal constraints, plans for follow-on systems, changes to the industrial base, or a combination" of these elements.[71] With 70 percent of the lifecycle costs of the capability at stake, operations and sustainment can easily create hurdles and even place financial burdens on component organizations. But that depends upon the circumstance.

For example, MDA was originally tasked with developing "cutting-edge" missile defense systems that would then be transitioned to the appropriate Service as a program of record whereby, the Service would have the responsibility for program management and system operation. This transition process has multiple challenges. Even when successfully transferred, programs have suffered for lack of attention, or have fallen victim to financial priorities. As a result, MDA has increasingly taken on funding responsibilities for operations and sustainment. This trend is acceptable to the Services because they believe the alternative is for them to fund those activities from their own budgets, which is not sustainable given their other budgetary pressures. This is a scenario that can transpire with ineffective operations and sustainment processes. It poses a risk to the system developer as well as to the receiving organization of the system during transfer.

Disposal and demilitarization is the final phase of the acquisition process. This phase begins when a system or equipment is no longer useful because of its age, cost to sustain, safety, or dated technology.[72] Systems are disposed "in accordance with all legal and regulatory requirements and policy relating to safety (including explosives safety), security, and the environment." Disposal planning should be considered early in the design lifecycle of any system."[73]

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[69] Office of the Under Secretary of Defense for Acquisition and Sustainment, "DOD Instruction 5000.85: Major Capability Acquisition," p. 18, August 20, 2020, updated November 4, 2021, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500085p.pdf.
[70] Christopher J. Lowman, "Life Cycle Sustainment Plan: A New Outline for Product Support Planning and Execution," October 21, 2022, https://www.acq.osd.mil/news/office-news/asds/2022/Life-Cycle-Sustainment-Plan.html.
[71] Department of Defense, "DODI 5000.85: Major Capability Acquisition," p. 18.
[72] Ibid.
[73] Ibid.

In summary, O&S and sustainment are important components of missile defense. The DOD doctrine for sustainment enables mission accomplishment. According to a Joint Staff J7, Insights and Best Practices Focus Report, "sustaining operations is key to the ability to aggregate, operate, and disaggregate rapidly. It encompasses the provision of logistics and personnel services to maintain and prolong operations, including mission accomplishment and redeployment of the force."[74] Furthermore, "today's complex joint operating environment places a significant burden on strategic and operational level sustainment partners and multiple stakeholders to ensure DOD's ability to conduct multiple, simultaneous operations around the world."[75]

Without exception, "sustainment will be contested in today's complex security environment with its array of current threats and adversaries."[76]

[74] Joint Staff J7, "Insights and Best Practices Focus Paper: Sustainment," p.1, May, 2022, https://www.jcs.mil/Portals/36/Documents/Doctrine/fp/sustainment_6ed.pdf?ver=bAfzHvGl4uoVuML424Y77g%3d%3d
[75] Ibid.
[76] Ibid.

Chapter 3: Missile Defense Roles and Responsibilities

This chapter provides an overview of the roles and responsibilities of the many DOD components involved in requirements, acquisition, and operations and sustainment across missile defense. These roles and responsibilities are described in a narrative format and presented in a series of grids (see Figures 6, 7, and 8). This chapter also provides analysis on the perceived gaps in component capabilities and unnecessary duplication, waste, or inefficiencies.

The complexities of missile defense roles and responsibilities are vast. Although certain aspects of the missile defense enterprise are noted in DOD directives, the intricacies of the processes and the number, of DOD components involved in those processes, and the integration of those components combined with a lack of documentation and transparency surrounding the roles and responsibilities of DOD components, contribute to the challenge of describing a coherent and integrated missile defense network. The lack of clearly delineated roles and responsibilities significantly complicates efforts to understand which component holds what responsibility and accountability for elements of the mission. Part of the impetus for this assessment is Congress' desire for clarity around roles and responsibilities.

Obtaining a clear sense of the missile defense roles and responsibilities required several months of research, interviews, and analysis. Further complications are added as missile defense roles and responsibilities change and adapt to the rapidly growing threat environment, with updated processes, shifting policy, and new designations. Examples of recent changes impacting roles and responsibilities include (1) the March 2020 Directive Type Memorandum (DTM) 20-002, which altered MDA's acquisition flexibilities; (2) the introduction of the Joint Staff's Chairman's Gap Analysis and Capability Portfolio Management Review (CPMR) process, which now vets the Combatant Commands' priority lists; and (3) the Joint Staff's Joint IAMD Portfolio Priority List (JIPPL) replacing STRATCOM's Missile Defense Integrated Priority List in March 2023. As some of these changes occurred during this study, this section captures the current structure of missile defense roles and responsibilities.

3.1 Roles and Responsibilities Grids

Grids and explanatory text are tools of this report to offer insights into high level roles and responsibilities of DOD components with respect to setting objectives and constraints for requirements, acquisition, and operations and sustainment of the various missile threat types described in Chapter 2. Input from stakeholder interviews and policy documentation informed their development.[77]

Three grids are prepared because the processes differ among some of the threat types: ballistic and hypersonic missile defense are combined into one grid, but cruise missile defense (CMD) and counter-uncrewed aircraft systems (C-UAS) have individual grids due to the different

[77] The Study Team received input on these grids from several DOD components, including OSD Policy, MDA, JIAMDO, JFCC-IMD, and DAMO Fires, to ensure that the Study Team had access to various perspectives across the Department while developing these grids.

configurations of roles and responsibilities. These grids capture standard roles and responsibilities across the three processes without getting into the nuances of specific missile defense systems.

Each grid is divided into three rows and two columns. The rows progress in a manner that reflects the lifecycle of a missile defense system's development: first, the requirements process where needs of warfighters are solicited, then, the acquisition process where capabilities are developed and acquired, and last, the operations and sustainment process where components maintain the systems once fielded. The left-hand column of each grid presents the components with lead roles and responsibilities, indicating that these components have primary responsibility for leading the processes for that missile threat type. The right-hand column presents the components with supporting roles and responsibilities, indicating that these components have an integral support role in the three processes. While the grids do not include the roles and responsibilities related to developing and obligating the budget for Missile Defense (MD) and defending against the four missile threat types, the Panel acknowledges the importance of those budgetary responsibilities.[78]

Figure 6 groups ballistic missile defense (BMD) and hypersonic missile defense together because both threat types are subject to MDA's missile defense development processes for requirements, acquisition, and operations and sustainment.

Ballistic and Hypersonic Missile Defense

MDA is predominantly responsible for developing the missile defense systems for BMD and hypersonic missile defense. The Services also contribute to the BMD system, especially through the acquisition of terminal phase systems. MDA has been the lead for fielding the BMD system since its time as the Strategic Defense Initiative Organization. This role continued as it evolved into the Ballistic Missile Defense Organization (BMDO) and then finally into MDA. It is the technical authority for IAMD. Technical authority gives MDA the responsibility, and accountability to determine technical standards based on requirements and architectures.[79] MDA is also the hypersonic defense executive agent for DOD for the development of a hypersonic defense architecture.[80] MDA has acquisition authority for both missile threat types at the Acquisition Category I (ACAT I) funding level.[81] Additionally, there are several other DOD

[78] Budgetary responsibilities for MD largely pertain to the Research, Development, Test and Evaluation (RDT&E); Procurement; and Operations and Maintenance or Sustainment appropriations categories.
[79] NAVSEA, "Engineering and Technical Authority Overview", January 15, 2019, https://www.navsea.navy.mil/Portals/103/Documents/Exhibits/SNA2019/Eng_TechAuth-Lind.pdf?ver=2019-01-15-165059-767.
[80] National Defense Authorization Act for Fiscal Year 2017, Section 1687.
DOD Directive 5101.01 explains that the executive agent designation is made when "There is no existing management arrangement to accomplish the identified DOD objectives," "DOD resources, policy or common service or support need to focus on a specific area of responsibility to minimize duplication or redundancy," and when required by law (DODD 5101.01, p. 3).
[81] MDA was assigned as the IAMD TA in the *May 8, 2013, Under Secretary of Defense for Acquisition, Technology and Logistics Acquisition Decision Memorandum*.

components involved in the requirements, acquisition, and operations and sustainment processes.

These components' roles and responsibilities for ballistic and hypersonic missile defense are described below and outlined in Figure 6. Note that Figure 6 represents roles and responsibilities related to only the three processes described below.

Requirements: With MDA's JCIDS process exemption (as discussed in Chapter 2), BMD and hypersonic requirements can go through an alternative pathway to the standard DOD requirements development process. Prior to March 2023, the combatant commands submitted their integrated priorities lists to the Warfighter Involvement Process (WIP), which was managed by the US Strategic Command (STRATCOM) and Joint Functional Component Command for Integrated Missile Defense (JFCC-IMD). The Missile Defense Executive Board (MDEB) oversees program priorities and investment options, which are considered in the requirements process. Starting in March 2023, JIAMDO will enter the requirements that emerge from the combatant commands' integrated priority lists into the CPMR process, which will vet and validate the requirements and provide the foundation for the new Joint IAMD Portfolio Prioritized List (JIPPL).

In a supporting role, the Cost Assessment and Program Evaluation (CAPE) Office conducts cost assessments during the requirements process, and the Services provide input to the CCMDs' integrated priority lists, which have influenced the WIP and will influence the CPMR.

The Space Development Agency (SDA), which focuses on domain awareness for higher flying objects, whether they be ballistic missiles, hypersonic systems, or cruise missiles, is also enabled by flexibilities in its requirements process. Due to SDA's use of the Middle Tier Acquisition (MTA) pathway for rapid prototyping and rapid fielding, SDA is exempt from JCIDS. Instead they use a built-for-purpose Warfighter Council to identify joint requirements enabling greater agility in developing its requirements for domain awareness. SDA's Director reports to the Chief of Space Operations for requirement decisions and co-chairs the Warfighter Council with the Vice Chief of Space Operations on a semi-annual basis at the general or flag officer, or government civilian equivalent level, punctuated by monthly working group meetings. The Warfighter Council consists of principals from the CCMDs, Services, and Joint Staff, and gives warfighter input and joint requirements directly to SDA, retaining accountability and transparency while facilitating rapid, spiral development acquisition cycles, and meeting the intent of JCIDS. SDA uses this input to evaluate available technology and to offer the council a minimum viable capability that can be provided to the warfighter within two years. SDA continues to incorporate feedback throughout the process at "vector checks" to ensure all stakeholders agree on the general direction of the process.

Acquisition: MDA is the acquisition executive for elements of the ballistic and hypersonic missile defense systems. MDA historically has been granted broad acquisition flexibility. However, the Directive Type Memorandum 20-002, released in March 2020, rolled back some of

those flexibilities.[82] As a result, MDA must receive external approval for more of its milestone decisions. MDA retains milestone decision authority for acquisitions unless there are elements that reach the ACAT I threshold or that may be of special interest, in which case the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)) serves as the milestone decision authority at the Technology Development Decision, Product Development Decision, and Product Development for missile defense system elements.[83] Recently, the USD(A&S) has formally concurred with the approach to delegate this milestone decision authority back to MDA for some program elements.[84]

During the acquisition process, the Director of Operational Testing and Evaluation (DOT&E), OUSD R&E Executive Director, Developmental Test, Evaluation, and Assessments (DTE&A), and Service operational test agencies have a lead role in overseeing the operational testing of ballistic and hypersonic missile defense systems. These components will review the Integrated Master Test Plan (IMTP) developed by MDA.

The DOD Under Secretaries of Research and Engineering (R&E) and Acquisition and Sustainment (A&S) co-chair the MDEB. The MDEB reviews and makes recommendations on MDA's acquisition strategy for ballistic missile defense systems and hypersonic defense systems[85].

Operations and Sustainment: MDA has a lead role in planning for the operations and sustainment of the systems it develops. With the expectation of program transition, the Services support MDA in the planning for the operations and sustainment of these ballistic and hypersonic systems.

MDA funds the majority of its systems for the first two years of operations.[86] Typically, the Services will assume responsibility for the operations and sustainment funding and management from MDA after those initial two years or at the point that the system transfer occurs depending on agreed to conditions between MDA and the Service. An extension of the typical two-year transfer period often happens because of the following reasons. First, transfer may not happen after two years because the system's cost is too high or the total end cost is unknown. A Service does not always have the funding to support the maintenance and continued technical development of these systems; if a Service does not have additional operations and sustainment funding to support the system, this funding comes out of its existing budget. If Service leaders do not think the operation of the system matches with the Service's mission, there may be some reticence to financially support a fielded system. Another reason why transfer to the Services may

[82] The DTM 20-002 resulted in MDA needing to obtain independent costs and technology risk assessments at an earlier point in the development process. The DTM also shifted milestone decision authority for large programs from the MDA Director to the Under Secretary of Defense for Acquisition and Sustainment. Directive-type Memorandum 20-002, "Missile Defense System Policies and Governance," March 13, 2020; Updated on August 12, 2022.
[83] Department of Defense. "DTM 20-002." https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dtm/DTM-20-002.PDF?ver=Toe7_xJ7x74vadUDZRoHew%3D%3D
[84] Department of Defense. "Resolution of Milestone Decision Authority Memo" (13 Feb 2023).
[85] Deputy Secretary of Defense. "Missile Defense Executive Board Charter," Mar 15, 2007
[86] The duration of MDA's financial support is dependent on individual programs' agreements.

not occur after two years is that MDA can continue to develop capabilities much faster than a Service is able due to its expertise, resources, and authorities. Finally, a Service may be reluctant to take the system because it does not believe its input was adequately included in the development of the system.

Past the point of transfer, MDA has a role in modernizing the systems, especially with the systems' software, and MDA serves as a technical expert to the Services on the systems it develops.

CCMDs play a critical role in the operations of these systems as each owns the assets in its AOR. STRATCOM and JFCC IMD play a crucial role in the cross-regional support of these systems. Its support includes asset management, sensor management including backup functional control, communications network monitoring, and cybersecurity of the ballistic missile defense system.

