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# **NATO MISSILE DEFENSE AND THE EUROPEAN PHASED ADAPTIVE APPROACH: THE IMPLICATIONS OF BURDEN SHARING AND THE UNDERAPPRECIATED ROLE OF THE U.S. ARMY**

Steven J. Whitmore  
John R. Deni



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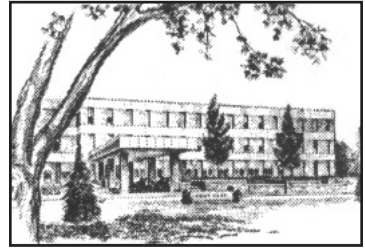


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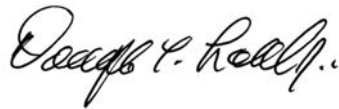


## FOREWORD

In 2010, the North Atlantic Treaty Organization (NATO) decided to significantly expand its ballistic missile defense program to include the defense of European member state territory and populations. Previously, when it came to ballistic missile defense, the NATO Alliance had focused solely on deployed forces and so-called “lower tier” systems. The Alliance’s policy change was based on several factors, but especially important were the decisions by the administration of President Barack Obama to redesign the U.S. plan for the use of American ballistic missile defense assets in Europe—known as the European Phased Adaptive Approach (EPAA)—and to offer the EPAA to NATO as the cornerstone of theater-wide Alliance ballistic missile defense, with the understanding that the European members of NATO would contribute to the common effort as well.

However, for a number of reasons, which co-authors Mr. Steven J. Whitmore and Dr. John R. Deni explain in terms accessible to laymen as well as strategists and other national security experts not necessarily well-versed in technical missile defense issues, it seems that the United States will continue to carry the lion’s share of the ballistic missile defense burden in Europe. This will have significant implications for the U.S. Army, which plays an important, though largely underappreciated, role in the EPAA and hence in NATO ballistic missile defense. Mr. Whitmore and Dr. Deni describe and explain the important role of the Army, and they analyze the specific implications for the Army of current and potentially growing U.S. commitments to ballistic missile defense of NATO’s European members. In doing so, Mr. Whitmore and

Dr. Deni make an important contribution to both policy and academic debates over Alliance burden-sharing and ballistic missile defense. For this reason, the Strategic Studies Institute is pleased to offer this monograph on the role of the U.S. Army and the manner in which it can best serve the nation today and in the future.

A handwritten signature in black ink, reading "Douglas C. Lovelace, Jr." in a cursive script.

DOUGLAS C. LOVELACE, JR.  
Director  
Strategic Studies Institute and  
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## ABOUT THE AUTHORS

JOHN R. DENI joined the Strategic Studies Institute in November 2011 as a Research Professor of Joint, Interagency, Intergovernmental, and Multinational (JIIM) Security Studies. He previously worked for 8 years as a political advisor for senior U.S. military commanders in Europe. Prior to that, he spent 2 years as a strategic planner specializing in the military-to-military relationship between the United States and its European allies. While working for the U.S. military in Europe, Dr. Deni was also an adjunct lecturer at Heidelberg University's Institute for Political Science. There, he taught graduate and undergraduate courses on U.S. foreign and security policy, the North Atlantic Treaty Organization (NATO), European security, and Alliance theory and practice. Before working in Germany, he spent 7 years in Washington, DC, as a consultant specializing in national security issues for the U.S. Departments of Defense, Energy, and State. Dr. Deni is the author of *Alliance Management and Maintenance: Restructuring NATO for the 21st Century*, as well as several journal articles. He has published op-eds in major newspapers such as the *Los Angeles Times* and the *Baltimore Sun*, and has spoken at conferences and symposia throughout Europe and North America. Dr. Deni holds an undergraduate degree in history and international relations from the College of William & Mary, an M.A. in U.S. foreign policy from American University in Washington, DC, and a Ph.D. in international affairs from George Washington University.

STEVEN J. WHITMORE is the Project Director for the Upper Tier Project Office under the Program Execu-

tive Office Missiles and Space (PEO MS), at Redstone Arsenal, AL. Mr. Whitmore was previously the Javelin Product Director, Close Combat Weapon Systems Project Office (PO) for the U.S. Army (2007-10). His previous Army acquisition assignments included Test Chief, Cruise Missile Defense Systems PO; Test Lead, Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) Project Office; Assistant Product Manager for Radar Systems, Apache Helicopter Project Management Office (PMO); and CH-47F Test Lead, Cargo Helicopter PMO. Mr. Whitmore has more than 20 years of professional experience in science, engineering, and management, covering a broad spectrum of activities. He is Level III certified in Program Management, Test & Evaluation (T&E) and Systems Planning, Research, Development, and Engineering (SPRDE). Mr. Whitmore has attended numerous leadership courses, including the Darden Business School Leadership program, and the Sustaining Base Leadership and Management (SBLM) course at the Army Management Staff College. He is a Fellow of both the Competitive Development Group (CDG) and the Defense Acquisition Senior Service College. Mr. Whitmore holds a bachelor's degree in engineering from the University of Alabama, Huntsville, and a master's degree in engineering from Southeastern Institute of Technology.

