MARCH 2017

# Missile Defense and Defeat

## Considerations for the New Policy Review


PROJECT DIRECTOR AND EDITOR

THOMAS KARAKO

CONTRIBUTING AUTHORS

KEITH B. PAYNE

BRAD ROBERTS

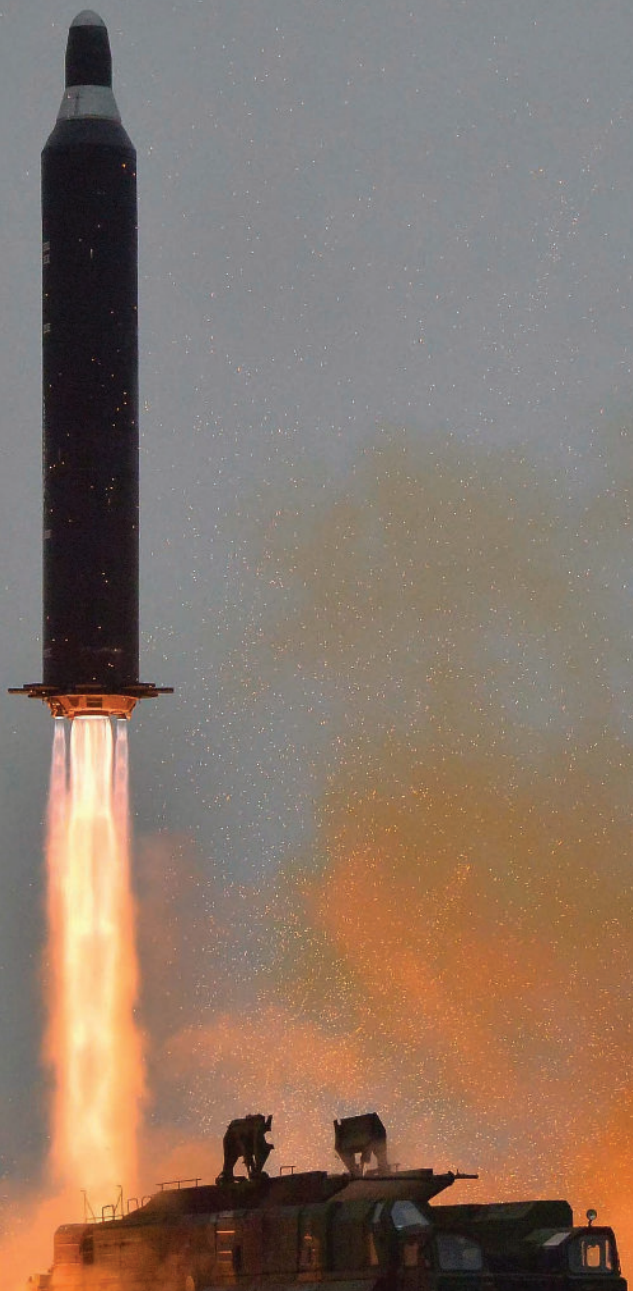
HENRY A. OBERING III

KENNETH TODOROV

THOMAS KARAKO


A REPORT OF THE

CSIS MISSILE DEFENSE PROJECT




CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

MARCH 2017

# Missile Defense and Defeat

## Considerations for the New Policy Review

PROJECT DIRECTOR AND EDITOR
Thomas Karako

CONTRIBUTING AUTHORS
Keith B. Payne
Brad Roberts
Henry A. Obering III
Kenneth Todorov
Thomas Karako

A Report of the
CSIS MISSILE DEFENSE PROJECT

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

ROWMAN & LITTLEFIELD

Lanham • Boulder • New York • London

## About CSIS

For over 50 years, the Center for Strategic and International Studies (CSIS) has worked to develop solutions to the world's greatest policy challenges. Today, CSIS scholars are providing strategic insights and bipartisan policy solutions to help decisionmakers chart a course toward a better world.

CSIS is a nonprofit organization headquartered in Washington, DC. The Center's 220 full-time staff and large network of affiliated scholars conduct research and analysis and develop policy initiatives that look into the future and anticipate change.

Founded at the height of the Cold War by David M. Abshire and Admiral Arleigh Burke, CSIS was dedicated to finding ways to sustain American prominence and prosperity as a force for good in the world. Since 1962, CSIS has become one of the world's preeminent international institutions focused on defense and security; regional stability; and transnational challenges ranging from energy and climate to global health and economic integration.

Thomas J. Pritzker was named chairman of the CSIS Board of Trustees in November 2015. Former U.S. deputy secretary of defense John J. Hamre has served as the Center's president and chief executive officer since 2000.

CSIS does not take specific policy positions; accordingly, all views expressed herein should be understood to be solely those of the author(s).



ISBN: 978-1-4422-8009-0 (pb); 978-1-4422-8010-6 (eBook)

Center for Strategic & International Studies
1616 Rhode Island Avenue, NW
Washington, DC 20036
202-887-0200 | www.csis.org

Rowman & Littlefield
4501 Forbes Boulevard
Lanham, MD 20706
301-459-3366 | www.rowman.com

# Contents

# Acknowledgments

The editor would like to thank Trey Obering, Keith Payne, Brad Roberts, and Kenn Todorov for contributing chapters to this collection, and Ian Williams for his extensive work in bringing it to publication. Jay Conrad, Charlotte Kearney, and Wes Rumbaugh also assisted in preparing and reviewing the text.

The report was made possible by general support to CSIS.

# 01

# The Missile Defeat Review in Context

Thomas Karako

The defense authorization act signed into law on December 23, 2016, contained a provision mandating a review of missile defeat policy, strategy, and capability, to be completed and submitted to Congress in January 2018.[1] This *Missile Defeat Review* (MDR) appears likely to serve as a successor to both the Department of Defense's 2010 *Ballistic Missile Defense Review* (BMDR) and other publications by the Joint Staff.[2] The first of its kind, the MDR represents a unique opportunity for the Donald Trump administration to articulate a vision for the future of air and missile defense, and determine how that vision is to be implemented by the Missile Defense Agency (MDA), the Joint Staff, the services, and other entities. This review will take place in the context of both an evolving strategic environment and several recent strategic analyses on related issues. Exploring these elements will help guide and inform the MDR's development.

## A Missile Renaissance: The Need for IAMD

The MDR comes amid a growing realization that missile-based weapons are acquiring ever-greater prominence. One emerging trend in the global strategic environment is a kind of missile renaissance, characterized by a high supply and demand for precise, high-velocity, unmanned standoff delivery systems. This spectrum includes guided rockets, artillery, and mortars (RAM); antiship missiles; supersonic and long-range subsonic cruise missiles; guided and maneuvering reentry vehicles; depressed trajectory ballistic missiles; hypersonic boost glide weapons; and antisatellite weapons—as well as the means to counter them, including with air and missile defenses. In short, this missile renaissance encompasses "a complex and nearly continuous threat spectrum across the characteristics of altitude, speed, propulsion type, and range."[3]

Missiles defenses, once considered exotic or theoretical, are now an established component of both U.S. and global security. Much remains to be done, however, to integrate defenses

[1] In January 2017, President Trump also directed a new national defense strategy to include both a nuclear policy review and a new ballistic missile defense review. Presidential Memorandum No. 2017-02282, 82 Fed. Reg. 8983, February 1, 2017, https://www.federalregister.gov/documents/2017/02/01/2017-02282/rebuilding-the-us-armed-forces.

[2] Martin E. Dempsey, *Joint Integrated Air and Missile Defense: Vision 2020* (Joint Chiefs of Staff, December 5, 2013); Department of Defense, *Strategy for Countering Weapons of Mass Destruction* (Washington, DC: Department of Defense, June 2014); William E. Gortney, *Countering Air and Missile Threats* (Joint Publication 3-01, March 23, 2012).

[3] Edward Cashman, "The Missile Defeat Posture and Strategy of the United States—the FY 17 President's Budget Request" (statement before House Armed Services Committee, Strategic Forces Subcommittee, April 14, 2016).

into the larger security architecture. Just as air superiority has long formed a major tenet of U.S. operational planning, missile defenses may continue to grow into a larger component of the defensive counterair (DCA) mission, an enabler of what one might call aerospace superiority.[4] Maturing missile defense capabilities, their expansion, and their integration into operational planning could lead missile defense beyond a mere responsive measure to a more comprehensive "ballistic missile protection plan."[5]

The MDR has the potential to revitalize and reshape the missile defense conversation, and indeed its very vocabulary. For good historical and operational reasons, the missile defense debate has largely been confined to ballistic missile defense (BMD), with cruise missile defense as either an afterthought or at least disconnected from the ballistic missile defense enterprise.

In the emerging security environment, a broader spectrum of counters will likely achieve greater prominence. BMD will remain critical, but BMD alone fails to capture and represent the full scope of the problem. The "B" in BMD excludes non-ballistic threats such as cruise missiles. The "M" is complicated by the increasing and interconnected challenge from various air-breathing and hybrid threats, such as boost glide vehicles, as well as lower-tier unmanned aerial systems (UAS) and RAM. And the "D" for defense is likewise incomplete, since countering missile threats must involve much more than simply intercepting them in flight.

To be sure, the technical challenges of ballistic missile defense are unique and in many ways more challenging than air defense. Acknowledging this, the MDR tasking preserves pride of place for ballistic missile threats.[6] Nevertheless, the increasing salience of the larger air and missile spectrum suggests that one may see the acronyms MD or IAMD (Integrated Air and Missile Defense) with greater frequency. Organizational identities and missions may likewise need to evolve.[7]

By focusing on the defeat of the full spectrum of missile threats using a wide range of means, the legislative mandate for the MDR invites a more complete perspective, thereby helping move IAMD from unrealized aspiration to concrete reality. In 2013, then-chairman of the Joint Chiefs of Staff General Martin Dempsey described IAMD as "an evolving approach" and

[4] Counterair is the term used in Gortney, *Countering Air and Missile Threats*. Antiair is the term used by the U.S. Navy and Marines, and is thus the object of the Aegis Ashore antiair study mandated by Congress in the FY2017 National Defense Authorization Act (NDAA). See U.S. Marine Corps, *Antiair Warfare* (Washington, DC: U.S. Marine Corps, 2000), http://www.marines.mil/Portals/59/Publications/MCWP%203-22%20Antiair%20Warfare.pdf; National Defense Authorization Act for Fiscal Year 2017, *Conference Report to Accompany S.2943*, Sec.1685, 114th Congress (2016): 632–33.

[5] Admiral Archer Macy, "Next Steps in Missile Defense: Future Directions" (speech, CSIS, Washington, DC, April 7, 2015).

[6] National Defense Authorization Act for Fiscal Year 2017, *Conference Report to Accompany S.2943*, Sec.1684, 114th Congress (2016): 629–32.

[7] As the Joint Integrated Air and Missile Defense Organization (JIAMDO) director recently observed, "Our organizational structures, which were originally based on these traditional definitions of 'Ballistic Missile Defense' or 'Air and Cruise Missile Defense,' will continue to evolve into specific roles within the 'Integrated Air and Missile Defense' mission area." Cashman, "The Missile Defeat Posture and Strategy of the United States—the FY 17 President's Budget Request."

a "vision" to be realized by the end of the decade. In late 2014, the heads of the U.S. Army and Navy again spoke of this effort in the future tense:

> Now is the opportunity to develop a long-term approach that addresses homeland missile defense and regional missile defense priorities—a holistic approach that is more sustainable and cost effective, incorporating "left-of-launch" and other non-kinetic means of defense.[8]

Realizing that vision will be easier said than done.[9] Capabilities and operational concepts for IAMD, for instance, still need to be developed.[10] Even when they are developed, they are unlikely to replace active means to defeat missiles right-of-launch. There will be no magic wand to counter missile threats prior to launch, nor is there any guarantee that the necessary sum of intelligence, surveillance, reconnaissance (ISR), strike, and other assets will be less expensive at the margin than additional kinetic air and missile defense interceptors. One Joint Staff publication states that "The best missile defense strategy is to destroy missiles prior to launch." This may be an oversimplification. While defeating missiles prior to launch may be the better *solution* at the margin, an IAMD *strategy* cannot and should not depend upon a left-of-launch solution.

Expectation control about left-of-launch is therefore emphasized in many of the documents and public statements that have encouraged it. While endorsing a robust IAMD vision, for instance, General Dempsey simultaneously warned that "While these offensive actions can attrite portions of the air and missile threat, they cannot assure complete negation."[11] For the foreseeable future, active air and missile defenses right-of-launch will remain necessary to compensate for limitations on countering air and missile threats left-of-launch.

## Drivers of the Review

While the strategic environment and responses change, the task of developing an effective missile defense strategy remains relatively constant. First, the purposes of missile defense and its contribution to the overall approach to national security must be defined relative to an updated assessment of current and emerging missile threats. Next, the available means to accomplish those ends need to be evaluated, including technological developments, budgetary levels, the state of the programs of record, and other policy considerations. Finally, the ways to translate available means into desired ends must be established to ensure that resources are marshaled appropriately and efficiently.

---

[8] Jonathan W. Greenert and Raymond T. Odierno, "Adjusting the Ballistic Missile Defense Strategy," Memorandum, November 5, 2014.
[9] See Brad Roberts, "Anticipating the 2017 Review of U.S. Missile Defense Policy and Posture," elsewhere in this volume.
[10] Gortney, *Countering Air and Missile Threats*, V-17. As the Defense Science Board further noted in July 2015, "To provide secure ballistic and cruise missile defense, DoD will need to develop capabilities that allow its forces to move 'left of launch' and attack the kill chain." Defense Science Board, *DSB Summer Study Report on Strategic Surprise* (Washington DC: Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, July 2015), 3.
[11] Dempsey, *Joint Integrated Air and Missile Defense: Vision 2020*, 3.

*Threat Assessment*

The MDR will begin with a review of the ballistic and cruise missile threats to the United States. The unprecedented rate of North Korean missile testing over the past several years represents both an improvement in capability and a desire to acquire intercontinental ballistic missiles (ICBMs), an intent recently made explicit by Kim Jong-un.[12] Should Pyongyang develop and begin serial production of an ICBM capable of threatening the U.S. homeland, it could strain the level of homeland defenses currently fielded. Iran also continues to develop and test long-range missiles, working to improve their accuracy, range, and survivability. Iran also appears to be putting more emphasis on solid-fueled rockets, permitting greater promptness and mobility. Russia continues to develop and conspicuously display more sophisticated conventional cruise missiles that threaten NATO.[13] China, too, has fielded the DF-21 "carrier killer," the DF-26 "Guam killer," and many other shorter-range ballistic and cruise missiles as part of its anti-access and area denial (A2/AD) strategy. Of course, both Russia and China also possess formidable arsenals of ICBMs capable of delivering nuclear weapons to the U.S. homeland.

*Policy Goals*

The next task will be to review the value of missile defense in relation to U.S. national security strategy. The MDR shapes this process by requiring an articulation of "policy, strategy, and objectives" for defeating ballistic, hypersonic, and cruise missile threats. To that end, the report requires a description of U.S. "posture, capability, and force structure," along with 5- and 10-year goals.

By way of comparison, the 2010 review identified six major goals for missile defense policy:

- Defense of the homeland against the threat of limited ballistic missile attack
- Defense against regional missile threats to U.S. forces while protecting allies and partners and enabling them to defend themselves
- Operationally realistic testing as a prerequisite to fielding new capabilities
- Ensuring that the pursuit of new capabilities is fiscally sustainable over the long term
- Flexibility to adapt as threats change
- U.S. leadership of expanded international missile defense efforts

Each of these goals from the BMDR remains worthy, but their meanings and priority are likely to be reevaluated. The prioritization of U.S. homeland defense, for instance, will likely remain

[12] Tony Munroe and Jack Kim, "North Korea's Kim says close to test launch of ICBM," Reuters, January 1, 2017, http://www.reuters.com/article/us-northkorea-kim-idUSKBN14L0RN.
[13] Roger McDermott, "Moscow Pursues Enhanced Precision-Strike Capability," *Eurasia Daily Monitor* 14, issue 1 (January 17, 2017), https://jamestown.org/program/moscow-pursues-enhanced-precision-strike-capability/.

atop the missile defense policy agenda, and could receive additional emphasis given North Korea's recent activity.

For good reason, the past three administrations have shared a discomfort about remaining wholly defenseless against ballistic missile attack. The refusal to rely on purely offensive deterrence or accept strategic vulnerability with North Korea will likely be retained, but additional action may be required to outpace the threat.

A separate question concerns Russia and China. The 2010 BMDR observed that long-range homeland missile defenses would be used against missile attack from "any source," but also noted that interceptor capacity is insufficient to defeat large-scale attacks and furthermore is not "intended to affect the strategic balance" with Russia and China. As the administration conducts a review of missile defense and defeat strategies and policy, missile defense should be examined as a means to enhance deterrence. Defenses for military forces and strategic capabilities, for instance, could improve their survivability, and thus enhance strategic stability.

A renewed emphasis on homeland missile defense, however, should not come at the expense of regional missile defense efforts for U.S. forces in the Asia Pacific, the Middle East, and Europe. The U.S. contribution to NATO missile defense notably includes the Aegis Ashore sites, one now operational in Romania and another under construction in Poland. Because they are nearly identical to the defensive systems onboard Aegis ships that support air defense and strike missions, they also represent the potential basis for a flexible and adaptable IAMD strategy for Europe.

*Budget*

Finally, the budgetary context will also shape the means available to address the threat. In adjusted 2017 dollars, the MDA topline has fallen by 23.4 percent between 2007 and 2016. Reversing that trend would be a prerequisite to any more ambitious missile defense efforts; indeed, an upward inflection point in FY2018 is necessary to implement the current strategy in the face of growing threats.

The Joint Integrated Air and Missile Defense Office's (JIAMDO) already modest budget has also continued to decline in recent years, from $109.3 million to $32.8 million between 2010 and 2017 alone, and considerably below past highs of $155.3 million in 1999 and $109.8 million in 2004. Given JIAMDO's significance to both offense-defense integration and the challenge of missile defeat, this downward trend will also be important to correct.

## Differences between MDR and BMDR

The MDR has some notable differences from its predecessor, in the first instance by having broader scope. Indeed, its detailed statutory mandate is twice as long as that for its 2010 predecessor. Whereas the object of the BMDR was ballistic missile defense policy and strategy, the MDR addresses the missile defeat capability, policy, and strategy of the United States, with respect to three distinct components:

- Left- and right-of-launch ballistic missile defense;
- The integration of offensive and defensive forces for the defeat of ballistic missiles of various kinds; and
- Cruise missile defense of the homeland.

Despite this broader scope, ballistic missile defense clearly retains pride of place, being the explicit focus of two of these three components. The MDR's scope encompasses ballistic missile defense (or rather defeat) across the full range of active, passive, kinetic, and nonkinetic measures from a variety of platforms and domains, with the express inclusion of hypersonic boost glide vehicles. The third part of the review focuses on cruise missile defense for the U.S. homeland, differentiating it from the ballistic missile defense and defeat components, which encompass regional defense as well.

About half of the 18 elements of the MDR have language almost identical to provisions from the BMDR. Indeed, the MDR includes almost everything from the BMDR, but simply adds more. Those with no prior analogue in statutory requirements include:

- Role of deterrence for missile defeat
- Missile defense posture, capability, and force structure
- Desired 5- and 10-year end-states for missile defeat programs, with benchmarks and milestones, as well as their integration and interoperability
- Means to affect the offense-defense cost curve
- Options for codevelopment with allies
- Statement of declaratory policy
- Role and plans for achieving multi-mission capabilities
- Description of the required indications and warning capabilities and a description of how to acquire them
- Ways in which adversaries can adversely affect U.S. indications and warning, and the impact of such effects.

Another important change from the BMDR to the MDR is authorship. Rather than being directed to the secretary of defense alone, the secretary and the chairman of the Joint Chiefs will jointly conduct the review. This coordination could lead to the report having a relatively more operational flavor, and better highlight the demand signals from combatant commands relative to both capacity and capability. The Joint Staff created several significant documents on the role of air and missile defense after the BMDR, including the *Vision 2020* report submitted in 2013 by then-chairman General Martin Dempsey as well as the 2012 Joint Publication *Countering Air and Missile Threats*, both of which are discussed below.

Given the emphasis on "integration of offensive and defensive force," the staff of JIAMDO, or at least the Joint Staff, will likely have a significant role in drafting the MDR. Charged with looking at this particular problem set on a military-wide perspective, JIAMDO has helped develop requirements, conduct simulations and analysis, and develop new doctrine, architectures, and concepts of operation. It would be unfortunate if JIAMDO's expertise on such matters were not leveraged for the MDR.

## Missile Defense Policy

Another development informing the review is the updated expression of missile defense policy found in the recent defense authorization act. The revision made four basic changes to the National Missile Defense Act of 1999, namely an updated status of homeland or national missile defense; a more comprehensive list of the objects to be defended; a modified description of the threat; and a revised description of the desired capability.

| Comparison of 1999 NMD Act to 2016 Update | | |
|---|---|---|
| | 1999 NMD Act | 2016 Update |
| **Status** | It is the policy of the United States to **deploy as soon as is technologically possible** | It is the policy of the United States to **maintain and improve** |
| **Description of defense** | an **effective** National Missile Defense system | an **effective, robust layered** missile defense system |
| **Object of defense** | capable of defending the **territory** of the United States | capable of defending the territory of the United States, **allies, deployed forces, and capabilities** |
| **Description of threat** | against **limited** ballistic missile **attack** (whether accidental, unauthorized, or deliberate) | against the **developing and increasingly complex** ballistic missile **threat** |
| **Funding** | with funding subject to the annual authorization of appropriations and the annual appropriation of funds for National Missile Defense. | with funding subject to the annual authorization of appropriations and the annual appropriation of funds for National Missile Defense. |

This updated language reflects changes to both the missile threat and to the current state of U.S. missile defense efforts. Much has transpired in the last 17 years, and the updated language removes some anachronisms. Homeland missile defenses were deployed in late 2004, for instance, so it makes sense to replace "deploy as soon as technologically possible" with "maintain and improve."

Other elements of the 2016 update are not too dissimilar from past expressions of current programs and policy. Expanding the scope to encompass both homeland and regional missile defense, rather than national territory alone, is also consistent with policy and program developments of the past decade, including the deployment of the Terminal High Altitude Area Defense (THAAD) and Aegis defenses.

Another change applies to the adjectives describing the desired defense, from "effective" to "effective, robust [and] layered." These changes, however, may represent a less significant policy shift than meets the eye. The 2010 BMDR also embraced "robust" defense for both long-range threats to the homeland as well as regional defenses. The Obama administration had also originally planned for a layered homeland defense featuring both Ground-based Interceptors (GBIs) and forward-deployed SM-3 IIBs. MDA's own charter (updated in 2009) also prescribes "an integrated [and] layered ballistic missile defense."[14]

Finally, the new text removes the description of a "limited ballistic missile attack," and instead prescribes a defense against "the developing and increasingly complex ballistic missile threat." This language, too, is not far removed from recent policy statements. The BMDR, for instance, also described missile threats as complex and growing.[15]

These legislative changes should also be seen as but a piece of a more complete expression of U.S. missile defense policy. The 1999 National Missile Defense Act never defined the whole scope of missile defense policy or activities under the Bush and Obama administrations, and neither will the 2016 update. While executive branch expressions of missile defense policy by the Bush and Obama administrations were informed by the 1999 act and tended to hew closely to it, they did not merely restate it verbatim. President Bush's NSPD-23 from 2002, for instance, had a slight reformulation of the "limited" language from 1999, as did the 2010 BMDR. Other documents and statements by the Trump administration will provide additional detail about the parameters of missile defense efforts, perhaps most notably in the forthcoming MDR. The MDR's legislative requirement for policy and strategy statement on homeland cruise missile defense, for instance, already goes beyond the 2016 revisions in the NDAA.

## Growing Attention to IAMD

Given the new role of the chairman of the Joint Chiefs in drafting the MDR, it may be relevant for the review process to recall the 2013 chairman's document, *Joint Integrated Air and Missile Defense: Vision 2020*, and some related Joint Staff publications. *Vision 2020* warned of an evolving security environment characterized by a "full spectrum of air and missile threats," in the hands of both major and minor adversaries, taxing some elements of

[14] "The Missile Defense Agency's (MDA) mission is to develop, test, and field an integrated, layered, ballistic missile defense system (BMDS) to defend the United States, its deployed forces, allies, and friends against all ranges of enemy ballistic missiles in all phases of flight." Missile Defense Agency, "Our Mission," https://www.mda.mil/about/mission.html.
[15] Department of Defense, *Ballistic Missile Defense Review Report* (Washington, DC: Department of Defense, 2010), 3, 16, 23.

American military superiority and creating an expanded battlespace that blurs the operational lines between regional, trans-regional, and homeland.

Despite declining defense budgets, this emerging reality has driven an increasing demand for air and missile defenses, both among combatant commands, allies, and partners.

To help meet these demands, Chairman Dempsey identified six imperatives to make IAMD a reality:

- Better distribution and use of information
- Increased interdependence among the services as well as with allies and partners
- Targeted development, modernization, fielding, and science and technology to fill capability gaps
- Connecting passive defense efforts to addressing capability and capacity shortfalls
- Improving and leveraging partner contributions
- Improving awareness of IAMD and integrating a framework of concepts, doctrine, acquisition, and war planning into combat operations[16]

To be sure, *Vision 2020* was an aspirational document articulating goals, rather than a description of current capabilities or even currently planned capabilities. In the three years since the document was issued, the DOD's budget has tightened significantly, so it is far from clear that the U.S. military is on track to achieve anything approximating these goals by 2020. The MDR notably requires end-state descriptions for the years 2023 and 2028, as well as milestones and benchmarks along the way, but much would be required to tackle the ambitious goals of *Vision 2020*.

Paving the way for the 2013 call for increased IAMD effort was another document also worthy of close consideration prior to the upcoming MDR. The 2012 Joint Publication 3-01 on *Countering Air and Missile Threats* laid out many of the operational procedures and problems for conducting counterair operations and the priorities commanders should consider in planning. Of particular note is the repeated emphasis that offensive counterair operations (OCA) are "the preferred method of countering air and missile threats," and furthermore that "The best missile defense strategy is to destroy missiles prior to launch."[17] But while left-of-launch may in principle be optimal, the aspiration is probably too good to realize, and at any rate an offensive-only posture is too great a gamble: "A mission failure in IAMD risks suffering potentially devastating attacks that could affect the outcome of the entire campaign."[18]

[16] Dempsey, *Joint Integrated Air and Missile Defense*, 4–5.
[17] Gortney, *Countering Air and Missile Threats*, xviii.
[18] Dempsey, *Joint Integrated Air and Missile Defense*, 3.

The 2012 document also emphasizes the importance of integration, particularly as a means to maximize a limited inventory. Assets for ballistic missile defense are singled out as a uniquely valuable and scarce resource, so while many of these assets may have a multi-mission capability, such as for air defense, the document suggests they ought to be conserved for ballistic missile attack.