Figure 6. Ballistic and Hypersonic Missile Defense Roles and Responsibilities for Requirements, Acquisition, and Operations and Sustainment

Ballistic and Hypersonic Missile Defense *The Missile Defense Agency (MDA) is the technical authority for all of IAMD.* *MDA is the hypersonic defense executive agent by law.*	
Requirements	
Lead Roles	**Supporting Roles**
Before Changes in September 2022 and March 2023: • ***Combatant Commands (CCMDs):*** In the past, CCMDs developed and submitted Missile Defense Integrated Priority List requirements for the Warfighter Involvement Process. • ***US Strategic Command (STRATCOM)/Joint Functional Component Command for Integrated Missile Defense (JFCC-IMD):*** Prior to the IAMD Capability Portfolio Management Review/Joint IAMD Portfolio Prioritized List initiative, STRATCOM/JFCC-IMD incorporated warfighters' voices through its lead role in developing, administering, and managing the Warfighter Involvement Process. **After Changes in September 2022 and March 2023:**[87] • ***Combatant Commands (CCMDs):*** Beginning in Sept. 2022, CCMDs provided their integrated priority lists to the Joint Staff for processing through the Chairman's Gap Analysis and entry into the Capability Portfolio Management Review process for eventual vetting and inclusion of the Joint Staff-produced Joint IAMD Portfolio Prioritized List.	• ***Missile Defense Executive Board (MDEB):*** Reviews the Capability Gap Tracker and Achievable Capabilities List. Oversees program priorities and investment options. • ***Services:*** Provide their integrated priority lists to the Joint Staff for the Chairman's Gap Analysis and their inclusion in the beginning of the Capability Portfolio Management Review process. Each also produces requirements for individual systems that can operate outside of the wholistic ballistic missile defense system. • ***Cost Assessment and Program Evaluation (CAPE) Office:*** Conducts cost assessments

[87] In September 2022, the Joint Staff introduced the new Chairman's Gap Analysis and Capability Portfolio Management (CPMR) processes, which vet the Combatant Commands' priority lists. In March 2023, the Joint Staff's Joint IAMD Portfolio Priority List (JIPPL) formally replaces STRATCOM's Missile Defense Integrated Priority List (MDIPL).

• ***Joint Staff:*** Validate and prioritize requirements and produce its Joint IAMD Portfolio Prioritized List. • ***STRATCOM/JFCC-IMD:*** Beginning in March 2023, the Joint IAMD Portfolio Prioritized List will replace STRATCOM's Missile Defense Integrated Priority List. • ***US Space Command (SPACECOM):*** In the next Unified Command Plan, SPACECOM *may* take responsibility for the ballistic missile defense requirements process. • ***Space Development Agency (SDA):*** Develops requirements for systems with domain awareness capability for higher flying objects, using input from SDA's Warfighter Council.	
Acquisition	
Lead Roles	***Supporting Roles***
• ***Missile Defense Agency (MDA):*** With the ballistic missile defense and hypersonic defense mission areas, MDA is the Acquisition Executive and responsible for *developmental* testing. • ***Director of Operational Testing and Evaluation (DOT&E) and Service Offices of Technical Authority (OTAs)*** are responsible for overseeing *operational* testing. They also review and approve the Integrated Master Test Plan. These testing activities include other entities involved in operating, maintaining, and updating the systems. These components conduct testing at multiple stages throughout development. • ***SDA:*** Acquires space-based capabilities for the ballistic missile defense and hypersonic defense mission areas.	• ***Acquisition and Sustainment (A&S):*** Approves acquisition milestone decisions for all major ACAT I programs unless delegated to MDA. Co-Chairs MDEB. • ***Research and Engineering (R&E):*** conducts evaluations and provides input before the acquisition of systems; co-Chairs the Missile Defense Executive Board. • ***Missile Defense Executive Board (MDEB):*** Reviews and makes recommendations regarding MDA's acquisition strategy. • ***Services:*** acquire systems that can operate independently of the wholistic ballistic missile defense system.
Operations & Sustainment (O&S)	
Lead Roles	***Supporting Roles***

• ***Missile Defense Agency (MDA):*** Responsible for planning for O&S and funds the first two years of operations after initial fielding (MDA retains "ownership" over certain systems' operations and sustainment for a longer period); MDA has a role in the modernization portion of the O&S process (for example, software updates). • ***MDA and DOT&E:*** Test changes to fielded capabilities that are initiated by MDA. • ***Services:*** Take over O&S funding and management after the first two years, or whenever transfer occurs; Services are responsible for testing changes to fielded capabilities that they initiate. • ***CCMDs:*** Support the operational needs of systems as well as asset and sensor management.	• ***Services:*** Participate in planning for O&S and provide resources (e.g., forces) needed to support the fielding of capabilities. • ***MDA:*** Offers technical support and knowledge to the Services.

Source: National Academy of Public Administration

Cruise Missile Defense

Each Service is responsible for developing its own cruise missile defense systems. Services deploy these systems in various CCMDs to defend individual fleets and armies or in joint areas of responsibility like in Guam. MDA is the lead integrator charged with technically connecting different cruise missile defense systems from each Service into a networked system of systems, which may be interoperable with MDA's ballistic missile and hypersonic defense systems. This integration enables warfighters from different Services to identify a threat and coordinate a response more quickly. For the Air and Cruise Missile Defense of the Homeland (ACMD-H) mission, DOD in August 2022 named the Department of the Air Force (DAF) as the acquisition authority. The Study Team learned that, so far, the DAF plans to utilize the acquisition flexibilities offered by Middle Tier of Acquisition within the Adaptive Acquisition Framework (AAF) and will adjust as needed as the ACMD-H mission evolves. Utilizing acquisition flexibilities is imperative to pacing the cruise missile threat. DOD components' roles and responsibilities for CMD are described below and outlined in Figure 7.

Requirements: Each Service follows the JCIDS process including the CPMR process led by JIAMDO to generate requirements for joint cruise missile defense capabilities. CCMDs and Services can submit input directly to JIAMDO to be included. For ACMD-H, the Air Force receives requirements through the CPMR and through the Integrated Acquisition Portfolio Review (IAPR) to identify gaps (the IAPR is in its first year of operational existence and covers a wider range of topics that include IAMD).

Acquisition: Each Service follows the Defense Acquisition process and applies the Adaptive Acquisition Framework when appropriate for certain programs. The DAF will lead the acquisition process to build an architecture for the ACMD-H mission. It will need to serve as an integrator and will need to partner with component acquisition executives, OSD, and the JS to support analysis and fielding of joint and multinational solutions. The scope of required authorities, funding, and governance processes for the DAF to accomplish this role is still in the initial phases of development. Some interviewees in the DAF have expressed concern that the DAF may not be adequately equipped with authorities to acquire needed systems for ACMD-H. DAF can use the AAF, but it must still navigate the JCIDS process unless it is otherwise exempted; for example, when DAF uses the MTA. The Air Force has been working with JIAMDO to develop a plan and proposed architecture for this mission. The USD (A&S) is the relevant Principal Staff Assistant for this mission.[88] The Air Force will give input to A&S including recommendations and any further authority or funding requests.

Operations and Sustainment: Each Service is responsible for operations and sustainment for the defense systems each acquires.

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[88] A Principal Staff Assistant is a head of an Office of the Secretary of Defense component and reports directly to the Secretary or Deputy Secretary of Defense.
"DOD and OSD Component Heads," Department of Defense, October 26, 2022, https://www.esd.whs.mil/Portals/54/Documents/DD/iss_process/coordination/DoD_OSD_Component_Heads.pdf?ver=H9MUpPwUIr24LziJda8aUg%3D%3D.

Figure 7. Cruise Missile Defense Roles and Responsibilities for Requirements, Acquisition, and Operations and Sustainment

Cruise Missile Defense	
Requirements	
Lead Roles	**Supporting Roles**
• ***Combatant Commands (CCMDs):*** Produce requirements through the Joint Requirements Oversight Council's (JROC's) Joint Capabilities Integration and Development System (JCIDS) process and Capability Portfolio Management Reviews (CPMR) process. Combatant Commanders serve as advisors on JROC. • ***Joint Staff:*** For ACMD-H, the Joint Staff validated the Initial Capabilities Document for the mission and will oversee requirements generation with the Commander, North American Aerospace Defense and the Department of the Air Force (DAF). • ***Services:*** Produce warfighter input. They also produce the capability to close gaps identified by CCMDs.	• ***Joint Functional Component Command for Integrated Missile Defense (JFCC IMD)*** is heavily involved in CCMD testing requirements. It coordinates testing requirements, including testing against cruise missiles, and represents the Warfighter at the Missile Defense Agency's System Engineering Test Requirements Working Group. • ***Joint Staff:*** ○ The Joint IAMD Portfolio Prioritized List (JIPPL) is all-inclusive. Stakeholders will be any Service or agency that has developed capabilities. ○ CCMDs develop their list of priority requirement operational needs and provide that to the Joint Integrated Air and Missile Defense Organization (JIAMDO). ○ JIAMDO manages the priorities/requirements and works with the Services and defense agencies to decide what will or will not be resourced. ○ Services and CCMDs can go straight to JIAMDO asking for systems to be better integrated. This would go through the CPMR process.
Acquisition	
Lead Roles	***Supporting Roles***
• ***Services*** deliver cruise missile defense capabilities as part of their respective Air Defense mission to defend their respective assets or defended areas.	• ***JIAMDO:*** Coordinates the development of air and missile defense capabilities between Services, CCMDs, and agencies to identify existing and emerging capabilities.

• ***Air Force*** is the acquisition authority for ACMD-H. The technical authority has not yet been determined.	• ***Missile Defense Agency (MDA)*** helps to develop elements of systems that can be used for either ballistic or cruise missile defense systems. MDA can take existing air defense sensors and apply emerging research and development to them to create systems that contribute to ballistic and cruise missile defense. MDA processes can be used to enhance existing systems originally procured by the Services.
Operations & Sustainment	
Lead Roles	***Supporting Roles***
• ***Services:*** conduct operations and sustainment for their own systems. • ***Missile Defense Agency (MDA)*** can help integrate certain cruise missile defense systems together with ballistic missile defense systems to help form a defensive architecture.	

Source: National Academy of Public Administration

Counter Uncrewed Aircraft Systems

Uncrewed aircraft systems (UAS) threats evolve more rapidly, requiring DOD to pace the threats with its counter-UAS systems. As discussed in Chapter 2, UAS threats often have a lifecycle of 12-24 months, in which time, the threat evolves to a more complex state than the previous iteration. As a result, DOD's approach to C-UAS involves more rapidly developing the technology required to address the UAS threat. DOD components' roles and responsibilities for C-UAS are described below and outlined in Figure 8.

Requirements: Each Service and CCMD is responsible for producing requirements for C-UAS; these components may enter these requirements through the JCIDS process, including the CPMR process, or be exempt from the JCIDS process if the component is using the MTA pathway of the AAF.[89] For defense against category 1-3 UAS, the Army's Joint Counter-small Unmanned Aircraft Systems Office (Joint C-sUAS or JCO) facilitates the requirements process through its liaison officers stationed in each combatant command. They provide this warfighter input to JIAMDO to use in the JCIDS and CPMR process.

Acquisition: Each Service is responsible for acquiring C-UAS systems through the DOD acquisition process including the AAF for appropriate programs. Services may use the AAF's MTA pathway, which leverages rapid prototyping and rapid fielding for the development of new Joint C-UAS capabilities. The MTA pathway can facilitate quicker deployment of C-UAS systems to the Services. The Army is the lead acquisition Service for C-UAS, which requires it to coordinate joint C-UAS system acquisition. Its JCO, which focuses on C-UAS groups 1-3,[90] facilitates acquisition of joint systems. The JCO analyzes the C-UAS systems available to the Services and produces a list of recommended systems for a joint environment. Countering groups 4 and 5 of UAS is considered traditional air defense mission, performed by the Services; the JCO does not address these groups in its responsibilities.

Operations and Sustainment: Each Service is responsible for the operations and sustainment of the C-UAS system it fields, as noted in DOD policy.[91] The JCO provides two years of sustainment support to the Services and CCMDs for each C-UAS prototype the JCO develops in order to determine if Services and CCMDs will move forward with the prototype.

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[89] Under Secretary of Defense for Acquisition and Sustainment, "DOD Instruction 5000.80: Operation of the Middle Tier of Acquisition (MTA)," p. 4, December 30, 2019. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500080p.PDF. DODI 5000.80 provides that MTA programs are not subject to the JCIDS process (CJCSI 5123.01I) or the Defense Acquisition System (DOD Directive 5000.01).

[90] National Intelligence Manager for Aviation. "UAS Categories; Groups (DOD Classifications)." https://www.airdomainintelligence.mil/Global-Air-Hub/Unmanned-Aircraft-System-UAS/UAS-Categories/

[91] Department of Defense, DOD5000.80. December 2019. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500080p.PDF

Figure 8. Counter-UAS Roles and Responsibilities for Requirements, Acquisition, and Operations & Sustainment

Counter-Uncrewed Aircraft Systems (C-UAS)	
Requirements	
Lead Roles	**Supporting Roles**
• ***Combatant Commands (CCMDs):*** Produce requirements through the JCIDS process (for major capability acquisition).	• ***Army's Joint Counter-small Unmanned Aircraft Systems Office (JCO):*** The JCO's liaison officers from the Services develop the requirements and solicit feedback from the CCMDs before formal submission in the JCIDS process (for major capability acquisition). • ***Joint Staff:*** Under the Joint Staff's CPMR process, C-UAS requirements will be prioritized for all Services and agencies to address.
Acquisition	
Lead Roles	***Supporting Roles***
• ***JCO:*** The Army is the lead acquisition Service for C-UAS, with the JCO office leading that assignment. JCO focuses on countering UAS categories 1-3.	• ***Services:*** Responsible for acquiring C-UAS systems
Operations & Sustainment	
Lead Roles	***Supporting Roles***
• ***Services:*** carry out operations and sustainment of C-UAS systems.	• ***JCO*** provides two years of sustainment support for its prototypes.

Source: National Academy of Public Administration

3.2 Gaps in Component Capability

This assessment examines gaps in component capability from an organizational management lens to determine if there are any core capabilities missing from the integrated MD enterprise. This section highlights several gaps in component capability that could be remedied by further action, as indicated by the recommendations presented in the following chapter. For the purposes of this study, the term "gaps in component capability" is defined as an opportunity for improved administrative function.

Gaps in component capability can lead to inefficiencies, which are defined as the failure to operate in an optimal manner. The research indicates that there are some inefficiencies that could be remedied by further action. Examples are provided below.

Unnecessary Duplication and Waste

Limited evidence of unnecessary duplication or waste was found beyond what the GAO found in its August 2015 report on opportunities to improve DOD's weapon system portfolio management.[92] Waste is considered the irresponsible expenditure of resources that harms the enterprise.[93] While no waste was detected in this unclassified review, it is important to stress that waste can also be deemed the result of the missile defense enterprise moving too slowly.

For the purposes of this study, unnecessary duplication is defined as any activity conducted by multiple components that serve the same purpose and harms the enterprise. While no findings rose to the level of unnecessary duplication, the expanding scope of integrated MD suggests potential for unnecessary duplication in the maintained service-centric incentive structure.

While duplication can be unnecessary or even harmful, there is also a form of duplication that can benefit the enterprise operations. As noted in Chapter 2, the Department has acknowledged that a layered missile defense system is essential to the National Defense Strategy.[94] There may be duplication when missile defense systems include elements that serve more than one mission, such as space domain awareness. Such duplication can be useful and even necessary.