## SUMMARY

The 2010 North Atlantic Treaty Organization (NATO) decision to expand its ballistic missile defense program was somewhat surprising for several reasons, including lukewarm European public support for ballistic missile defense and tightening defense budgets on both sides of the Atlantic. Nevertheless, the Alliance has moved forward, with a significant expansion of its ballistic missile defense program, stating its intent to defend all European member state territory and populations, and declaring at the Chicago summit in 2012 that the Alliance had achieved an interim capability.

The reasons for the Alliance decision in 2010 were several, but critical among them was the U.S. Government's offer to include the new European Phased Adaptive Approach (EPAA), announced by the Barack Obama administration in September 2009, as the centerpiece of the NATO ballistic missile defense program. For cash-strapped European members of the Alliance eager to influence NATO's ballistic missile defense efforts but unable to devote funds on par with the United States, Washington's proposal to include the EPAA framework in an expansion of the Alliance missile defense effort comprised an offer too attractive to refuse.

Nonetheless, and despite the American offer to provide the EPAA as the lion's share of NATO's expanded ballistic missile defense program, Washington made clear to its allies that it expected them to contribute to the common defense. In response, several allies have offered land or facilities, and many have pledged to provide future capabilities and assets. However, few have actually contributed tangible ballistic missile defense assets to date in terms of missile

interceptors, radars or other sensors, or ballistic missile defense-related platforms. Given differing threat perceptions and declining defense budgets, it seems very likely that tangible Alliance contributions, in the form of sensors and interceptors in particular, will remain minimal over the next decade.

A lack of tangible allied contributions is likely to have significant implications for the U.S. Army, which has an important but largely underappreciated role in NATO missile defense today. In particular, the Army is likely to face increased manpower demands, materiel requirements, and training needs in order to meet the demand created by the NATO ballistic missile defense program. Additionally, Army units involved directly in or in support of ballistic missile defense are likely to face a higher operating tempo (OPTEMPO) than currently projected. As a result of all these increased requirements—some of which the Army and the Department of Defense (DoD) currently foresee, and some they do not—it seems unlikely that current Army and DoD budget projections in this regard will prove valid. Instead, all available evidence currently points to increased budgetary requirements as well. In conclusion, it appears that the Alliance’s decision in 2010 to cover all Alliance territory and populations in Europe coupled with Washington’s offer of the EPAA as the centerpiece of the new NATO ballistic missile defense system will together require the U.S. Army specifically, and the United States more broadly, to contribute more than expected to the ballistic missile defense of European territory and populations. In turn, this will exacerbate the perceived imbalance in transatlantic burden-sharing, particularly if the EPAA provides little, if any, benefit to the defense of U.S. territory, given Washington’s decision to cancel Phase 4 of that framework.

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**INTRODUCTION**

In 2010, the North Atlantic Treaty Organization (NATO) decided to significantly expand its ballistic missile defense (BMD) program. Years prior, the Alliance had committed itself to developing the capability to defend deployed forces against ballistic missiles. But at the November 2010 Lisbon (Portugal) Summit, Alliance heads of state and government agreed to ultimately defend *all* Alliance territory and populations in Europe against ballistic missiles, not just deployed forces. Given the tenor of transatlantic discussions on BMD in previous years and decades, the Alliance's decision represented a significant change.

One of the reasons why NATO agreed to expand its missile defense program was that the United States had offered to provide the vast majority of capabilities—in terms of sensors and interceptors—necessary to defend all Alliance territory and populations in Europe through its European Phased Adaptive Approach (EPAA). Nonetheless, and in spite of the EPAA offer, the United States made clear at Lisbon and in various other venues since that it expects the European members of the Alliance to contribute to common BMD efforts.

When the EPAA was first announced by the Barack Obama administration in September 2009, much of the attention focused on how the new plan emphasized

ship-based systems, at least initially. This stood in contrast to the George W. Bush administration's land-based plan for a so-called "third site" for U.S. homeland defense against ballistic missiles, which would have involved radars in the Czech Republic and ground-based interceptors in Poland.<sup>1</sup> Given this new system architecture and the U.S. offer to include the EPAA in the Alliance's BMD program, it seems obvious that the U.S. Navy is set to play an important role in the EPAA and hence in NATO BMD. However, the U.S. Army has come to play a critical, though largely underappreciated role as well.