Another notable emphasis of the 2012 publication is the role of passive defense, which it highlighted as "the responsibility of every commander in the joint force."[19] Attention to the active-passive dichotomy is another new addition to the MDR statutory requirements relative to the BMDR. Passive defenses can help compensate for capacity shortfalls in active air and missile defenses. While mobility and deception are not always considered part of the air or missile defense mission, the increased quantity and quality of adversary missiles could raise the importance of such tactics for U.S. policy and planning.

## Path Forward

Missile threats to the United States continue to grow, and the various means to counter them will require more attention. As the Joint Staff and the Office of the Secretary of Defense embark upon the Missile Defeat Review process, a wide range of policy, budgetary, and strategic considerations will play a role, as well as a review of the current programs of record and a new assessment of emerging missile threats. The recent statutory revisions to missile defense declaratory policy and the renewed attention to the broad IAMD problem set make the review especially important and timely.

To help inform the conversations around the MDR, the following essays help lay down some markers for what considerations and solutions will be important to defending against and defeating the missile threats of the near future.

[19] Gortney, *Countering Air and Missile Threats*, xxii.

# 02

# A New Missile Defense Review

Keith B. Payne

This analysis seeks to place consideration of ballistic missile defense (BMD) in its broad strategic context by examining the U.S. policy frameworks that have defined the metrics used to judge BMD's role and value over time. Over the course of decades, various U.S. BMD policies and programs have come and gone, and their consideration has taken place within the policy framework prevailing at the time.

The Johnson administration's late 1960s Sentinel BMD program, for example, focused on particular roles judged valuable for a time, including protection of U.S. society against a then-expected Chinese missile threat. By 1969, that policy framework had shifted and the Nixon administration replaced the Sentinel program with the Safeguard BMD program. The focus of Safeguard was to serve different purposes, supporting deterrence by protecting U.S. nuclear retaliatory capabilities against Soviet ballistic missile attack.

Yet, within a matter of three years, the policy framework for considering BMD once again shifted. The Nixon administration effectively canceled the Safeguard program in 1972 with the signing of the Anti-Ballistic Missile (ABM) Treaty, which prohibited any serious strategic BMD deployment, and severely limited BMD development and testing options. In approximately five years, the U.S. policy framework for considering BMD shifted significantly three times, from Sentinel to Safeguard to the ABM Treaty.

Eleven years later, in 1983, President Reagan famously announced the new U.S. goal of a comprehensive defense of U.S. society against even large-scale Soviet attack. He initiated the Strategic Defense Initiative (SDI) for this declared purpose. This was a dramatic turnabout from the then-extant policy framework favoring the absence of BMD. Yet, within five years, the U.S. SDI goal shifted, at least for the near-term "Phase 1," from the direct and comprehensive protection of society to creating uncertainties for Soviet counterforce target planning, that is, to support deterrence.

In early 1991, President George H.W. Bush, redirected the SDI goal and program once more to Global Protection Against Limited Strikes (GPALS).[20] This program, which included plans for ground- and space-based interceptors, was intended to provide direct area protection on

[20] See the Defense Department's announcement of GPALS: Office of the Assistant Secretary of Defense (Public Affairs), "New Strategic Defense Initiative Program Focus: Global Protection Against Limited Strikes (GPALS)," News Release, No. 54-91 (January 30, 1991), 1.

a global basis against limited missile strikes, including protection against missiles of less than intercontinental ballistic missile (ICBM) range.

The point here is that the policy framework for considering BMD is not static. It is shaped by shifting beliefs and judgments regarding the security context—for example, U.S. security goals and their priorities, the threat context confronting the United States and allies, and the preferred U.S. strategies for achieving its priority goals in light of threats. As the security context changes and U.S. goals shift accordingly, so too does the policy framework for considering BMD. As is well-illustrated by the multiple transitions from the Sentinel program to GPALS, the U.S. BMD roles and goals deemed worthy given perceptions of the security environment drive the consideration of programs that in turn lose or gain favor as the measures of merit for judging BMD shift with those transitions.

As beliefs and judgments shift regarding U.S. security goals and their priorities, the threat context, and preferred U.S. strategies, so too do views about what BMD might usefully do for the United States, how important that role might be, and correspondingly the metrics for judging BMD. Beliefs and judgments about these fundamental factors can shift quite rapidly and unevenly, and the history of U.S. BMD since the 1960s has seen only occasional periods of general consensus regarding the BMD policy framework and the related metrics for judging the potential roles and value of BMD—whether favorably or unfavorably.

## Recent History and the BMD Policy Framework

The occasional periods of consensus on BMD typically have been interspersed between periods of sharply competing judgments about the security environment and potential BMD roles and value. That there have been periods of both consensus and strong debate about BMD over the past six decades should come as no surprise. They are the natural, understandable reflection of both domestic political change and a dramatically shifting security environment.

This may seem a simple, self-evident point, but it helps to explain the rollercoaster ride of consensus found and lost regarding BMD, the corresponding fits and starts in U.S. BMD policies and programs, and the periodic and often contentious national debates about BMD. When significant change occurs in the domestic political constellation and the external security environment, previously established views about BMD, whether favorable or unfavorable, are very likely to be deemed an anachronism and in need of revision.

Indeed, the primary expressed goals for U.S. BMD—the focal point for its policy framework—have generally shifted to and fro from providing direct territorial defense, "area defense," that is, the direct protection of society against missile strikes, to providing "point defense" to strengthen deterrence by helping to ensure the survivability of U.S. strategic retaliatory capabilities, or some combination of these two goals. For example, as noted above, the Sentinel and SDI programs were presented primarily as providing direct territorial protection,

while Safeguard and the later Low Altitude Defense System (LoADS) were presented primarily in terms of supporting deterrence by protecting U.S. strategic retaliatory capabilities.[21]

Unfortunately, the threat environment can shift rapidly and unexpectedly, while established policy thinking can be highly resistant to change and BMD programs can take many years to move from concept, to development and testing, to deployment. Consequently, policy adjustments can lag changed circumstances, and U.S. defense acquisition programs can lag changes in the threat environment further still.

How does this discussion provide potential insight with regard to the consideration of BMD? It suggests that the potential roles and values of BMD must not be considered only in the context of current threats and circumstances because they will change, perhaps quickly and dramatically. The consideration of BMD should encourage looking well beyond existing circumstances, and a corresponding priority measure of merit for U.S. BMD policies and programs should be that they are as adaptable as the security environment is changeable.

The need for adaptability is demonstrated by recent history. Since the end of the Cold War, there has been little apparent concern about steps that might need to be taken to protect the survivability of U.S. ICBMs, including active defense via BMD. This lack of concern followed naturally from the collapse of the Soviet Union and the associated U.S. perception that the counterforce threat to U.S. ICBMs had come to an end—a threat that occupied considerable U.S. attention during the 1980s "window of vulnerability" for U.S. ICBMs. The end of the Cold War and collapse of the Soviet Union ushered in a new era perceived to be free of such concerns.

Yet, given the robust nature of contemporary Russian and Chinese strategic nuclear modernization, now including the MIRVing of new ICBMs and the possibility of highly accurate hypersonic strategic systems, it is not far-fetched to suggest that over the course of coming years, U.S. ICBM survivability will once again become a concern. Russian advances in its own BMD and deep reductions in each leg of the U.S. triad of strategic forces over the past two decades have compelled renewed concern about the survivability for the remaining U.S. forces.[22]

If U.S. ICBM survivability once again is of concern, what might be the future value of active missile defense for U.S. ICBM survivability and how might BMD for this purpose now compare to other possible measures, such as mobility and deception? While the question of

[21] For a description of LoADS, see Congress of the United States, Office of Technology Assessment, *MX Missile Basing* (Washington, DC: U.S. Government Printing Office, September 1982), 111–126.
[22] Gen. Robin Rand, the commander of Air Force Global Strike Command, recently highlighted the potential problem that Russian anti-access and area-denial capabilities will pose for continued Minuteman ICBM effectiveness. See Jennifer Hlad, "Replacing Minuteman III, *Air Force Magazine*, March 3, 2016, http://www.airforcemag.com/DRArchive/pages/2016/March%202016/March%2003%202016/Replacing-Minuteman-III.aspx. China also reportedly is developing strategic BMD. Chinese Defense Ministry Spokesman Yang Yujun stated on July 28, 2016, "To develop suitable capabilities for missile defense is necessary for China to maintain national security and improve defensive capabilities." Quoted in Bill Gertz, "China Gears Up for Missile Warfare with US," *Asia Times*, August 24, 2016.

BMD and ICBM survivability has not been an element in virtually any public discussion for decades, such considerations should now be a part of any review of BMD.

The point here is that consideration of BMD roles, measures of merit, and programs must not be limited to a policy framework derived from only the contemporary security environment because that environment will change, perhaps rapidly, and the consideration of BMD roles and measures of merit will very likely shift correspondingly. Pegging consideration of BMD only to the immediate context, or worse, to the past context, nearly guarantees not having the desired BMD programs or capabilities when needed. When the security environment shifts dramatically, as it has since the Obama administration's 2010 Ballistic Missile Defense Review (BMDR), a new look and a new debate is to be welcomed as the natural recognition that key factors in the consideration of U.S. strategic capabilities have changed, and so should our thinking about BMD.

This again may seem a simple point, but the history of U.S. BMD policies and programs illustrates as nothing else can how BMD consideration often has been based on the presumption of a static security environment and policy framework, with little apparent readiness to adjust past thinking on the subject when the security environment shifts. Dominant views of BMD roles and values can be, and have been "stuck" when the strategic environment underlying those views has long since changed.

## Assuming Continuity: The ABM Treaty

The failure to appreciate that changes in the security environment affect consideration of BMD is illustrated nowhere better than by the ABM Treaty. Signed in 1972, the ABM Treaty severely limited strategic BMD deployment, and limited BMD component development and testing outside the laboratory to narrow confines, that is, fixed and ground-based only. The Nixon administration rationalized the abandonment of its Safeguard BMD program on the grounds that forthcoming U.S.-Soviet offensive arms control limits, facilitated by the ABM Treaty, would instead address the question of U.S. ICBM survivability, thus Safeguard would be unnecessary.

The treaty also had the de facto effect of limiting potential theater missile defense capabilities as the United States adopted a restrictive "demarcation line" separating permitted theater defenses from restricted strategic defenses. And, because the treaty codified U.S. societal vulnerability to Soviet ICBMs, the United States subsequently eliminated most air defense systems against bombers on the argument that defending against bomber attack made little sense if there was to be no defense against missile attack.

Barring an extremely problematic and contentious U.S. withdrawal from the ABM Treaty, this treaty essentially "locked" the United States (and, presumably, the Soviet Union) into the continuing absence of strategic BMD (and other active defenses) on the basis of a policy framework derived almost exclusively from the particular conditions of the U.S.-Soviet mid-Cold War relationship and a policy framework favoring the codification of a stable "balance of terror" as a basis for U.S. security.

The fact that a bipartisan consensus supported an ABM Treaty of unlimited duration, with severe limitations on BMD development and testing, reflected the expected continuity of the then-current policy framework and security environment. Not only did the United States consciously codify without end date the rejection of any serious strategic BMD deployment, it also codified the rejection of BMD development and testing that might threaten to alter the balance of terror policy framework. The treaty reflected a particular threat environment and related policy framework, and actively worked against the possible adaptation of BMD roles and values to changes in the environment.

Yet, within a decade, the bipolar security environment evolved in unexpected ways. By the early 1980s, it was obvious that the follow-on strategic arms control agreement U.S. leaders had hoped would cap Soviet counterforce ICBM capabilities, and thus address the threat to U.S. ICBM survivability, had failed to do so. As a bipartisan group of senior U.S. officials noted in 1986:

> Our major effort over 17 years of arms control negotiations on strategic offensive systems has been dedicated to preserving the survivability of our own silo-based ICBMs. To the end we have used, and wasted, much negotiating leverage in trying to get the Soviets to agree to restrictions on their large MIRVed ICBMs. They have noted our concern about survivability and have cheerfully made it worse with their massive investments in the programs we most want to restrict.[23]

Consequently, preserving U.S. ICBM survivability became one of the most significant U.S. strategic concerns of the late 1970s and early 1980s. By that time, however, the well-established U.S. commitment to the ABM Treaty virtually precluded BMD *a priori* as a means of addressing this problem deemed critical by the early 1980s.[24]

In addition, a mutual U.S.-Soviet balance of terror, codified by the ABM Treaty's rejection of defensive capabilities, had become firmly established in U.S. policy as the preferred mode of deterrence security.[25] Yet, by the end of the Cold War, the security environment was again shifting in ways that led many to question a policy framework, derived from the U.S.-Soviet deterrence relationship of the 1960s and 1970s, that so favored the virtual absence of U.S. strategic defenses.

---

[23] Brent Scowcroft, John Deutsch, and R. James Woolsey, "A Small, Survivable, Mobile ICBM," *Washington Post*, December 26, 1986.

[24] See Office of Technology Assessment, *MX Missile Basing*, 113–114, 139–143. The following captures this point: "Even a tightly limited and partially effective local defense of missile fields . . . would require radical amendments or repudiation of the ABM Treaty and would create such interacting fears of expanding defenses that we strongly believe it should be avoided." McGeorge Bundy, George Kennan, Robert McNamara, and Gerard Smith, "The President's Choice: Star Wars or Arms Control," *Foreign Affairs* (Winter 1984/85): 272.

[25] For example, Secretary of Defense Harold Brown stated in 1979: "In the interests of [deterrence] stability, we avoid the capability of eliminating the other side's deterrent, insofar as we might be able to do so. In short, we must be quite willing—as we have been from some time—to accept the principle of mutual deterrence, and design our defense posture in light of that principle." Harold Brown, *Department of Defense Annual Report, Fiscal Year 1980* (Washington, DC; U.S. GPO, January 25, 1979), 61.

For example, by the early-1990s, the proliferation of missile and nuclear weapon technology suggested that a BMD policy framework that generally favored the continued absence of U.S. active defenses was becoming increasingly divorced from reality.[26] Along with proliferation, the collapse of the Soviet Union highlighted associated concerns about the potential for unauthorized missile launches and added to the shifting policy framework in favor of some BMD. In 1999, in recognition of such emerging limited missile threats, Congress passed and President Clinton signed-off on the Missile Defense Act, stating that "It is the policy of the United States to deploy as soon as is technologically possible an effective National Missile Defense system capable of defending the territory of the United States against limited ballistic missile attack (whether accidental, unauthorized, or deliberate)."

This policy was inconsistent with the unlimited duration and restrictions of the ABM Treaty that were designed to serve a very different policy framework—the U.S.-Soviet mutual balance of terror. They could not accommodate the defensive goals increasingly deemed valuable given new, post–Cold War security concerns. Consequently, the George W. Bush administration, almost immediately upon coming to power, took on the still-challenging task of withdrawing from the ABM Treaty; and in December 2002, the United States initiated a development, testing, and deployment program in line with the policy framework set out in the Missile Defense Act of 1999.

## Shifting Again

From 1999 until recently, there has been an enduring general consensus on *limited* strategic BMD, largely in recognition of North Korean and Iranian missile programs, and an increasing emphasis on defenses against theater-range ballistic missiles given their continuing proliferation. Correspondingly, the U.S. BMD policy framework, as reflected in the 2010 BMDR, has effectively been bifurcated: it distinguishes between the accepted role of defending against limited strategic missile threats from small states such as North Korea, as opposed to the broader goal of defending against larger strategic missile threats posed by Russia or China—a goal publicly rejected by senior administration and military officials.[27] This bifurcated policy framework essentially favors defending against the limited strategic missile threats from select small states while continuing to rely on deterrence for protection against the larger missile threats.

However, there has been recent movement in the FY 2017 National Defense Authorization Act (NDAA) to eliminate the word "limited" from the earlier language of the 1999 Missile Defense Act, in favor of the creation of a "robust layered missile defense system capable of defending the territory of the United Sates, allies, deployed forces, and capabilities against

[26] See an early discussion of these dynamics: Keith B. Payne, *Missile Defense in the 21st Century: Protection Against Limited Threats* (Boulder, CO: Westview Press, 1991).
[27] Air Force Gen. John Hyten reportedly made this point in recent congressional testimony. See "US Missile Defense Not Meant to Offset Balance With Russia, China—US General," *Sputnik*, September 20, 2016. U.S. officials have also said that "Our missile defense system is not designed against China. Never has been and never will," and that "We don't defend against China as a threat." See the reported statement by VADM James Syring, director of the Missile Defense Agency, in Yoon Min-sik, *The Korea Herald*, August 11, 2016, http://www.koreaherald.com/view.php?ud=20160811000829.

the developing and increasingly complex ballistic missile threats."[28] Toward this end, the NDAA also calls for the exploration of BMD boost phase intercept and space-based platforms. These are not trivial directions. They suggest a shift to new and more expansive U.S. strategic BMD goals than has been the case for almost two decades.[29] If so, the appropriate measures of merit for U.S. BMD systems and requirements will again shift accordingly.

Developments inspiring these recent BMD initiatives appear to include the continued proliferation and buildup of missile capabilities, the deepening hostility in U.S.-Russian relations and in Chinese relations with key U.S. allies, ongoing Russian arms control violations and the renewal of its strategic nuclear capabilities. Despite these developments, the Obama White House has indicated strong opposition to reconsidering U.S. BMD in this revised fashion—reflecting anew a lack of political consensus regarding the proper roles for and value of U.S. BMD in a shifting threat environment.[30] A new administration may, however, be more favorable.

## The Implications of a Highly Dynamic Threat Environment for BMD

This brief discussion illustrates how the perceptions of the threat environment directly affect the U.S. policy framework for considering BMD, and how often and significantly that environment shifts—thereby changing the BMD roles and values that are deemed worthy of consideration, and correspondingly the appropriate measures of merit for BMD. The effect of this dynamic, combined with domestic political developments, has been shifting goals and periodic points of consensus about U.S. BMD and its measures of merit amid periods of sharp debate on the subject—with no likely end in sight to this uneven and unpredictable process given the turbulence and uncertainties in the contemporary threat environment.

The implications of this reality are profound for the consideration of U.S. BMD. What are the BMD roles and values that should be deemed worthy of consideration, now and for the future? And, what are the corresponding BMD measures of merit that should be applied? Because the threat environment is a moving and uncertain target, as are the prospective BMD roles and values deemed worthy of consideration, BMD capabilities (or the absence of capabilities) deemed suitable for U.S. goals in one context may be overtaken rapidly by changes in the external threat environment and the domestic political context. This was the previous U.S. experience with the dramatic policy turnabouts from Sentinel, to Safeguard, to the ABM Treaty, to the SDI over the course of only 15 years.

---

[28] See Sections 1652, 1656, and 1665 of the House-passed and Senate-passed versions of the NDAA for FY 2017. See also National Defense Authorization Act for Fiscal Year 2017, *Conference Report to Accompany S.2943, Sec. 1681*, 114th Congress (2016), 1598.
[29] David J. Trachtenberg, "Time to Reassess U.S. Missile Defense Policy," *Information Series*, National Institute for Public Policy, No. 409 (July 25, 2016).
[30] See, for example, the discussion in "Ballistic Missile Defense: What's in a Word?," *Defense News*, June 25, 2016, http://www.defensenews.com/story/defense/commentary/editorial/2016/06/24/ballistic-missile-defense-whats-word/86292350/.

The challenge therefore is to identify fundamental U.S. BMD goals and associated policy frameworks for evaluation that, to the extent possible, are expected to be enduring, and also to identify plausible excursions that would affect the roles for BMD deemed worthy and the corresponding BMD measures of merit. This is an uncertain and imprecise business; former U.S. Navy Secretary Richard Danzig has rightly likened it in general to "Driving in the Dark."[31] As such, considerable speculation cannot be avoided.

There are several BMD goals that are most likely to endure given some basic continuing characteristics of the threat environment, and several other goals that may well emerge over time. Virtually all of these possible goals have past precedent and have been part of one or more previous U.S. BMD policy frameworks.

For example, the United States is likely to maintain the existing goal of providing societal protection against select limited threats. This goal easily fits the existing bifurcated BMD policy framework. But the emerging threat environment is characterized by continuing ballistic and cruise missile proliferation, including the ballistic missile programs of North Korea, Iran, and China, and increasingly sophisticated ballistic and cruise missile threats, with greater missile numbers, complexity, and sophistication.[32] Missile threats also increasingly appear to be directed against the U.S. homeland itself.[33] The growing North Korean missile and nuclear capabilities in particular (and prospective Iranian capabilities), including the apparent North Korean development of a submarine-launched ballistic missile,[34] are likely to reinforce U.S. concerns regarding this expansion of limited missile threats, and an enduring U.S. commitment to some level of active defense against such threats.[35] In short, the United States is highly unlikely to move back to a policy framework that prioritizes the virtual absence of defenses for U.S. territory in favor of "stable" mutual deterrence concepts vis-à-vis countries such as North Korea.

The existing BMD goal and policy framework is likely to mandate an expansion of U.S. and allied missile defense capabilities to keep pace with these expanding limited threats. This direction may also be reinforced by the potentially increased threat of unauthorized/accidental missile launches associated with proliferation. (U.S. missile defense is a much more reasonable response to this concern than the frequently proposed notion of pressing for international agreement to take missiles off alert.) The reportedly increasing

---

[31] Richard Danzig, *Driving in the Dark: Ten Propositions About Prediction and National Security* (Washington, DC: Center for a New American Security, October 2011).
[32] See, for example, the discussion in U.S. Joint Chiefs of Staff, *Joint Operating Environment 2035* (Washington, DC: Joint Chiefs of Staff, 2016), 6–7, 17, 25–26, 47.
[33] Ibid., 7, 26–27.
[34] Park Chan-Kyong, "North Korea Test-Fires Sub-Launched Missile Close to Japan," August 24, 2006, https://www.yahoo.com/news/n-korea-test-fires-sub-launched-missile-yonhap-214636610.html.
[35] As Sen. Jim Inhofe recently remarked, "The growing ballistic missile threats to our nation and our allies are beginning to outpace the United States' missile defense capability in numbers and sophistication." Thus, it is time for "prioritizing and modernizing our nation's missile defense." Jim Inhofe, "Inhofe Statement on North Korea's Launch of Two Medium-Range Ballistic Missiles," August 3, 2016, http://www.inhofe.senate.gov/newsroom/press-release/inhofe-statement-on-north-koreas-launch-of-two-medium-range-ballistic-missiles. The recent Japanese annual defense review reports that the North Korean Taepodong 2-derived missile can now target the United States, and that North Korea may now have the capability to strike the United States with a missile-delivered nuclear warhead. "N. Korea Likely Has Capability to Launch Missile Able to Hit Mainland US: Japan," *Yonhap*, August 2, 2016.

possibility of specialized missile EMP threats may also reinforce interest in an expansion of U.S. BMD to keep pace with select limited threats.[36]

The existing bifurcated U.S. BMD policy framework is consistent with these goals, at least to the point where U.S. defenses against selected limited missile capabilities expand to the threshold of posing a threat to Russia's retaliatory capabilities (Russia's currently expressed concern amid U.S. denials). Also consistent are existing U.S. strategic BMD initiatives, including consideration of a third U.S. BMD site, an increase in the number of defensive interceptors, a Redesigned Kill Vehicle (RKV), the Multi-Object Kill Vehicle (MOKV), and the Long Range Discrimination Radar in Alaska. The existing policy framework could encompass further plausible defensive measures that add to the reliability and effectiveness of U.S. missile defense capabilities for this limited but expanding defensive goal, including boost phase defenses and defenses against cruise missiles.

Although NATO territorial defense was affirmed in the recent *Warsaw Communique*, the existing BMD policy framework would likely need to be revised to place any emphasis on defensive capabilities against a potential Russian missile attack against NATO territory. The protection of NATO territory and military assets against Russian theater ballistic and cruise missiles, particularly those critical to the rapid reinforcement of allied forward defenses and NATO nuclear deterrent capabilities will become increasingly important if Russia continues to deploy new missile strike capabilities along with its expansionist goals and strident threats against Western neighbors. If so, there are likely to be significant implications for the number and types of allied missile defenses in and around Europe.

Additional BMD goals and associated capabilities outside the existing BMD framework may also be deemed of considerable value in coming years. For example, as discussed briefly above, with U.S. ICBM survivability likely to be of growing interest given Russian and potentially Chinese actions, and inherent impediments for alternative U.S. ICBM survivability measures, including mobility,[37] defensive protection for ICBMs and other U.S. strategic deterrence assets may be deemed increasingly critical. Such BMD capabilities could contribute to deterrence by strengthening ICBM survivability and by helping to preclude any future need for launch-on-warning or launch-under-attack (LOW/LUA) tactics for this purpose. Given the many decades that the new U.S. ICBM (Ground Based Strategic Deterrent—GBSD) is intended to be viable, discounting the potential for the emergence of a serious new counterforce missile threat to its survivability would be heroically optimistic.

Current U.S. BMD programs appear not to be intended for this deterrence-oriented purpose, but they have been in the past and may need to be so again. An obvious change in U.S. planning that would render this BMD goal irrelevant vis-à-vis U.S. ICBMs would be a decision to eliminate this leg of the triad. At this point, however, such a decision would be a serious

[36] Bryan Gabbard and Robert Joseph, *Addressing Electromagnetic Threats to U.S. Critical Infrastructure*, JINSA's Gemunder Center EMP Task Force (Washington, DC: Jewish Institute for National Security of America, September 2015).

[37] For a past, but still instructive, examination of alternatives, see a report devoted to this question: Office of Technology Assessment, *MX Missile Basing.* For a recent discussion of this point, see Brian Wish, "Mobile ICBMs Are a Bad Idea," *Real Clear Defense*, August 3, 2016, http://www.realcleardefense.com/articles/2016/08/03/mobile_icbms-are-a-bad-idea-109666.html.

mistake and appears *not to be in the cards*; consequently, renewed concern about ICBM survivability and consideration of BMD for this deterrence role appears wholly reasonable. There are likely implications of this possibility for the GBSD program and certainly for the measures of merit for U.S. missile defense programs and planning.

Perhaps the most significant departure from the current BMD policy framework would be a renewed goal of thick U.S. territorial protection, that is, "area defense," for direct societal protection *against large-scale Russian and/or Chinese missile attack*. While such an expansive goal may seem implausible at this point, there is past precedent for it, notably Sentinel and the original SDI, and the security environment may evolve in a direction that again places great importance on this goal.