Rather than finding unnecessary duplication, the Study Team learned of several examples where components involved in missile defense actively reduce unnecessary duplication. One such example occurred when the Army's Joint Counter-small Unmanned Aircraft Systems Office (JCO) examined the counter-UAS system landscape shortly after the Secretary of the Army delegated the counter-UAS mission to JCO in 2021. The JCO examined hundreds of counter-UAS requirements and identified redundancies, while also examining all counter-UAS systems used by the Combatant Commands (CCMDs). Through this examination, the JCO narrowed the counter-

[92] See GAO-15-466, *Opportunities Exist to Improve the Department of Defense's Portfolio Management*, p. 4, August 2015, https://www.gao.gov/assets/gao-15-466.pdf.
[93] Waste has a specific definition in the federal inspectors general context. This study did not examine waste in a manner like inspectors general.
[94] Department of Defense. "2022 Missile Defense Review," p. 12. https://media.defense.gov/2022/Oct/27/2003103845/-1/-1/1/2022-NATIONAL-DEFENSE-STRATEGY-NPR-MDR.PDF.

UAS systems down to approximately ten systems that have proven their success in the theater. The JCO's research, development, test, and evaluation (RDT&E) funding now supports these ten systems to further advance their counter-UAS capabilities. This effort to streamline duplicative systems and identify opportunities for greater success demonstrates the interest of the Department to use missile defense funds more effectively.

Inefficiencies

This section addresses inefficiencies primarily in terms of factors hindering integration at the enterprise level, both by individual missile threat type and across missile threat types. These include: (1) the lack of clarity about roles and responsibilities; (2) the lack of authority (i.e., lack of authority over the actions of other components, whose cooperation is needed to execute these responsibilities); and (3) insufficient resources to induce cooperation of other components to execute these responsibilities in situations where direct authority is inappropriate, such as in the case of the Services' role in organizing, training, and equipping (Title 10). Discussion of these individual factors relates primarily to the integration by individual missile threat type. Two subsequent sections seek to address these factors as they concern integration across missile threat types.

Lack of an Integrator with Defined Roles and Responsibilities

The most significant MD enterprise capability gap is the absence of a component with integration of missile defense as its defined responsibility. The Panel found current integration of this enterprise to be insufficient. A more detailed discussion of the integrator role is included in Chapter 4, as well as findings and recommendations on how to address it.

Lack of Authority

Authority to integrate efforts across components both by missile threat type and across missile threat types is a key challenge. There is general agreement that no component working on missile defense activities has the requisite authority to integrate relevant requirements and acquisition activities related to strategic missile defense systems at the enterprise level.

There are several flexibilities for requirements development and acquisition that some components may utilize. The AAF provides DOD components with several alternative acquisition pathways such as the MTA pathway, which incorporates rapid prototyping and rapid fielding. Programs using MTA are not subject to the JCIDS process or to other processes outline in DOD5000.01 "except to the extent specifically provided in the guidance."[95] Research indicates that some components regularly use these alternative acquisition pathways to move quickly through the acquisition process, while other components do not take full advantage of them. The Services utilize their Other Transaction Authority (OTAs) as a means of expediting the contracting process and accessing traditional and nontraditional partners in the defense industrial base; this authority contributes to more rapid acquisition. MDA has special flexibilities for their missile defense requirements and acquisition authorities including the MDA Director's responsibility for

[95] DOD 5000.02 Operation of the Adaptive Acquisition Framework, p13

exercising selection and milestone decision authorities[96] These authorities are not uniformly enjoyed by components involved in requirements development and acquisition for the four missile threat types.

For example, some senior leaders across the Department noted that the Army's JCO may not have the authority and requisite flexibilities it needs to keep pace with UAS threats. Historically, the Army's JCO has had misaligned authorities that may prevent the office from completing the entirety of the task it has been given to lead and direct "joint Counter-small Unmanned Aircraft Systems (C-sUAS) doctrine, requirements, materiel and training to establish joint solutions to address current and future small UAS threats."[97] The JCO does not have the authority to direct other Services to act or hold them accountable. Quickly evolving UAS threats require authorities that enable appropriate speed and efficiency in developing requirements, acquiring systems, and deploying the systems with the warfighters.

With DAF's recent designation to be the lead acquisition authority for ACMD-H, there has not been any demonstrable evidence yet showing if DAF has the authorities, funding, and clear mission to accomplish this work. It may be too soon to tell. However, some interviewees across the Department express concern that DAF may not be equipped with the authorities it needs to be focused on acquiring the right ACMD-H systems. Unless DAF utilizes the MTA pathways, DAF will still need to navigate the JCIDS requirements development process, which has a reputation as being a slow process. Together, these concerns point to a potential inefficiency that may be realized in the coming years as DAF develops its role as ACMD-H acquisition authority.

An enterprise-wide gap in component capability stems from the lack of authority to incentivize and direct components. Incentivizing components can be a challenge without the authority or funding to induce action. Integrating missile defense systems is commonly described as an effort by a "coalition of the willing," meaning that if components have other priorities it will not happen. Broadly, components with lead roles in missile defense systems lack the requisite authority to hold other components accountable, direct action, or incentivize. The absence of this authority to incentivize leads to inefficiencies because components' collaborative engagement depends on leaders' willingness (i.e., is "personality driven"), rather than prescription.

Lack of Funding

A lack of funding to incentivize integration contributes to inefficiency in so far as the services pursue their particular priorities. A prominent example of the impact of this absence of integration funding and lack of incentivization to integrate is that outside of the Global Command and Control System, each Service has its own command and control (C2) system. The warfighter must learn how to operate C2 systems for all the Services' missile defense systems, which further complicates the warfighters' job. When services have their own interests without any direction

[96] US Government Accountability Office, "GAO-22-563 Missile Defense Acquisitions," https://www.gao.gov/products/gao-22-563.
[97] "Joint Counter-small Unmanned Aircraft Systems Office," US Army, August 27, 2021, https://www.army.mil/standto/archive/2021/08/27/.

and mandate to integrate, it becomes increasingly more challenging to strategically align on a mission as complex as integrated MD without the requisite funding.

Insufficient Integration Across Missile Threat Types

Throughout this research, it became clear that while there are components working towards integration across individual missile threat types, different missile defense systems, or with a handful of components, greater integration is required in the integrated MD enterprise. Ballistic and hypersonic missile defense is primarily the responsibility of the Missile Defense Agency (MDA), while cruise missile defense and counter-UAS are primarily the responsibility of the Services. Consolidating authorities, funding, and talent in one organization has the potential to reduce inefficiencies created by insufficient integration across DOD components.

Integration poses several challenges, but it is a necessary job. The missile defense system includes many legacy systems developed decades ago (e.g., Patriot) and many newer systems. Interoperability can be difficult because the systems don't inherently speak to each other without time, resources, and attention to actively integrate the systems. Systems built today and in the recent past are made to be "born integrated," meaning that since the initial planning for the systems, there has always been an element of interoperability.

While individual components strive to integrate systems where they can, there is insufficient integration due to a lack of integrator authority and integration funding. While MDA has technical authority to develop plans, it does not have the authority or funding to ensure or incentivize services to work within those plans. There is no singular entity devising an integrated architecture across the components conducting air and missile defense. An illustrative case of this inefficiency, which will be discussed in greater detail in Chapter 4, is the defense of Guam and the integrated architecture it requires. Without dedicated funding for the purpose of integrating systems, components may not willingly do so because it could detract from contributing to other missions.

Insufficient Clarity and Transparency around Roles, Responsibilities, and Processes

In addition to the issues related to the lack of an integrator as discussed above, there is a lack of clarity about the roles and responsibilities of individual DoD components in relevant requirements, acquisition, and operations and sustainment processes. Further confusing matters, certain roles and responsibilities and processes are in flux (e.g., as discussed in Chapter 2, the proposed new role of SPACECOM and the new Capability Portfolio Management Review (CPMR), process, which will shift roles and responsibilities regarding requirements prioritization). The remedy for this lack of clarity would be documentation and clear communication to keep stakeholders, such as Congress, informed of the roles and responsibilities and the impacts of any recent changes.

Clarity and transparency around integrated MD roles and responsibilities and processes are essential for Congress and DOD leadership to perform effective oversight and manage the

direction of the MD enterprise. Several interviewees offered that their attempts to outline the various MD enterprise roles and responsibilities have either been fruitless or resembled a diagram akin to a plate of spaghetti.

Finding 3.1: The lack of clarity around roles and responsibilities in the integrated missile defense enterprise produces confusion over ownership, funding responsibilities, and accountability for progress toward meeting enterprise objectives.

Recommendation 3.1: The Deputy Secretary of Defense, or the component designated as missile defense integrator, should regularly document through an instruction missile defense roles and responsibilities to provide transparency to Congress.

Chapter 4: Governing the Enterprise

The United States faces a rapidly evolving set of missile threats to the homeland and to its interests in regions around the world.[98] Responding effectively and efficiently to these threats will require: (1) speed and agility in decision making and acquisition of missile defense capabilities; (2) coordinated action across DOD components; and (3) clarity and unity of purpose within and outside of DOD.

Speed and agility in acquisition depends on the ability of individual DOD components, such as MDA, to move quickly, enabled in some cases by flexibilities within standard processes. Coordinated action across responsible components will require both formal and informal mechanisms of integration.

Clarity and unity of purpose are important because sustaining and effectively managing flexibilities and integration will require agreement within DOD and in Congress about what is required to pace evolving threats (e.g., the level of risk that is acceptable, and under what conditions, to develop needed capabilities rapidly). Clarity of purpose also supports coordination across DOD headquarters components, the Services, and combatant commands. Due to Title 10,[99] there are limits on what can be done through direct authority. A shared sense of purpose will expand what can be accomplished informally, rather than through top-down direction.

The recommendations included in this chapter pertain to the organizational structure and functions of missile defense. However, the entities responsible for carrying out missile defense functions rely on the backing and clear direction of political leaders, including the White House, DOD senior leadership, and Congress. Further integrating missile defense functions will only be successful with political support.

This chapter addresses two topics central to enhanced governance of the missile defense enterprise that are strongly interrelated: flexibilities and integration. The chapter concludes by offering illustrative options on how DOD might go about achieving greater integration.

4.1 Flexibilities

As described in Chapters 2 and 3, missile defense requirements generation and acquisitions are governed by a mix of standard (DOD 5000/JCIDS) and nonstandard processes. The flexibilities enjoyed by MDA are related to requirements generation and milestone decision-making authorities and apply to all MDA programs. The Services also have access to flexibilities through the Adaptive Acquisition Framework (AAF) when they use MTA, but all other acquisition programs are subject to JCIDS. Both the MDA and AAF flexibilities are specifically designed to give DOD components the ability to move with speed and agility in requirements generation and

[98] As noted in Chapter 2, for the purposes of this report missile defense refers to defense against ballistic missiles, cruise missiles, hypersonic systems, and certain classes of UAS.
[99] Under Title 10 of the U.S. Code, the Services have the authority and responsibility to organize, train, and equip their forces, which is interpreted as the Services having the final say on what they will acquire.

acquisition to respond to rapidly changing and advancing threats. The requirements generation flexibilities enhance speed by enabling agile development: fielding capabilities as quickly as possible, and then spiral developing them over time. This contrasts with the JCIDS process, which (as described in Chapter 2) demands specific final capability characteristics before granting approval to proceed with a materiel solution[100] and time frames upfront.

One of the desired outcomes of MDA's agile approach to requirements generation and acquisition, which allows it to rapidly develop and field capabilities and spiral upgrade them later is to "fail fast," learn from those failures, and adapt quickly. While this approach can be beneficial—several warfighters say they would rather have some capability quickly and develop it over time—it can be used to minimize risk and accountability by allowing reports of incremental progress without addressing the actual threat.

Not all MDA programs are "agile," however; some involve developing next generation technologies/capabilities. These programs can be larger, longer, and costlier. They also are unlikely to "fail fast." When failure occurs, it is likely to be more consequential. These failures (rightfully) garner more scrutiny but can also be used as justification for curtailing MDA's flexibilities.

In an attempt to mitigate risk, recently MDA's requirements and acquisitions flexibilities have been rolled back somewhat (see Chapter 3 for a detailed description of the changes to MDA's flexibilities under DTM 20-002).[101] The DTM curtailing MDA's acquisition flexibilities was issued in 2020 and imposes additional oversight requirements. While the independent acquisition and engineering oversight directed by the DTM can benefit solution development, additional oversight also can divert staff time and focus from the important work of developing and delivering solutions. There is anecdotal evidence that the recent erosion of MDA's flexibilities has undermined the original intent of fostering speed and agility. For example, one interviewee noted an instance of a program's entry into milestone A being delayed by nine months as a result of the DTM. A February 2023 agreement between R&E and A&S regarding programs that exceed the dollar threshold of an ACAT I program reverted Milestone A decision authority to MDA, as well as Milestone B authority for software spirals and limited fielding programs. Under the agreement, A&S retains Milestone B decision authority for hardware-intensive programs and Milestone C. Thus, the MDA decision authorities that were in place before the DTM have largely been restored, with the exception of the A&S Milestone B decision authority for hardware-intensive program elements. The right balance between oversight and risk is difficult to achieve; however, it is the sense of many interviewees and the Panel that MDA's flexibilities should be fully restored.

Another recent development that could affect MDA's flexibilities is the new CPMR process, described in Chapter 2. The CPMR was designed to provide an enterprise-level portfolio review of IAMD requirements, which would be beneficial. However, some interviewees were concerned

[100] The JCIDS process' objective is to find other possible solutions (e.g., changes in doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy). Materiel solutions are pursued only if there is no alternative.
[101] Ibid. GAO-22-563, p. 2.

that the CPMR process has the potential for further eroding MDA's flexibilities. For instance, it is possible that under this new process all requirements, including MDA's, will be funneled through the JCIDS process. If that is the case, it could impair MDA's ability to respond in a timely way to new threats; the JCIDS process is universally viewed as being slow.

Other DOD processes reflect the mindset of prioritizing risk mitigation at the potential cost of not being able to keep pace with the nation's adversaries. For example, a DOD failure review board can take a year to review the reasons for failure. There is a significant mismatch between DOD's processes and the approach of the US's adversaries, who pause for only a matter of weeks or months after a tactical failure, then quickly adapt and continue to develop and test capabilities. DOD's failure review board can take a year to review the reasons for failure. DOD must ensure accountability for failure, but not slow processes unduly for the sake of near-term budget savings in the face of threats to the homeland and the national interest.

The risk-averse culture driving these changes is not only a feature of DOD, but also of Congress and the public. While speed and agility are vitally important, the argument goes, they are not the only criteria. MDA also must build systems that effectively meet the threat within budget. In any case, those supportive of the recent changes to MDA's flexibilities contend that, at most, the additional oversight and requirements add weeks or months to multiyear programs. This modest impact on speed is more than outweighed by the benefits of avoiding costly mistakes, ensuring the resultant capabilities meet warfighter needs, and getting the buy-in of all relevant stakeholders.