As the NATO BMD architecture continues to develop in the coming years—and depending in great measure on the nature and scope of European contributions—there is a strong possibility that the U.S. Army's role may actually grow beyond that envisioned by American officials at the time of the Lisbon decision. To assess this potential and the modalities by which the Army's role might grow, this monograph will first explain why the Alliance decision in 2010 to expand its BMD program represented a significant change. Knowing why NATO decided to expand its missile defense program is vital to understanding whether and how the U.S. Army role is likely to change in the coming years. The monograph will then examine what the allies have committed or contributed to date before outlining the specific role of the U.S. Army. As will be shown later in this monograph, it appears as if the Army's role is indeed likely to grow, perhaps well beyond that currently envisioned by resource managers and policymakers, and bringing with it potentially significant budgetary and operational implications.



## NATO'S DECISION TO EXPAND MISSILE DEFENSE

In a major announcement at the 2012 Chicago summit, NATO declared an interim capability to defend parts of Europe from limited ballistic missile attacks. Just 2 years prior, during its previous 2010 summit in Lisbon, NATO formally took on theater-wide missile defense of member state territory and populations in Europe – the aim, declared Alliance heads of state and government, is to, “develop a missile defence capability to protect all NATO European populations, territory and forces.”<sup>2</sup> In doing so, the Alliance essentially agreed to expand its Active Layered Theater Ballistic Missile Defense (ALTBMD) program. Begun in 2005, the ALTBMD Command and Control (C2) architecture was originally designed to defend just deployed allied forces against short- and medium-range (up to 3,000 kilometers [km]) ballistic missile threats.

At the Lisbon summit, the Alliance also formally adopted the U.S.-proposed EPAA as an “indispensable contribution” to the NATO BMD architecture. The EPAA would form such an indispensable component of the ALTBMD expansion, that it would soon be described as “by far the lion’s share” of the planned NATO BMD system expansion.<sup>3</sup>

Although missile defense is not a new issue for the Alliance, NATO’s decision in 2010 to go beyond the protection of deployed forces and instead to include homeland defense of allied populations and territory in Europe was a major shift in at least three respects. First, European publics have never strongly embraced missile defense. Second, the expansion of the Alliance’s appetite in this area comes as defense budgets on both sides of the Atlantic are increasingly squeezed. Finally, there remain major technical challenges asso-

ciated with missile defense in general, much less the BMD of 900 million people spread across 28 democracies in North America and Europe. The next several sections will examine in detail NATO's decision to take on BMD of Alliance territory and populations in Europe in light of these factors.

## EUROPEAN PUBLIC OPINION

Since the Prague summit of 2002, Alliance summit statements have acknowledged the growing ballistic missile threat. However, in agreeing to expand ALT-BMD in 2010, European leaders appeared to be leading public opinion vice following it. Since the days of the Ronald Reagan administration's strategic defense initiative, European publics have never been as supportive of BMD as the American public, which itself has been riven by discord on this issue over most of the last 30 years.<sup>4</sup> In more recent debates over missile defense in Europe, there appears to have developed a significant gap between the views of policymakers—which over time have generally become more open toward American missile defense proposals, if only as a means of ensuring more American boots on the ground in Poland and the territories of other new NATO allies—and those of the public, which have continued to oppose much of what Washington has been pushing.<sup>5</sup>

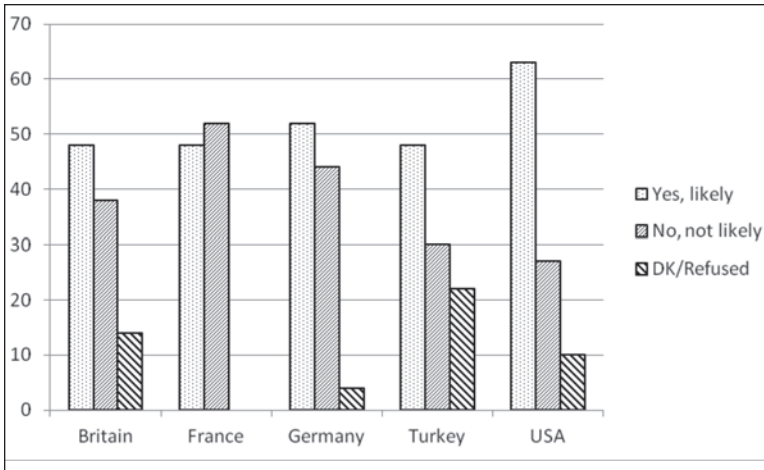
Even among those European allies which stood to gain most from a deployment of American missile defense assets to Europe—such as Poland and the Czech Republic—most public opinion surveys showed strong opposition.<sup>6</sup> Much of this was based on concerns over sovereignty but also over the risk of antagonizing Russia, which has long opposed U.S. missile defense systems in Europe.<sup>7</sup>