Moving in this direction almost certainly would require BMD programs beyond current kinetic defense systems and terrestrial basing, probably including breakthroughs in the development and application of directed energy.[38] Space- and sea-basing appear to provide the greatest potential defensive flexibility for responding to a broad array of missile threats potentially originating from widely disparate global locations.[39] This goal would suggest the need for a renewed emphasis on U.S. missile defense research and development—an emphasis that reportedly has declined dramatically over the past two decades.[40]

A less dramatic departure from the current envisaged role for BMD would be "thin" missile defense to protect against *limited missile threats* or attacks *from any origin*, including Russia and China. The intention would be to support two priority goals simultaneously: 1) direct territorial *protection against limited missile attacks from any origin*; and 2) *protection against counterforce attack or coercive strategies* involving limited threats from any origin. Defenses would protect territory, that is, society, against *any limited attacks*, including any intentional, or accidental/unauthorized strikes, and could be scoped to provide highly effective protection against the limited missile arsenals of most countries, including North Korea, Iran, and possibly China. They simultaneously could contribute to deterrence by strengthening the survivability of U.S. retaliatory forces against any attack (again, helping to preclude any U.S. need to rely on LOW/LUA tactics for this purpose), and by reducing U.S. vulnerability to coercive missile threats.

These BMD roles could fit within a still bifurcated policy framework because a thick territorial defense against Russia would not be included. These more limited goals intended to provide U.S. territorial defense against limited attack from any origin and to support U.S. deterrence strategies would be akin to elements of multiple earlier programs, including, Sentinel,

[38] According to some defense industry experts, the application of laser technology for missile intercept will be available "within five years." Cameron Leuthy, "Lasers That Shoot Down Long-Range Missile Could Upend the Market," *Bloomberg*, September 12, 2016, https://about.bgov.com/blog/lasers-shoot-long-range-missiles-updend-market.
[39] See the excellent discussion in Steve Lambakis, *The Future of Homeland Missile Defense* (Fairfax, VA: National Institute for Public Policy, 2014), 47–68.
[40] Thomas Karako, Wes Rumbaugh, and Ian Williams, *The Missile Defense Agency and the Color of Money* (Washington, DC: Center for Strategic and International Studies, July 2016), 28–35.

Safeguard, Phase 1 SDI, LoADs, and GPALS. These defensive goals also would likely suggest the need for a renewed emphasis on U.S. missile defense research and development.

In addition, as discussed above, past U.S. BMD goals have largely been presented in terms of the value of BMD for deterrence and/or direct territorial defense. Another increasingly important basis for assessing the value of BMD goals and programs is the degree to which BMD can help to assure allies. This is *not* a new U.S. strategic goal; Secretary McNamara discussed it in relation to the Sentinel program. However, given Russian and Chinese aggressive expansionism in Europe and Asia respectively, it is increasingly clear that BMD contributes to this goal for some European and Asian allies. Identifying how U.S. missile defense plans and programs can contribute to assurance should be a significant element of their measures of merit.

Finally, given a highly dynamic threat environment, U.S. BMD plans and programs should be designed from the outset to be as adaptable and resilient as possible to address a variety of possible BMD roles and goals, including some that may not be considered critical now, but could easily be so over the course of a decade. U.S. BMD goals, plans, and programs must be able to adapt to a shifting threat environment and corresponding shifting needs. Indeed, adaptability and resilience should now be regarded as a continuing, priority measure of merit for U.S. BMD goals and programs. As Richard Danzig observes with regard to defense efforts in general, in a highly dynamic threat environment in which "unpredictability and frequent surprise" is the norm, "there are heavy penalties for ponderous decisionmaking and slow execution."[41] The same surely is true for BMD. Consequently, the United States must, to the extent possible, seek to reduce long lag times in the acknowledgment of negative changes in the security environment, the corresponding recognition of new defensive needs, and the fielding of programs responsive to those needs.

Current U.S. decisionmaking, development, and production processes in general appear not to value highly either adaptability or speed. Some special provisions historically have been made available for U.S. BMD in this regard, but perhaps it is helpful to recall that the United States moved the Polaris SSBN/SLBM program from concept to first submerged missile test launch in four years, with the first Polaris patrol coming shortly thereafter. Streamlining the typically sluggish processes that have been established over decades would likely be an enormous undertaking. But, in a world in which changes in the threat environment often are not sluggish, ponderous, or predictable, the U.S. BMD policy framework must now include these broad considerations as key elements in its measures of merit.

[41] Danzig, *Driving in the Dark*, 6.

# 03

# Anticipating the 2017 Review of U.S. Missile Defense Policy and Posture

Brad Roberts

As the new national security team comes together in early 2017, it will launch into a number of major policy reviews, some of its own volition and some mandated by Congress. Among the congressionally mandated reviews will be a review of missile defense policy and posture.[42] This will be the second such congressionally mandated missile defense review, following the one mandated in 2008, conducted by the Obama administration in 2009, and summarized in the unclassified Ballistic Missile Defense Review Report of 2010.[43]

This paper sets out a framework for examining the main issues likely to be taken up in the new administration's review. It builds on the experience of creating and conducting the 2009 BMDR and implementing its results. This paper begins with a discussion of the likely scope of the review. Five main components are then analyzed, with a primary focus on the major policy questions that will require leadership decision.[44]

## Scope of the Review

As directed by the Congress, the 2017 missile defense review will take a very broad look at U.S. missile defense policy and posture. The Congress has asked for a restatement of high-level strategy objectives and for a comprehensive assessment of present capabilities and future requirements. But the scope of the 2017 review will be, by legislative direction, somewhat different from that of the 2009 review. Rather than focus on defense against ballistic missiles as in 2009, the 2017 review will examine the broader threat posed by both ballistic and cruise missiles, and also by hypersonic glide vehicles. Rather than focus just on kinetic kill of missiles, the new review will examine the broader toolkit for defending against missile threats, including nonkinetic means, denial and deception, and "left-of-launch" capabilities that effectively negate the missile threat before it launches. The Congress seeks a "missile defeat" strategy, not just a "missile defense" strategy.

---

[42] National Defense Authorization Act for Fiscal Year 2017, *Conference Report to Accompany S.2943*, Sec. 1694, 114th Congress (2016): 1601-1609.
[43] U.S. Department of Defense, *Ballistic Missile Defense Review Report, 2010* (Washington, DC: DoD, 2010).
[44] This paper builds on an informal presentation originally delivered to the April 2016 Missile Defense Conference of the Royal United Services Institute in London. The author benefited from feedback from conference attendees and from a subsequent seminar discussion of the same topic at the Center for Strategic and International Studies hosted by Tom Karako. The author is grateful also for feedback and assistance from Ivanka Barzashka and Peppi DeBiaso in developing these arguments.

It is important to understand the intended role of such policy and posture reviews. The Congress mandates such reviews in order to stimulate policy coherence in areas of particular interest. The administration is obliged to conduct the review and to address the questions posed by the Congress, but has the latitude to shape the study as it sees fit. In 2009, the legislative requirement was followed by a Presidential Study Directive to the Department of Defense that spelled out the objectives and scope of the BMDR. The reports themselves are intended to serve as a means of informed dialogue between the executive and legislative branches about national policy and about how to align military requirements, operational capabilities, and budget requests with policy. The 2010 report was an unclassified summary of a classified review that lasted a year. The Obama administration provided that unclassified report in order to help inform national and international discussion about its policies and plans. The BMDR was one of a number of such unclassified reports, including the reports of the Quadrennial Defense Review and Nuclear Posture Review, which were aimed at promoting informed discussion. This helped to lay the political foundation for cooperation with the Congress and with allies to advance those plans. The next administration would be well served by a similar approach.

## Main Components of the Review

The 2017 review will likely be built around five main components:

1. An intelligence-informed review of the threat environment.
2. A review of the 2017 Program of Record for capability acquisition.
3. An assessment of the budget context.
4. An assessment of the political context.
5. A review of policy objectives and strategies.

The first building block—an intelligence-informed review of the threat environment—will look both backwards and forwards. In looking backwards, it will assess what has changed relative to 2009. According to the 2016 assessment of the U.S. intelligence community, the ballistic missile threat to the United States and its allies has become more complex and diverse, with an increase in the number of adversary ballistic missiles, an increased sophistication of those missiles, and improving BMD countermeasures.[45] Cruise missiles have a rapidly rising salience across the globe. China, Russia, and others concerned with deterring and defeating U.S. power projection are comprehensively modernizing their missile strike capabilities, both ballistic and cruise. Their success in bringing together anti-access, area denial capabilities (A2AD) could call into question the credibility of the U.S. security commitments to allies in Northeast Asia, Europe, and the Middle East.

[45] For a recent intelligence-informed update, see James R. Clapper, "Worldwide Threat Assessment of the U.S. Intelligence Community" (statement for the record to the Senate Armed Services Committee, February 9, 2016).

After taking stock of changes over the last decade, the review will look ahead a decade or so in order to characterize emerging threats. It will likely note continued uncertainty about how and when ICBMs might be fielded by North Korea and Iran, whether nuclear-tipped or not. It will likely predict North Korean progression from research, development, and testing of long-range ballistic missiles into serial production. It will likely highlight Iranian missile and nuclear capabilities and the uncertainties associated with implementation of the Joint Comprehensive Plan of Action (JCPOA). It will also assess the impact of new technologies in the hands of U.S. adversaries and their potentially disruptive applications.

The review of the threat environment will likely also address the continued efforts by Russia and China to adapt their strategic forces in order to ensure their effectiveness in penetrating U.S. missile defenses. It will likely also explore developments in their regional missile postures since 2009. These include the emergence of short-range and potentially also intermediate-range ballistic missile threats from Russia to Europe. The progress of both Russia and China in developing missile defense penetration capabilities is also noteworthy.[46] The review will likely examine the hypersonic glide capabilities in development by both Russia and China.[47] And it will likely also assess the possible implications of further potential Russian violations of the treaty on intermediate-range nuclear forces (INF). A Russian decision to proceed to deploy such weapons would raise a major question about strategic stability in Europe (arising from increased confidence in its ability to safely initiate war and manage the risks of escalation) as well as new questions about the role of NATO's missile defenses (see more below).

The second main building block of the 2017 review will be a review of the program of record (PoR). This is a term used to describe a Department of Defense acquisition program that is approved in the Future Year Defense Program (FYDP), and thus is a line item in the defense budget. On regional BMD, the program of record reflects a commitment to continue to ramp up deployed forces, albeit more slowly than expected in 2009. On homeland BMD, the program of record reflects completion in 2017 of the purchase and deployment of 44 Ground-based Interceptors (GBIs) as well as a commitment to continue to update and modernize this system to ensure continued performance improvements. The program of record also reflects the Obama administration's approach to hedging in the homeland defense posture—against possible rapid emergence of new missile threats from North Korea and Iran. The current hedge comes in the form of the infrastructure for future GBI deployments in Alaska (up to a possible 100) and a process for evaluating candidate sites for a new missile field on the East coast or in the center of the country.[48]

The third main building block of the 2017 review will be a review of the budget context. Our national ambitions for BMD have been hostage to federal budget paralysis. BMD spending for

[46] Ibid., 8–9.
[47] Jen Judson, "Hypersonic Weapons Threat Looms Large at Missile Defense Symposium," *Defense News*, August 17, 2016. Reuben Johnson, "China and Russia take aim at THAAD with Hypersonic Programmes," *IHS Janes Defense Weekly,* May 10, 2016.
[48] Department of Defense, "Missile Defense Protection of the American Homeland: Hedge Strategy," Report to Congress, March 15, 2013.

the Missile Defense Agency is down—by about 23 percent since 2009.[49] Spending reductions have come at the expense of advanced capabilities, as spending for research and development has continued to shrink. The November 2016 election may bring a pathway out of the Budget Control Act. But it may not. We should expect a significant debate about overall level of effort on BMD (from a spending perspective) and about the relative emphasis on procurement versus the development of advanced capabilities (about which more below).

The fourth main building block will be a review of the political context. This is unlikely to be reflected in written guidance to the study team, of course. But politics will undoubtedly shape the next set of decisions. The next administration will inherit a measure of bipartisan agreement on the basic strategic assumptions of U.S. missile defense policy unknown in recent decades. This has something to do with a shared appreciation of the strategic values of missile defense to U.S. defense strategy and to U.S. interests more broadly. Elsewhere I have catalogued those values in terms of their impact on U.S. deterrence, assurance, and strategic stability strategies.[50] Given bipartisan support in the Congress for the benefits of missile defenses, it is hardly surprising that the United States has pursued them, within certain policy boundaries, for nearly two decades. The 1999 National Missile Defense Act reads as follows: "it is the policy of the United States to deploy as soon as is technologically possible an effective National Missile Defense system capable of defending the territory of the United States against limited ballistic missile attack (whether accidental, unauthorized, or deliberate)."[51] Similarly, there has been bipartisan support for ramping up regional missile defenses as the technologies become available.

But the political agreement in support of missile defense is neither broad nor deep and thus is vulnerable to perturbations. The advocates of missile defense are relatively few and they tend to have different visions of how capabilities should come together over the medium term. The national election result may be interpreted by the next leadership group as giving it new leeway for new projects outside the recent scope of bipartisan strategic agreement (as discussed in further detail below). Embracing the strategic values of missile defense, some new policymakers might seek a much more ambitious missile defense policy and posture. Others might be more skeptical of those values and seek to constrain the further development of missile defenses. As we have seen, the election may also put U.S. relations with Russia and China on an entirely different footing while also reinforcing the view that allies need to do more to protect themselves.[52]

---

[49] Thomas Karako, Wes Rumbaugh, and Ian Williams, *The Missile Defense Agency and the Color of Money* (Washington, DC: Center for Strategic and International Studies, July 2016).
[50] For a full discussion of those strategic values, see Brad Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century* (Stanford, CA: Stanford University Press, 2015), chapter 3, "The New Regional Deterrence Strategy," 81–105. See also Brad Roberts, *On the Strategic Value of Missile Defense*, Proliferation Papers No. 50 (Paris: IFRI, June 2014).
[51] Public Law 106-38, 113 Stat. 205 (July 22, 1999).
[52] David E. Sanger and Maggie Haberman, "Donald Trump Sets Conditions for Defense NATO Allies Against Attack," *New York Times*, July 20, 2016.

The fifth main building block will be a review of policy. As a first step, the leaders of the next review are likely to reassess the policy results of the 2009 review. As set out in the 2010 BMDR Report, the Obama administration set out six policy priorities:

1. To defend the American homeland against the threat of limited ballistic missile attack from states like North Korea and Iran

2. To defend against regional threats to U.S. forces (whatever their source), while protecting allies and partners and enabling them to defend themselves

3. To test new capabilities under realistic operational conditions before deploying them

4. To ensure new capabilities are fiscally sustainable over the long term

5. To ensure that BMD capabilities are adaptable to future threats and are flexible to adjust as the threats change

6. To lead expanded international efforts for missile defense[53]

Of course some changes can be expected. Every administration creates its own strategic vocabulary and needs to put its own imprint on inherited agendas. Every administration also brings a new set of political perspectives that at least reshuffle past priorities. This implies some changes to these priorities. On the other hand, there has been a lot of continuity in U.S. missile defense policy over the last 20 years, and it is plausible to expect more of the same.

But where will the balance fall? Will there be more continuity or more change? A case can be made for both. On the one hand, a lot of continuity can be expected because of the absence of sharply partisan differences over the strategic value of missile defense and over the policy priorities pursued since 2009. On the other hand, the bipartisanship in evidence is (as argued above) neither broad nor deep and the policy review is likely to surface some fundamental issues in an international context quite different from 2009. The potential for significant change is real, but its likelihood is difficult to gauge. To better anticipate the possible alternative outcomes in 2017, the following analysis focuses on the top two policy priorities as set out above. These will not be the only focus of policy debate, but they are likely to be the primary ones.

## Defending the Homeland

The Obama administration's priority has been to defend the American homeland from limited attack by countries like North Korea and Iran. The next administration will have to make decisions on at least two big questions in 2017:

[53] DoD, *Ballistic Missile Defense Review Report*, 11–12.

1. Should the United States retain the commitment to a high level of protection against only *limited* attacks, or should it seek protection against all attacks, whatever their scale and source?

2. Assuming the United States retains that commitment, should it retain the 2009 commitment to maintain the currently "advantageous position" vis-à-vis North Korea and Iran.[54]

*Homeland Defense and the "Limited" Criterion*

Should the United States retain the commitment to protection against only *limited* strikes? The term "limited" was first introduced in the 1999 National Missile Defense Act, as cited above. The 2017 NDAA strips out the term.

At its most basic, this is a question about whether the United States should also seek protection of the American homeland from strikes by Russia and China. Debates on this question have surfaced periodically since missile defense first came into discussion in the 1950s. The 2010 BMDR Report states clearly that the United States does not seek the capability to defeat the large-scale strikes of which Russia and China are capable and is not intended to undermine strategic stability with them. This echoed the approach of the George W. Bush administration and thus reflected a measure of bipartisan agreement. But the 2010 BMDR Report also states that missile defenses would be engaged to try to defeat any missile strike on the American homeland, even if it would be ineffective against large-scale strikes. By removing the word "limited" from the statement of objectives, the United States would be adopting a policy of protection of the homeland from all strikes, whatever their scale and source. This would align well with the preferences of those who see a need and value in protecting the homeland by strikes from Russia and China. David Trachtenberg, for example, has argued that "continued American vulnerability to Russian nuclear missiles is unacceptable."[55]

As argued above, the threat analysis will show that Russia and China are both modernizing and improving their ability to strike the United States and to penetrate U.S. missile defenses. They are doing so in part on the argument that their strategic forces would not survive in large numbers an American first strike, thus negating the credibility their threats to retaliate with limited forces against a U.S. BMD systems aimed at limited protection. And as the political analysis will show, leaders in both Moscow and Beijing rejected the Obama administration claims of limited missile defense ambitions against either Russia or China. They were not reassured by the transparency and confidence-building measures offered by the Obama administration and were not interested in proposals for cooperation against third-party missile threats proposed by the administration and NATO.[56] Russian and Chinese officials and experts have become ever clearer that their objections to U.S. missile defense

[54] Ibid., iv.
[55] David Trachtenberg, *Time to Reassess U.S. Missile Defense Policy*, Information Series Issue No. 409 (Fairfax, VA: National Institute for Public Policy, 2016), 3.
[56] Dmitry Medvedev, "Statement by Dmitry Medvedev in Connection with the Situation Concerning the NATO Countries' Missile Defence System in Europe," Permanent Mission of Russia to NATO, November 23, 2011; Roberto Zadra, "NATO, Russia, and Missile Defence," *Survival* 56, no. 4 (2014).

are both technical and political—that they are not concerned about the current capability of the system but about potential future developments, and they see missile defense as part of a hidden U.S. political agenda to encircle, contain, and coerce them, and to foist color revolutions upon them.[57]

Their shared concerns have resulted in the development of new technologies, deployment of new capabilities, and implementation of new operational approaches. Most of these are separate national activities but some are cooperative.[58] Although U.S. missile defense is not designed against them, Russia and China are developing and fielding countermeasures aimed at disrupting and destroying elements of the system. Some of these countermeasures are aimed at ensuring that their own nuclear forces can overcome U.S. missile defenses. Others are directed at undermining the effectiveness of the U.S. system as a whole, potentially undermining its effectiveness against regional actors (some of whom are their military allies.) For example, Russia has "deployed radar-imagery jammers and [is] developing laser weapons designed to blind U.S. intelligence and ballistic missile defense satellites."[59]

How should the next administration approach the decision about whether or not to set aside the "limited" criterion? The case for abandoning "limited" and seeking to protect the American homeland from missile strikes by Russia and China is most fundamentally that new threats require a new approach. After all, between 2009 and 2016 bilateral U.S. relations with both countries have taken a turn for the worse, and with Russia dramatically so. If leaders in Moscow and Beijing intend to target the United States with even limited strikes, we should be able to protect ourselves. There is also an argument that increasing the role of missile defense in the deterrence relationships with Russia and China can reduce the role of nuclear weapons in those relationships.

But the case against this policy change is powerful. From a technical perspective, it is far from clear that the United States can compose a missile defense of the homeland robust against all kinetic and nonkinetic threats from major powers. Even if it were technically feasible, the cost of doing so would be far beyond what the nation has been willing and able to spend on missile defense thus far. In the current budget context, a decision to spend significant new resources in pursuit of this goal would likely come at the cost of modernization of other elements of the strategic toolkit. This would be especially troublesome to the effort to maintain the nuclear deterrent as current forces age out over the next decade. And if the United States were successful in finding the technologies and money to fulfill this ambition, there would be responses by Russia and China to ensure that their deterrents remain credible in their eyes (and ours). An intensification of the action-reaction cycle could turn into an arms race, with significant consequences for the political relationships and major consequences for U.S. allies, most of whom would strongly caution against such strategic competition (and who would likely resist being drawn into it).

---

[57] These insights are drawn from unofficial dialogues conducted in recent years. For a discussion of key insights from such dialogues bearing on the question of strategic stability, see the chapters on Russia and China in Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century*.
[58] "Russia, China launch first computer-enabled anti-missile exercises," TASS, May 26, 2016, http://tass.com/defense/878407.
[59] Clapper, "Worldwide Threat Assessment of the U.S. Intelligence Community."

In my view, policy continuity on this topic is preferable to major policy change. The United States should not seek homeland missile defense against Russia and China because doing so would generate major new threats to U.S. allies and probably a race for strategic advantage with both Russia and China. There is no technical solution and, even if there were, the money is not available for this purpose. If either were to attack the United States with very few weapons, or if there were to be an accidental or unauthorized launch from either country, the United States should do what it can to protect itself with the capabilities in being. But it should not design its homeland defense for the purpose of negating the strategic deterrents of Russia or China.

If the next administration opts to retain the commitment to limited protection, it would then face three subsidiary decisions.

1. Should it give up on reassuring Moscow and/or Beijing that U.S. missile defenses are not intended to undermine strategic stability and that the capabilities it is composing are consistent with its commitment to limited protection?

2. Should the United States respond to Russian and Chinese countermeasures to U.S. missile defense?

3. Should the protection against limited ballistic missile strikes be extended to protection against limited cruise missile strikes on the homeland (reportedly, a threat posed by Russia, not China)?[60]

First, in my assessment, the United States should not give up on reassuring Moscow and Beijing. But its expectations should be far lower than in 2009. As a first principle, it should continue to seek stable strategic relations with Russia and China because increasingly unstable relations would increase the risk of confrontation, increase the threat to U.S. allies, and reduce cooperation on other priorities. There is already a good deal of instability for multiple reasons and the United States should find ways to work with both countries to address the sources of instability. Toward that end, the United States should continue to provide the reassurances to Moscow and Beijing it considers necessary and appropriate, even if they are not fully effective. Over time, these may have a positive effect in one or both capitals. Another reason for doing so is that such efforts are essential for building political support in the United States and among its allies for enhanced military responses to emerging regional missile threats from Russia and China (as argued further below). The next administration must appreciate the political value to U.S. allies of such efforts to assure Moscow and Beijing, given their concerns about becoming entangled in an intensification of competition between the United States and their neighboring major power. But the next administration must proceed with reduced expectations of cooperation and increased attention to developments in their military postures, both strategic and regional, that bear on strategic stability. The old dialogue with Moscow and Beijing, based on their complaints and our assurances, needs to give way to a more substantive dialogue about how developments

[60] Cheryl Pellerin, "Northcom Chief Discusses Threats to Homeland," *DoD News*, March 12, 2015.

in our separate national postures are increasingly connected and moving in uncertain but potentially destabilizing directions.

Second, should the United States respond to Russian and Chinese countermeasures? Steps taken by Russia and China to ensure the ability of their strategic forces to penetrate U.S. missile defenses need not generate U.S. concern so long as those steps are consistent with a shared view of strategic stability and are in service of the status quo ante (that is, of ensuring that their deterrents remain viable in the face of reasonably predicted future developments in U.S. defensive and offensive capabilities). It is not entirely clear that these conditions exist today (and the new administration will have to make its own assessment). But steps taken by Russia and China to defeat U.S. strikes on their strategic forces should generate U.S. concern and technical responses as they call into question our understanding of the requirements of strategic stability.

Finally, should the protection against limited ballistic missile strikes be extended to protection against limited cruise missile strikes on the homeland (a threat posed by Russia, not China)? Yes, it makes sense to extend this principle in this way. A major Russian cruise missile strike can be deterred with the threat of a major U.S. military response, but it is less clear that a very limited Russian strike aimed at signaling its resolve in a mounting crisis can be similarly deterred. Thus some protection would be strategically beneficial, especially of critical military targets and political targets associated with continuity of government.

*Homeland Defense and the "Advantageous Position"*

The second major policy question likely to be debated in 2017 related to homeland defense is whether to retain the commitment to maintain the currently "advantageous position" vis-à-vis North Korea and Iran. In 2009, those two countries deployed no nuclear-tipped ICBMs while the United States was moving past 30 GBIs—a very advantageous position for the United States. In 2009, the administration assessed that rapid growth in Iranian and North Korean forces was possible but unlikely, which created the opportunity to pause in the deployment of GBIs, fix some inherited technical problems, and shift the strategy to hedging against future rapid growth in the threat. As noted earlier, in 2013, the decision was taken to implement the hedge (by deploying the hedge GBIs for a total of 44) and also to reset the hedge by beginning to explore an additional missile field for improved protection against a possible future Iranian missile threat.[61] In 2016, significant growth in North Korea's forces appears plausible and even likely over the next decade. Rapid growth in Iran's intercontinental-ranged missile force appears less likely but still plausible.

How might the new administration approach this decision in 2017? On the one hand, it might back off the commitment to maintain the significantly advantageous quantitative position of 2009, while retaining the commitment to protect against limited strikes and putting the emphasis on "left-of-launch," although this will be much easier said than done. Even in this context, some further growth of the Ground-based Missile Defense (GMD) system seems

[61] DoD, *Homeland Defense Hedging Policy and Strategy* (Washington, DC, DoD, 2013). See also Chuck Hagel, "Missile Defense Announcement" (speech, Pentagon, March 15, 2013), http://archive.defense.gov/Speeches/Speech.aspx?SpeechID=1759.

warranted. On the other hand, a new administration might significantly ramp up GBI acquisition and deployment and overall modernization of the homeland defense system. Given the very high cost of GBIs, this would require significant new resources. It also implies a robust hedge that is "spring loaded" to provide new capability in a timely manner if there are rapid increases in the threats from these countries.

*Revisiting the Homeland Defense Project*

The twin challenges of sustaining the homeland defense strategy of 2009 into the decade ahead may well bring to the fore a discussion in 2017 about the wisdom of further development. In 2009, we could confidently say that the responses by Russia and China were not so far significant or damaging to U.S. and allied interests; in 2017, this cannot be said. In 2009, we could confidently say that strategic stability with Russia and China could be sustained while we strengthened the defensive posture vis-à-vis regional challengers like North Korea and Iran; in 2017, this cannot be said (given the reactions in Moscow and Beijing). In 2017, it is necessary and appropriate to revisit the basic assumptions of policy and to ask whether to continue on the pathway of strengthening homeland defense (with an eye to protection against regional challengers like North Korea and Iran) without worrying about the reactions of Russia and China.

The case for a major change in policy follows from the robust and continuing adaptations in the strategic postures of Russia and China. Those adaptations are doing more than maintaining the status quo ante (the balance of strategic power "before" U.S. missile defenses were introduced). They are generating new instabilities of their own, including new threats to U.S. allies. Some will argue that this is too high a price to pay for limited protection of the United States and its allies and, further, that foreswearing the missile defense project will cause Russia and China to cease these adaptations, allowing the system to return to a point of stability. It is difficult to see that Russia and China are prepared to cease those adaptations, though perhaps they would attenuate them, or that America and its allies would be better off facing regional nuclear-armed challengers without a mixed offense/defense posture.