For those concerned about MDA's loss of flexibilities, the risk of the threat, which is existential, far outweighs the risks associated with those flexibilities. In fact, the need to continually find ways to move faster was the stated position of DOD as recently as 2019, one year before the DTM was issued. The 2019 MDR states that the US will need flexibility and adaptability in missile defense design, research, and acquisition programs,[102] and that DOD will continue to look for ways to shorten the time required to develop and field MD capabilities.[103] It goes on to say, "Given the worsening of the missile threat environment, DOD must prioritize speed of delivery, continuous adaptation, and deliver enhanced performance at the speed of relevance. To do so, DOD must adopt processes and cultures that enable MDA and the Services to streamline missile defense, and swiftly adapt systems once fielded."[104]

Arguments about how much flexibility MDA should have ultimately come down to how much acquisition risk DOD, Congress, and even the nation are willing to accept in order to swiftly field a missile defense solution to counter adversary weapons. The risk of tactical failure (i.e., budget and schedule overruns) must be balanced against the risk of longer-term strategic failures (i.e., the failure to defend against threats to the homeland and national interests). Moving quickly and

[102] Department of Defense. "*2019 Missile Defense Review*," p. VIII, https://www.defense.gov/Portals/1/Interactive/2018/11-2019-Missile-Defense-Review/The%202019%20MDR_Executive%20Summary.pdf.
[103] *2019 MDR*, p. IX.
[104] *2019 MDR*, p. 15

being agile increases the risk of tactical failure, but these inevitable tactical failures should be viewed as potentially valuable opportunities to learn and improve. Therefore, decisions regarding the level of acceptable acquisition risk must also consider what can be learned from failure, and whether what is learned will advance the missile defense knowledge base and long-term progress. Currently, when there is a tactical failure, it is viewed negatively as an instance of waste or inefficiency, rather than as a potential opportunity to learn and advance progress toward defending the homeland/national interest. In the case of missile defense, given the enormous consequences of failing to meet the threat combined with the rapid evolution of that threat, a risk-averse culture can lead to devastating results for national security.

This aversion to tactical failure—or the unwillingness to move forward despite tactical failure—can lead to longer term strategic failures. For example, the US abandoned the development of hypersonic technology after initial tactical failures. But the nation's adversaries continued testing and learning, made progress, and left the US playing catch up. That strategic failure occurred because the decision was made to not accept additional tactical failures. The stakes of tactical failure are high—but not as high as the potential strategic failure.

Congress contributes to a culture of cautiousness and lack of risk taking. DOD officials are less likely to take risks if a failure means being called to testify before Congress and a potential reduction in program funding. More tolerance for risk and failure requires frequent communication and transparency with Congress. To the extent possible, these discussions about risk—not only the risks associated with acquisition, but the risks associated with the failure to keep pace with the nation's adversaries—should be held in public. A broader national understanding of the general threat would likely lead to greater acceptance of acquisition risk and a better understanding of the potential value of failure (i.e., a greater understanding and acceptance of expenditures on technological investments that might fail in the short-term but ultimately lead to innovation needed to meet the emerging longer-term strategic threat).

In summary, decisions about how to manage acquisition risk are exceedingly complex because they must find the right balance between financial risk versus speed, tactical failure versus long-term strategic failure, accountability for failure versus flexibility, and the cost of failure versus the opportunity to learn from it.

Finding 4.1: DOD's recent decision to partially roll back MDA's acquisition flexibilities to mitigate risk may undermine its ability to deliver missile defense capabilities needed to meet the rapidly evolving missile threat. Current DOD processes, including the Joint Capabilities Integration Development System (JCIDS) and failure review boards, are universally viewed as slow. While it is too early to tell due to their recent implementation, there is anecdotal evidence that the rollback of MDA's flexibilities has caused program delays and the new CPMR process could further erode MDA's requirements generation flexibilities.

Recommendation 4.1: The Department should be prepared to take on more acquisition risk and the Deputy Secretary of Defense should consider further restoring (beyond the February 2023 A&S/R&E agreement) MDA's flexibilities within standard processes for acquisition that were in place prior to the Directive Type Memorandum (DTM) 20-002. In addition, the Deputy Secretary

of Defense should examine other processes, such as testing, failure review boards, and the CPMR that could cause delays.

4.2 Integration

Missile threats and battle spaces are merging but, as described in Chapter 3, the responsibilities and authorities for defending against them are fragmented among MDA, the Services, Combatant Commands (CCMDs), the Joint Staff, A&S, and more. The hugely complex nature of the problem, combined with the myriad of DOD entities involved, can impede progress in developing capabilities and designing architectures, which in turn makes the US less secure. What's more, the roles, responsibilities, and processes for acquiring missile defense capabilities vary, depending on the organization with lead responsibility and the threat type. This causes confusion; slows decision making; and increases the potential for gaps, seams, and unnecessary duplication. At issue is how DOD can manage missile defense in a more holistic way.

Certain characteristics of the threat and the missile defense enterprise make integration both imperative and challenging:

- Rapidly expanding, advancing, and lethal threats and the resultant high priority of and demand for missile defense
- A mission area that is large, cross-cutting, cross-functional, and multidomain and that reaches across the department
- A large and increasing number of entities with a role in missile defense
- A wide array of missile defense programs, each with unique interfaces and software requiring frequent updates, complicating joint interoperability
- Services that are siloed, resistant to encroachment on their priorities and decision making, prone to making investment decisions based on what is optimal for their Service rather than the military as a whole, and less concerned with integrating their systems with other Services' systems (though there are some reports of these issues improving over time, and that the Services have recently begun collaborating with each other more)
- Processes that prevent DOD from matching the speed at which adversaries are developing new technologies and fielding new capabilities

Integration needs to happen in the areas of governance, acquisitions, and technology. DOD has more than enough technical expertise to tackle the complex issue of integrating missile defense systems; therefore, this report will focus on the governance and acquisitions aspects of integration needed to effectively and efficiently—and as rapidly as possible—achieve joint interoperability.

DOD lacks a single organization with the responsibility to oversee, coordinate, and integrate the wide array of development, acquisition, and technology that needs to be leveraged to adequately defend against missile threats. Given the sprawling scope of the missile defense mission and enterprise, it would be impossible to create such an organization. However, DOD could take steps toward greater cohesion across DOD components by establishing or designating an enterprise-level "integrator" entity responsible for joint missile defense systems that would consolidate the

authorities, budget, and talent necessary to execute the responsibility. The ultimate goals of these efforts would be to increase speed and agility, improve coordination, and create clarity and unity of purpose. The integrator must function in such a way that it does not create more bureaucratic hurdles; rather it should align incentives, authorities, resources, and responsibilities to accelerate progress.

It is important to keep in mind that integration is no panacea. The pace at which the threat is evolving and expanding will continue to make missile defense a challenge, no matter how cohesive the enterprise is. Nevertheless, it is imperative that DOD improves integration to facilitate keeping pace with the threat.

Whatever entity becomes the integrator, changes should be evaluated using the criteria laid out at the beginning of this chapter; in other words, how well the new integrator facilitates speed and agility, coordination across missile defense components, and creates clarity and unity of purpose to achieve greater efficiency and effectiveness. This will have to be assessed over time to ensure slow, bureaucratic processes that prevent the integrator from achieving these outcomes are not introduced or reintroduced.

The remainder of this section discusses characteristics the missile defense integrator would need to effectively execute its roles and responsibilities, namely:

- Consolidation of authorities (including flexibilities), funding, and talent;
- Strong formal and informal relationships across the missile defense enterprise;
- Simplified and streamlined missile defense organizational structure;
- Early and consistent input of the warfighter and Services;
- Proximity of the integrator entity to key civilian decision makers; and
- Leadership at an adequate level to drive top-down integration.

Consolidation of Authorities, Funding, and Talent

As mentioned earlier, missile defense responsibilities and authorities are fragmented between multiple DOD components. Fragmented authorities make it difficult to understand who is responsible for what or to hold them accountable.[105] Consolidating acquisition responsibilities and authorities for all four threat types in one organization would reduce confusion, shorten decision-making cycles, and improve accountability.

The fragmentation of responsibilities and authorities slows decision making and is especially problematic when building complex defensive networks and—as mentioned earlier—the need for these networks is likely to increase in the future. MDA is the only DOD organization that can design joint architectures, but it is heavily reliant on other entities because MDA does not have CMD or C-UAS acquisition authority or the resources or capacity to fully exercise its IAMD technical authority (TA), which gives MDA the responsibility to "lead IAMD engineering and

[105] GAO-15-466, *Opportunities Exist to Improve the Department of Defense's Portfolio Management*, p. 11, August 2015, https://www.gao.gov/assets/gao-15-466.pdf.

integration efforts to enable joint capability." Having the data and expertise for defense against all four missile types in one organization would help speed progress on things like modeling and simulations.

Currently, as highlighted in Chapters 2 and 3, there is an organizational bifurcation between acquisition for ballistic missile and hypersonic system defense, which is the responsibility of MDA, and acquisition for cruise missile defense and C-UAS, which is the responsibility of the Services. Consolidating all or some of these responsibilities would realize synergies, improve efficiencies and effectiveness, promote accountability, and facilitate addressing gaps and seams. In this arrangement, the Services would retain control over discrete capabilities for self-protection.

While the current structure is logical in some respects, some officials believe that this bifurcation has not worked well and that the defense systems for these threat types need to be integrated to a greater extent. These officials argue that the threat types are merging, as are the technologies and systems that defend against them. For example, there are hypersonic cruise missiles that fly at low altitude. Cruise missiles and UAS, while they both stay in the atmosphere, can travel at hypersonic speeds. Drones are being used in Ukraine to crash into targets, blurring the line between cruise missiles and UAS. Moreover, this bifurcation of responsibilities and defense systems does not align with how the US's adversaries employ threats. The standalone missile defense systems of the past that dealt with a specific threat are not going to meet the needs of today's quickly changing threat environment. To the extent possible, sensors and interceptors should detect and defend against the four missile threat types. For example, some elements of ballistic missile defense can also be utilized for cruise missile defense.[106]

In addition, MDA model (especially before its flexibilities were rolled back) is viewed as necessary to keep pace with cruise missile and UAS threats. For example, UAS technology is evolving every eighteen to twenty months, requiring rapid technology innovation in C-UAS. Rather than extend these flexibilities to the Services, it makes more sense to move responsibility for cruise missile defense and C-UAS to an organization that already has flexibilities in place and a proven track record in using them effectively.

Interviewees offered two options for greater integration through the consolidation of responsibilities and the authorities and resources needed to enable their effective execution across threat types: (1) creating a new organization, similar to MDA, with the responsibility for cruise missile defense and C-UAS or (2) consolidating authority for all four missile types within MDA. It is worth noting that some DOD officials pointed out that the Services are capably delivering cruise missile defense and C-UAS capabilities and that transferring those responsibilities to another organization would slow things down and be counterproductive. In addition, some of the interviewees who believe that consolidating responsibilities across threat types would be helpful did not think it would be useful to include C-UAS. However, for the reasons stated above, this discussion covers all four threat types.

[106] Department of Defense, "2019 Missile Defense Review," p. X.

A new organization responsible for cruise missile defense and C-UAS would need to have the same flexibilities and technical authority as MDA to pace the threat. The problem with this option is that it perpetuates some existing seams and will create new ones. Therefore, this organizational configuration is unlikely to have a significant effect on speed/agility, coordination, or unity/clarity of purpose.

Alternatively, DOD could designate MDA as the acquisition authority for cruise missile defense and UAS. Opinions within DOD differ on whether MDA could or should have responsibility for all four threat types. Those who are opposed say it would be a culture shift for MDA and that the agency would lose its mission focus, it does not have the bandwidth to take on an expanded mission, and its expertise in cruise missile defense and C-UAS (and even defense against hypersonic systems) is still nascent.

Others contend that MDA should have a broader missile defense mission because of the convergence of the threat types (as discussed above) and that the technologies to counter the threats are similarly merging. They argue that what is needed to maximize effectiveness and efficiency is to consolidate responsibilities for defense against all four threat types in one organization, as well as authorities, funding, and talent. Expanding MDA's mission would create synergies, create clarity and unity of purpose, and reduce the complexity of the enterprise, thereby enabling speed and agility. They also argue that no other DOD component has the core competencies and experience that MDA has. However, MDA would need the appropriate level of funding, as well as personnel with expertise in cruise missile defense and C-UAS, to effectively carry out this expanded mission.

In addition to its acquisition authorities, OSD designated MDA the IAMD TA for IAMD in 2013. As such, MDA leads systems engineering and other activities to achieve joint interoperability of MDA and Service systems. However, MDA's ability to fully carry out its TA role is limited because it does not have the authority to implement its recommendations; due to Title 10, it cannot direct the Services to integrate systems or acquire capabilities. As a result, the best MDA can do is make suggestions to the Services and hope they listen. The Services contribute significantly to missile defense; systems, like Patriot and Aegis, that they have used to protect their assets predate MDA's existence. However, the Services are not incentivized to prioritize integrated MD; they have their own priorities and understandably do not want to divert funds and attention from them. It is unrealistic to expect them to take on new priorities absent additional resources and/or clear direction to reprioritize. In addition, the Services are very siloed (though some have reported improvement in recent years), and they are not incentivized to integrate their systems with each other. This situation slows progress in developing and implementing integrated missile defense.

Simply giving MDA IAMD TA is therefore insufficient. Resourcing MDA's IAMD TA would help overcome the disincentive of the Services to take on new integrated MD mission responsibilities. The agency needs control of an adequate level of funding and the authority to direct resources to incentivize the Services to acquire the capabilities and take the actions necessary to integrate missile defense systems.

Case Study: Cruise Missile Defense of the Homeland

In July 2022, the Department of the Air Force (DAF) was given acquisition authority for cruise missile defense of the homeland, primarily due to its domain awareness mission and the Space Force's role in global surveillance. It is too early to assess how well this designation will work or DAF's performance in this role. However, already this designation illustrates some of the challenges of fragmented authorities, especially when the lead acquisition organization is a Service.

DAF's progress has been slow for several reasons. The roles and responsibilities of the relevant entities and how system integration will occur remain unclear. DAF is trying to determine the division of labor between itself, other Services, and MDA. MDA has indicated that it will assist the DAF with integration if needed, but it is unclear who will have ultimate responsibility for integrating capabilities.

Moreover, DAF is struggling to identify which capabilities need to be integrated; it has visibility into its own capabilities, but architectures are joint. Being a lead service in a joint environment, one problem DAF is likely to contend with going forward is getting other Services to cooperate; DAF has no authority over the other military departments and there is no guarantee that they will make acquisition decisions based on DAF direction.

Another factor likely to slow progress is that DAF will not benefit from the acquisition flexibilities that MDA enjoys; it will instead be subject to the JCIDS process. While there are alternative pathways in the DOD 5000 process that provide some flexibilities to speed acquisition, they are not as extensive as MDA's acquisition flexibilities. Both the Air Force and Space Force have offices focused on rapid capabilities development and fielding (in the case of the Space Force, the Space Development Agency (SDA) also contributes to rapid development and fielding), but they are primarily used to produce rapid solutions relying on commercial or government off-the-shelf technologies, and rarely for major acquisition programs-- although SDA provides a model for rapid acquisition of space architectures that are ACAT I programs. Multiple DOD interviewees raised concerns about DAF's incentive to play the role of acquisition authority for cruise missile defense of the homeland, especially since this new mission responsibility was not accompanied by additional funding. As mentioned earlier, the Services are disinclined to shift resources from their other priorities; the issue of incentives is not unique to DAF and would be a challenge for any of the other Services.

Strengthening Formal and Informal Relationships across the Missile Defense Enterprise

However the missile defense enterprise is organized, it will not be enough to rely on formal roles, responsibilities, and authorities because integration does not mean consolidation; stovepipes will remain. Silos are not necessarily a problem; they are simply a way to organize people around specific functions. The problem is how long it takes for information to travel between stovepipes.[107] In complex, knowledge-based organizations much of the work gets done in collaboration across functional borders.[108]

The integrator, therefore, would need to take steps to enhance collaboration and communication across components with missile defense roles and responsibilities through formal and informal mechanisms. The mapping of missile defense roles, responsibilities, and processes in Chapters 2 and 3 is an important first step. Clarity around roles and responsibilities will facilitate stakeholders' ability to work together.

DOD already utilizes both formal and informal mechanisms to create partnerships. For example, MDA has staff embedded in combatant commands, JFCC-IMD and MDA are colocated, and MDA establishes hybrid program offices staffed by both MDA and Service personnel. As another example, MDA has made additional efforts to work more closely with the Services; it has built a community of interest with the Services to work on things like developing requirements and modeling. As the Services have observed the value of what MDA does, they have been more willing to adopt the systems MDA develops. Similarly, as people realize the benefits of communication and coordination across components, it encourages them to look for new and innovative ways to partner across silos.

An informal mechanism that has proved successful in other organizations (e.g., the intelligence community) is to designate individuals in each component organization as coordinators (the intelligence community calls them "mission managers"); these individuals would be responsible for tracking missile defense activities in other components to help ensure gaps are filled, synergies are realized, and unnecessary duplication is avoided. These individuals should be empowered to convene, collaborate, and communicate across components. They also should have the backing of and access to leaders in their organizations to give them credibility with other organizations and the ability to quickly escalate issues and opportunities.

Leveraging existing convening bodies is another way that DOD can improve collaboration and communication across stovepipes. Recently, MDA increased the use of existing missile defense oversight bodies to improve coordination across the enterprise and bridge seams. OSD Policy office also has reenergized the Policy Oversight Standing Committee, which had not been used in recent years, to advise the MDEB on strategic missile defense policy direction. The Steering

[107] Greg Satell, "What Makes an Organization 'Networked'?," Harvard Business Review, June 8, 2015, https://hbr.org/2015/06/what-makes-an-organization-networked.
[108] Ibid.

Committee is currently overseeing the implementation of the 2022 Missile Defense Review, among other missile defense policy-related matters.

Simplification and Streamlining of the Missile Defense Organizational Structure

The success of integration will depend on some degree of simplicity of organizational arrangements. For example, a simplified structure can expedite decision making (this result was observed when MDA was created, consolidating ballistic missile responsibilities and authorities in one organization).[109] A simpler organizational structure would facilitate collaboration by reducing the number of entities that need to be involved and making it easier to access all relevant data and pull together the talent needed for complex endeavors (e.g., Guam; see case study, below). It would also help clarify who is responsible for what, and therefore, who is accountable.

Given the large scope of the missile defense enterprise, along with the myriad of components with missile defense roles and responsibilities, DOD could organize the enterprise in countless ways, ranging from the status quo to creating a new component to serve as an enterprise-level integrator of defense against all missile threat types. There will always be stovepipes; the question is how to organize the stovepipes to minimize inefficiencies.

Organizational change is often costly and disruptive. Therefore, the evaluation of any proposed changes must weigh potential gains in the criteria of speed and agility, coordinated action, and clarity and unity of purpose against the costs of organizational change in terms of funds, staff time, disruptions, diversion of focus from the mission, and employee morale.

Early and Consistent Input of the Warfighter and Services

Meeting the needs of the warfighter is essential to the success of the missile defense enterprise. MDA has a close relationship with the CCMDs that was developed through the WIP (see Chapter 3), which in the past had helped ensure warfighter requirements were prioritized and met, and that MDA did not produce capabilities that the warfighter has not requested or cannot use. Even so, a recent GAO report highlighted the need to further improve the alignment between capabilities pursued by MDA and the requirements generated by the CCMDs.[110] It is unclear how the new CPMR process will affect this relationship and the alignment between MDA and the CCMDs. As a result, new processes and mechanisms might be needed to maintain this relationship and ensure warfighter input on and buy-in to the capabilities MDA develops, as well as to serve as a vector check.

The Services also need to have a strong relationship with the integrator, as they have the responsibility to "organize, train, and equip." Under the WIP, the Services had an opportunity to provide input to the requirements generation process while the CCMDs took the lead; the Services become more involved later, typically via their role in the MDEB. The new CPMR process seeks to involve the Services earlier to gain the user perspective, as well as to ensure they understand

[109] Institute for Defense Analyses, "Independent Study of the Organizational Location and Acquisition Processes of the Missile Defense Agency (MDA)," p. 2-2.
[110] Ibid. GAO-22-563, p. 22.

early on what will be required of them to enable them to plan and budget accordingly. The Services also need a complete understanding of system capabilities and limitations. Further, MDA's recent initiative to develop a community of interest with the Services indicates that building a stronger relationship earlier in the process can demonstrate to the Services the importance and value of acquiring integrated MD capabilities.

While the CCMDs and Services play a vital role in ensuring missile defense development pursuits are operationally relevant and supported to execute warfighting, their early and consistent involvement cannot turn into a consensus process that slows or derails action.

Proximity of the Integrator Entity to Key Civilian Decision Makers

One consideration in any missile defense organizational arrangement is the leadership structure of the integrator entity. The integrator will need to have the ability to quickly elevate issues up the chain to a key senior civilian leader who needs to make difficult decisions involving tradeoffs. As mentioned above, getting input does not mean reaching consensus and there are cases where there is no solution that will satisfy all involved (e.g., designating a Service lead in Guam; see case study, below). In those cases, a senior civilian leader will need to balance the impact on the entities involved and make a decision that will allow a program to move forward. A civilian leader could also help the integrator navigate complicated policy matters.

Relatedly, civilian leadership could be a force for action across an enterprise comprised of many components with varying incentives for carrying out their missile defense roles. The civilian leaders could hold all entities, including the integrator, accountable for progress.

Leadership at an Adequate Level to Drive Top-Down Integration

A missile defense integrator organization with a four-star leader would have the ability to drive an integrated missile defense architecture through their influence and authority to facilitate coordination and overcome stovepipes among the entities with MD responsibilities. The four-star leader would derive this authority from their status and proximity to senior military and civilian DOD leaders (the Secretary of Defense and the chairman of the Joint Chiefs of Staff). Even so, the four-star leader will largely have the ability to coordinate and incentivize other MD entities, rather than direct them. The Secretary, Deputy Secretary, and/or the chairman of the Joint Chiefs of Staff will have to become involved when issues between the different components cannot be resolved and difficult decisions need to be made.

Finding 4.2: The nation's adversaries are developing missile technologies at a rapid pace and the current governance and acquisition structures and processes DOD has in place could prevent it from meeting the threat with equal speed and agility. There is no missile defense integrator organization with the responsibility or the necessary authorities, budget, and talent to acquire capabilities to defend against the four missile threat types. As a result

- Acquisition authorities are fragmented across the multiple components with missile defense responsibilities;

- Not all components with missile defense acquisition responsibilities have the flexibilities MDA is afforded;
- There is no effective top-down technical authority to achieve joint interoperability;
- The complicated organizational structure creates seams that can be difficult to work across;
- CCMDs and Services do not always have the ability to provide early and consistent input to requirements development and acquisition;
- The Services are not incentivized to prioritize integrated missile defense; and
- No one is responsible for setting enterprise-wide investment priorities based on a global, integrated view of missile defense.

This situation causes confusion; slows decision making, acquisition of capabilities, and innovation; and increases the potential for gaps, seams, and unnecessary duplication.

Recommendation 4.2: The Deputy Secretary should designate an existing organization or create a new one to serve as an enterprise-level missile defense integrator for the purposes of improving speed and agility, coordination, and clarity and unity of purpose. To achieve these desired outcomes, the missile defense integrator should have the following resources, authorities, and characteristics:

- Requirements generation and acquisition processes with sufficient flexibility to keep pace with the threat;
- Technical authority for missile defense to lead systems engineering and other activities to achieve joint interoperability of MDA and Service systems;
- Lead acquisition authority for defense against ballistic and cruise missiles, hypersonic systems, and Uncrewed Aircraft Systems (UAS) and the necessary authorities and resources (including talent) to address all four threat types;
- Formal and informal mechanisms for cross-component collaboration and communication;
- New or strengthened mechanisms to ensure (1) continued, robust warfighter and Service input and buy-in, (2) balance between considerations from these two sets of stakeholders, and (3) flexibility by avoiding a consensus-based process;
- Proximity to the senior civilian leaders who need to make timely decisions and help ensure coordination across relevant DOD components; and
- A four-star leader with a global view of missile defense and the ability to set enterprise-wide investment priorities and drive top-down integration

Several of these changes (e.g., installing a four-star leader) would require legislative action, including appropriations, by Congress. Given the immediate nature of the threat, these changes should be included in the Fiscal Year 2024 National Defense Authorization Act (NDAA) and full implementation should be completed within two years.

There are a variety of ways DOD could structure the MD enterprise to enhance further integration, ranging from the status quo with improved processes, to placing the integrator organization under

a Service or CCMD, to creating a new organization. There is no perfect option; for example, while the status quo would be the least disruptive and costly option, it would not reduce the number of seams that MDA must work across or simplify/streamline the organizational structure. This option also does not necessarily provide the global view of missile threats and defense. However, new organizational structures can create new seams and friction points that will have to be worked. The goal is to identify the option with the greatest potential for improving integration and coordination across the MD enterprise. When considering options, DOD should look for opportunities to rearrange and/or reduce seams and provide clarity and transparency regarding roles and responsibilities.[111]

[111] The Institute for Defense Analyses published a study in January 2021 that evaluated the options of moving MDA to Space Force, STRATCOM, or A&S. However, that study was conducted for a different purpose—its goal was to determine if better alignment could be achieved between MDA and its parent organization to improve oversight rather than improve integration across the enterprise. In addition, the study was conducted before the proposal was made to transfer JFCC-IMD to SPACECOM, and before the CPMR was implemented. Institute for Defense Analyses, *Independent Study of the Organizational Location and Acquisition Processes of the Missile Defense Agency (MDA)*, P-20437, January 2021.

Case Study: Guam

The defense of Guam is extremely important from a regional and national security standpoint; it is a major logistics hub and is key to the US's ability to credibly project power in the Indo-Pacific region. It is also extremely technologically complex, requiring data-sharing, system-level interoperability, and performance to optimize the use of the joint forces for IAMD.

In many respects, Guam is not so much illustrative of what has come before, but of the thorny issues DOD is likely to confront in the future. Guam may be only the first of several integrated architectures that will be needed. As the threat in the Pacific grows, it could extend to Hawaii, Alaska, and the West Coast. As one interviewee put it, "Guam is the current issue, but it won't be the next big issue." In addition, Guam was initiated and has progressed outside of normal DOD processes—it did not go through the MDEB or JROC. If other entities seek to emulate the Guam model to elevate their own priorities, it will affect the future of missile defense governance processes, including JCIDS.

DOD is under pressure from Congress because progress on Guam has been slow. But given the complexity, it will take years to work through all of the challenges involved, including the following:

- Guam must be defended against multiple adversaries, including China and Russia, and against multiple threat types. Authorities for defense against the different threats are fragmented; therefore, while MDA may be the only DOD organization that can design the architecture needed for defense of Guam, it is heavily reliant on other entities because it is not empowered to work on CMD or C-UAS.
- Defense of Guam is technically complex. It will require a system of systems that includes both existing and new systems. Sensors, command and control systems, and interceptors like Aegis and Patriot will need to be linked. DOD has never attempted integration to this degree and at this scale before.
- Virtually all entities in the IAMD enterprise have a role in the defense of Guam, including MDA, Joint Staff, Army, Navy, CAPE, and others.

Case Study: Guam (continued)

- A lead Service has not yet been designated. None of the Services want the mission because it would force them to make tradeoffs that would suboptimize other priorities (e.g., tying destroyers to the island would prevent the Navy from using those ships for other purposes). The mission also does not neatly align with how the Services view their roles (e.g., the Army views Aegis as a Navy system that should be manned by Navy personnel, but the Navy considers land-based missile defense to be a doctrinal Army responsibility and not a core Navy mission). Even when a lead Service is designated, the additional resources will be needed to help overcome the centrifugal tendencies inherent in the multiple, conflicting priorities of the Services and their roles.

Against this complicated backdrop, MDA has been working with stakeholders to develop an architecture that will meet warfighter needs. Recommendation 4.2 addresses and would help resolve the challenges discussed above.

4.3 Conclusion

This chapter offers recommendations on two important aspects of missile defense governance: flexibilities and integration. For clarity, it largely discusses the two topics separately, but they are strongly interrelated. A missile defense integrator without nonstandard requirements generation and acquisition authorities cannot successfully carry out its role. The Department and Congress should inform the public about the need to keep pace with adversaries to build support for taking program risks and develop appreciation for the value of tactical failures.

The Department has several options on how to organize missile defense to improve integration that will lead to greater speed and agility, coordination, and clarity and unity of purpose. Other outcomes of an integrated enterprise include increased transparency around roles and responsibilities and a greater ability to hold entities accountable for delivering capabilities that are responsive to warfighter needs and defend against the perceived threat. The Panel recommends that DOD designate an organization to play the integrator role, with the necessary authorities, funding, and talent to effectively carry it out. The integrator would need several characteristics to be successful, but the Panel believes that key element is the integrator's singular focus on global missile threats, enabling it to make enterprise-wide priorities and drive top-down missile defense integration, and the flexibilities necessary to pace the rapidly evolving threat.

However DOD decides to move forward with integrating missile defense, it should be guided by the principles and recommendations discussed in this chapter. In addition to determining the appropriate level of risk acceptance, these are

- Consolidation of authorities (including flexibilities), funding, and talent;

- Strong formal and informal relationships across the missile defense enterprise;
- Simplified and streamlined missile defense organizational structure;
- Early and consistent input of the warfighter and Services;
- Proximity of the integrator entity to key civilian decision makers; and
- Leadership at an adequate level to drive top-down integration.