An alternative case can be made that the United States should care little about the complaints from Russia and China and should care a lot about the nuclear blackmail potential of North Korea and others. After all (goes the argument), those complaints ring hollow given the many actions Russia and China have taken and are taking to maintain confidence in their deterrents. Accordingly, some will conclude that the protection against regional challengers should not be scaled back but should be accelerated.

Whether these more fundamental questions will be taken up in 2017 is an open question.

## Defending against Regional Threats

Let us turn now to the policy debates likely to emerge around the second Obama administration policy priority: to defend against regional threats, while protecting allies and

partners and enabling them to defend themselves.[62] The next administration will have to make decisions on at least two major policy issues:

1. What goals should the United States set with its allies in Northeast Asia regarding the future regional architecture in light of a changing security environment and newly available capabilities?

2. What goals should the United States set with its allies in Europe regarding the future regional architecture in light of a changing security environment and conclusion of the three phases of the European Phased Adaptive Approach (EPAA)?

The administration will also have to make decisions about whether and how to proceed with regional cooperation in the Middle East. U.S.-Israel missile defense cooperation can be expected to proceed with the strong backing of the U.S. Congress.[63] The members of the Gulf Cooperation Council are likely to pursue continued developments of their separate national capabilities, as well as some integration of sensors where shared threats are perceived.[64] These two cooperation pathways in the region will raise various questions for U.S. policymakers, but none of the salience of the two key questions noted above.

Note here the repeated reference to the role of U.S. allies in setting these goals. Their effective participation will not happen without a significant investment of time and effort by the new administration. Moreover, the natural inclination of a new administration is to think it has most of the answers already in place (after all, its platform has just been endorsed by the electorate). In addition, finding the time and bandwidth to conduct needed consultations can be especially challenging in an administration's first year, when the leadership ranks are not yet fully staffed (as nominees await confirmation) and when many reviews are underway simultaneously. If the new administration values the cooperation and participation of U.S. allies in its missile defense projects, then it must overcome these challenges and effectively consult with allies during the review process. This is a time-consuming process, but one that can pay long-term dividends if it generates shared views and joint commitments. Of course, the next administration may be ill disposed to shape its policies in a manner aligned with the interests of U.S. allies, and thus may have no appetite for their views. And it may discover that its allies have strongly held policy preferences that differ from its own, potentially frustrating its ambitions.

## The Future of Missile Defense in Northeast Asia

Turning first to Northeast Asia, what goals should the United States and its allies set? At present, the United States and its two allies (Japan and South Korea) essentially have three separate national postures aimed primarily at one problem—North Korea. As additional capabilities become available for lower-tier and high-altitude defense, we can anticipate that

[62] DoD, "Regional Ballistic Missile Defense," Report to Congress, August 23, 2013.
[63] For an overview of this cooperation, see Missile Defense Agency, "Frequently Asked Questions: US-Israeli Ballistic Missile Defense Programs," https://www.mda.mil/faqs/faq_us_israel_programs.html.
[64] Peppino DeBiaso, "Missile Defense and the GCC: Strengthening Deterrence Through a New Framework," *Harvard International Review* (Spring 2016): 89–93. See also International Institute for Strategic Studies (IISS), *Missile Defence Cooperation in the Gulf*, Strategic Dossier (London: IISS, 2016).

this architecture will become more robust and integrated over time in response to developments in North Korea's posture. But the U.S. regional posture is also about China, and the threat to forward-deployed U.S. forces posed by China's robust and growing force of regional missiles. Additionally, Japan and the United States are jointly developing the next-generation interceptor, the SM-3 IIA, which will have improved capability relative to its predecessors. Looking ahead to 2017 and the availability later in the decade of the advanced interceptor, there will be a rising debate about whether the regional architecture should evolve and adapt to become more effective against China's threat to U.S. allies. As already noted, China is highly motivated by the possibility that U.S. missile defenses will become increasingly effective against its regional capabilities and strategic forces and by the possibility that the United States might seek increased cooperation with and among its regional allies as part of a strategy to encircle and contain China.

How might the next administration approach this question in 2017? Improved cooperation between and among the United States and its two allies on regional BMD should remain a U.S. policy priority, as this promises to strengthen the deterrence posture vis-à-vis North Korea. But improved trilateral cooperation should remain focused primarily on North Korea; South Korea need not be drawn into the project to protect Japan from missile strikes by China.

The more challenging question relates to the future objectives of Japan's defensive posture vis-à-vis China and associated questions of the U.S. role in supporting that posture. Japan has not so far set out politically the objective of defending itself from attacks by China; its focus has been on North Korea. The next administration will have to work with Japan to frame the strategic and operational objectives that will guide deployments of the advanced interceptor beginning in 2018 or so. In my view, the logic governing protection of the U.S. homeland from limited ballistic missile attack fits Japan as well as it fits the United States. This is already acknowledged in terms of the North Korean threat to Japan and can and should be acknowledged in terms of the Chinese threat to Japan. Given that threat, Japan should have some capability to defend itself against small-scale strikes by China, which would help reduce its vulnerability to coercion, blackmail, and brinksmanship. Japan need not have the capability to defend itself fully against the large-scale strikes of which China is capable because the U.S. extended deterrence commitment should be effective in preventing such attacks. Beijing would likely react strongly to a Japanese choice to deploy any defenses against China. But it will not be prepared to cap or roll back the missile postures that are now threatening to Japan and the forces defending it. The U.S.-Japan alliance will have to explain clearly the limits of its missile defense and defeat ambitions but also its resolve to safeguard its interests.

A key related question will be whether the advanced interceptor is deployed only to the Japanese mainland or also at sea. The latter deployments could raise significant new questions about strategic stability, as these might conceivably be deployed in ways that could impact China's confidence in its ability to strike the United States with its strategic forces, albeit only in a limited way.

## The Future of the European Phased Adaptive Approach

In 2017 there will also be a significant debate about next steps on missile defense in Europe. Phases 1 through 3 of EPAA will have come to fruition (or nearly so). Recall that Phase 4 was traded off in 2013 to pay for the hedge implementation decision (that is, to conclude the GBI buy to 44).[65] Where next? How should the missile defense architecture in Europe reflect changes to the strategic environment since the 2010 BMDR and NATO's Deterrence and Defence Posture Review (DDPR) of 2012? Two changes stand out: the change in perceptions of the Iranian threat (occasioned by the Joint Comprehensive Plan of Action, JCPOA) and the change in the perceived Russian threat to NATO.

NATO embraced territorial missile defense at the Lisbon summit in 2010 with an explicit commitment to strengthen its deterrence and defense posture against the threat posed by the proliferation of ballistic missiles and clearly established that missile defense was about threats from outside the Euro-Atlantic area.[66] It perceived no threat inside the Euro-Atlantic security area (in NATO's conception, Russia is clearly inside the Euro-Atlantic security area).

The JCPOA and the associated negotiating process and economic opening up that has occurred subsequently have altered perceptions in Europe of the Iranian threat. But how, and with what implications for NATO's missile defense posture? Is there a continued role for NATO missile defense in protecting against missile threats (whether nuclear or conventional) from outside the Euro-Atlantic security area? What options should the new administration consider?

Some in the United States and many in Russia have argued that the nuclear deal obviates the need for missile defense in Europe.[67] After all, goes the argument, the nuclear problem has been "solved" and the threat to Europe of conventionally armed ballistic missiles can be discounted given improving political relations with Tehran. This would imply that Phase 3 should be abandoned and Phase 2 reversed (with the removal of U.S. missile defense assets from Romania).

But the new administration would be ill advised to follow this path. The nuclear problem has not yet been solved. We will not know for 15 or more years what choice leaders in Tehran will make about Iran's future nuclear identity. Tehran retains a significant latent nuclear weapons potential, albeit with an extended timeline to the bomb. For now, the problem has been postponed, with a hope of long-term resolution. Moreover, the conventionally armed ballistic missile threat to Europe from Iran cannot so readily be discounted. Especially if and as sanctions on its missile program are removed, as envisioned in the JCPOA in its seventh year, then its missile program will become much more robust.[68]

---

[65] See the previously cited report to Congress on the adaptation of the homeland defense hedge posture in 2013.
[66] NATO, *Deterrence and Defence Posture Review, 2012* (Brussels: NATO, May 2012), http://www.nato.int/cps/en/natohq/official_texts_87597.htm.
[67] For a discussion of varied views on this topic, see Steve Pifer, "Would an Iran Deal Obviate Missile Defense in Europe," Brookings Institution, December 2, 2013.
[68] Department of State, "Joint Comprehensive Plan of Action: Annex V—Implementation Plan" (Sec. D: Transition Day).

Moreover, the question of Iran's long-term political orientation remains largely settled in Tehran. Hostility to the United States (and its allies when they join with it) is deeply engrained. There appears to be a high expectation in Tehran of U.S.-led military action against the regime at some future point.[69] In other words, the alliance still has good reason to seek territorial missile defense protection from threats outside the Euro-Atlantic security environment. Now it has two additional interests: incentivizing Iranian compliance with the JCPOA and hedging against Iranian noncompliance. Both are better supported by a continued commitment to missile defense in Europe than by roll back of the project.

Furthermore, it is a convenient fiction that EPAA is and was only about the missile threat to Europe from Iran. In recent years, Iran has been the primary concern, given its nuclear program. But it has not been the only concern, as missiles and missile production capabilities are proliferating throughout the Middle East and to other countries potentially threatening to Europe. Looking back over the last two decades, multiple countries have generated missile proliferation concern in Europe, including not least Iraq, Libya, Syria, and even Egypt. A good solution to the Iran threat goes only part of the way to solving the potential missile threat to Europe from outside the Euro-Atlantic security area.

An additional reason not to reverse Phase 2 would be the reactions from third parties. U.S. allies in Europe (and Asia and the Middle East) would have new reason to question the reliability of U.S. commitments. Russia might well interpret such a move as a new form of deference to its interests, which might potentially be seen as appeasing. Charges of appeasement would certainly be made widely in the West. And such a move would likely be strongly opposed in the Congress.

For the same reasons, Phase 3 should not be abandoned. But it might be modified. There are at least two options for doing so. One is to adjust the plan for Phase 3 from a standing force to a hedge force. That is, the United States and Poland could complete preparation of the missile defense site in Poland, acquire the interceptors, but hold them in storage. The decision to move to an operational capability could be made in response to evidence of Iranian noncompliance with the JCPOA. The other option for modifying Phase 3 would be to complete the current plan but offer to convert it to hedge status at a future time if confidence grows in Iran's nonnuclear status. There could be an implicit or explicit linkage to the obligation in the JCPOA of the U.N. Security Council to review existing sanctions on Iran's missile program, with an eye to sanctions relief, in year seven of the JCPOA (2022). If the Security Council deems Iran's missile programs not to be a threat to peace, then NATO could convert its standing operational capability to a hedge force.

These choices to modify EPAA to reflect the positive aspects of the JCPOA, and to hedge against its uncertainties, should be made after careful consultations with NATO allies. Some adjustment to EPAA seems warranted in light of the JCPOA, given its generally positive (albeit so far modest) impact on European security, and would be broadly welcomed in Russia and to a lesser extent Europe. But a new administration may conclude that it is too early in the JCPOA implementation process to jettison the modest capabilities associated with the Phase

[69] Eric Edelman, Andrew F. Krepinovich, and Evan Braden Montgomery, "The Dangers of a Nuclear Iran: the Limits of Containment," *Foreign Affairs* 90, no. 1 (January/February 2011): 74.

3 plan and, moreover, that establishing a clear operational capability to defend the alliance is the best way to dis-incentivize Iranian noncompliance.

It is important to recognize that choices about how to deal with the potential Iranian missile threat to Europe will have implications outside Europe. A NATO decision to treat the Iranian threat as eliminated by the JCPOA and to downgrade its defensive effort accordingly could have a spillover effect in the Persian Gulf, where U.S. allies and partners are highly motivated by the Iranian missile threat, and not just a potential future threat. As already noted, the JCPOA does nothing to curb Iran's missile program, whether long- or short-range, and the Iranian missile threat in the Gulf is clear and present. In some ways, with the JCPOA now in place, Tehran presents a greater threat to its neighbors: Iran's economy has improved as a result of sanctions relief; Tehran has increased its bid for regional hegemony in the Middle East; and the conflict in Syria has provided the Iranian military with experience in operational coordination with a major nuclear power. So there is a case to be made for more cooperation on missile defense with Gulf Cooperation Council states and with Israel and for additional deployments in countries with U.S. bases and within range of Iranian missiles, whatever choice is made in Europe.

If changes in perceptions of the Iranian threat occasioned by the JCPOA will generate debate in 2017 about the needed missile defense posture in Europe, so too will changes in perceptions of the Russian threat. The sea change has been dramatic. The implications for the alliance's missile defense strategy are, however, highly uncertain.

The Obama administration, like the Bush administration that preceded it, envisioned no role for missile defense in Europe against Russian missiles. After all, from the collapse of the Soviet Union until the forced annexation of Crimea, NATO has envisioned and worked toward a Europe "whole and free" that includes Russia, if not as ally then at least as a strong partner.[70] The alliance perceived no threat from Russia and saw no pathway to armed conflict with Russia. The alliance strategic concept endorsed by heads of state and government in Lisbon in 2010 stated these principles clearly and characterized the alliance as having no enemies.[71] From a technical and operational perspective, Russia had retained some ability to target Europe with its strategic forces, and to employ tactical nuclear weapons, but these generated no perception of threat requiring a NATO response. Similar views were reflected in the 2010 BMDR, which also set out a positive vision for regional BMD *with* Russia.[72] The alliance sought to enlist Moscow as a partner against regional actors (like Iran) seeking illicit capabilities, recognizing that cooperation could "greatly increase the effectiveness of [...] combined missile defence capabilities."[73] NATO and Russia had been actively seeking operational coordination on theater missile defense since the early 2000s and on territorial missile defense since 2010, with the last joint exercises taking place in 2012.

[70] As a key indicator, see the 1997 NATO-Russia Founding Act and subsequent alliance communiqués reiterating its commitment to the objectives set out there.
[71] NATO, *Lisbon Summit Declaration* (Brussels: NATO, November 20, 2010), paragraph 23.
[72] NATO, *Deterrence and Defence Posture Review Report, 2012*.
[73] Alexander Vershbow, "NATO's vision for missile defense cooperation with Russia" (speech, Moscow Missile Defense Conference, May 3, 2012), http://www.nato.int/cps/en/natohq/opinions_86832.htm?selectedLocale=en.

But these cooperative efforts were suspended in 2014 with the Russian annexation of Crimea.

In 2017, Russia presents nuclear and conventional threats to Europe that did not exist in 2009. It overtly threatens NATO members, particularly those hosting U.S. missile defense assets, with ballistic and cruise missiles.[74] It regularly rattles its nuclear saber.[75] It is deploying new military capabilities to support an escalate-to-deescalate strategy in case of war against NATO. These capabilities include many new strike systems of various ranges, many of which are capable of delivering both conventional and nuclear payloads. These strike systems include both ballistic and cruise missiles, with the latter delivered from sea, air, and land.[76] Russia is also in violation of its INF Treaty obligations.[77] In 2017 the new administration will have to assess whether that violation is reversible and whether or not Russia has or will proceed to deploy these banned capabilities (a move that would have significant consequences for NATO security). Additionally, Russian leaders maintain that U.S. and NATO missile defense do currently, and/or will in the future, undermine its nuclear deterrent.[78] Accordingly, as already noted, it is pursuing various countermeasures to negate the current and future effectiveness of the system.[79]

There have been other important changes to Russia's military posture. Russia has been integrating its offensive air and defensive aerospace forces in service of an A2AD (anti-access, area denial) operational strategy. This strategy aims to limit U.S. and NATO freedom of maneuver along Russia's periphery by, among other means, undermining Western air superiority. It seeks to increase the operational risks to forward-deployed U.S. and NATO forces supporting Eastern European allies.[80]

Russian military and political leaders apparently believe that the cumulative changes to Russia's military toolkit will give it the means to successfully manage a military crisis with NATO and, if war comes, to manage escalation in a way that induces choices for restraint by Western leaders, such that NATO is divided and unwilling to defend a core interest being challenged by Russia.[81] Russian leaders could falsely assess that these strategies would enable aggression against a NATO member. The Russian military has developed a concept of integrated strategic deterrence that utilizes many means—both hard power and soft, both

[74] "US Missile Defense in Eastern Europe: How Russia Will Respond," *Sputnik*, May 16, 2016.
[75] For an analysis of one particular phase, see Jacek Durkalek, *Nuclear-Backed "Little Green Men": Nuclear Messaging in the Ukraine Crisis* (Warsaw: Polish Institute of International Affairs, 2015).
[76] Gudrun Persson, ed., *Russian Military Capability in a Ten-Year Perspective—2016,* FOI-R-4326-SE (Stockholm: Swedish Defense Research Agency, 2016), available at www.foi.se/russia.
[77] Michael Gordon, "US Says Russia Tested Cruise Missile, Violating Treaty," *New York Times*, July 28, 2014.
[78] See, for example, "Russia to Take Retaliatory Measures in Response to US Missile Defense System in Romania," *Pravda*, May 13, 2016. For more on these claims and an analysis, see Michael Paul, *Missile Defense: Problems and Opportunities in NATO-Russia Relations* (Berlin: Stiftung Wissenschaft und Politik, July 2012).
[79] Many of these were outlined in President Medvedev's November 2010 speech, as previously cited.
[80] Matthew Bodner, "Russia Merges AF with Missile Defense, Space Commands," *Defense News*, August 8, 2015; Dave Johnson, *Russia's Approach to Conflict: Implications for NATO's Deterrence and Defence*, Research Paper No. 111 (Rome: NATO Defense College, 2015); and Dmitry Adamsky, *Cross-Domain Coercion: The Current Russian Art of Strategy*, Proliferation Papers 54 (Paris: IFRI Security Studies Center, November 2015).
[81] For further discussion of these points, see "Rethinking Deterrence and Assurance: Russia's Strategy Relating to Regional Coercion and Possible War and NATO's Response," a not-for-attribution meeting convened May 11–14, 2016, at Wilton Park, Wiston House, United Kingdom.

kinetic and nonkinetic, both nuclear and nonnuclear—to impose costs and risks on Western leaders so that they are compelled to ask whether NATO's stake is sufficient to escalate against a Russian leadership that perceives its vital interests at risk.[82] In short, Russian missiles play a central role in Russia's theory of victory in a conflict with NATO.[83]

What implication should these changes have for NATO and its missile defense policy and posture? And for the U.S. missile defense review? From a political perspective, these are highly sensitive questions. The 2016 Warsaw Summit communiqué recognized that:

> Russia's aggressive actions, including provocative military activities in the periphery of NATO territory and its demonstrated willingness to attain political goals by the threat and use of force, are a source of regional instability, fundamentally challenge the Alliance, have damaged Euro-Atlantic security, and threaten our long-standing goal of a Europe whole, free, and at peace.

But allies have been reluctant to discuss what role, if any, missile defense can play in deterring and defending against Russian aggression. So in Warsaw they reendorsed past missile defense policies, stating that NATO's missile defense is "intended to defend against potential threats emanating from outside the Euro-Atlantic" and is "not capable against Russia's strategic nuclear deterrent." They also restated that "there is no intention to redesign this system to have such a capability in the future."[84]

Changes in Russian policy and posture are not the only reason to reevaluate NATO's current policy. The organizational command structure of NATO's missile defense program, along with specific technical characteristics of its emerging defensive system, are also important factors. For NATO, territorial ballistic missile defense evolved from theater ballistic missile defense for the protection of expeditionary forces. These two missions are now linked through a common command and control (C2) system paid for jointly by NATO allies. This C2 system will also integrate capabilities for defending against air-breathing threats (including cruise missiles and aircraft), given the dual air and missile defense roles of many elements of the system (both sensors and shooters). Unlike its missile defense posture, NATO's air defense system has been geared to take on all potential threats, by implication including any threat from Russia, on a continuous basis since 1961. NATO's Integrated Air and Missile Defence is meant to protect "alliance territory, populations and forces against *any* air and missile threat and attack."[85] Given the integrated nature of conflict and the multipurpose roles of military technology, it becomes increasingly difficult to insist that NATO's BMD system has no role against Russia.

---

[82] Kristin ven Bruusgaard, "Russian Strategic Deterrence," *Survival* 58, no. 4 (Summer 2016): 7–26; and Dave Johnson, *Nuclear Weapons in Russia's Approach to Conflict* (Paris: Fondation pour la Recherche Stratégique, 2016).
[83] Roberts, *The Case for U.S. Nuclear Weapons in the 21st Century*, chapter 4, "Relations with Putin's Russia," especially 128–138.
[84] NATO, "Deterrence and Defence Posture Review," press release, May 21, 2012, http://www.nato.int/cps/en/natolive/official_texts_87597.htm.
[85] NATO, "NATO Integrated Air and Missile Defense," last updated February 9, 2016, http://www.nato.int/cps/en/natohq/topics_8206.htm.

What strategic and operational value might regional missile defense have against Russia? The 2010 BMDR identifies three potential values of missile defense against regional challengers that might now be applied to the Russian regional threat to Europe:

- During peacetime, missile defense undermines "an adversary's efforts to coerce states near and far" to advance their political objectives by threatening attacks on the United States and its allies;

- During a crisis, it reduces an adversary's incentives for starting a conflict by stripping his confidence that they can "engage the United States in a confrontation if they can raise the stakes high enough by demonstrating the potential to do further harm with their missiles";

- During a conflict, it offsets an adversary's perceived advantage that they can "escalate his way out of a failed conventional aggression."[86]

This framework implies a number of potentially relevant roles for European missile defense in political-military confrontations between NATO and Russia:

1. During peacetime, European BMD could help to negate Russian coercion strategies backed by threats to attack allies hosting U.S. BMD assets;

2. During a crisis, European BMD could help to deter a Russian decision to attempt a military fait accompli (for example in the Baltics) by eroding its confidence in its A2AD strategies (and the risk they pose to U.S. power projection);

3. During a conflict, European BMD could help to deter Russian both "pre-nuclear" and nuclear escalation. It might also play a role in deterring Russian involvement in U.S. conflicts with third parties.

If the next administration seeks these potential benefits of European BMD vis-à-vis newly perceived Russian threats, what basic policy choices might it then consider? One option would be to expand NATO's territorial missile defense mission to encompass not only threats from outside the Euro-Atlantic security area, as now stated, but also threats from inside that area: ruling Russia in rather than out. The rationale for this approach would be that negating Russian coercive leverage and nuclear and pre-nuclear escalation strategies requires the protection of European allies against the threat of limited strikes. But territorial missile defense against Russia would require a substantially larger and more capable missile defense system in Europe than so far envisioned. Territorial missile defense requires the ability to protect key assets, both military and political, in all NATO countries. The demands on that defense posed by a technically advanced country with a large arsenal of strike systems would be dramatically different from the demands of the unsophisticated threats from outside the Euro-Atlantic security area.

[86] DoD, *Quadrennial Defense Review* (Washington, DC: DoD, 2014).

Many allies would likely reject such an agenda as strategically unhelpful, by renewing a European arms race and inciting additional Russian belligerence. And of course Russia would react harshly to such an agenda. Moscow's claims that the EPAA will eventually turn into an anti-Russia project would be vindicated. Russia has already made clear how it would respond to a NATO missile defense system against it. In fact, as noted above, it is already moving forward with many of the threatened countermeasures. But it is likely that Russian leadership would react by adopting additional political and military measures or speeding up already planned activities.

Accordingly, the new administration and NATO should reject the choice to refocus the territorial missile defense mission to address the Russia threat. Within the alliance, the political foundations do not exist for such a dramatic shift in policy. Moreover, it is likely that a U.S.-led effort to reorient the territorial defense mission in this way would poison the current commitment of the alliance to territorial missile defense more generally. And as argued above, territorial missile defense against proliferation threats to Europe remains strategically valuable.

A second option is to leave the territorial defense mission as agreed in 2010 but to add a limited theater defense mission against Russia. This would entail a commitment by NATO to ensure that it has the defensive means in place to enable successful pursuit of its defensive military strategy, as opposed to also providing protection of critical political and economic targets. It would also entail a commitment to fielding defenses capable against only limited strikes, with the objective of taking Russia's "cheap shots" at the alliance off the table (that is, Russia's use of a very small number of strikes, with the threat of more to come, to persuade NATO not to act militarily to secure an interest) as opposed to the large-scale strikes of which Russia is also capable (which should be deterrable by other means). In short, the regional defense mission would be a force-protection mission aimed at enabling NATO to make good on its conventional defense strategy through American power projection into Europe.

In support of this option, the United States could increase its preparedness to provide protection against missile attack, both ballistic and cruise, of its power-projection forces. Allies in Europe could provide point protection of critical air and seaports of debarkation (APODs and SPODs) for those forces, as well as logistics centers and command-and-control nodes. The upper-tier component provided by the United States would be a surge capability, present in Europe only when there is a clear and present danger of Russian attack. In practice, this may entail fielding BMD systems along NATO's periphery for longer periods of time. Moreover, depending on the numbers and locations of the defended assets and the location and footprint of defensive systems, the theater missile defense architecture may in fact look like a territorial missile defense of Eastern Europe.

A key advantage of this option over the first is that it could generate broad alliance support. European allies already own (and in some cases develop) national lower-tier systems. For example, the United States, Germany, the Netherlands, and Spain have deployed Patriot systems in Turkey since 2013 to provide protection against threats from Syria. Some NATO members like Poland have already opted to procure and permanently station Patriot systems.

A key drawback is in the uncertainty about its long-term impact. Russia may proceed with a further buildup of its forces to overwhelm the system. And it may move even further away from a possible future rapprochement with the West.

As argued, each of these options would be politically and operationally challenging for the alliance and both would antagonize Russia's leadership. So what are the alternatives? At a high level of generality, there are two. One is to maintain the Warsaw strategy: strengthen the conventional balance so that Russian leaders are not tempted to go for a fait accompli against a Baltic state while modernizing NATO's nuclear-sharing arrangements so that Russia sees no benefit in nuclear escalation or other escalation threatening a vital interest of an ally. This would have the advantage of being politically viable within the alliance. But it seems unpromising of stripping away Russian confidence in its escalate-to-deescalate strategy (especially its "pre-nuclear" dimension).

The other high-level option is to put all of the emphasis on an offense-dominant strategy for the deterrence of Russia and to rule out even a limited role for defenses. This would entail deploying new strike systems in or near Europe, whether conventional, nuclear, or both. It would probably entail an in-kind response to Russian deployment of INF systems (if it chooses that pathway). This approach would not have the advantage of being politically viable within the alliance; there is nothing to suggest that the political will for such a strategy exists or can be created in current circumstances. Moreover, it would pitch Europe back into the middle of a nuclear arms race, at a time when the alliance as a whole is committed to working to reduce nuclear dangers and its own reliance on nuclear weapons. Russia's likely response would be increased deployments or strike systems targeting European targets. In such a circumstance, it might also provide assistance to its allies and partners in the Middle East in defeating American and European missile defenses.