Chapter 5: Report Conclusion

In considering MD, it is nigh impossible to describe the many dimensions that must be taken into careful account without an excessive use of superlatives. It is fraught with extreme challenges from virtually every angle and direction. Significant hurdles start with the variety of missile threat types, then move to the global expanse from which an attack may appear and proceed on to the complicated tasks of rapid sensing, tracking, and finally taking precise action to neutralize each threat. Countermeasures that offer an effective active defense must pass through complicated development phases that include setting requirements that meet the needs of warfighters, conducting creative and complex technical research and development, acquiring and deploying the functional defense systems as quickly as possible, and operationalizing them by the Armed Services that will use them. All these steps require time, adequate funding, authorities to act and manage systems, and effective coordination across many individual components of DOD, and in consultation with defense manufacturers.

Over the past several decades, the absence of successful missile attacks against US forces and the homeland could suggest that the patchwork of roles and responsibilities among DOD components actively involved in missile defense, along with the threat of a lethal US counterattack, to name two key factors, offer the nation a successful deterrence. However, given the continuing rapidly advancement of technology applied to ballistic missiles, hypersonic systems, cruise missiles, and uncrewed aircraft systems, the future of the US MD enterprise is at ever greater risk of being obsolete and inadequately coordinated.

The current patchwork of roles and responsibilities across many DOD components to deliver effective comprehensive MD, and the challenges of inter-communication and integrated delivery of countermeasures across these various systems, leave the homeland and US forces at risk. The United States could well face serious challenges to successfully counter a future adversary that decides to launch a multi-pronged attack involving all four threat types launched from various locations on land, sea, and air.

The essential message of this analysis (the study is prepared on an unclassified level and focuses broadly on organizational behaviors and structures) is an urgent call for immediate decisive action to be taken to enhance a more integrated MD,[112] calling for a substantially revamped unification of efforts and coordination across the enterprise. There is appreciation and respect for how complex an effort is required to build a more integrated MD network. Taking action to enhance integration does not allow for a simple solution in respect to how this might be done in DOD. Driven by the clear and growing threat environment from adversaries such as China and Russia, further complicated by growing missile attack capabilities of rogue states such as North Korea and Iran, DOD has the opportunity to move forward to build a new architecture to address future gaps.

[112] This analysis acknowledges that MD is part of a broader integrated air and missile defense. The congressional charge for this work has a narrower focus on the defensive kinetic element of IAMD.

As discussed at length in Chapter 4, DOD lacks a single organization with the resources and authorities to oversee, coordinate, and integrate the wide array of acquisition and technology that needs to be leveraged to adequately defend against all missile threats. Given the sprawling scope of the MD mission and enterprise, it might seem impossible to create such an organization. However, DOD must take steps to enhance integration toward greater cohesion across DOD components by establishing or designating an "integrator" entity responsible for joint MD systems that would consolidate the necessary authorities, budget, and talent in one place. The ultimate goals of these efforts are to shorten decision cycles (thus increasing speed and agility overall), improving coordination, and creating clarity and unity of purpose. Taking this action also creates an environment of accountability in which specific individuals are tasked to lead a monolithic but coordinated MD. These designated individuals must be provided requisite authority, adequate budgetary resources, operational flexibilities, and line-of-sight into the entire enterprise so that seams can be eliminated, inefficiencies addressed, and effective use of resources maximized, those responsible to lead the integrator organization must operate it with maximum collaboration, communication, and synchronization across the enterprise to be successful.

It is important to keep in mind that integration is no panacea. The pace at which the threat is evolving and expanding will continue to make integrating MD a challenge, no matter how DOD is organized. Nevertheless, it is imperative that DOD improves integration to facilitate keeping pace with those threats.

Rather than prescribing one way DOD should go about enhancing integration of the comprehensive MD enterprise, this study offers several ideas to guide the Department's deliberations. The report also provides a list of six features of how an integrator entity should function to achieve the end-state of greater integration.

There is an urgent need to take extraordinary steps to advance a more comprehensive integration of the various centers of excellence that operate today but fall outside of a unified oversight. The enterprise must be led by an organization that has accountability, authority, and budgetary resources to protect against a multi-dimensional missile attack. Such a new architecture, with requisite civilian oversight, must have the flexibilities and features to serve the nation long into this century to address current and new future instruments of destruction. It's time.

The following summary of findings and recommendations distills the report's main points.

Finding 3.1: The lack of clarity around roles and responsibilities in the integrated missile defense enterprise produces confusion over ownership, funding responsibilities, and accountability for progress toward meeting enterprise objectives.

Recommendation 3.1: The Deputy Secretary of Defense, or the component designated as missile defense integrator, should regularly document through an instruction missile defense roles and responsibilities to provide transparency to Congress.

Finding 4.1: DOD's recent decision to partially roll back MDA's acquisition flexibilities to mitigate risk may undermine its ability to deliver missile defense capabilities needed to meet the rapidly evolving missile threat. Current DOD processes, including the Joint Capabilities Integration Development System (JCIDS) and failure review boards, are universally viewed as slow. While it is too early to tell due to their recent implementation, there is anecdotal evidence that the rollback of MDA's flexibilities has caused program delays and the new CPMR process could further erode MDA's requirements generation flexibilities.

Recommendation 4.1: The Department should be prepared to take on more acquisition risk and the Deputy Secretary of Defense should consider further restoring (beyond the February 2023 A&S/R&E agreement) MDA's flexibilities within standard processes for acquisition that were in place prior to the Directive Type Memorandum (DTM) 20-002. In addition, the Deputy Secretary of Defense should examine other processes, such as testing, failure review boards, and the CPMR that could cause delays.

Finding 4.2: The nation's adversaries are developing missile technologies at a rapid pace and the current governance and acquisition structures and processes DOD has in place could prevent it from meeting the threat with equal speed and agility. There is no missile defense integrator organization with the responsibility or the necessary authorities, budget, and talent to acquire capabilities to defend against the four missile threat types. As a result

- Acquisition authorities are fragmented across the multiple components with missile defense responsibilities;
- Not all components with missile defense acquisition responsibilities have the flexibilities MDA is afforded;
- There is no effective top-down technical authority to achieve joint interoperability;
- The complicated organizational structure creates seams that can be difficult to work across;
- CCMDs and Services do not always have the ability to provide early and consistent input to requirements development and acquisition;
- The Services are not incentivized to prioritize integrated missile defense; and
- No one is responsible for setting enterprise-wide investment priorities based on a global, integrated view of missile defense.

This situation causes confusion; slows decision making, acquisition of capabilities, and innovation; and increases the potential for gaps, seams, and unnecessary duplication.

Recommendation 4.2: The Deputy Secretary should designate an existing organization or create a new one to serve as an enterprise-level missile defense integrator for the purposes of improving speed and agility, coordination, and clarity and unity of purpose. To achieve these desired outcomes, the missile defense integrator should have the following resources, authorities, and characteristics:

- Requirements generation and acquisition processes with sufficient flexibility to keep pace with the threat;

- Technical authority for missile defense to lead systems engineering and other activities to achieve joint interoperability of MDA and Service systems;
- Lead acquisition authority for defense against ballistic and cruise missiles, hypersonic systems, and Uncrewed Aircraft Systems (UAS) and the necessary authorities and resources (including talent) to address all four threat types;
- Formal and informal mechanisms for cross-component collaboration and communication;
- New or strengthened mechanisms to ensure (1) continued, robust warfighter and Service input and buy-in, (2) balance between considerations from these two sets of stakeholders, and (3) flexibility by avoiding a consensus-based process;
- Proximity to the senior civilian leaders who need to make timely decisions and help ensure coordination across relevant DOD components; and
- A four-star leader with a global view of missile defense and the ability to set enterprise-wide investment priorities and drive top-down integration.

Several of these changes (e.g., installing a four-star leader) would require legislative action, including appropriations, by Congress. Given the immediate nature of the threat, these changes should be included in the Fiscal Year 2024 National Defense Authorization Act (NDAA) and full implementation should be completed within two years.

Appendices

Appendix A: Panel and Study Team Member Biographies

Panel of Academy Fellows

Dr. William Greenwalt (Chair): William C. Greenwalt has longstanding experience in federal acquisition and industrial base issues. He currently sits on several corporate boards and is a nonresident senior fellow at the American Enterprise Institute where he focuses on defense management and innovation. He is also a founder of the Silicon Valley Defense Group. Dr. Greenwalt served in senior positions at the Department of Defense, in Congress, and in the private sector. He began his career at the U.S. General Accounting Office and then in Congress served as a senior staff member for the Senate Armed Service Committee, the Senate Governmental Affairs Committee, and the House Appropriations Committee. As deputy under secretary of defense for industrial policy, he advised the under secretary of defense for acquisition, technology, and logistics on matters relating to the defense and commercial industrial bases. In the private sector, Dr. Greenwalt has worked for Lockheed Martin and the Aerospace Industries Association. Bill received a BA in economics and political science from California State University, Long Beach, an MA in international relations and defense and security studies from the University of Southern California, and a PhD in public policy from the University of Maryland.

Elliott Branch: Deputy Assistant Secretary of the Navy (Acquisition and Procurement), U.S. Department of Navy, U.S. Department of Defense; Former Civilian Director of Contracts, Naval Sea Systems Command, U.S. Department of Navy, U.S. Department of Defense; Sr. Program Dir., Acquisition, Atlantic Management Center Inc; Chief Procurement Officer, Government of the District of Columbia; Project Executive Officer, U.S. Department of Navy, U.S. Department of Defense; Executive Director, Acquisition and Business Management, U.S. Department of Navy, U.S. Department of Defense; Director, Shipbuilding Contract Division, U.S. Department of Navy, U.S. Department of Defense.

Susan Kinney-Perkins: Susan Kinney-Perkins has nearly 20 years of experience in Space Acquisition and Logistics and Policy development as the Director for Logistics (SES) at NASA and as a Logistics Program Manager for the Space Station program. Additionally, she has served the DOD for over 14 years as a civilian at HQMC USMC as the Deputy for Logistics addressing all facets of logistics planning, policy development, and strategic mobility across the ground forces of the Marine Corps; and at Naval Air Systems Command (NAVAIR) supporting logistics Program Managers. She also served NAVAIR as a Naval reserve officer for 27 years (Aerospace Maintenance Duty Officer) commanding four acquisition and maintenance organizations. Susan served in commercial industry as a Senior Manager establishing a Supply Chain practice offering solutions to the Federal sector, and earlier as a Logistics Manager supporting multiple aircraft platforms and space hardware. Later in her career Susan transitioned to Academia and led the Supply Chain curriculum at the National Defense University (NDU–Eisenhower School) and taught Acquisition, Innovation, and supported the Space, Land Combat, and Industrial Base

industry studies programs. Later she taught at the Defense Systems Management College – Defense Acquisition University (DAU) where she led the Life Cycle Logistics and Sustainment portion of the university education and provided consulting to Senior Program Managers across the DoD and Federal Government. Susan received a MS in National Resource Strategy & a Strategic Acquisition Certificate from the National Defense University, Industrial College, an MBA from George Mason University, and a BS in Management from GMU/Virginia Tech. She is a graduate of MIT Seminar XXI Foreign Politics and International Relations, Federal Executive Institute (FEI), UNC Executive Logistics & Technology, Office of Personnel Management (OPM's) Excellence in Government and is Defense Acquisition University certified in Life Cycle Logistics (III) & Program Management (II), a Lean Six Sigma Green Belt, and a Certified Acquisition Professional.

William Phillips: Bill Phillips has extensive experience in government operations, concentrated in financial management, human capital management, supply chain management and strategic planning. Most recently he was a member of the Defense Business Board, offering business process advice to the Secretary of Defense, the Chairman of the Joint Chiefs and their leadership teams. Specific studies addressed reforms in departmental financial operations, acquisition, logistics and public policy. During his sixteen years on the board, Bill also served in leadership roles in the private sector. He retired from KPMG where he led the Firm's Federal Advisory Practice, which served virtually every major Federal Agency with business operations services. Before joining KPMG, Bill was IBM's Vice President of Global Defense Services, working with many NATO and U.S. allies providing operations improvements designed to facilitate effective business resource management and technology applications in support of military missions. His initial role at IBM was the partner and leader of the U.S. Defense Services Practice, a role he held at PricewaterhouseCoopers prior to IBM's acquisition of PwC Consulting. While a partner at PwC, Bill held various leadership roles including responsibility for services provided to the U.S. Department of Energy, U.S. Mint, National Science Foundation and the U.S. Department of Commerce. The principle focus of services he provided included business process reengineering, total quality management implementation, strategic planning and financial management reform. Before the merger of Price Waterhouse and Coopers & Lybrand, Bill was a partner focused principally on financial management and business operations related services across the Federal Government. He began his career as a consultant with Deloitte Haskins and Sells implementing financial systems at the U.S. Navy and NASA. Bill has co-authored two books on government financial management: Public Dollars, Common Sense and Public Dollars Transformation. For his service on the Defense Business Board he received the DoD Exceptional Public Service Medal.

Dr. Joseph Westphal: Ambassador Joseph W. Westphal is Global Senior Fellow at the Joseph H. Lauder Institute of Management and International Studies at The Wharton School of The University of Pennsylvania. Dr. Westphal is also a Senior Fellow at the Center for Leadership and Change Management at Wharton, Fellow at the National Academy of Public Administration and Non-Resident Fellow at the International Studies Center of the Catholic University of Chile. Ambassador Westphal has had a long and distinguished career in government and academia. Dr. Westphal was the U.S. Ambassador to the Kingdom of Saudi Arabia from March 2014 to January 2017. Prior to this appointment, Ambassador Westphal was the Under Secretary of the Army and

its Chief Management Officer from 2009 to 2014. In this role, Dr. Westphal was the lead on Force Management and the Army's business operations. He also held the positions of Assistant Secretary of the Army (Head of the Army Corps of Engineers) from 1998 to 2000 and Acting Secretary of the Army in 2001. Dr. Westphal began his career in 1975 as a professor of political science at Oklahoma State University and later served as a Department Head. In 2002 he became the Chancellor of the University of Maine System and Professor of Political Science. He also served as Director of the Tishman Environmental Center and Provost at the New School University in New York and Adjunct Professor at Georgetown University in Washington D.C. In government, he worked in both the House and Senate for more than twelve years. Dr. Westphal directed a bicameral-bipartisan organization called the Sunbelt Caucus. He was a staff member on the House Budget Committee and his last appointment was as a Special Assistant to Senator Thad Cochran (R-MS). He has held positions in the administrations of Presidents Carter, Reagan, Clinton, Bush, and Obama, working in the Department of the Interior, U.S. Army Corps of Engineers, the Environmental Protection Agency, the Department of Defense, and the Department of State. Dr. Westphal has served on academic boards as well as nonprofit and public advisory boards. Ambassador Westphal received a B.A. from Adelphi University and his Ph.D. from the University of Missouri-Columbia.

Study Team

Brenna Isman, *Director of Academy Studies*. Ms. Isman has worked for the Academy since 2008 and provides oversight across the Academy's studies. She recently served as the Project Director for the Academy's project that assisted a national regulatory and oversight board in developing and implementing its strategic plan. She also recently directed the Academy's statutorily required assessments of the NASA's use of its Advisory Council and the Environmental Protection Agency's practices for determining the affordability of regulatory mandates, as well as the Academy's organizational assessments of the U.S. State Department's Office of Inspector General and the Amtrak Office of the Inspector General. Ms. Isman has served as a Senior Advisor on strategic plan development for the Postal Regulatory Commission (PRC) and Social Security Administration (SSA), and organizational change consulting support for the Coast Guard. Her prior consulting experience includes both public and private sector clients in the areas of communication strategy, performance management, and organizational development. Prior to joining the Academy, Ms. Isman was a Senior Consultant for the Ambit Group and a Consultant with Mercer Human Resource Consulting facilitating effective organizational change and process improvement. She holds an MBA from American University and a Bachelor of Science in Human Resource Management from the University of Delaware.

Roger Kodat, *Senior Project Director*. Mr. Kodat has led 40 projects for the Academy. He brings twenty years of commercial and investment banking experience with JPMorgan Chase, and six years of senior level federal government experience at the Department of the Treasury. Appointed by President George W. Bush in 2001 to serve as Deputy Assistant Secretary of Treasury, he was responsible for Federal Financial Policy. Some of his tasks at Treasury included policy formulation

for the 2006 Postal Accountability and Enhancement Act; rule making and oversight of Federal loan and loan guarantee programs; and management of the Federal Financing Bank (a $32 billion bank at that time). Mr. Kodat holds a BS in Education from Northwestern University and both an MBA in Finance and Master of Arts (MA) in Political Science from Indiana University.

Dr. Karen Hardy, *Senior Advisor*. Dr. Hardy is Chief Executive Officer of Strategic Leadership Advisors LLC and an Adjunct Professor at George Mason University's School of Business. Previously, she was the Deputy Chief Risk Officer and Director Risk Management at the Department of Commerce. In this role she was an Executive Member of the DOC IT Review Board and the DOC Acquisition Review Board. She served as a Senior Advisor to the U.S. Controller at the Office of Management and Budget, Washington, DC for risk management policy development and implementation. Previously, she was a Senior Management Analyst at the National Institutes of Health and served on the U.S. Technical Advisory Group for the ISO 31000 International Standard for Risk Management. Dr. Hardy is a published scholar of the IBM Center for the Business of Government. She is the author of the first award winning textbook on Enterprise Risk Management in government and is a founding Board member of the Association for Federal Enterprise Risk Management (AFERM). She holds an Ed.D in Organizational Leadership and Human Resources Development from Nova Southeastern University, an MBA and is a RIMS Certified Risk Management Professional.

Maria Rapuano, *Senior Advisor*. Ms. Rapuano has served as a Deputy Project Director and as a Senior Advisor for several Academy projects. Her areas of expertise include public policy, strategic planning, organizational design, and change management. She holds an MA in International Affairs from American University and a BA in Government from the College of William and Mary.

Dr. Jonathan Tucker, *Senior Research Analyst*. Mr. Tucker has served as a Project Director and as a Senior Research Analyst for several Academy projects. His areas of expertise include strategic planning, organizational design, change management, and science and technology/innovation policy. Mr. Tucker holds a PhD in Public Policy from George Mason University, an MS in Science and Technology Studies from Rensselaer Polytechnic Institute, and a BA from New College of Florida.

James Higgins, *Research Analyst*. Mr. Higgins currently supports the Academy's Strategic Initiatives including researching for its Grand Challenges in Public Administration campaign and producing the Management Matters podcast. Mr. Higgins has previously worked on studies for the Bureau of Transportation Statistics, the United States Trade and Development Agency, and the project, Increasing the Agility of the Federal Government. James graduated with a B.A. in International Studies with a focus on Asia from Dickinson College, and a M.A. in Global Policy with a focus on Security and Foreign Policy from the University of Maine School of Policy and International Affairs.

Elise Johnson, *Research Analyst*. Ms. Johnson's focus areas include organizational transformation and change management, human capital, governance, and strategic planning. Ms. Johnson also contributes to a current study for the U.S. Coast Guard Academy. Before joining the

Academy, Ms. Johnson earned a B.A. in Public Policy and a B.A. in Government & Politics from the University of Maryland, College Park.

Appendix B: National Defense Authorization Act for Fiscal Year 2022

FY 2022 National Defense Authorization Act Subtitle D—Missile Defense Programs

SEC. 1675. INDEPENDENT STUDY OF ROLES AND RESPONSIBILITIES OF DEPARTMENT OF DEFENSE COMPONENTS RELATING TO MISSILE DEFENSE.

(a) INDEPENDENT STUDY AND REPORT.—

(1) CONTRACT.—Not later than 30 days after the date of the enactment of this Act, the Secretary of Defense shall seek to enter into a contract with the National Academy of Public Administration (in this section referred to as the "Academy") for the Academy to perform the services covered by this subsection.

(2) STUDY AND REPORT.—

(A) ROLES AND RESPONSIBILITIES.—Under an agreement between the Secretary and the Academy under this subsection, the Academy shall carry out an study regarding the roles and responsibilities of the various components of the Department of Defense as they pertain to missile defense.

(B) MATTERS INCLUDED.—The study required by subparagraph (A) shall include the following:

(i) A comprehensive assessment and analysis of existing Department component roles and responsibilities for the full range of missile defense activities, including establishment of requirements, research and development, system acquisition, and operations.

(ii) Identification of gaps in component capability of each applicability component for performing its assigned missile defense roles and responsibilities.

(iii) Identification of opportunities for deconflicting mission sets, eliminating areas of unnecessary duplication, reducing waste, and improving efficiency across the full range of missile defense activities.

(iv) Development of a timetable for the implementation of the opportunities identified under clause (iii).

(v) Development of recommendations for such legislative or administrative action as the Academy considers appropriate pursuant to carrying out clauses (i) through (iv).

(vi) Such other matters as the Secretary may require.

(C) REPORT.—

(i) REQUIREMENT.—Not later than one year after the date on which the Secretary and the Academy enter into a contract under paragraph (1), the Academy shall submit to the Secretary and the congressional defense committees a report on the study conducted under subparagraph (A).

(ii) ELEMENTS.—The report submitted under clause (i) shall include the findings of the Academy with respect to the study carried out under subparagraph (A) and any recommendations the Academy may have for legislative or administrative action pursuant to such study.

(3) ALTERNATE CONTRACT ORGANIZATION.—

(A) AGREEMENT.—If the Secretary is unable within the time period prescribed in paragraph (1) to enter into an agreement described in such paragraph with the Academy on terms acceptable to the Secretary, the Secretary shall seek to enter into such an agreement with another appropriate organization that—

(i) is not part of the Government;

(ii) operates as a not-for-profit entity; and

(iii) has expertise and objectivity comparable to that of the Academy.

(B) REFERENCES.—If the Secretary enters into an agreement with another organization as described in subparagraph (A), any reference in this subsection to the Academy shall be treated as a reference to the other organization.

(b) REPORT BY SECRETARY OF DEFENSE.—Not later than 120 days after the date on which the report is submitted pursuant to subsection (a)(2)(C), the Secretary shall submit to the congressional defense committees a report on the views of the Secretary on the findings and recommendations set forth in the report submitted under such subsection, together with such recommendations as the Secretary may have for changes in the structure, functions, responsibilities, and authorities of the Department.

Appendix C: List of Interviewees

DoD Headquarters:

- **Acquisition & Sustainment (A&S):** 4 individuals (2 individuals from the missile defense unit, 2 from Defense, Strategic, Space, and Intelligence Portfolio Management)
- **Cost Assessment & Program Evaluation (CAPE):** 2 individuals (1 senior official and 1 in the analysis unit for missile defense)
- **Office of the Comptroller:** 1 individual in the analysis unit
- **Research & Engineering (R&E):** 2 individuals from the missile systems unit
- **OSD Policy:** 4 individuals (including the study's points of contact)
- **Joint Integrated Air and Missile Defense Organization (JIAMDO):** 4 individuals
- **Joint Staff:** 1 individual from Force Structure, Resources, and Assessment, J8
- **Missile Defense Agency:** 18 individuals from policy, acquisition, warfighter integration, and other units
- **Office of the Director, Operational Test and Evaluation:** 1 individual
- **Office of the Director of Administration and Management:** 1 individual
- **Office of the Assistant Secretary for Space Policy:** 1 individual
- **The Space Development Agency:** 1 individual

Combatant Commands

- **USCENTCOM:** 1 individual from CCJ38 IAMD Division
- **USCYBERCOM:** 1 individual from the special projects division
- **USEUCOM:** 1 individual from the IAMD division
- **USINDOPACOM:** 1 individual from the space and IAMD division
- **USNORTHCOM:** 4 individuals from the BMD division
- **USSTRATCOM:** 3 individuals from the policy division
- **USSPACECOM:** 2 individuals (1 from the policy and doctrine division)
- **Joint Functional Component Command for Integrated Missile Defense (JFCC-IMD):** 22 individuals across the directorates and senior leadership

Services

- **Navy:** 6 individuals (1 from N54, 2 from N96, 1 from NAVSEA T&E, 1 from OPNAV N96, 1 from Strategic Systems Programs)
- **Army:** 9 individuals (1 from the Fires Center of Excellence, 1 from DAMO Fires, 4 from Army's C-UAS Office, 1 from HQDA ASA ALT, 1 from HQDA G8 PA&E, 1 from CFT A&MD)
- **Air Force:** 4 individuals (2 individuals from the IAMD unit, 1 individual and team from SAF/AQI)
- **Space Force:** 1 individual (1 from Strategy and Policy)

Government Accountability Office (GAO)

- **Dennis Antonio**
- **Michelle Kim**
- **James Madar,** Assistant Director
- **Ian Reed**
- **John Sawyer**, Acting Director, Contracting and National Security Acquisitions
- **Brian Tittle**

Other Subject Matter Experts

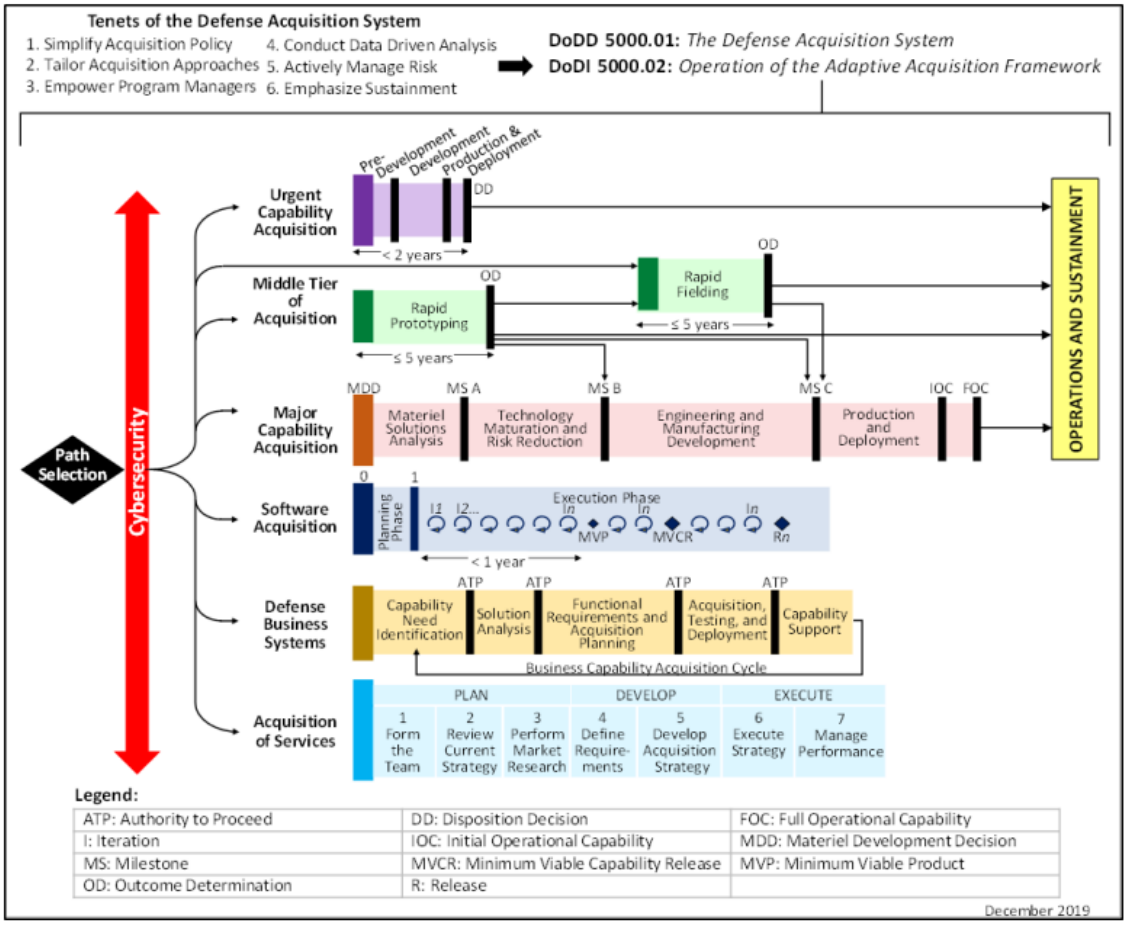
- **Lt. Col. Daniel Allmacher,** Former Chief of the Intelligence Support Group, Joint Planning Support Element, Joint Enabling Capabilities Command, Naval Station Norfolk, Virginia
- **Lt. COL Gabe Almodovar, USAF,** AFMC AFLCMC/WVSS
- **LTG Howard Bromberg, USA, Ret.,** Vice President, Strategy and Development, Lockheed Martin. Former Deputy Commanding General/Chief of Staff, U.S. Army Forces Command.
- **LTG Richard Formica, USA, Ret.,** Vice President, CALIBRE. Former Commanding General, U.S. Army Space and Missile Defense Command and U.S. Strategic Command's Joint Functional Component Command for Integrated Missile Defense.
- **Tom Karako,** Senior Fellow, International Security Program and Director, Missile Defense Project, Center for Strategic & International Studies
- **Katharina McFarland,** Former ASD for Acquisition
- **Mac Thornberry,** Former Congressman and ranking member of the House Armed Services Committee