In short, neither the Warsaw strategy nor the offense-dominant strategy seems well suited to the alliance's interests. This requires coming to terms with the difficult tradeoffs of the other options that mix defense and offense in new ways in the alliance's deterrence and defense posture.

In sum, the new administration faces, together with allies in Asia and Europe, a number of major choices about regional missile defense policies and postures with long-term strategic consequences. The central question is the same in each region: whether and how to account for the emergence of threats from neighboring major powers in regional missile defense architectures conceived originally to deal with the threat of limited nuclear threats from regional challengers like North Korea and Iran. The choices will be consequential for regional deterrence, the assurance of allies, and strategic stability with those powers. Allies will be enthusiastic for improved protection, but also reluctant to provoke major power neighbors in ways that cannot effectively be addressed by defensive means.

## Revisiting the Regional Defense Project

It seems likely that the practical challenges of adapting regional missile defense to a changing security environment will seem significant, given political constraints among allies,

constrained budgets, and predictable harsh reactions by China and Russia. This will likely fuel a debate about whether to continue the regional missile defense project at all. More precisely, it seems likely to fuel a debate about whether to taper off the pursuit of phased, adaptive responses in three regions (Europe, Northeast Asia, and the Middle East) in favor of continued national developments of air and missile defenses without seeking integration or major technical improvements.

A possible reluctance to go much further with regional missile defenses will be fueled by the perception that they are unpromising of long-term strategic benefit. After all, some see regional missile defense as a fool's errand, with the following argument: in the offense/defense competition, the advantage necessarily falls to the offense (as it is cheaper and easier).[87] Accordingly (goes the argument), the continued pursuit of regional defense plays into the hands of adversaries who are applying a cost-imposing strategy on us—the more we compete, the more we fall behind, while starving out funding for other responses.[88] This objection to regional missile defense is reinforced by the perception of some that regional defenses are driving Russia and China to actions that are destabilizing and avoidable. Accordingly, the argument will be made that the United States should (further) scale back its regional missile defense investments and leave it to our allies to determine whether and how much defense they need (or as some would have it, to build nuclear deterrents of their own).

In my view, regional missile defense is not a fool's errand. But it is important to be clear about the goal—which is not defense dominance. This is an important strategic asset for the United States and its allies and can be purchased at reasonable cost. But obviously to be effective in the emerging threat environment, this limited regional defense must be effective against not just ballistic missiles but also cruise missiles.

## Conclusions

So will there be more continuity than change in the 2017 missile defense review? Or vice versa?

The case for continuity is strong. There is broad political agreement in the United States about the main elements of missile defense policy. There is a sound logic for the commitment to protection of the American homeland from "limited" strikes and to the continued pursuit of strategic stability with Russia and China. Regional missile defenses can be further improved without jeopardizing that strategic stability. And neither the money nor the technology exists to support more ambitious objectives.

But there is also a strong case to expect more change than continuity. That broad political agreement is not particularly deep and is subject to significant perturbations in the context of changing U.S. domestic politics. In particular, there is a strong body of opinion to move away from the commitment to the "limited" criterion for homeland defense. Moreover, there is a

[87] These arguments are generally presented behind closed doors in Washington and in not-for-attribution think tank discussions.
[88] For more on this challenge, see Mark Gunzinger and Bryan Clark, *Winning the Salvo Competition: Rebalancing America's Air and Missile Defenses* (Washington, DC: Center for Strategic and Budgetary Assessments, 2016).

clear need to adapt the regional missile defense strategies, policies, and architectures to the new challenges posed by Russia and China. There may even be a more fundamental discussion of whether to continue with the homeland defense project, the regional defense project, or perhaps even both.

But making big changes to U.S. missile defense strategy, policy, and capabilities is easier said than done. The executive branch is only one of many actors on this topic. The Congress has strong views on these questions. Money is tight. Technology is even more constraining. Relations with allies can be critical enablers of U.S. strategy and policy—but also critical constraints.

In sum, the outcome of the 2017 missile defense review is very difficult to predict. We can anticipate the likely scope and structure of the discussion, including the major policy questions. We can imagine a vigorous debate about how changes to the security, political, and budget environments since 2009 should affect the baseline approach. But we can also imagine a vigorous debate about whether it is necessary to take bold steps to remake the fundamentals of our policy. These will be judgment calls by the new president and the people he appoints. As a veteran of the 2009 review, I can only wish them good success.

# 04

# Missile Defense Review 2.0

Henry A. Obering III

Since 2004, ballistic missile defense (BMD) has become a core competency of the U.S. military and a key element of our overall national security strategy. When discussing the future of ballistic missile defense, we cannot lose sight of this context. We should think of how it will integrate with our offensive capabilities both at the theater and strategic level to strengthen our deterrence posture. As we look to the future, there are several factors that must be considered in defining the next generation of capability. These include threat changes and technological advances. The decisions made today will shape the capabilities we will have tomorrow just like the capabilities we began fielding in 2004 were shaped by decisions made years earlier.

## Inflection Point for U.S. Ballistic Missile Defense

The history of U.S. BMD has been defined by a series of inflection points since President Reagan launched the Strategic Defense Initiative in 1983. These milestones included technological breakthroughs as well as major policy shifts associated with threat changes.

The founding of the Strategic Defense Initiative Organization (SDIO) was the first major policy milestone with its concentration of funding and research across the Department of Defense directed at the development of capabilities to destroy incoming nuclear missiles. This resulted in significant technological advances in computer systems, component miniaturization, sensors, and propulsion systems that form the basis for our current ballistic missile defense elements.

Major technological milestones included the first intercept of an ICBM in 1984; the first space-based intercept, which occurred with the Delta 180 program in 1986; the development of smaller lightweight "hit-to-kill" interceptors in the 1990s; and the modification and development of powerful sea-based and land-based sensors in the 2000s.

Policy milestones included the movement from space-based to ground-based architectures in the late 1980s; the focus on Global Protection Against Limited Strikes (GPALS) by President George H.W. Bush in 1991; the shift to theater missile defense with the change to the Ballistic Missile Defense Organization (BMDO) by President Clinton in 1993; the withdrawal from the 1972 Anti-Ballistic Missile (ABM) Treaty and transition to the Missile Defense Agency by President George W. Bush in 2002 with the subsequent deployment of the first elements of an integrated, layered ballistic missile defense system (BMDS) to defend the U.S. homeland, allies, and friends against all ranges of missiles in all phases of flight; and the establishment of

a European Phased Adaptive Approach (EPAA) in 2009 under President Obama with significant program cancellations/cutbacks and funding reductions.

As stated earlier, the factors that stimulated these inflection points included both threat status changes as well as technological advances. For example, the diminution of the Soviet threat and the Gulf War experience led President George H.W. Bush to shift to theater missile defense. The emergence of the missile threats from North Korea and Iran, along with the maturation of the intercept technology, were major factors in President George W. Bush's ABM Treaty withdrawal and deployment decisions.

Today, these same threat and technological factors are at play, and with President Donald Trump's administration we are now facing another major inflection point in the U.S. BMD program.

## The Expanding Need for Ballistic Missile Defense

Ballistic missiles have been used in nearly every major conflict for the last three decades and are the "air force of choice" for many nations. In the Gulf War, a single Iraqi Scud missile attack was responsible for the largest loss of American lives in that conflict. Ballistic missiles were also used in Operation Iraqi Freedom, the Russian-Georgian conflict, as well as the ongoing war between Saudi Arabia and the Yemeni rebel forces. Despite decades of arms control measures, the proliferation of ballistic missiles continues to expand into more than 30 countries, many of which are hostile to U.S. interests.

*North Korea*

North Korea has an aggressive missile development program that includes short-, medium-, and long-range variants with eight that are either operational or presumed operational. In addition, it has demonstrated an ability to miniaturize a nuclear warhead, as evidenced by their test program. It has also successfully put satellites into orbit, thereby achieving the same technical know-how involved with the development of an intercontinental missile capability such as multistage flight, control through staging, and vernier thrusting. In addition, it has a submarine-launched missile in development.

The North Korean missile program was largely based on old Soviet Scud technology, elongating these missiles with larger propellant tanks for increased range (No Dong) and stack them for space launch capability (Taepodong). Its warhead construction also appeared to be rudimentary. For these reasons, the North Korean threat was described as "limited" and was one of the primary reasons for the deployment of today's integrated ballistic missile defense system to address a "limited" threat. However, over the last several years, North Korea is advancing beyond what one could consider a "limited" threat. It has developed new propellant technology (hypergolic and solid) with new designs, and appears to be making progress in moving to even more sophisticated capabilities.

*Iran*

Similar to North Korea, Iran has also invested heavily in an aggressive ballistic missile program. With the largest missile inventory in the Middle East and short-, medium-, and long-range variants with eight either operational or presumed operational. Like North Korea, Iran too has achieved advances in propellant technology (Ashura) as well as the ability to successfully put satellites into earth orbit (Safir). The similarity between the Iranian and North Korean programs is unsurprising given the close cooperation in missile development between the two nations.

Iran has especially focused on improving the accuracy and lethality of its missiles. Accelerated advances can also be expected with the infusion of significant funding from the lifting of financial sanctions and the U.S. payment stemming from the Joint Comprehensive Plan of Action (JCPOA) agreement signed last year. Iran enjoys a close relationship with Russia and, as a result of the JPCOA agreement, has taken delivery from Russia of the advanced air and missile defense system known as the S-300.

*Russia*

One of the most compelling factors for an inflection point in the U.S. BMDS program is the reemergence of a belligerent Russia with the largest missile inventory in the world. Combined with its nuclear weapons program, Moscow presents an existential threat to the United States and its allies.

Russia has demonstrated advanced capabilities that would go well beyond the ability of the current U.S. BMDS to handle. These include advanced countermeasures to confuse sensors' ability to discriminate warheads from decoys, the ability to maneuver and thereby complicate simple ballistic trajectory calculations for tracking, multiple independently targeted warheads per missile, and other means. Russia also has announced the development of advanced hypersonic missiles. Operating at speeds Mach 7 to Mach 12, these could penetrate today's limited U.S. missile defenses.

*China*

While Russia has the largest inventory of missiles in the world, China has the most aggressive missile development program. This includes three different ICBM variants (DF-5, DF-31, DF-41), maneuvering antiship missiles (DF-21) that pose a threat to U.S. carrier battle groups, and submarine-launched missiles (JL-2). Like Russia, China also has advanced countermeasures and an even more aggressive hypersonic program, having completed seven test flights of its DF-ZF missile.

## What Do We Do First?

In light of these trends, what steps should we take to address these threats? We must strike a balance in improving the performance of the current system while developing the advanced capabilities needed for the future. The foundation for all of this is to increase the investment the United States makes in its missile defense program.

*More Funding Needed for MDA*

Since 2009, when President Obama took office, there have been dramatic cuts to the funding for the U.S. BMD program.

For example, in the last four years of the Bush administration, MDA spent roughly $40.7 billion. In the last four years of the Obama administration, MDA spent roughly $32 billion—a reduction of 21 percent. The funding cuts to the ability of the United States to defend its homeland have been even more drastic. The base budget for the Ground-based Midcourse Defense (GMD) program, the only element of the BMDS that can currently defend the U.S. homeland, has been reduced by over 60 percent since 2008. In addition, as systems are fielded, production, operations, and support costs are eating up more and more of MDA's diminishing budget, which squeezes out the funding MDA can spend on its next generation of missile defense capability.

The United States should commit to funding MDA at a top line level of $12 billion per year in order to meet tomorrow's threats, while addressing shortfalls with the current system. Budgetary responsibility for procurement and operations and support should be allocated to the responsible military service with money "fenced" from being used for other service priorities. Sustaining engineering responsibility and funding should remain with MDA to ensure we continue to build an integrated system.

*Need for Homeland Defense Improvements*

When the GMD system began deployment in 2004, the Exoatmospheric Kill Vehicle (EKV) contained in the Ground-based Interceptor (GBI) was an operational prototype. The decision to proceed with the deployment of a prototype was based on several factors: the United States had no homeland missile defense, the North Koreans were developing long-range missiles, the success of the GMD test program with four straight intercepts, and adherence to the National Missile Defense Act of 1999 that stated, "It is the policy of the United States to deploy as soon as is technologically possible an effective National Missile Defense system capable of defending the territory of the United States against limited ballistic missile attack."

Modifications to the EKV to improve its reliability were developed and funding was programmed to achieve a full operational capability. With the cuts to the GMD program referenced earlier, however, these improvements were not fully implemented.

*Redesigned Kill Vehicle*

Starting last year, a new program to address the EKV reliability issue was initiated by MDA, the Redesigned Kill Vehicle (RKV) program. The technology in the current EKV fleet was developed in the 1990s. The RKV program allows the introduction of more modern technology to include advances in seeker capability, propulsion, guidance and control, manufacturing, and other improvements. The completion of the RKV program should be one of the first priorities to address the shortfalls of the current GMD capability. It should dramatically improve the effectiveness of the GMD system by reducing the number of interceptors fired at each incoming warhead. It should also include advances in

communications technology to allow the kill vehicle to fully exploit all of the information available from the variety of space-based, sea-based, and land-based sensors.

*Expand Current Capability*

The current elements of the BMDS include:

- Upgraded early warning radars in Alaska, California, Massachusetts, United Kingdom, and Greenland.
- Deployed X-band radars in Japan, Turkey, Israel, CENTCOM, and a powerful and sea-based radar ported in Hawaii.
- Hundreds of deployed PAC-3 interceptors.
- More than 100 sea-based SM-3 interceptors on over 30 Aegis BMD-capable ships.
- 24 land-based SM-3 interceptors at the Aegis Ashore site in Romania with another site scheduled to be completed in Poland in 2018.
- Terminal High Altitude Area Defense (THAAD) batteries with nearly 50 interceptors.
- Approximately 36 silo-based GBIs in Alaska and California with a total of 44 scheduled for the end of 2017.
- Operational command and control centers in Alaska, Colorado, Nebraska, Hawaii, Washington, D.C., and Germany.

The inventories of PAC-3, Aegis SM-3, and THAAD should continue to expand. With the delivery of the RKV, there would be merit in building a "third site" for 20 long-range interceptors on the East Coast. This would replace the capability lost with the cancellation of Phase 4 of the EPAA and could give the United States a "shoot-look-shoot" capability against Iranian launches.

## Next-Generation Missile Defense

Whether we are addressing the rogue nation threat or stepping up to defend the nation from peer or near-peer threats, we must no longer think in terms of building just "limited" missile defense capabilities. The United States should begin the journey to develop a next-generation missile defense that will form the foundation for our missile defense strategy well into the future. Several key future challenges include the ability to:

- Provide "birth-to-death" tracking of incoming threat suites.
- Intercept a single warhead in a complex threat suite including advanced countermeasures.
- Intercept multiple warheads on a single missile.

- Handle substantial raid sizes.
- Intercept a missile in its boost phase from operationally effective ranges.
- Provide reliable kill assessment.
- Handle maneuvering warheads.
- Destroy hypersonic missiles.
- Operate in an aggressive, contested cyber domain.

The ability to build a next-generation missile defense is dependent on first meeting the near-term challenges stated above. In order to go further, we need to pursue several key capabilities, including a precision tracking space-based sensor layer, advanced discrimination algorithms and techniques, a Multi-Object Kill Vehicle, boost phase directed energy, and a space-based kill layer.

*Precision Tracking Space-Based Sensor Layer*

We currently use space-based sensors to warn us of an adversary missile launch and then use the data to predict approximate impact points. These sensors do not, however, provide the accuracy needed to intercept the incoming warhead, so we rely on terrestrially based radars to provide missile tracks. The ability to provide persistent, "birth-to-death" missile tracking can only be done cost effectively from space, and doing so improves discrimination of the warhead from countermeasures and other objects.

Not only would a space-based tracking layer contribute to the defense of the U.S. homeland, the tracks would significantly expand the operating and defended areas of regional defenses. When integrated with terrestrial sensors, a space-based sensor layer would also contribute significantly to tracking more advanced threats, such as maneuvering hypersonics.

In 2009, MDA launched two Space Tracking and Surveillance System (STSS) demonstration satellites to determine the feasibility of providing intercept quality tracking from space. The results of the demonstration flights have been outstanding, and indicate that this capability is certainly achievable.

The United States should build an initial STSS constellation as a foundational capability. Further expansion and resilience could be added using more cost-effective and innovative approaches, such as putting payloads in commercial constellations and using other organizations' satellites as hosts.

*Advanced Discrimination Algorithms and Techniques*

In 2006, MDA began developing advanced discrimination approaches that were suspended by the MDA director in 2010 in favor of another path that did not materialize. MDA has now revitalized these efforts, and *they should be continued and fully implemented in their terrestrially based sensors*.

In addition, there are several innovative contractor-developed approaches that significantly improve the ability of the BMDS to handle more complex threat suites. While outside the security scope of this paper, these efforts must be properly funded and deployed.

*Multi-Object Kill Vehicles*

No matter how much sensor discrimination capabilities are improved, they will never be foolproof. Therefore, the ability to destroy more than one "credible object" with a single interceptor is vitally important. These credible objects could include decoys, simulated warheads, debris, post-boost vehicles, and empty upper stages. In addition, having a multiple kill capability addresses those threat missiles with multiple real warheads.

A similar program called Multiple Kill Vehicle (MKV) was launched by MDA under President Bush, and later canceled under President Obama due to budgetary considerations. The value of such a capability was so compelling, however, that MDA established the Multi-Object Kill Vehicle (MOKV) program.

Each MOKV would have independently targetable kill vehicles that could be assigned to the credible objects. Each kill vehicle would steer itself to a target and destroy it. Modern communications technologies, algorithms, and processing power could significantly enhance the overall effectiveness of this "swarming" approach.

MOKV is a critical element of the next generation of missile defense. It will enhance nearly all aspects of the missile defense challenge, including discrimination, raid size, and kill assessment. MOKV capability could be provided to not only the GBIs but potentially also SM-3 Block II interceptors. The effort should be given the highest priority in the interceptor development portfolio.

When MOKV capability is combined with the first two initiatives of precision space-based tracking and advanced discrimination algorithms, the system begins to be able to handle even the most advanced threat suites.

*Boost Phase Directed Energy*

The optimum approach to ensuring the warheads are destroyed in the presence of countermeasures is to destroy the enemy missile before it has a chance to deploy either the warheads or countermeasures. In other words, destroy the missile in the boost phase. Boost phase intercept provides advantages and disadvantages.

The advantage in destroying the missile in its boost phase includes the destruction of the warhead without having to deal with the countermeasures. In addition, most boost phase intercepts would place any residual intercept debris over the territory of the launching country.

The disadvantage is that the boost phase is typically short, so there is not time to launch a terrestrially based kinetic interceptor against many trajectories, especially against adversary countries that are geographically large.

Boost phase intercept is an ideal mission area for the use of a speed-of-light weapon such as a High Energy Laser (HEL). Using HELs against ballistic missiles is much more cost-effective than kinetic interceptors. Today, we have to fire multiple, multimillion dollar interceptors against a single threat missile. With a HEL, multiple threat missiles can be destroyed by a single laser magazine.

MDA experimented with just such a weapon, called the Airborne Laser (ABL), beginning in 2004 when it achieved first light and first flight of a megawatt-class HEL onboard a 747 aircraft. After successfully destroying both a solid propellant as well as liquid propellant missile in 2010 flight testing, the program was canceled due to budget constraints, as well as ongoing technical challenges.

Since the beginning of the ABL program in the 1990s, laser technology has come a long way. Today, there have been major advances in solid state and hybrid lasers. At least one version, the Diode Pumped Alkali Laser (DPAL), promises to deliver high-power capability in a weight and volume to allow it to be deployed on high-altitude unmanned aircraft. Operating in this regime and with a solid state or hybrid laser would avoid nearly all of the technical issues encountered by ABL.

It is now possible to have a lethal laser in the next 10 years capable of conducting the boost phase intercept mission from an airborne platform. MDA has submitted a report to Congress and is in the process of detailing their directed energy roadmap to achieve boost phase intercept. Since ABL, funding for directed energy activities at MDA has been very limited. This needs to change and sufficient funding should be provided to achieve their goals.

*Space-based Kill Layer*

To meet the missile threats presented by Russia and China, a move to a space-based kill capability is necessary. The geographies to be covered, the trajectories involved, and the complexity of the threat suites all lend themselves to a space-based kill approach.

Space is where missile defense began under President Reagan's Strategic Defense Initiative. The advantage of the ultimate "high ground" allows global coverage even in large geographies, shoot-look-shoot capability for many trajectories, and more. In addition, a space-based kill capability can contribute significantly to overcoming the threat posed by hypersonic weapons.

This layer could initially consist of kinetic space-based interceptors (SBI) and later evolve to space-based lasers (SBL) as that technology matures. The SBI layer should complement terrestrially based assets, and even a modest constellation of satellites with several kill vehicles apiece could have a significant impact on the U.S. ability to defend itself against more advanced threats. It would expand the defended area to our allies around the globe as well, and could be used to support both regional and homeland defense.

As directed energy technologies continue to mature, and their size and weight continue to be reduced with increasing power levels, an SBL capability could then augment or replace

the SBI capability. This space-based HEL capability with multiple kills per magazine could address substantial threat missile raid sizes.

To start down this path, the United States should fund the development of a space test bed to begin to explore the variety of technologies that could be brought to bear. This test bed could explore constellation command, control, communications and battle management issues; long-term storage of propellants on orbit; space-to-space engagement environments, and more.

Some critics will state that this type of defense from space is counter to existing treaties such as the Outer Space Treaty of 1967, but that is not the case. The only ban on weapons in space is that of weapons of mass destruction, which obviously does not apply to either SBI or SBL.

## The Cost vs. Benefit of Ballistic Missile Defense

With the dramatic decline in the defense budget due to budget caps since the 2011 Budget Control Act, there has been a major focus on the cost of our weapon systems and less emphasis on their value.

Is building the next-generation missile defense worth the costs?

To answer this, the costs of missile defense must be put in perspective. The total spending on the U.S. BMD program from 1985 through 2016 has been approximately $235 billion in inflation-adjusted dollars.

How does one measure the value of this investment? One way to approach this is to look at the 9/11 attacks on New York City and Washington, D.C. The physical damage to NYC alone from the September 11 attacks, according to a 2002 Government Accountability Office study, was $83 billion.[89]

The total economic cost from both attacks was $3.3 trillion and these attacks did not involve a nuclear weapon, which would have caused more destruction by orders of magnitude.[90] Even at $12 billion a year, the investment in ballistic missile defense pays for itself many times over.

## Final Considerations

Developing next-generation capabilities would also have several broader national security advantages.

---

[89] Government Accountability Office (GAO), *Review of Studies of the Economic Impact of September 11, 2001, Terrorist Attacks on the World Trade Center* (Washington, DC: GAO, 2002), http://www.gao.gov/new.items/d02700r.pdf.
[90] David Sanger, "The Price of Lost Chances," *New York Times,* September 8, 2011, http://www.nytimes.com/2011/09/08/us/sept-11-reckoning/cost.html.

First, building a robust missile defense system could dissuade adversaries from developing ballistic missiles in the first place, since their effectiveness would not be clear.

Second, without the protection of a robust missile defense, some nations capable of building their own nuclear weapons for defense might be incentivized to do so. This would lead to further instability in regions such as the Middle East and the Asia-Pacific.

Third, a robust missile defense capability enhances deterrence by putting doubt in the mind of an attacker. Not knowing which of the offensive missiles would survive complicates an attacker's plan.

Fourth, missile defense can stabilize events in a crisis. For example, in 2006 when North Korea was preparing to launch the multistage Taepodong-2 (TD-2) missile and not providing any international notification as required by protocol, several senior former DoD officials called for a preemptive strike against the launch site, which would have been highly escalatory. President Bush decided to rely on the GMD system should the TD-2 missile threaten U.S. territory.

Fifth, missile defense provides the president and other senior commanders an option other than preemption or retaliation, and provides critical additional decision time when faced with an accidental or rogue-directed launch

Finally, and most importantly, if deterrence fails, it is the only option available to destroy warheads once they are launched.

## Conclusion

The United States has made tremendous progress to meet a real threat that is only going to grow—in spite of our efforts otherwise. And as has often been the case in the history of ballistic missile defense, we are at an inflection point.

Today we are developing and fielding missile defenses to meet a "limited" threat from countries like North Korea and Iran. But even the threat from the rogue nations is now progressing beyond the "limited" level.

We must use this inflection point to build the next generation of missile defense needed, not only to meet the rogue nation threat, but also the threats posed by Russia and China as well. The decline in funding for these defenses must be reversed and restructured so that MDA can once again focus on building tomorrow's capabilities.

The technology continues to mature and improve to allow several game-changing measures to be pursued such as directed energy and space-based capabilities.

This is too important not to get it right.

# 05

# A Vector Check for America's Missile Defense: Assessing the Course for the Trump Administration

Kenneth Todorov

The reality of a Trump administration has given rise to a wave of euphoria about increased Pentagon budgets, new possibilities for hawkish zealots, and second chances for programs thwarted by the previous administration. Nowhere is that euphoria more prevalent than in the missile defense community, made up of national security watchers, political power players jockeying for position, interested industry constituencies, and the military community itself.

There is little doubt that the defense budget and spending for the missile defense mission will increase under President Trump, but the key questions are how much additional funding will be available and exactly what the nation should do to best defend itself. Mr. Trump himself has been adamant that any increases in defense spending would require offsets through reductions in overhead, bureaucracy, and other Pentagon programs. Given that the decisions surrounding the future of America's missile defense will be bounded by fiscal reality, it will be critical to make the right choices. Missile defense has been and will remain an expensive venture, and the nation does not have the luxury to choose carelessly, both because we simply cannot afford to, but also because the growing threat will demand we plan realistically for the future, or potentially suffer unthinkable consequences.

The threat from a ballistic missile and increasingly from a nonballistic missile attack on the United States continues to grow. Threat systems around the world continue to mature in quality, quantity, and variety. Adversary technologies are demonstrating more sophisticated and reliable missiles with increasing complexity, range, and accuracy. America's ability to develop robust yet affordable missile defense will be challenging. Despite the almost certain increases in missile defense funding, the anticipated windfall is unlikely to measure up to the anticipated appetite.

Now is the time for a fresh look at the many challenges and resulting questions that surround our nation's missile defense posture—exactly how do we proceed; in what do we invest the still-limited resources we have; and to what lengths do we go in order to defend our homeland and our interests around the world from the growing threat of ballistic and nonballistic missiles? For further consideration—is it possible to upset the global strategic

balance and deterrence equation if we go too far? These are the fundamental questions facing the Trump administration.

## Current Missile Defense Policy

On February 1, 2010, the secretary of defense delivered the nation's first ever Ballistic Missile Defense Review (BMDR) to Congress after a nearly yearlong effort within the Department of Defense to dissect the then-current challenges being faced by the missile defense mission. Given the new administration, changes in the threat, our own capabilities, and technological advances that might enable new options, it is time to reexamine our national policy. The policies implemented in 2010 sought to sustain and enhance our ability to defend the homeland against a limited long-range ballistic missile attack from specific rogue states. The world has rapidly changed and our approach must keep pace. It is time to expand our national policies and focus areas for missile defense.

Let us first briefly review the existing guidance. The 2010 BMDR Report outlined six broad missile defense policy priorities:

1. Defend the U.S. homeland from a limited attack from states such as North Korea and Iran;

2. Defend against regional threats to U.S. forces (whatever their source), while protecting allies and partners and enabling them to defend themselves;

3. Test new capabilities under realistic conditions before deploying;

4. Ensure new capabilities are fiscally sustainable;

5. Ensure the flexibility in capabilities needed for a changing world;

6. Lead expanded international efforts for missile defense.

These priorities have served us well over the past seven years, and while some will be continued in the new administration, there is a need for change, expansion, and growth. Clearly, much has changed in the world of missile defense since the last BMDR. The ways in which the threat has developed demand a fresh look at strategies we designed to protect our interests, first at home, and then abroad. Changes in the applicable variables have been so rapid in recent years that our nation has de facto embarked on a course for missile defense that has advanced faster than our national policy of 2010 had articulated. In essence, the rate of change of the threat landscape has resulted in a mismatch of policy to strategy to technology. It is also time for a fully synchronized approach to all of missile defense—ballistic, nonballistic, and air breathing—where our national strategy catches up with the totality of the threat rather than being focused on only one element of it. This updated approach, considering all existing and emerging threats and possible new technological solutions in response, while enormous in scope, is critical. The Trump administration will naturally want to put its imprint on where we go as a nation, and in doing so, will reshape our

critical national policy on missile defense. This points to the question of exactly where and how far we go.

In military speak, a "vector check" is a term of art often used to connote taking a look to validate one's direction or "course heading" on a given issue. It is also a check with leadership to ensure one is on the task assigned. It is an opportunity to examine where one has been, and where one goes from there. A vector check usually comes with course corrections that even if minor, have the possibility to alter possible outcomes long into the future. The remainder of this essay will examine the many aspects of current missile defense priorities and policies. It will attempt to offer a fresh look, a vector check of sorts regarding those priorities, programs, and policies, then suggest where we as a nation should either remain on course, make minor course corrections, and perhaps most importantly, where we need to blaze a new trail for America's missile defense.

## Stay the Course

*Maintain the Current Homeland Ballistic Missile Defense Program of Record*

We should maintain the vector that will make us safer—in this case, the existing program of record (POR) for the U.S. homeland. This applies not only to finishing the plan to deploy 44 Ground-based Interceptors (GBIs), which is nearing completion, but more importantly, continuing our commitment to update and modernize the existing ballistic missile defense system (BMDS) to ensure continued performance improvements and long-term sustainment. Included within this vector is maintaining our commitment to enhancing features of the existing system that take it into the future.

We should also maintain our commitment to upgrading the existing Exoatmospheric Kill Vehicle (EKV) with the follow-on Redesigned Kill Vehicle (RKV). Leveraging technological advances within industry, and using a "best of breed" approach, the RKV will result in a kill vehicle that is much more reliable, producible, and testable than the existing model. This program remains a necessary step toward making the BMDS more operationally effective and reliable. The methodical systems engineering rigor required to develop the RKV will also provide invaluable lessons for the nation's next-generation kill vehicle, the Multi-Object Kill Vehicle (MOKV)—for example, the ability to communicate from one kill vehicle to another.

Other POR enhancements, such as ground system upgrades and infrastructure improvements, are absolutely critical to future BMDS health and also must be maintained.

*Continue Preliminary Work on a Third Interceptor Site, but Make No Commitment to Putting More Interceptors in the Ground*

For the last several years, debate surrounding a potential "third site," sometimes referred to as the "East Coast Site," has been one of the hottest topics regarding the future of missile defense. The Obama administration and the Department of Defense have not formally committed to a third site, citing limited resources and higher priorities such as improvements to the existing BMDS and enhancements in midcourse discrimination technologies. Given that little has changed that lowers the priority of those upgrades, and the fact that a

commitment to more interceptors would cost billions of dollars, a decision to move forward with a third site would at this point be folly. The prudent path would be to continue the operational and environmental work required to enable the possibility of a third site, should the operational need, which does not today exist, arise to emplace more interceptors in the coming years.

The argument to refrain from committing to a third site is not based on fiscal realities alone. Considerable debate remains on whether additional interceptors in any location, east coast or elsewhere, would provide additional operational advantage over the existing BMDS architecture. Proponents have long argued an additional site would provide "shoot-look-shoot" capability against incoming threats, yet that argument falls short when we consider the nation lacks effective means to "look," or confirm a kill of an incoming reentry vehicle. A fact widely acknowledged by the warfighter is that a third site would offer more "battlespace," providing more intercept decision time and therefore more interceptors with which to react. Despite the benefits, spending billions of dollars on a third site would not, at this time, provide the requisite "bang for the buck" to make the effort worthwhile. Increased battlespace and inventory alone do not justify the cost of committing resources, considering the other higher priorities that clearly exist.

## Make Course Corrections

*Accelerate Work on the Multi-Object Kill Vehicle*

In light of recent rapid advances of potential threats, the current pace of technological development for the Multi-Object Kill Vehicle is inadequate. The MOKV system allows for more than one kill vehicle to be launched from a single booster, and consists of a carrier vehicle with onboard sensors and several small, simple kill vehicles that can be independently cued against objects in a threat cluster. The integrated payload is designed to fit on existing and future interceptor boosters. Each interceptor will be equipped with an advanced sensor, as well as divert, attitude-control, and communications technologies, to enable each MOKV to home-in on an individual target. The current program is currently largely experimental and developmental. Now is time to accelerate the technology/miniaturization and prototyping of MOKV, alongside RKV, rather than at the relatively glacial pace of MOKV delivery by the middle to late in the next decade.

Given the very real potential for increased raid sizes of incoming hostile missiles and the increased complexity of the target scene, the possibility exists in the not-too-distant future that the current BMDS could be outmatched by sheer numbers of incoming threats. It is a simple game of numbers. The current approach of countering one incoming threat with a single kinetic kill vehicle on an expensive booster is adequate today, but will be much less so as the numbers of potential threats increase. The MOKV is the force multiplier that will enable the nation's competitive advantage, and its development must be accelerated.

*Acknowledge the Cruise Missile Threat and Develop an Action Plan to Address It*

It is time for America to prioritize homeland cruise missile defense above regional ballistic missile defense. The threat to the U.S. homeland from cruise missiles, predominantly from China and Russia, is increasing at an alarming rate. Russia in particular is progressing toward its goal of deploying long-range, conventionally armed cruise missiles with ever-increasing standoff launch distances from its bombers, submarines, and surface combatants, augmenting Russia's possible courses of action for flexible deterrent options short of the nuclear threshold. The use of these weapons in such scenarios has been part of Russia's publicized doctrine for years. Making the problem worse, detecting cruise missiles launches, which can be done from the air, ground, or sea, is much harder than detecting a ballistic missile launch, making the element of surprise a more likely reality for any potential adversary. Published guidance on national missile defense policy has been limited to ballistic missiles, but the reality of the threat demands we take a "whole-of-missile-defense" look to include cruise missile defense in the greater problem set, focusing first on defense of our national capital region.

Today, DoD's efforts toward solving the cruise missile conundrum are uncoordinated, under-resourced, and lack a dedicated technology and developmental sponsor. Attempts to "assign" this problem to one of the military services, most recently the U.S. Air Force, have been met with institutional resistance and ambivalence. While some efforts have been made toward solving the problem of cruise missile detection (most recently the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System, or JLENS, for which funding was pulled by Congress), those efforts are largely conducted piecemeal and without sufficient coordination or service "buy-in." Any efforts to review U.S. policy toward missile defense must include cruise missile defense and establish it as a national imperative. It is a problem we can no longer ignore.

*Fund the Missile Defense Agency to Refocus on Research and Development*

Through no fault of its own, and largely a victim of its own success, DoD's Missile Defense Agency (MDA) has lately been forced to focus on procurement of missile defense systems, sustainment of existing capabilities, and increasingly, operations. As a result, research and development of innovative experimental technologies has suffered. MDA's original charter was to develop cutting-edge missile systems and then transfer operating responsibilities to the respective branches of service—but in almost all cases, this has not happened. In the rare instances where it has happened, programs have suffered for lack of attention, or have fallen victim to service parochialism or diverging financial priorities. In addition, MDA has seen its annual budget reduced by more than $1 billion (roughly 13 percent) over the past four years. Having been forced to do more with less, the trend at MDA has increasingly been toward operations, maintenance, and procurement of existing systems versus research and development of new ones. Important pieces of the mission are being neglected.

Left to tend their own interests, the respective military services will gladly stand idly by and watch this trend continue. From their perspective, the alternative is to fund these activities from their own budgets, something less than tenable given all the other budget pressures on maintaining force structure and readiness. Yet if defense of the U.S. homeland is indeed a

priority, Congress must consider legislating a solution that forces the services to pick up some of the financial burden for missile defense systems, thereby freeing MDA's resources for developing technologies agile enough to respond to a rapidly growing air and missile threat.

*Designate Missile Defense as a Specific Major Force Program (MFP)*

To counter the trend of services reallocating monies from missile defense programs into other needs, the DoD and Congress could "fence" monies appropriated for missile defense systems in a way that stipulates by law that those funds may only be used for missile defense systems. Precedence for such an arrangement exists within the DoD's Major Force Program (MFP) designation, which aggregates program elements that reflect a force or support mission of DoD and contains the resources necessary to achieve an objective or plan. Special Operations equities have long been well protected from hungry service budgeteers since the monies appropriated for Special Operations Command (SOCOM) and its service components have been off-limits to anything but special operations needs. A separate MFP designation for missile defense would go a long way toward ensuring missile defense funding, increasingly critical to the defense of the nation, would be left untouched for anything but its intended purpose.

*Accelerate Work on the Long Range Discrimination Radar in Alaska, and Commit to a Second Discriminating Sensor on the East Coast of the United States*

The fact that MDA validated warfighter requirements to build the Long Range Discrimination Radar (LRDR) and put it on contract in less than two years is a testament to the urgent need to provide the BMDS an enhanced tracking and discriminating radar. The LRDR will provide the warfighter increased battlespace, a clearer depiction of the threat scene, better discrimination, increased probability of engagement success, and the possibility of freeing up additional assets to be used elsewhere.

The system is currently slated to be online by 2020, yet with recent advancements in North Korean missile and nuclear technologies, the timeline to field the LRDR should be accelerated.

While the LRDR greatly enhances sensor coverage in the northern Pacific, the BMDS lacks similar reach, scope, and coverage for the east coast of the United States. With recent developments in threats from southwest Asia, our nation needs additional discriminating sensor coverage to provide earlier detection (and the resulting increased battlespace) for threats targeting east coast population centers and the National Capitol Region. This additional coverage could be provided via another permanent ground-based sensor, or a commitment to move the Sea-based X-band Radar (SBX) to an east coast location. By accelerating fielding of the LRDR, we will not only be keeping pace with the growing threat, but could also develop and field a more balanced sensor coverage to the nation sooner.

*Make a Real Commitment to Passive Defense Measures*

Too often ignored, passive missile defense measures are genuine force multipliers and must not be neglected. Indeed, passive defense is one of the tenets prescribed in the chairman of the Joint Chiefs of Staff's 2013 publication, *Joint Integrated Air and Missile Defense: Vision 2020*, and yet DoD has paid little attention to a strategy or policy on passive missile defense measures. Given the complexity required for active defensive technologies to succeed, the systems cannot be expected to be flawless—no complex system is. Passive defense measures such as denial, deception, mobility, hardening, and information operations, coupled with active defensive and offensive operations, are force multipliers ensuring mission success. Failure to fully integrate and coordinate offensive, active, and passive actions places Joint Force objectives and resources at unnecessary risk.

The planning required to take full advantage of these passive missile defense measures must occur before fielding and employment of the systems takes place. In order to take maximum economic advantage of the values of these measures, requirements makers, materiel developers, and industry partners must work together more closely with end users to determine how best to take advantage of these opportunities. Any fresh look at America's missile defense policy should explicitly consider passive defense measures as a mandatory part of the entire equation.

## Chart a New Course

*Rethink Missile Defense Policy toward "Near-Peer" Nations*

Ever since walking away from the ABM treaty in June of 2002 (notification actually took place in December 2001), the United States has gone to great lengths to convince near-peer nations that America's missile defense is not oriented toward them. It is time to rethink that policy, at least to a degree. Russia continues to show a penchant for violating the borders of its nearby neighbors, and China continues attempts to expand its influence in and around the South China Sea. The idea of designing our regional missile defenses as a deterrent against similar incursions should be placed back on the table.

Rethinking our policy regarding near peers and the U.S. homeland should be considered as well. Our stated policy of homeland missile defense as "limited," directed only toward rogue nations, has served us well thus far, yet it is time to consider taking off the self-imposed handcuffs and acknowledging that some of America's missile defense needs to be arrayed toward an attack from a near-peer competitor. While missile defense against the totality of near-peer inventory of ballistic missiles is both impractical technologically and fiscally, missile defense against some threats, such as the aforementioned cruise missiles, should be overtly acknowledged by our policy and strategy toward defense of the nation.

*Tackling Emerging New Threat Technologies*

The threat from missile technology is very real today. It stands to only increase in complexity. New methods of countermeasures, maneuvering technologies, and vexing technologies such as hypersonics are already beginning to dot the landscape. The Trump administration

must make a concerted and deliberate effort to tackle these challenges head-on. DoD must establish and fund new research and testing measures to counter these challenges. If properly resourced, MDA could lead such an effort, but it must go beyond MDA and extend to a "whole-of-defense" approach, including the best and brightest technical minds from defense, academia, and industry.

*Commit to Developing a Space-based Tracking and Discrimination Capability*

MDA is currently reviewing options to develop a space-based tracking and discrimination capability. The nation needs to commit to operationally fielding this capability as soon as possible. Space remains an expensive venture; however, the notion that "space is unaffordable" is dated. Responsible combatant commanders have for years listed a persistent missile tracking capability from "birth to death," or through all phases of flight, as a priority. Currently, the capability does not exist. Today we use multiple sources of piecemeal information to create a complete end-to-end picture of an incoming threat. We rely on numerous data sets from various sources to track those threats, often resulting in an incomplete picture or one based on extrapolated data from previously known tracks, and requiring complex matching and merging algorithms to operate.

*Develop a National Strategy toward Nonkinetic Kill R&D*

Developing alternate means of engagement of incoming threats is essential not only to addressing the missile defense "cost-curve" problem, but also to providing the warfighter additional tools with which to defend the nation. Advances in laser miniaturization, increased power density, and viable platforms are being explored, but not with the appropriate urgency or to the level of effort required to field these capabilities in the near term. Year after year, Congress has used advanced technology budget lines to fund other programs of record. This practice must cease, and the nation must make a real commitment to advancing new and innovative technologies for missile defense.

Notably, the use of directed energy in the boost phase of a missile launch, with its goal of substantially reducing the number of lethal objects entering the battlespace by destroying potential incoming threats early, would significantly reduce the number of relatively expensive interceptors needed to address increasingly complex threats. Boost phase defenses have the potential to defeat ballistic missiles of all ranges, up to and including intercontinental ballistic missiles (ICBMs). Early detection in the boost phase from space layer sensors would also allow for a rapid response and intercept early in a threat missile's flight, possibly before any countermeasures can be deployed. If properly resourced and explored, challenges to boost phase intercepts could be addressed today. The possibilities for such a capability, although not without its operational challenges, must be fully explored with an appropriate budget.

*Think beyond Ballistic Missile Defense and toward a More Holistic Integrated Air and Missile Defense Mindset*

As a nation, we have too long been focused on just ballistic missiles and have ignored the growing threat of cruise missiles, breakthroughs in hypersonic technology, maneuverable

reentry vehicles, and other air-breathing threats. The conversation has recently changed to include these strategic imperatives, but our national policy has lagged. Now is the time to embrace these threats in a more holistic approach to Integrated Air and Missile Defense (IAMD). Wars are not fought in stovepipes, yet we are largely developing defense systems, capabilities, and policies that way, without putting much thought into how to fold in other elements of the "integrated air" part of the equation. Future IAMD systems need to demonstrate more commonality in sensors, shooters, and all elements of command and control. The nation needs to respond to the full range of threats, missile and air, and not just one domain or the other or even just a subset of one, as we are currently doing.

Key to solving the air and cruise missile threat is research and development on an elevated sensor. Last year, Congress pulled the plug on funding for the JLENS three-year test exercise, citing problems with the tethered aerostat, rather than considering the elements of the test that really matter. The program was not about the balloon—its key effort was developing holistic solutions that go beyond ballistic missile threats and address dangerous air and cruise missile threats to the homeland. Despite some well-publicized issues, it was a mistake to lose sight of the significance of the test in developing the capabilities to ensure BMD/IAMD integration for the future.

Further toward a more holistic BMD/IAMD approach, the recent trend in the Department of Defense and Joint Staff to gut the budget and manpower of the Joint Integrated Air and Missile Defense Organization (JIAMDO) must be reversed. JIAMDO is the only organization operating across the entirety of DoD's requirements processes. They have proven themselves to be a trusted, disinterested agent able to influence research and development while vetting requirements and monitoring acquisition with no vested interests or agendas other than implementing the chairman's vision for IAMD. They also serve as a first point of contact for industry to vet IAMD concepts, something the military services cannot do without bias. In short, JIAMDO is able to sustain contact and IAMD conversation across warfighting combatant commanders, the Office of the Secretary of Defense, joint staff, services, U.S. government interagency, industry, and academia, all without parochialism. The idea that JIAMDO's work is somehow complete and that the organization can be stood down is simply ludicrous. Given the challenges to efficient execution in the BMD and IAMD mission sets, the critical work that JIAMDO does is vitally important now more than ever.

*Consider Missile Defense as Part of a Larger Offense-Defense Mix of Capabilities*

Finally, the nation must rethink its mindset for missile defense, especially when it comes to considering other kinds of capabilities as a part of a larger picture. Missile defense systems are inherently expensive, and we will never be able to afford everything we need. This will become increasingly true going forward. The new administration needs to take a more balanced approach and consider the nation's missile defenses as part of a total mix of offensive and defensive capabilities. Missile defense was never intended to be a "catch-all," "shield," or "bubble." Rather, missile defense is intended to be but one tool in the warfighter's "tool kit," a continuum of capabilities that might be employed in a given battlespace. And it is a transitory effect as well—interceptor inventories do not last forever, and sensor and launch sites are themselves targets. Missile defense allows the operational commander a few days of

protection during which he can energize the other tools in his kit to take the offense to the adversary.

## Considering the Strategic Balance

Whatever the course, the new administration would be wise to consider each decision in the context of implications for relationships with other nations, especially the near peers. It is worth restating that regardless of what windfalls may come for defense spending, a major vector check on current missile defense policy would be prudent before proceeding and is long overdue. A BMDR that served the Obama administration well for missile defense policy in 2010 will not necessarily be best for the Trump administration. In terms of missile defense, we are now presented with the perfect opportunity to dust off a good starting point and determine which portions warrant a decision for the United States to "stay the course," "change the course," or "chart a new course." In most instances, senior DoD officials would agree the threat landscape has drastically changed over the past six years, and as a result, U.S. missile defense requires not only an update, but also new thinking to "chart a new course." As we review where we have been, we need to keep in mind where we want to go to defend the United States from not only ballistic missile attack, but the whole gamut of potential air-breathing threats that continue to emerge from traditional states and nontraditional actors.

The question will always remain on "how" to effectively and efficiently allocate funds to an expensive challenge—we know "why," and "when" is now. Missile defense has never been cheap, but the stakes are high. By revising and establishing altogether new missile defense policy, the Trump administration has an opportunity to shape the future of U.S. missile defense for decades to come and drive the department to make a decision, that while tough, will benefit the effort and the nation. This is an opportunity to chart a "clear course" that the department and services can fully support and make lasting through their vision, programs, and budgets. The difficult task at hand is creating that policy, and that will be a task the new administration will need to tackle head-on. It will require both new thinking, and thinking grounded on years of experience in the missile defense community.

The Trump administration will face this and myriad other challenges affecting national security well beyond the next four years. There will be some who recommend we go "all-in" on missile defense, while others will argue for more of an "appetite suppressant" given missile defense's technological challenges, high costs, and policy implications. The right answers probably lie somewhere in the middle. The effectiveness with which the United States fields competent, tested, reliable, and dependable missile defense capabilities will determine our ability to prevent catastrophic attacks on the homeland, ensuring the U.S. and global economic systems remain stable and viable. To be sure, it is important now more than ever that we take a fresh look at our options and choose wisely.

# 06

# Five Paths to Maturing Missile Defense: Toward the 2017 Review

Thomas Karako

In 2016, then-presidential candidate Donald Trump pledged to "develop a state of the art missile defense system," and to "rebuild the key tools of missile defense."[91] The ambition to do so comes none too soon, as missile threats around the world continue to grow more complex and multifaceted, qualities also reflected in the broadened scope of Congress's new *Missile Defeat Review* (MDR) mandate.[92] The need to address the "missile defeat" problem has been articulated before, most notably in General Martin Dempsey's 2013 *Vision 2020* document, which laid out the need for a robust, integrated air and missile defense (IAMD).[93] Much remains to be done, however, to make the vision of IAMD an operational reality.

Although no longer in their infancy, many of today's missile defense efforts might be best characterized as in their adolescence. Significant strides have been made with the deployment of homeland defenses and a range of operational fleet, area, and point defenses for U.S. forces, allies, and partners. At the same time, much remains to be done to help missile defenses to achieve greater maturity, and a more comprehensive strategy and approach will be necessary to address and outpace today's dynamic threat environment.

As the new administration looks to formulate a broad strategy to counter and defeat missile threats, it should especially consider evaluating five complementary avenues of effort:

- Capability evolution
- Capacity increase
- More international cooperation
- New concepts of operation
- Revolutionary technologies

[91] Donald J. Trump, "Military Readiness Speech" (speech at the Union League of Philadelphia, September 7, 2016).
[92] National Defense Authorization Act for Fiscal Year 2017, Conference Report to Accompany S.2943, Sec.1684, 114th Congress (2016): 629–32.
[93] Martin E. Dempsey, *Joint Integrated Air and Missile Defense: Vision 2020* (Joint Chiefs of Staff, December 5, 2013).

Of these five paths, those devoted to capability, capacity, and internationalization more or less represent natural extensions of systems and concepts currently fielded. Concepts of operation and more revolutionary technology represent a sharper break from those fielded today, but hold greater transformative potential. Consistent with the desire for a more holistic approach to defeating the missile threat problem, officials conducting the MDR might in particular consider new concepts of operation such as multi-mission flexibility, mixed loads, and alternative basing modes.

Creating a robust IAMD force will also require institutional change and revisiting the division of labor within and between the services and other entities. Adequately pursuing any of these paths and beginning to approximate the "vision" of IAMD will, however, require reversing the downward budgetary trend for air and missile defense over the past decade, during which time the Missile Defense Agency (MDA) budget declined by nearly a quarter, and that of the Joint Integrated Air and Missile Defense Office (JIAMDO) by 44 percent.[94]

## Capability Evolution

The first path toward more robust missile defense lies with the evolution of elements within the current program of record which, for the Ballistic Missile Defense System (BMDS), includes various command and control (C2) systems, sensors, and four families of interceptors. In the past, programmatic vacillation has stymied progress, and constancy will be important to improve the four major systems fielded today.

Evolution of the program of record probably represents the simplest, most reliable, and most cost-effective way to incrementally improve the missile defense force. Instead of large new programs, incremental or evolutionary improvements can be leveraged in the broadening of missions, and by integrating missile defenses into the larger offense-defense mix. The path of continued evolution also represents continuity. The chartered mandate for MDA was a capabilities-based approach and the idea that there would be no "final, fixed missile defense architecture."[95] Indeed, each of the past five administrations has likewise expressed their visions for missile defense not in fixed or static terms, but rather in terms of phased, spiral, or block development.

*GMD*

Thus far, the development of U.S. homeland defense can perhaps be characterized as ad hoc, owing to the speed and urgency with which the Ground-based Midcourse Defense (GMD) was initially deployed in 2004. Near-term steps for capability improvements include the development, testing, and fielding of the Redesigned Kill Vehicle (RKV), the deployment of 44 Ground-based Interceptors (GBIs) by the end of 2017, the construction of the Long Range Discrimination Radar (LRDR) in Alaska, and gradual preparation for a potential GBI site

[94] MDA's topline budget declined from $11 billion in 2007 to $8.4 billion in 2016, in adjusted 2017 dollars. Thomas Karako, Wes Rumbaugh, and Ian Williams, *The Missile Defense Agency and the Color of Money* (Washington, DC: CSIS, July 2016), 8.
[95] George Bush, *National Policy on Ballistic Missile Defense* (Office of The White House, NSPD-23, December 16, 2002).

in the continental United States. While programs like LRDR and RKV promise improvements in system-wide reliability, cost, and capability, they will not come to fruition until 2020 or later.

The FY2017 budget notably restarted funding for the Multi-Object Kill Vehicle (MOKV). Predicated on significant kill vehicle miniaturization relative to today's Exoatmospheric Kill Vehicle (EKV), this potentially game-changing concept would allow a single interceptor to engage multiple targets in a threat cloud, rather than having to fire multiple interceptors to deal with a single threat picture. Other configurations might still have multiple interceptors, but with additional dedicated sensors to improve discrimination.

As the system has evolved with a new emphasis on reliability and capability improvements, it may be time to begin a more structured incremental or block development, similar to how the Standard Missile (SM) family evolved over the past decade.[96]

*Aegis/Standard Missile*

The Aegis weapons system and the Standard Missile (SM) represent both an example of successful recent evolution as well as an object for continued growth. The SM has evolved to the SM-2 and the SM-3, and SM-3 has itself gone through evolutionary stages with seekers, motors, communications, and divert capability. The SM-3 IA is being phased out, and the future will include the IB and the IIA. The SM-3 IIB, canceled in 2013, held promise as a bridge between regional and homeland defenses. Since that cancelation, there is no settled plan to evolve beyond the IIA. Indeed, MDA previously stated that it "is not currently studying any capabilities for a follow-on SM-3 variant."[97]

Continued incremental or block development of the SM family could, however, make a lot of sense. This might include a faster or (slightly) wider booster in a modified Mk 41 Vertical Launching System (VLS) or even in the slightly roomier Mk 57. Augments to propellant and speed may not, however, be the primary or even next steps for capability improvement. Seeker and divert advances, a throttle-able solid fuel motor, and changes to the kill vehicle to engage not merely exo-atmospheric, but also threats in the high endo-atmosphere could be of relatively greater value. Such evolution, along with improved external sensor capabilities to permit launch and engage on remote cues, would dramatically increase the defended area, improve divert flexibility, and expand the range of threats that the SM family can defeat.