Congressional Staff

- **Jonathan Epstein,** Counsel, Senate Committee on Armed Services
- **Adam Trull,** Professional Staff Member, Senate Committee on Armed Services
- **Ryan Tully,** Lead Professional Staff Member, Subcommittee on Strategic Forces, House Committee on Armed Services
- **Andy Vanlandingham,** Professional Staff Member, Subcommittee on Defense, Senate Appropriations
- **Maria Vastola,** Lead Professional Staff Member, Subcommittee on Strategic Forces, House Committee on Armed Services

Appendix D: Chapter 2 Supporting Visual Aids, Laws, and Regulations

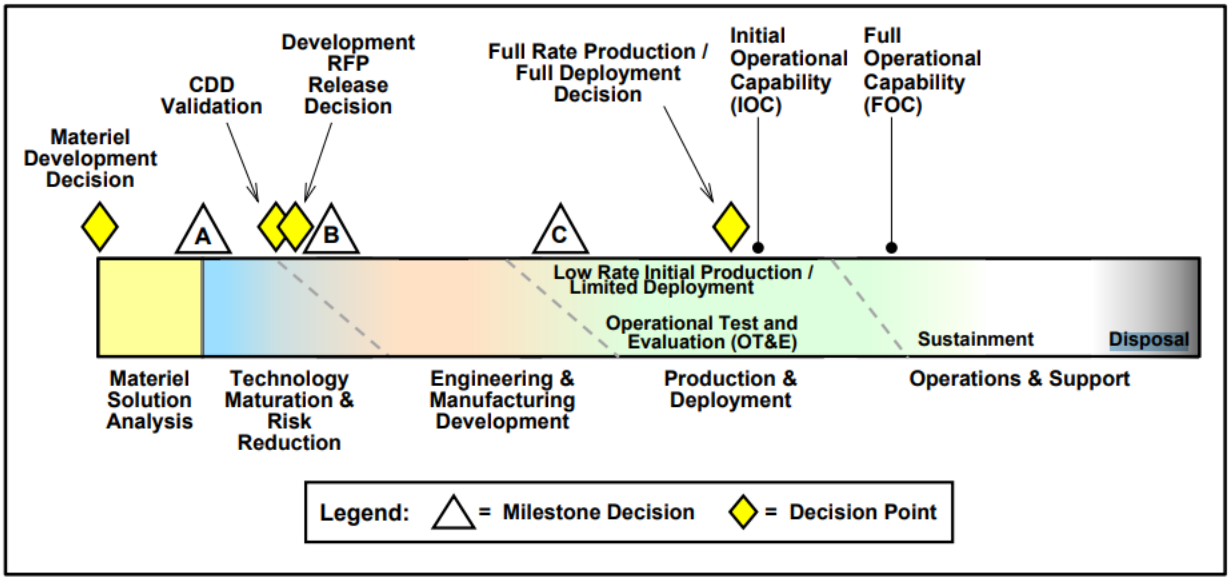
Figure 9. Adaptive Acquisition Framework



Source: DOD Instruction 5000.02[113]

[113] DODI 5000.02, "Operation of the Adaptive Acquisition Framework," p. 10, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500002p.PDF

Figure 10. Major Capability Acquisition Model



Source: DOD Instruction 5000.85[114]

Phase 1: Materiel Solutions Analysis (MSA): Analyze all potential materiel solutions for identified needs.

- Milestone A initiates technology maturation and risk reduction. The Milestone A decision approves or denies a concept demonstration to show that a proposed concept is feasible.

Phase 2: Technology Maturation & Risk Reduction (TMMR): Reduce technology risks and determine the appropriate set of technologies to be integrated into a future system that satisfies the identified needs. Includes risk reduction, cost estimation, and programmatic activities.

- Milestone B initiates engineering and manufacturing development. The Milestone B approval starts the Engineering and Manufacturing Development Phase

Phase 3: Engineering & Manufacturing Development (EDM) Phase: Complete the engineering development of the capability and proceed into production and development.

[114] Office of the Under Secretary of Defense for Acquisition and Sustainment, "DOD Instruction 5000.85: Majr Capability Acquisition," p. 18, August 20, 2020, updated November 4, 2021, https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500085p.pdf.

- Milestone C initiates production and deployment. Decisions are necessary to start the product and deployment phase to include low-rate initial production and operation tests.

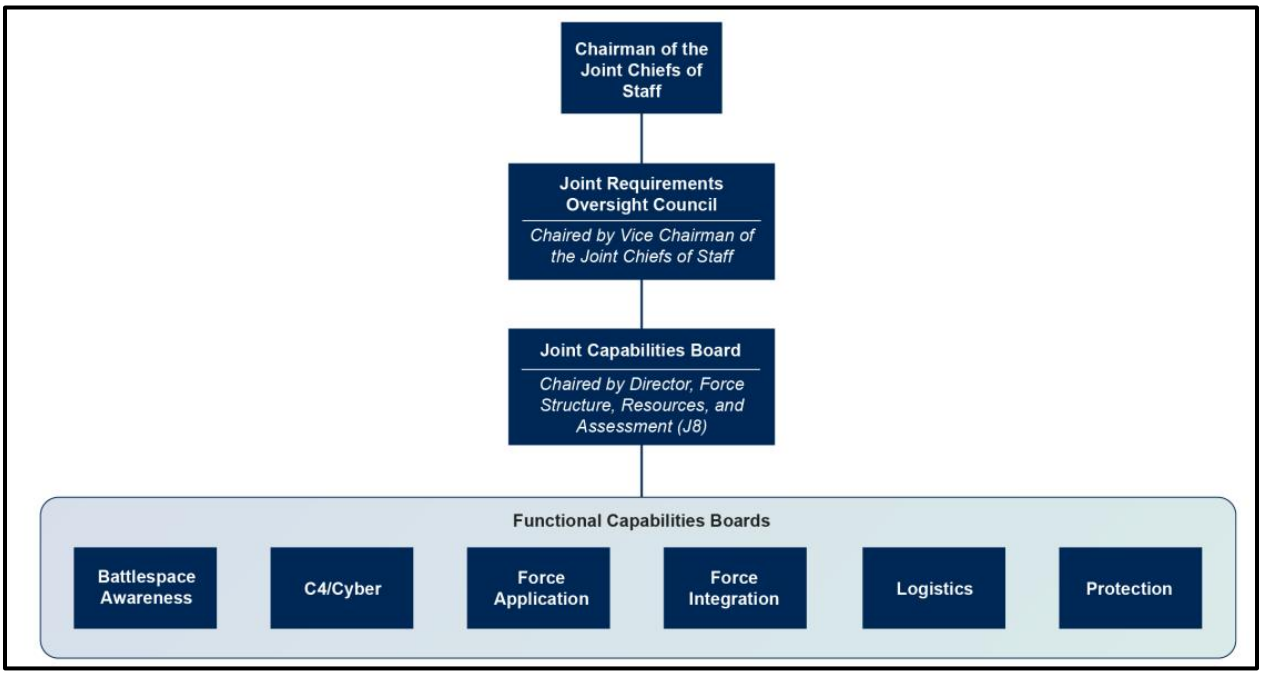
Phase 4: Production and Development (PD) Phase: Achieve an operational capability that satisfies the receiving organization's needs.

Figure 11. DOD Research, Development, Test & Evaluation Budget Activity Codes

Budget Code	Activity
6.1	Basic Research
6.2	Applied Research
6.3	Advanced Technology Development
6.4	Advanced Component Development and Prototypes
6.5	System Development and Demonstration
6.6	RDT&E Management Support
6.7	Operational Systems Development
6.8	Software and Digital Technology Pilot Programs

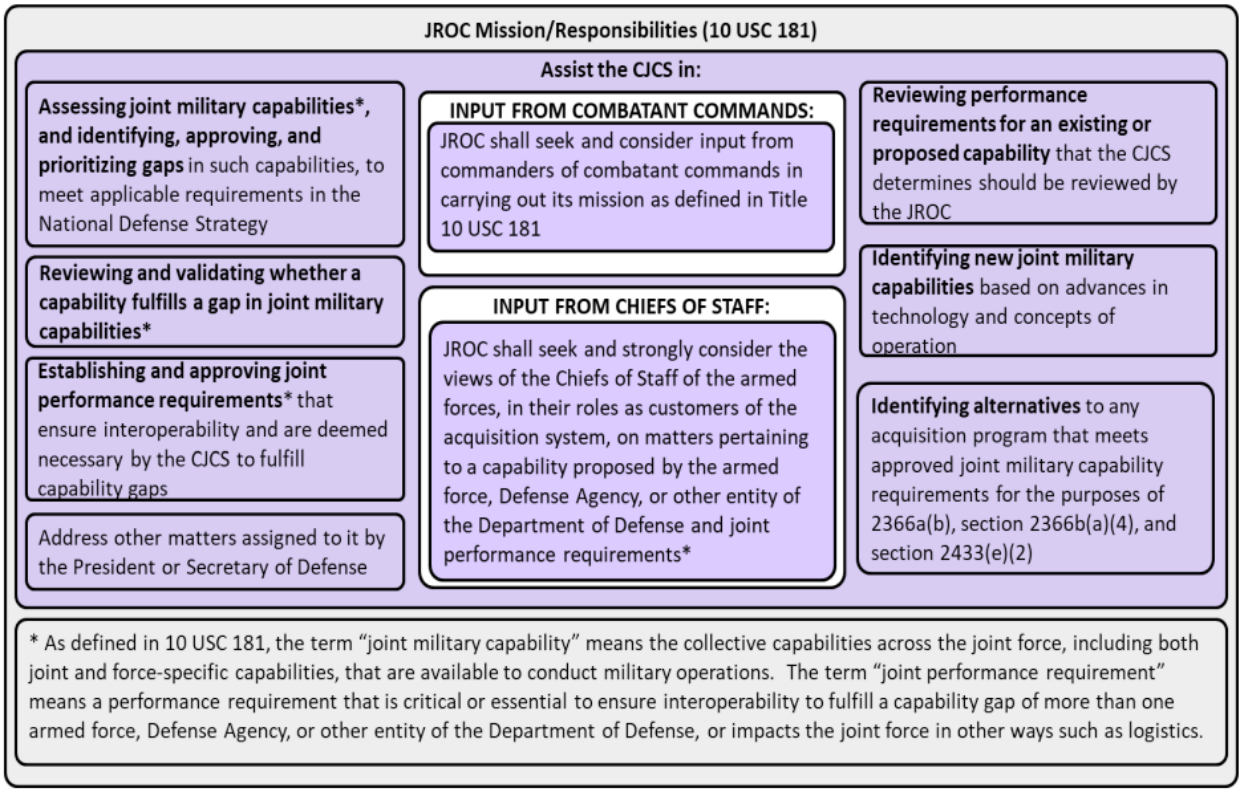
Source: Department of Defense, Financial Management Regulation (DoD 7000.14-R), Volume 2B, November 2017

Figure 12. Hierarchy of the Joint Requirements Oversight Council (JROC) Organizational Structure



Source: Government Accountability Office[115]

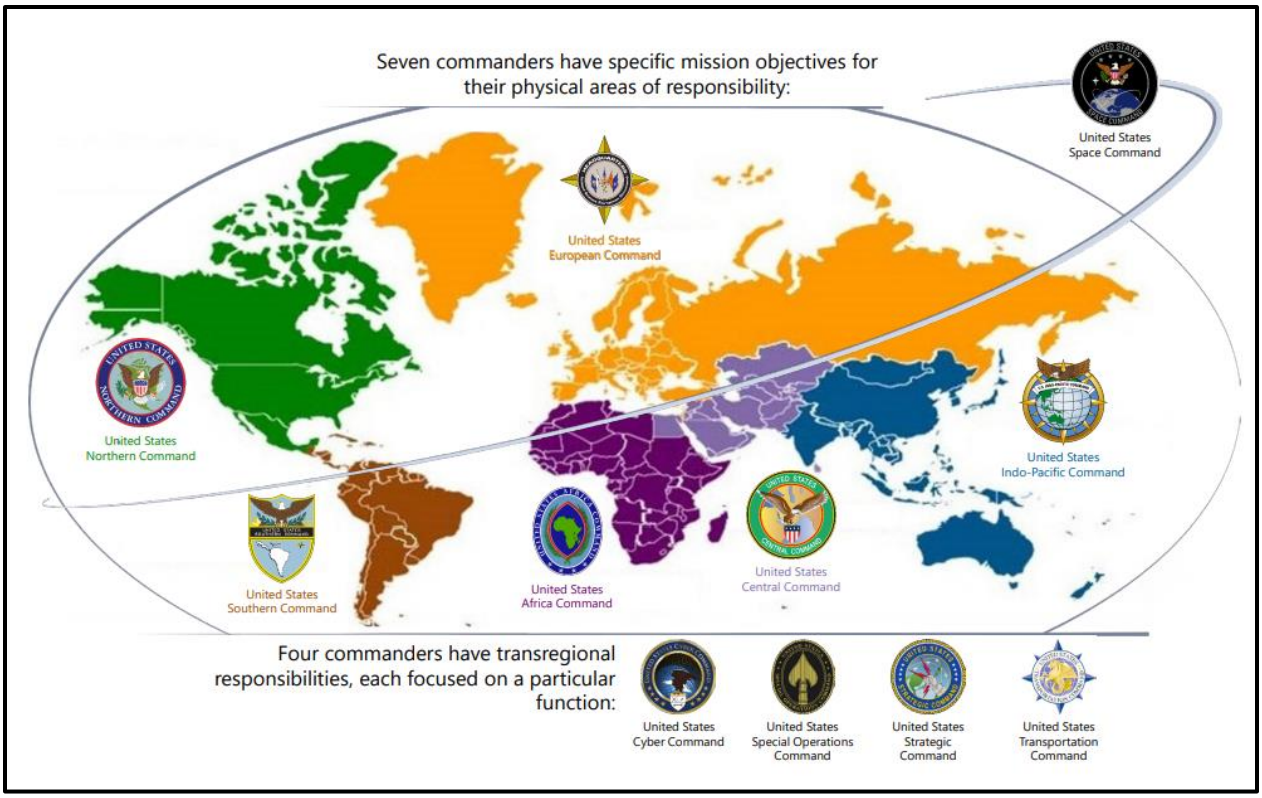
Figure 13. JROC Title 10 Responsibilities and Mission



Source: Joint Staff, CJCSI 5123.01I[116]

[115] https://www.gao.gov/assets/gao-22-104432.pdf
[116] Joint Staff, *Charter of the Joint Requirements Oversight Council and Implementation of the Joint Capabilities Integration and Development System*, CJCSI 5123.01I, P. A-1, https://www.jcs.mil/portals/36/documents/library/instructions/cjcsi%205123.01i.pdf.

Figure 14. Combatant Commands



Source: United States Department of Defense Agency Financial Report - Fiscal Year 2022[117]

[117] United States Department of Defense Agency Financial Report - Fiscal Year, p. 18, 2022https://comptroller.defense.gov/Portals/45/Documents/afr/fy2022/DOD_FY22_Agency_Financial_Report.pdf.

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