In the absence of such evolution to close the high endo-atmospheric gap, adversaries could circumvent U.S. defenses by flying boost glide vehicles between the respective engagement altitudes of today's systems—below GBIs and SM-3, and above SM-6 and the PAC Missile Segment Enhancement (MSE).

---

[96] Thomas Karako, Ian Williams and Wes Rumbaugh, *Missile Defense 2020: Next Steps to Defend the Homeland* (Washington, DC: CSIS, forthcoming April 2017), 52–53.
[97] Justin Doubleday, "Missile Defense Agency not pursuing follow-on to SM-3 Block IIA interceptor," *Inside Defense*, October 25, 2016, https://insidedefense.com/daily-news/missile-defense-agency-not-pursuing-follow-sm-3-block-iia-interceptor.

A model for incremental improvements across the BMDS is found with SM-6 development. In short order, the missile evolved by combining components from other existing systems. With the front end of an Advanced Medium-Range Air-to-Air Missile (AMRAAM) and the airframe of an SM-2, the SM-6 provides dual capability against both cruise missiles and terminal ballistic missiles. More recently, it has demonstrated antiship capability.[98] The rapid acquisition path for SM-6 led by the Strategic Capabilities Office (SCO) points to potential for how other "hybrid" or multi-mission capabilities might be acquired. Such possibilities should be systematically considered across the BMDS.

*THAAD*

Another prime object for capability evolution is the Terminal High Altitude Area Defense (THAAD) interceptor, of which six batteries are currently operational for the U.S. Army, and two in the United Arab Emirates (UAE). With a kick stage and a pulse motor, an extended-range THAAD could have 9 to 12 times the defended area of today's system. Increased velocity and divert capability could help it engage glide bodies at the upper edge of the atmosphere. The Army's 2012 *Air and Missile Defense Strategy* declared that by 2020 the United States should "be prepared to field a 2-stage interceptor capability to the Asia Pacific," a reference to an extended-range THAAD, but to date little has been done.[99] The FY2017 budget contained only $17 million to explore follow-on development. UAE had previously offered to subsidize some of the THAAD-ER development cost, but their assistance has not been accepted.[100]

*Patriot*

The Patriot family has been around for decades, and for the foreseeable future will likely continue to serve as the mainstay of U.S. Army and partner point air and missile defense. The PAC-3 has now moved to the MSE variant, providing longer ranges, higher velocities, enhanced capabilities, and multiple basing options. If Poland acquires the system for its own national defense, it would become the 14th country to do so.[101] Even with the emergence of other alternative lower-tier systems like the Medium Extended Air Defense System (MEADS), Patriot and its associated family of missiles will be around for many decades. Although the MSE interceptor has significantly improved capability, the increased cost per round will help continue to drive demand toward a mixed fleet of interceptors.

---

[98] Sam LaGrone, "Navy Sinks Former Frigate USS Reuben James in Test of New Supersonic Anti-Surface Missile," *USNI News*, March 8, 2016, https://news.usni.org/2016/03/07/navy-sinks-former-frigate-uss-reuben-james-in-test-of-new-supersonic-anti-surface-missile.

[99] The FY2017 budget request explicitly makes reference to a THAAD follow-on program with extended range and the ability to interface with other Army assets. Department of Defense, *Department of Defense Fiscal Year (FY) 2017 President's Budget Submission: Missile Defense Agency Defense-Wide Justification Book Volume 2a of 2 Research, Development, Test & Evaluation, Defense-Wide* (Washington DC: DOD, 2016), 71–72. See also Department of the Army, "Air and Missile Defense Strategy," 2012, 14.

[100] Brian P. McKeon, "Ballistic Missile Defense Policies and Programs" (remarks during hearing of the House Armed Services Committee, Subcommittee on Strategic Forces, 114th Cong., 2nd sess., April 14, 2016).

[101] Jaroslaw Adamowski, "Poland to Select Patriot Systems Following PGZ-Raytheon Cooperation," *Defense News*, July 5, 2016, http://www.defensenews.com/story/defense/omr/roadtowarsaw/2016/07/05/poland-patriot-missile-pgz-raytheon/86719468/.

Despite being so widespread, the system has long been in dire need of modernization. Some components are decades old, stalled by underfunding and lack of prioritization by the Army since the program was transferred to the service in 2003 from the Ballistic Missile Defense Organization (BMDO). An exceptionally high operational tempo for the Patriot force has further slowed updates. In its most recent defense authorization act, Congress authorized funds for modernization, conditioned on a review of the Army's Patriot modernization plan.[102] The cancelation of the U.S. Army's involvement with the MEADS program means that there is no active near-term plan for comparable 360-degree force protection, especially important for air and cruise missile threats.

*Sensors*

No missile defense interceptor is better than the sensors that tell it where to go and what to kill. As missile threats become more mobile, stealthy, and maneuverable, there will be an increased need for more intelligence, surveillance, and reconnaissance (ISR) to detect, track, surveil, and discriminate missile threats. The expansion and improvements to sensors will considerably improve what today's interceptors can do. Next steps include the timely completion of the LRDR in Alaska, continuing the production of high-frequency TPY-2 radars for both terminal and forward-based operations, upgrading Aegis with the AMDR (SPY-6) radar, deploying a radar for the defense of Hawaii, developing new concepts for drone- and aerostat-based sensors, and adding persistent tracking and discrimination with the field of view that only an orbiting satellite can provide.

While progress is being made to shore up sensor gaps along likely flight paths from North Korea, coverage looking toward the Middle East is less developed. Once LRDR is operational, the Sea-based X-Band (SBX) radar may be in demand as both a test asset and a hedge for an East Coast discriminating radar. Should a greater threat emerge from the Middle East, a dedicated ground-based radar on or near the East Coast may become necessary, potentially in addition to a forward-based radar in Europe or the United Kingdom.

While ground systems have the benefit of higher power outputs, the near exclusive dependence upon terrestrial radars has inherent limitations from both the curvature of the Earth and overreliance upon radio frequency as a single phenomenology. A space-layer of sensors that uses infrared, electro-optical, or other sensors would add dramatic capability advances to the entire BMDS.

*Cruise Missile Defense and Antiair Warfare*

The field of cruise missile defense is one where threat-driven demand bears little relation to supply, in terms of both development and fielding. Vice Admiral James Winnefeld, then-vice chairman of the Joint Chiefs of Staff, remarked in 2015 that "homeland cruise missile defense is shifting above regional ballistic missile defense, in my mind, as far as importance goes."[103]

[102] National Defense Authorization Act for Fiscal Year 2017, *Conference Report to Accompany S.1691*, 114th Congress (2016), 640–41.
[103] James A. Winnefeld Jr., "Missile Defense and U.S. National Security" (speech, CSIS, Washington, DC, May 19, 2015).

Cruise missile defense for the U.S. homeland is one of the three focus areas for the MDR. But relatively little attention has thus far been given to the mission.

The Integrated Fire Protection Capability (IFPC) and the Multi-Mission Launcher represent one related effort, which can be paired with the Sentinel radar, and used against some cruise missile, unmanned aerial systems (UAS), and RAM (rockets, artillery, and mortars) threats. Creating cruise missile defense capability is but one part of a larger antiair warfare (AAW) challenge that in some ways defines the larger IAMD problem set, so other air-breathing threats must be included, ranging from UAS to aircraft and helicopters.

In recent years, Congress canceled the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) program, which would have established a high-altitude aerostat with a high-frequency radar to detect and track cruise missiles and other air-breathing threats. Although the program had challenges, the cancelation of the elevated sensor without some alternative is unfortunate.[104] If cruise missile defense for both the homeland and regional forces is to become more than a vision, an alternative platform will be needed to provide wide and persistent surveillance and tracking, with either electronic warfare aircraft or some other platform.[105] In terms of effectors to defeat cruise missile threats, low-cost interceptors include the Evolved Sea Sparrow Missile (ESSM) (both land- and sea-based), SM-6, the National Advanced Surface-to-Air Missile System (NASAMS), the Patriot family, and still shorter-range interceptors like Stinger. Distributed land basing and wide-field sensors may be necessary for any but the most localized point defense.

## Capacity Increase

The MDR mandate is premised on the principle that active defenses must be integrated and combined with other means to counter the missile threat. This does not mean, however, that the United States can stop building active missile defenses in lieu of something else, at least not soon. Across the board, current interceptor capacity levels are too low, even relative to requirements made when the strategic environment was more benign. Research and development and more imaginative concepts of operation are badly needed, but in the short term further capacity growth may be required.

During 2016, then-presidential candidate Trump highlighted the shortfall in missile-defense-capable Aegis ships and his intent to modernize the cruisers and preserve their ballistic missile defense capability.[106] Similar capacity shortfalls afflict Patriot, THAAD, and GMD. Interceptor procurement has in recent years been a billpayer of choice to compensate for MDA's lower topline and increased obligations for missile defense foreign assistance.

---

[104] The U.S. Army has other aerostat-based sensor programs underway, some of which might have the potential to be expanded to include some cruise missile detection capability. See, for example, U.S. Army Acquisition Support Center, "Persistent Surveillance Systems—Tethered (PSS-T)," accessed February 17, 2017, http://asc.army.mil/web/portfolio-item/iews-pss-t-2/.

[105] Thomas Karako and Ian Williams, "JLENS Future Bleak, But Need for Capability Remains," CSIS Missile Threat, April 5, 2016, https://missilethreat.csis.org/160405_karako_jlens_web/.

[106] Trump, "Military Readiness Speech."

Increases in capacity for short-range fleet defense could significantly improve naval survivability.[107]

On the regional defense side, the United States has a variety of systems deployed around the world, but lacks the capacity to meet the growing demand of combatant commands (COCOMs). The stated COCOM demand for 77 BMD-capable ships, for instance, is nowhere near being met.[108] The Army does not have a plan to get to its stated requirement of nine THAAD batteries, a number set in 2012 amid a comparatively rosy geopolitical environment.[109] Capacity shortfalls have also led to a strained and unsustainable operational tempo for Patriot.[110] An additional battalion or different rotations—or perhaps new and more distributed concepts of deployment—could help relieve this strain, but imagination can only substitute so much for quantitative shortfalls.

GBI capacity will also face underappreciated pressure in the near future. MDA remains on track to field 44 interceptors by the end of 2017, but this number will soon fall 10 percent, down to 40 or fewer in 2021, due to a total lack of operational or testing spares.[111] Under current plans, set in 2013, the production of all-up-rounds will cease this year, and restarting it could be difficult, costly, and slow. If North Korean ICBM progress continues, a capacity shortfall could quickly arise for homeland defense. At the margin, the most cost-effective way to increase capacity is with additional interceptors at Fort Greely in Alaska, designed to hold up to 100. If the current rate of GBI production of about one per month were instead continued beyond 2017, the United States would be able to deploy around 68 interceptors by 2019 and 80 interceptors by 2020.

## More International Cooperation: Asking More of Allies and Partners

A third way to mature missile defense is continued internationalization of the mission, both by doing more with allies and partners and by expecting more from them. International cooperation encompasses a range of cooperative programs, military exercises, information sharing, hosting agreements, and foreign military sales. Building partner missile defense capacity—as well as missile defeat capabilities of various kinds—would greatly alleviate current and potential strain on U.S. forces and defray costs.

---

[107] Mark Gunzinger and Bryan Clark, *Winning the Salvo Competition: Rebalancing America's Air and Missile Defenses* (Washington, DC: Center for Strategic and Budgetary Assessments, 2016), 5.
[108] Ronald O'Rourke, *Navy Aegis Ballistic Missile Defense (BMD) Program: Background and Issues for Congress* (Washington, DC: Congressional Research Service, October 25, 2016), 14, https://fas.org/sgp/crs/weapons/RL33745.pdf.
[109] Daniel B. Allyn, "Army Priorities for the Terminal High-Altitude Area Defense (THAAD) Program to Inform the MDA's Program Budget Review Fiscal Year 2016 (PBR 16)," memo for the director of the Missile Defense Agency, October 8, 2014.
[110] Sydney J. Freedberg Jr., "Army Missile Defense Stretched Thin: Readiness, Crisis Response at Risk," *Breaking Defense*, February 12, 2015, http://breakingdefense.com/2015/02/army-missile-defense-stretched-thin-readiness-crisis-response-at-risk/.
[111] Missile Defense Agency, "Roadmap for the Ground-based Midcourse Defense System" (report to Congress, February 15, 2016), 4–5.

To be sure, the global missile defense enterprise has already advanced considerably, and can no longer be defined as a niche capability or American idiosyncrasy. At the same time, there is also no doubt that decades of U.S. leadership and investment in the missile defense realm have been responsible for most of the advances to date.

*Integration & Interoperability*

The MDR requires statements of 5- and 10-year programmatic goals for missile defeat capabilities, as well as desired end states and milestones for integration and interoperability with allies, and a statement on the role of international cooperation. Much work in this area can and should be done for both technical and political cooperation.

Before integration with allies can be realistically advanced, however, U.S. missile defense assets must themselves be made capable of greater integration with each other. Unfortunately, this is not the case today, particularly in the lower-tier air and missile defense systems such as Patriot. Toward this goal, basic integrating elements such as the Integrated Air and Missile Defense Battle Command System (IBCS) program need to be accelerated and fielded. IBCS would allow, for instance, one Patriot battery to fire interceptors using the sensor data of another unit, or from another system entirely—the "launch on remote" capability that has thus far been largely associated with Aegis. Even Aegis integration is less than optimal for tactical data links used to share sensor information across platforms. Such a capability was, however, demonstrated at the multinational *At-Sea Demonstration 2015*, when a Dutch frigate provided a radar track for an SM-3 intercept test off the coast of Scotland.[112] Similar work has been underway between the United States and Japan.

Missile defense cooperation in each region will and must have its own unique characteristics. As the BMDR observed, the U.S. vision for regional missile defense "does not require a globally integrated missile defense architecture that integrates allies into a uniform, global structure."[113] Some allies, for instance, may be concerned about being perceived as "joining" the U.S. missile defense system as if it were a franchise, but significant opportunities remain for coordination between national capabilities. Especially outside of NATO, allied and partner defenses will almost certainly be autonomous in both capability and C2, even if the interceptors appear the same.

For the foreseeable future, both cautious allies and competitors such as China may take comfort knowing that missile defense in the Asia-Pacific is likely to be different from the more integrated NATO system. While some progress has been made in reviving a 2012 intelligence-sharing agreement between South Korea and Japan to pass information on North Korean missiles directly, the significant opposition to even these incremental steps

[112] Robert Bell, "Presentation on Ballistic Missile Defense" (speech, May 10, 2016), https://nato.usmission.gov/may-10-2016-mr-robert-bell-ballistic-missile-defense/; see also Pamela Rawe, "Maritime Theater Missile Defense Forum Completes at Sea Demonstration," Naval Forces Europe-Africa/U.S. 6th Fleet Public Affairs, October 27, 2015, http://www.navy.mil/submit/display.asp?story_id=91739.
[113] Department of Defense, *Ballistic Missile Defense Review Report* (Washington, DC: Department of Defense, February 2010).

suggests deeper integration is some time away.[114] Both nations are likely to continue their significant investments in purchasing missile defenses, but trilateral coordination would leverage these investments further.[115]

*Codevelopment and Coproduction*

The MDR also requires an articulation of the role of international codevelopment of missile defeat capabilities. The U.S.-Japan cooperation on the SM-3 IIA and Japan's licensing to produce the PAC-3 illustrate another way to engage allies. America's long support for Israeli missile defense programs continues to reach new highs, not only with the Arrow program but also with U.S. coproduction of the medium-tier Stunner interceptor for David's Sling and the lower-tier Tamir interceptor for Iron Dome. Access to the capabilities of such programs for potential U.S. fielding or tech-harvesting may be a way to further leverage years of investment in Israeli missile defense capabilities.

Other means of cooperation and even coproduction might make sense to pursue. There may be opportunities to work with South Korea, for example, on high-tech means such as directed energy, railguns, and counter-battery capabilities to detect and defeat North Korea's artillery capabilities and mobile, solid-fueled threats like the KN-02 and now the KN-11.

*Coordinated Acquisition*

Another major element of internationalizing missile defense is to increase partner capacity through foreign military sales (FMS). Over the next few years, new systems like SM-3 IIA, SM-6, MSE, and a THAAD follow-on are likely to be in high demand. One could well see the sale of, say, 10 THAAD batteries to the Kingdom of Saudi Arabia and some of its Gulf Cooperation Council (GCC) neighbors, several Aegis Ashore sites in Japan, and widespread global demand for multi-mission assets like SM-6.

A related avenue to reducing costs and increasing both U.S. and partner capacity would be coordinated, transnational, and even transregional bulk buys to reduce unit costs. Should pent-up interest begin to result in actual contracts, the coordination of production and sales could lower the unit cost to all parties involved. Production of Aegis Ashore for Japan, for instance, could help reduce the cost for additional U.S. facilities, and a rush of THAAD sales could help costs for the U.S. Army. Recognizing that these sales could be in the offing will require a strategic initiative on the part of the United States to be prepared to exploit it.

---

[114] Ju-min Park, "South Korea, Japan agree intelligence-sharing on North Korea threat," Reuters, November 23, 2016, http://www.reuters.com/article/us-southkorea-japan-military-idUSKBN13I068.

[115] In fiscal year 2016, for example, Japan spent roughly $2.1 billion while South Korea increased the budget for its Korean Air and Missile Defense system to $1.43 billion for 2017. Japan Ministry of Defense, *Defense Programs and Budget of Japan: Overview of FY2016 Budget* (Tokyo: Ministry of Defense, 2016), 11, http://www.mod.go.jp/e/d_budget/pdf/280330.pdf; "S. Korea to increase budget in 2017 to develop homegrown anti-missile system," Xinhua, September 10, 2016, http://news.xinhuanet.com/english/2016-09/06/c_135666792.htm.

*Foreign Assistance*

Another important area of cooperation is found with foreign assistance to allies such as Israel, European members of NATO, and GCC partners. The United States reaps benefits from these relationships, and in the cases of Israel and GCC members gains insight about realistic use in battle and concepts of operation. The European Phased Adaptive Approach (EPAA) has likewise involved considerable investment of American funds for the ballistic missile defense of European territory. Both executive and legislative branches will need to continue to ensure that plus-ups for missile defense-related foreign assistance to allies do not inadvertently shortchange funding for U.S. missile defenses.[116]

## New Concepts of Operation

Although growth in existing capacity and capabilities of U.S. and partner missile defenses cannot be neglected, in a larger sense the missile defense problem will not be solved by merely doing more of the same. More dramatic and innovative steps will be required to reduce costs and provide a more effective and comprehensive strategy. One area in which missile defense and defeat remains in relative infancy is with new concepts of operation. The MDR reporting requirements present a ripe opportunity, especially considering the need for JIAMDO-like expertise. Retired Admiral Jonathan Greenert, former chief of naval operations, recently predicted that this is an "opportunity that will not be missed."[117]

The network integration of missile defense assets is currently a high priority for the U.S. Army and Navy, and the phrase "any sensor, any shooter" is frequently used in missile defense circles. Other follow-on concepts are also possible and deserve more attention, especially those that exploit modular and open architectures.

Several newer operational concepts for missile defeat are worthy of further consideration, such as mixed-load launchers ("any shooter, any launcher"), alternative basing modes ("any launcher, anywhere"), and multi-mission flexibility ("any seeker, any target"). These several concepts are designed to increase flexibility and capability, lower costs, and impose new burdens upon adversaries.

*Network Centric: Any Sensor, Any Shooter*

Many of today's missile defense systems operate in a sort of operational stovepipe, structures where most elements—launchers, interceptors, radars, and fire control—are collocated, and operate more or less independently from other missile defense assets. Although they may receive information from the larger BMDS and C2BMC, today's THAAD, Patriot, and other low-tier defenses are mostly characterized by localized control. At the other end of the spectrum, longer-range GBIs must, out of necessity, launch and engage on the basis of disparate and remote sensors, and an interceptor in Alaska can be launched by C2 centers in

[116] Thomas Karako, "The Dirty Secret of US-Israel Missile Defense Cooperation," *Defense One*, July 28, 2016, http://www.defenseone.com/ideas/2016/07/dirty-secret-us-israel-missile-defense-cooperation/130297/.
[117] Justin Doubleday, "Former CNO advocates for new missile defense review," *Inside Missile Defense* 23, no. 4 (February 15, 2017): 1.

several locations in the United States. SMs both on Aegis ships and Aegis Ashore are evolving to launch and engage on cuing from remote sensors, but more remains to be done. Today's interoperability among Patriot, Aegis, and THAAD systems falls well short of the "network-centric" goal identified in the 2010 BMDR—both for the United States and for allies that operate multiple systems, such as Japan and UAE. Realizing such a distributed but networked architecture will depend on an initiative to increase the number and distribution of sensors and improve their integration across systems, including with IBCS and other efforts.

*Mixed Loads: Any Shooter, Any Launcher*

Most missile defense launchers are designed to carry a single type of interceptor.[118] GBIs, THAADs, and Patriots, for instance, are all located in dedicated launchers. The exception is the Aegis weapons system, which carries a wide variety of effectors in its versatile Mk 41 VLS, including for strike, air defense, and ballistic missile defense missions. Aboard a given ship, a tube with an SM-3 might be located next to others holding ESSMs, an SM-2, or an SM-6.

Shifting from compartmentalization to a mix-and-match philosophy would permit a wider defended area, increased defense depth, and greater survivability and resilience. New basing modes offer opportunities to improve current missile defense organization and structure with a more distributed architecture. Cost savings, moreover, could potentially be had with more widespread mixed loads by making a variety of launchers more interceptor agnostic, combining multiple capabilities with a reduced manning requirement and consolidated fire control.

Such combinations would contribute to dramatic capability improvements, effectively providing a layered defense within a single battery—a layered defense in a box. The Aegis Ashore site in Poland will contain both SM-3 IBs and SM-3 IIAs, providing shorter-range (and less expensive) interceptors to defend some areas, while longer-range (and more expensive) interceptors can be reserved for more westward areas, or perhaps be used in serial in a shoot-look-shoot concept. The VLS could, in that sense, become a model for missile defense basing more broadly, permitting the mixing and matching of interceptors (or other effectors) in launchers, which could then be widely distributed. Although already in place across many types of ships for numerous allied countries, more active proliferation of flexible launch systems like the VLS could become a policy goal to help create flexibility to hedge against future geopolitical uncertainty.

Instead of having to deploy a Patriot battery alongside a THAAD battery to protect the latter, for instance, a single launcher could include a mix of interceptors. Additional mixing and matching might also be explored. Existing Patriot launchers could carry Stunner interceptors, which are somewhat less capable than PAC-3 or MSE interceptors, but significantly less expensive. Patriot launchers could also be plugged into Aegis Ashore facilities, or Patriot and other interceptors could be emplaced in the VLS itself, to provide air defense.[119] Although no plans exist for such deployments, the inherent flexibility of the Aegis Ashore facilities in

[118] Patriot launchers can, for instance, collocate different Patriot missiles—PAC-2, GEM-T, PAC-3, MSE, or others—which are, despite the Patriot name, largely distinct weapons.
[119] Office of the Director, Operational Test and Evaluation, "FY 2013 Annual Report," January 2014, 122.

Romania and Poland could permit them to bear not only different SM-3s but also other effectors such as ESSM, SM-6, and MSE. Should Russia's Intermediate-Range Nuclear Forces (INF) Treaty violations fail to be resolved and the treaty cease to exist, the inclusion of strike assets could also be considered—for both Aegis Ashore sites and numerous non-U.S. Aegis ships.[120] At the lower tier, the U.S. Army is currently proving out the 15-cell Multi-Mission Launcher, which might have similar flexibility.[121]

*Distributed Defense: Any Launcher, Anywhere*

Closely connected to both interceptor agnosticism and network-centric assets is a potential for the greater distribution of launchers. The Navy's concept of "distributed lethality" may also offer an opportunity to explore the possibilities of multi-mission launcher roles.[122] While it has been characterized largely in terms of offensive posture, with more strike missiles loaded on more platforms, the concept of distributed lethality permitted by launcher flexibility also points toward the possibility of a more "distributed defense."

One approach to fielding a more distributed and complex defense could involve adapting inexpensive and seemingly nondescript cargo containers to contain launchers, potentially VLS cells, linked through a larger network of sensors and C2. Located either on land or at sea, these "cargo containers for peace" could be moved between bases to provide surge capacity wherever air defenses, missile defenses, or other effectors are required.

To all outward appearances, these containers could look like any other shipping container, but inside could have self-contained power, communications, and cooling. Trucks, railcars, or trailers could transport and deposit them wherever desired, thereby improving the mobility, or at least relocatability, of missile defenses. It would need to be made clear, however, that such assets would only be placed on military platforms, so as not to put civilian areas at unnecessary risk.

Such a deployment concept would also support deception by means of a shell game. Other containers of similar appearance could be empty, but an adversary would have a difficult time telling which is which. To impose costs upon hostile ISR, the decoy containers could be outfitted with fake antennas and made to emit comparable heat and other electronic signatures. Deception would be integrated into troop or maintenance movements between decoys and real containers alike. Greater distribution of launchers and deception about their true locations could significantly hinder an adversary's planning efforts.

Should the cargo container launchers be as effector-agnostic as a VLS, they could also potentially contain strike assets to support missile defeat. While such an approach may seem unconventional, a similar network-centric or "net-fires" concept was the Non-Line of Site

---

[120] Thomas Karako, "Looking East: European Air and Missile Defense after Warsaw," CSIS Missile Threat, July 14, 2016, https://missilethreat.csis.org/wp-content/uploads/2016/08/160714_Karako_LookingEast_Web.pdf.
[121] Jen Judson, "US Army's Multi-Mission Launcher Defeats Cruise Missile, UAS Threat," *Defense News*, April 7, 2016, http://www.defensenews.com/story/defense/land/army/2016/04/07/us-armys-multi-mission-launcher-defeats-cruise-missile-uas-threat/82765932/.
[122] Thomas Rowden, Peter Gumataotao, and Peter Fanta, "Distributed Lethality," *Proceedings Magazine* 141, no. 1 (January 2015): 343.

Launch System (NLOS-LS) program as part of the Army's Future Combat Systems program. These "missiles in a box" consisted of a small, platform-independent (and potentially unmanned) vertical launch system that could be fired remotely.[123] The concept is not dissimilar to one that Russia has openly advertised for its Klub-K cruise missile system available for export.[124]

*Multi-Mission Flexibility: Any Seeker, Any Target*

One other way for missile defense to evolve begins with how we tend to think about it, from something that is less purely "defensive" to something that is more integrated with the full array of military capabilities and broadly oriented to *countering* particular threats. In contrast with the BMDR, such integration is a key part of the legislative mandate for the MDR. Crafting concepts of operation for how to use an offense-defense mix is a key task of the Joint Staff.

Too frequently, discussion focuses on the number of available missile defense interceptors relative to the threat, drawing overly simplistic conclusions about saturation attacks and numbers without taking offensive forces into account. In the event of an active missile threat, missile defenses would be used to buy time, but offensive strike capabilities would play a prominent role in defeating the threat.

One way to build upon today's current systems and to spur integration between offense and defense is by exploring the inherent multi-mission roles of missile defense interceptors and their constituent components—allowing the same missile to do both. Such inherent multi-mission flexibility would of course further blur the line between "distributed lethality" and "distributed defense."

Although the seekers and terminal guidance are unique to every missile's mission, the continued growth in the missiles' reach and velocity, along with the continued miniaturization of components, could permit and encourage such flexibility. The addition of seeker types or attack modes may allow the expansion of mission sets, as seen by recent modifications to the Tomahawk Block IV and the SM-6 for the antiship mission.[125] Secretary of Defense Ash Carter likewise announced in October 2016 that the Army Tactical Missile System (ATACMS) will be outfitted with a different seeker, enabling it to hit moving targets and serve an antiship role.[126] ESSM Block 2s will also reportedly acquire an active seeker similar to that of SM-6.[127]

---

[123] Andrew Feickert, *The Army's Future Combat System (FCS): Background and Issues for Congress* (Washington, DC: Congressional Research Service, August 3, 2009), http://www.dtic.mil/dtic/tr/fulltext/u2/a511412.pdf.
[124] "Club-K Container Missile System 2013," YouTube, April 3, 2013, https://www.youtube.com/watch?v=mbUU_9bOcnM.
[125] Sam LaGrone, "WEST: U.S. Navy Anti-Ship Tomahawk Set for Surface Ships, Subs Starting in 2021," *USNI News*, February 18, 2016, https://news.usni.org/2016/02/18/west-u-s-navy-anti-ship-tomahawk-set-for-surface-ships-subs-starting-in-2021.
[126] Ashton Carter, "The Path to an Innovative Future for Defense" (speech, CSIS, Washington, DC, October 28, 2015).
[127] Kris Osborn, "Navy Readies ESSM Block 2 Ship Defense Missile for 2020 to Stop High-Tech Attacks," *Scout Warrior*, September 30, 2016, http://www.scout.com/military/warrior/story/1643358-navy-essm-2-missile-to-stop-high-tech-attacks.

The SM-6 development path again provides a model of how such capability might emerge in relatively short order. The SM-6 was originally designed as an SM-2 follow-on to defeat aircraft and cruise missiles. Additional capability was then added for terminal-phase intercept of ballistic missiles, and with a new seeker it can also function as an antiship missile, thereby assuming a strike capability. Additional changes to the seeker and warhead could potentially add a land-attack mission to the SM-6, essentially filling the role of the missile once known as the SM-4.[128] A single missile in a single launch tube could thereby provide the warfighter with a range of effects. Here again, there is nothing new: past surface-to-air missiles (SAMs) like Nike Hercules, for instance, had a secondary surface-to-surface capability.

Lessons from the SM-6 development might be transferred to other airframes as well. The motor stack of the SM-3 IIA, for instance, has substantially longer legs than that currently employed by the SM-2 and SM-6. Should that airframe be paired with a payload similar to that intended for today's SM-6 instead of the missile defense kill vehicle, it could provide the basis for a medium-range ballistic missile of sorts for basing at sea or elsewhere for antiship and land-attack missions. To be sure, such applications would not make sense for expensive and scarce assets like GBIs, THAAD, and SM-3s, but could be promising as a secondary mission for lower-cost interceptors.

## Technological Revolution

The fifth and final path considered here is revolution. As missiles continue to proliferate and the cost of active defenses continues to rise, the demand has grown for new technologies to significantly bend the cost curve.[129] This demand is for means to defeat missiles more cheaply and reduce the cost ratio between missiles and their counters. Among the more promising of these technology efforts are nonkinetic technologies that have larger magazines and the ability to engage missiles before they can deploy complex decoys and countermeasures, through either boost phase intercept or striking them prior to launch.

MDA director James Syring has described directed-energy technology as having the potential to "revolutionize missile defense by dramatically reducing, if not eliminating, the role of very expensive interceptors."[130] Primary among these efforts is the work being done in MDA to mount directed-energy lasers onto high-altitude unmanned aerial vehicles. Efforts to reduce the size, weight, and power required for lasers could yield an operationally effective system that can intercept missiles in their boost phase, effectively thinning the herd for other missile defense systems in a structured salvo attack. Previous efforts to accomplish something similar were hindered by the platform required to house the laser.

The development of UAVs along with smaller lasers would build and improve upon the former concept of the Airborne Laser. This would have significant operational utility, as a

[128] "Standard SM-4 LASM," Deagel.com, accessed February 17, 2017, http://www.deagel.com/Standoff-Weapons/Standard-SM-4-LASM_a001148010.aspx.
[129] Kenneth E. Todorov, "Missile Defense: Getting to the Elusive Right Side of the Cost Curve," CSIS, April 2016, https://csis-prod.s3.amazonaws.com/s3fs-public/publication/160408_Todorov_MissileDefense_Web_0.pdf.
[130] James Syring, "The Missile Defeat Posture and Strategy of the United States—The FY17 President's Budget Request" (statement before the House Armed Services Committee, Strategic Forces Subcommittee, April 14, 2016).

boost phase laser would be able to intercept both shorter-range regional missiles as well as longer-range missiles that threaten the homeland. While a number of technical hurdles remain before any system can be deployed, the promise of this revolution could be immense. Other nonlaser directed-energy weapons also hold promise such as high-power microwaves, as demonstrated by the Counter-electronics High-powered Microwave Advanced Missile Project (CHAMP). Missile defense sensors could contribute to multi-mission flexibility by serving as ISR for strike missions, providing space situational awareness, and being used to fry air and missile threats as a form of nonkinetic missile defeat.[131]

Directed-energy efforts are not limited, however, to only countering missile technologies. The Army High Energy Laser-Mobile Demonstrator seeks to demonstrate the capability to use directed energy to intercept even cheaper rockets and artillery. By housing the directed-energy weapon in a truck, the Army has more room for the laser generation and cooling equipment. Such a system could provide point defenses to mobile units should its capabilities come to fruition. One can envision similar technology for ships similar to the Laser Weapons System already deployed on the USS *Ponce* (AFSB(I)-15). These applications would provide close-in defense of valuable military assets, improving their survivability and thus enhancing their deterrent value.

But revolution does not come easy. While these programs have promise, more funding is required for advanced technology development. Indeed, funding shortfalls, rather than technological maturity, appear to be the primary impediment to growth.[132] Over the past five years in particular, MDA has moved away from being devoted primarily to research and development and instead put an increasing amount of its overall shrinking budget into procurement, operations and maintenance (O&M), and foreign assistance to Israel.[133] This has meant relatively fewer resources for R&D, which seems at odds with the Third Offset strategy of the Department of Defense. Often the first programs to receive cuts in favor of these ongoing operational requirements are those for advanced and revolutionary technologies.

Part of the explanation for the lack of advanced research funding is that MDA's budget has fallen as a whole, producing a situation in which it has to fit more missions into an ever-smaller top line. While according to the original charter of MDA the services were supposed to take on both the procurement and O&M for deployed systems, so far this budgetary transfer has not occurred. Even if such a division of labor were reached, it is not clear that the services would not sacrifice the missile defense mission in favor of other priorities. One way to resolve this possibility would be to designate integrated air and missile defense as a Major Force Program (MFP) to effectively fence the money designated to the services for the task. Such an arrangement might help ensure that designated services could not cannibalize missile defense programs in favor of other projects.

---

[131] Association of the United States Army, *U.S. Army Integrated Air and Missile Defense Capabilities: Enabling Joint Force 2020 and Beyond* (Arlington, VA: Institute of Land Warfare, May 2014), 22, https://www.ausa.org/publications/us-army-integrated-air-and-missile-defense-capabilities-enabling-joint-force-2020-and; Gunzinger and Clark, *Winning the Salvo Competition*, 43–48.
[132] Missile Defense Agency, *Boost Phase Missile Defense Options* (Report to Congress, January 3, 2014), 3, 7.
[133] Karako, Rumbaugh, and Williams, *The Missile Defense Agency and the Color of Money*, 5.

## Organizing for Missile Defeat

The five paths described above attempt to lay out some considerations and questions for the future of missile defense and missile defeat. The institutions and organizations charged with implementing and executing the challenge of integrated air and missile defense also deserve attention during the process. The MDR legislative mandate anticipates this need by requiring statements of the process for determining requirements, force structure, and inventory objectives, as well as institutional roles and responsibilities. Numerous institutional and service changes may be required, as well as updates to joint doctrine, concepts of operation, and operational plans. Organizational responsibilities and identities are also likely to change, potentially including COCOMs and the Joint Staff.[134]

To pursue these new missions, the identity and mission of MDA and other entities may also need to be redefined. The MDA charter was last revised in 2009, and a number of new developments suggest that its mission may need to be updated, including whether it should retain a near exclusive focus on ballistic missile defense. MDA currently has little attention on cruise missile defense, for instance, but the MDR specifically draws attention to cruise missile threats to the homeland. Congress has furthermore designated MDA as the responsible agency for emerging hypersonic boost glide vehicles and for technical aspects of IAMD, both also highlighted in MDR. Still other organizational questions include the Joint Staff and the military command structure, such as the future of a JIAMDO-like organization and whether there could be a global missile defense-focused functional combatant command.

Should the missile defense and defeat missions be prioritized by the MDR in a manner broadly consistent with *Vision 2020*, the role and corresponding budgets for missile defense and missile defeat will require significant growth and prioritization.

[134] "Our organizational structures, which were originally based on these traditional definitions of 'Ballistic Missile Defense' or 'Air and Cruise Missile Defense,' will continue to evolve into specific roles within the 'Integrated Air and Missile Defense' mission area." Edward Cashman, "The Missile Defeat Posture and Strategy of the United States—the FY 17 President's Budget Request" (statement before House Armed Services Committee, Strategic Forces Subcommittee, April 14, 2016).

# Appendix A: FY 2017 NDAA Requirement for a Review of U.S. Missile Defeat Policy and Strategy

SEC. 1684. REVIEW OF THE MISSILE DEFEAT POLICY AND STRATEGY OF THE UNITED STATES.[135]

(a) REVIEW REQUIRED.—The Secretary of Defense and the Chairman of the Joint Chiefs of Staff shall jointly conduct a new review of the missile defeat capability, policy, and strategy of the United States, with respect to—

(1) left- and right-of-launch ballistic missile defense for—

(A) both regional and homeland purposes; and

(B) the full range of active, passive, kinetic, and nonkinetic defense measures across the full spectrum of land-, air-, sea-, and space-based platforms;

(2) the integration of offensive and defensive forces for the defeat of ballistic missiles, including against weapons initially deployed on ballistic missiles, such as hypersonic glide vehicles; and

(3) cruise missile defense of the homeland.

(b) ELEMENTS—The review under subsection (a) shall address the following:

(1) The missile defeat policy, strategy, and objectives of the United States in relation to the national security strategy of the United States and the military strategy of the United States.

(2) The role of deterrence in the missile defeat policy and strategy of the United States.

(3) The missile defeat posture, capability, and force structure of the United States.

(4) With respect to both the five- and ten-year periods beginning on the date of the review, the planned and desired end-state of the missile defeat programs of the United States, including regarding the integration and interoperability of such programs with the joint forces and the integration and interoperability of such

[135] National Defense Authorization Act for Fiscal Year 2017, *Conference Report to Accompany S.2943*, Sec.1684, 114th Congress (2016): 629-632.

programs with allies, and specific benchmarks, milestones, and key steps required to reach such end-states.

(5) The process for determining requirements, force structure, and inventory objectives for missile defeat capabilities under such programs, including input from the joint military requirements process.

(6) The organization, execution, and oversight of acquisition for the missile defeat programs of the United States.

(7) The roles and responsibilities of the Office of the Secretary of Defense, Defense Agencies, combatant commands, the Joint Chiefs of Staff, the military departments, and the intelligence community in such programs and the process for ensuring accountability of each stakeholder.

(8) Standards for the military utility, operational effectiveness, suitability, and survivability of the missile defeat systems of the United States.

(9) The method in which resources for the missile defeat mission are planned, programmed, and budgeted within the Department of Defense.

(10) The near-term and long-term costs and cost effectiveness of such programs.

(11) The options for affecting the offense-defense cost curve.

(12) The role of international cooperation in the missile defeat policy and strategy of the United States and the plans, policies, and requirements for integration and interoperability of missile defeat capability with allies.

(13) Options for increasing the frequency of the codevelopment of missile defeat capabilities with allies of the United States in the near-term and far-term.

(14) Declaratory policy governing the employment of missile defeat capabilities and the military options and plans and employment options of such capabilities.

(15) The role of multi-mission defense and other assets of the United States, including space and terrestrial sensors and plans to achieve multi-mission capability in current, planned, and other future assets and acquisition programs.

(16) The indications and warning required to meet the missile defeat strategy and objectives of the United States described in paragraph (1) and the key enablers and programs to achieve such indications and warning.

(17) The impact of the mobility, countermeasures, and denial and deception capabilities of adversaries on the indications and warning described in paragraph (16) and the consequences on the missile defeat capability, objectives, and military options of the United States and the plans of the combatant commanders.

(18) Any other matters the Secretary determines relevant.

(c) REPORTS.—

(1) RESULTS.—Not later than January 31, 2018, the Secretary shall submit to the congressional defense committees a report setting forth the results of the review under subsection (a).

(2) FORM.—The report required by paragraph (1) shall be submitted in unclassified form, but may include a classified annex.

(3) ANNUAL IMPLEMENTATION UPDATES.—During the five year period beginning on the date of the submission of the report under paragraph (1), the Director of Cost Assessment and Program Evaluation shall submit to the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the congressional defense committees annual status updates detailing the progress of the Secretary in implementing the missile defeat strategy of the United States.

(4) THREAT REPORT.—Not later than 180 days after the date of the enactment of this Act, the Director of National Intelligence shall submit to the congressional defense committees, the Permanent Select Committee on Intelligence of the House of Representatives, and the Select Committee on Intelligence of the Senate a report containing an unclassified summary, consistent with the protection of intelligence sources and methods, of—

(A) as of the date of the report required by this paragraph, the ballistic and cruise missile threat to the United States, deployed forces of the United States, and friends and allies of the United States from short-, medium-, intermediate-, and long-range nuclear and non-nuclear ballistic and cruise missile threats; and

(B) an assessment of such threat in 2026.

(5) DECLARATORY POLICY, CONCEPT OF OPERATIONS, AND EMPLOYMENT GUIDELINES FOR LEFT-OF-LAUNCH CAPABILITY.— Not later than 120 days after the date of the enactment of this Act, the Secretary of Defense and the Chairman of the Joint Chiefs of Staff shall jointly submit to the congressional defense committees the following:

(A) The unclassified declaratory policy of the United States regarding the use of the left-of-launch capability of the United States against potential targets.

(B) Both the classified and unclassified concept of operations for the use of such capability across and between the combatant commands.

(C) Both the classified and unclassified employment strategy, plans, and options for such capability.

(d) NOTIFICATION.—

(1) LIMITATION.—None of the funds authorized to be appropriated by this Act or otherwise made available for fiscal year 2017 or fiscal year 2018 for the Secretary of

Defense may be obligated or expended to change the non-standard acquisition processes and responsibilities described in paragraph (2) until—

(A) the Secretary notifies the congressional defense committees of such proposed change; and

(B) a period of 180 days has elapsed following the date of such notification.

(2) NON-STANDARD ACQUISITION PROCESSES AND RESPONSIBILITIES DESCRIBED.—The non-standard acquisition processes and responsibilities described in this paragraph are such processes and responsibilities described in—

(A) the memorandum of the Secretary of Defense titled ''Missile Defense Program Direction'' signed on January 2, 2002; and

(B) Department of Defense Directive 5134.09, as in effect on the date of the enactment of this Act.

(e) DESIGNATION REQUIRED.—

(1) AUTHORITY.—Not later than March 31, 2018, the Secretary of Defense shall designate a military department or Defense Agency with acquisition authority with respect to—

(A) the capability to defend the homeland from cruise missiles; and

(B) left-of-launch ballistic missile defeat capability.

(2) DISCRETION.—The Secretary may designate a single military department or Defense Agency with the acquisition authority described in paragraph (1) or designate a separate military department or Defense Agency for each function specified in such paragraph.

(3) VALIDATION.—In making a designation under paragraph (1), the Secretary shall include a description of the manner in which the military requirements for such capabilities will be validated.

(f) DEFINITIONS.—In this section:

(1) The term ''Defense Agency'' has the meaning given that term in section 101(a)(11) of title 10, United States Code.

(2) The term ''intelligence community'' has the meaning given that term in section 3 of the National Security Act of 1947 (50 U.S.C. 3003).

# Appendix B: FY 2009 NDAA Requirement for a Review of U.S. Ballistic Missile Defense Policy and Strategy

SEC. 234. REVIEW OF THE BALLISTIC MISSILE DEFENSE POLICY AND STRATEGY OF THE UNITED STATES.[136]

(a) REVIEW REQUIRED.—The Secretary of Defense shall conduct a review of the ballistic missile defense policy and strategy of the United States.

(b) ELEMENTS—The matters addressed by the review required by subsection (a) shall include the following:

> (1) The ballistic missile defense policy of the United States in relation to the overall national security policy of the United States.
>
> (2) The ballistic missile defense strategy and objectives of the United States in relation to the national security strategy of the United States and the military strategy of the United States.
>
> (3) The ballistic missile threat to the United States, deployed forces of the United States, and friends and allies of the United States from short, medium, intermediate, and long-range ballistic missile threats.
>
> (4) The organization, discharge, and oversight of acquisition for the ballistic missile defense programs of the United States.
>
> (5) The roles and responsibilities of the Office of the Secretary of Defense, defense agencies, combatant commands, the Joint Chiefs of Staff, and the military departments in such programs.
>
> (6) The process for determining requirements for missile defense capabilities under such programs, including input from the joint military requirements process.
>
> (7) The process for determining the force structure and inventory objectives for such programs.

[136] Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, Sec. 234, 122 Stat. 4393-4394 (October 14, 2008).

(8) Standards for the military utility, operational effectiveness, suitability, and survivability of the ballistic missile defense systems of the United States.

(9) The method in which resources for the ballistic missile defense mission are planned, programmed, and budgeted within the Department of Defense.

(10) The near-term and long-term affordability and cost effectiveness of such programs.

(11) The objectives, requirements, and standards for test and evaluation with respect to such programs.

(12) Accountability, transparency, and oversight with respect to such programs.

(13) The role of international cooperation on missile defense in the ballistic missile defense policy and strategy of the United States.

(14) Any other matters the Secretary determines relevant.

(c) REPORT.—

(1) IN GENERAL.—Not later than January 31, 2010, the Secretary shall submit to Congress a report setting forth the results of the review required by subsection (a).

(2) FORM.—The report required by this subsection shall be in unclassified form, but may include a classified annex.

# About the Editor and Authors

Thomas Karako is a senior fellow with the International Security Program and the director of the Missile Defense Project at the Center for Strategic and International Studies (CSIS), where he arrived in 2014 as a fellow with the Project on Nuclear Issues. His research focuses on national security, U.S. nuclear forces, missile defense, and public law. He is also an assistant professor of political science and director of the Center for the Study of American Democracy at Kenyon College, where he arrived in 2009. For 2010–2011, he was selected to be an American Political Science Association Congressional Fellow, during which time he worked with the professional staff of the House Armed Services Committee on U.S. strategic forces policy, nonproliferation, and NATO.

Dr. Karako received his Ph.D. in politics and policy from Claremont Graduate University and his B.A. from the University of Dallas. He previously taught national security policy, American government, and constitutional law at Claremont McKenna College and California State University, San Bernardino. He has also written on executive-congressional relations, the thought of Niccolo Machiavelli, and international executive agreements.

Lieutenant General Henry A. Obering III (USAF Ret.) is a Booz Allen Hamilton executive vice president based in McLean, Virginia. He retired from the U.S. Air Force as a lieutenant general with more than 35 years of experience in space and defense systems development, integration, and operations. He served as director of the 8,500-person Missile Defense Agency, Office of the Secretary of Defense. He was the Department of Defense (DoD) acquisition executive for the nation's $10 billion per year missile defense portfolio. In addition, he served as the program manager for the Ballistic Missile Defense System. Prior to his assignment at MDA, he planned and programmed 68 joint, Air Force, and international programs with a $28 billion budget as mission area director for information dominance on the Air Staff.

General Obering entered the Air Force in 1973 after completing the University of Notre Dame's ROTC program as a distinguished graduate. He received his pilot wings in 1975 and flew operational assignments in the F-4E. Later, he was assigned to the Space Shuttle program and participated in 15 space shuttle launches as a NASA orbiter project engineer and was responsible for integrating firing room launch operations. Other assignments include tours with the Air Force Inspector General, the Defense Mapping Agency, and Electronic Systems Center. General Obering has twice earned the DoD's highest noncombat award, the Defense Distinguished Service Medal for leadership. In 2008, he received the prestigious University of Notre Dame Rev. William Corby Award recognizing alumni who have led a distinguished military career. He was honored by the National Defense Industrial Association's Missile Defense Division with the 2011 Kadish Award for Acquisition Excellence. He received a B.S. degree in aerospace engineering from Notre Dame University and an M.S. degree in astronautical engineering from Stanford University.

**Keith B. Payne** is professor and head of the Graduate Department of Defense and Strategic Studies, Missouri State University (Washington Campus). He is also president and cofounder of the National Institute for Public Policy, a nonprofit research center located in Fairfax, Virginia. Dr. Payne served in the Department of Defense as the deputy assistant secretary of defense for forces policy. He received the Distinguished Public Service Medal, and the Forces Policy Office led by Dr. Payne received a Joint Meritorious Unit Award. Dr. Payne was the head of U.S. delegation in numerous allied consultations and in "Working Group Two" negotiations on ballistic missile defense (BMD) cooperation with the Russian Federation. In 2005, he was awarded the Vicennial Medal from Georgetown University for his many years on the faculty of the graduate National Security Studies Program.

Dr. Payne is chairman of the U.S. Strategic Command's Senior Advisory Group, Strategy and Policy Panel; editor-in-chief of *Comparative Strategy: An International Journal*; and cochair of the U.S. Nuclear Strategy Forum. He served as a commissioner on the bipartisan Congressional Commission on the Strategic Posture of the United States; on the Secretary of State's International Security Advisory Board; as cochairman of the Department of Defense's Deterrence Concepts Advisory Group; and also as a participant or leader of numerous governmental and private studies, including White House studies of U.S.-Russian cooperation, Defense Science Board studies, and Defense Department studies of missile defense, arms control, and proliferation. He was a primary contributor to the 2001 Nuclear Posture Review, and he has served as a consultant to the White House Office of Science and Technology Policy, the Arms Control and Disarmament Agency, and participated in the 1998 "Rumsfeld Study" of missile proliferation. Dr. Payne has lectured on defense and foreign policy issues at numerous colleges and universities in North America, Europe, and Asia. He is the author, coauthor, or editor of over 150 published articles and 18 books and monographs. His articles have appeared in many major U.S., European and Japanese professional journals and newspapers. Dr. Payne received an A.B. (honors) in political science from the University of California at Berkeley in 1976, studied in Heidelberg, Germany, and in 1981 received a Ph.D. (with distinction) in international relations from the University of Southern California.

**Brad Roberts** is director of the Center for Global Security Research at the Lawrence Livermore National Laboratory. From April 2009 to March 2013, he served as deputy assistant secretary of defense for nuclear and missile defense policy. In this role, he served as policy director of the Obama administration's Nuclear Posture Review and Ballistic Missile Defense Review. He had lead responsibility for their implementation. From September 2013 through December 2014, Dr. Roberts was a consulting professor and William Perry Fellow at the Center for International Security and Cooperation at Stanford University, where he authored *The Case for U.S. Nuclear Weapons in the 21st Century* (Stanford University Press, 2015). In summer 2013, he was a visiting fellow at the National Institute for Defense Studies in Tokyo, Japan, with a focus on extended deterrence and strategic stability in Northeast Asia. From 1995 to 2009, Dr. Roberts was a member of the research staff at the Institute for Defense Analyses in Alexandria, Virginia, and an adjunct professor at George Washington University. From 1983 to 1995, he was a fellow at the Center for Strategic and International Studies, where he also served as editor of the *Washington Quarterly* from 1987 to 1995.

Dr. Roberts has also served as a member of the Defense Department's Threat Reduction Advisory Committee, chair of the research council of the Chemical and Biological Arms Control Institute, and member of the executive committee of the U.S. Committee of the Council for Security Cooperation in the Asia Pacific. He has a bachelor's degree in international relations from Stanford University (1976), a master's degree from the London School of Economics and Political Science (1981), and a doctorate in international relations from Erasmus University, Rotterdam, The Netherlands.

Brigadier General Kenneth Todorov (USAF Ret.) is director of global air and missile defense for Northrop Grumman Missile Defense Mission Systems in McLean, Virginia. For much of his Air Force career, he served as a Combat Search and Rescue and Special Operations helicopter pilot. From 2007 to 2009, General Todorov commanded the Air Force's "Flying Tigers," where he led 6,200 people and was responsible for aviation operations and maintenance, global logistics, and a five-state, 117,000-acre installation complex. There he managed $4 billion in capital assets and 121 fighter and helicopter aircraft executing successful combat operations in Iraq, Afghanistan, and the Horn of Africa. General Todorov also served as executive assistant to the four-star commander at NORAD and U.S. Northern Command in Colorado Springs, Colorado. Then as deputy director there he oversaw homeland defense, cyber, disaster relief, and missile defense operations for the United States and Canada. Most recently, he served on the staff of the chairman of the Joint Chiefs of Staff as director of the Joint Integrated Air and Missile Defense Organization, and as deputy director of the Missile Defense Agency, where he was responsible for an 8,500-person agency and an $8.2 billion budget. He served as the secretary of defense's colead for cyber and missile defense policy for the 2014 Quadrennial Defense Review.

General Todorov is a nonresident senior associate with the Missile Defense Program at the Center for Strategic and International Studies (CSIS) in Washington, D.C. He holds an M.B.A., as well as master's degrees in national security and strategic studies. He was a senior executive fellow in national and international security at the John F. Kennedy School of Government at Harvard University.

**COVER PHOTO** KOREAN CENTRAL NEWS AGENCY

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

1616 Rhode Island Avenue NW
Washington, DC 20036
202 887 0200 | www.**csis**.org

ROWMAN & LITTLEFIELD

Lanham • Boulder • New York • London

4501 Forbes Boulevard
Lanham, MD 20706
301 459 3366 | www.**rowman**.com

ISBN 978-1-4422-8009-0

9 781442 280090 90000