More recently, even within those member states that were among the stronger supporters of missile defense—such as the Netherlands—it seems clear to some that national political elites have been in front of public opinion. For example, with respect to missile threats and the likelihood of a ballistic missile attack on the Netherlands, the Hague Centre for Strategic Studies found that, “There is a significant gap between the ‘expert community’ [which is concerned about the missile threat] and the [Dutch] public at large [which is far less concerned].”<sup>8</sup>

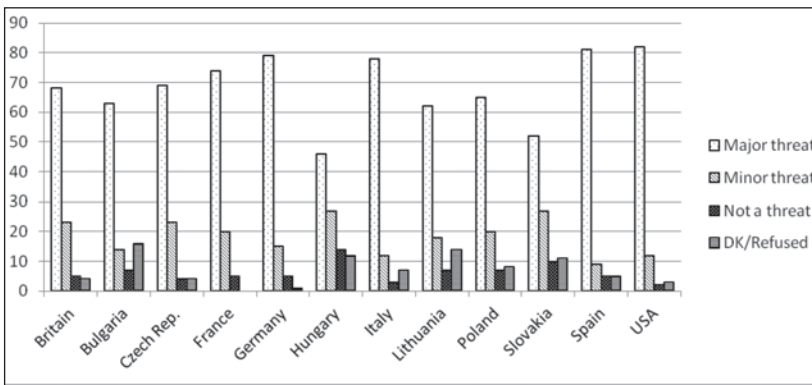
Opinions in Europe have been divided over not only missile defense as a concept but also with regard to the most likely ballistic missile threat facing Europe, namely Iran. Europeans typically have not shared Americans’ perceptions on the gravity of the Iranian threat. For example, as shown in Figure 1, a survey conducted by the Pew Research Center’s Global Attitudes Project in 2006 found that Americans were far more concerned than citizens in several of Washington’s closest European allies about a potential attack from Iran.

Similarly, a survey conducted in 2007 found that only 54 percent of Europeans believed a nuclear Iran would threaten Europe, while 67 percent of Americans felt the same.<sup>9</sup>

More recently though, there is some data to suggest that the Iranian threat has become more salient to Europe publics. In a fall 2009 survey conducted by the Pew Center, the perception of a nuclear Iran as a major threat certainly appeared to have increased over just a few years prior in several European countries, as seen in Figure 2.



**Figure 1. If Iran were to develop nuclear weapons, do you think they would be likely to 1) attack the U.S. and/or Europe, or 2) not attack the U.S. and/or Europe?**



**Figure 2. If Iran developed nuclear weapons, would this be a major threat, a minor threat, or not a threat to the well being of your country?**

Nonetheless, among some other European NATO member states, such as France, even if the missile threat from Iran is acknowledged, there appears to be a consensus among some policymaking elites that nuclear weapons are sufficient to deter Tehran, and that BMD is not vital.<sup>10</sup>

In sum, the evidence regarding whether Europeans share American perceptions of the threat from Iran, or American preferences for what to do about it, is somewhat mixed. Regardless of whether a new trend – that is, a convergence of transatlantic threat perceptions and policy preferences – was underway in the late 2000s, the 2010 decision to expand ALTBMD represented a significant change from attitudes and preferences of just a few years prior, and something of an unexpected outcome when gauged against the history of transatlantic deliberations over missile defense.

## **DEFENSE BUDGET CHALLENGES**

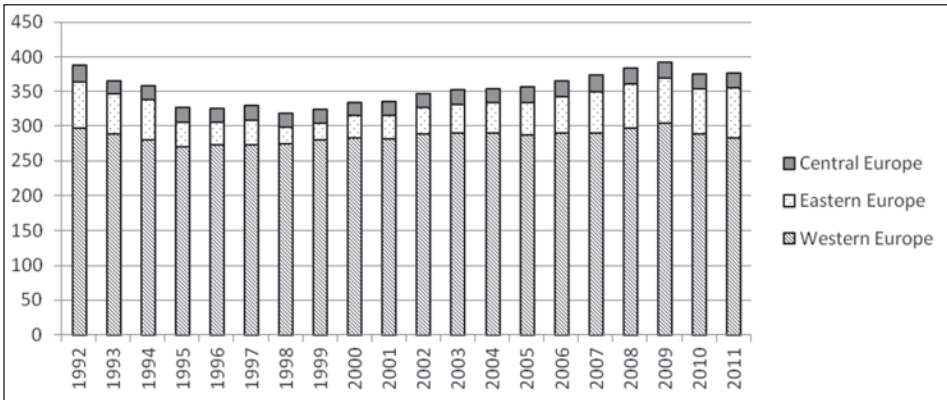
Perhaps more significant than edging out in front of public opinion, Alliance commitment to expanding the ALTBMD program meant taking on a new mission at a time when defense budgets on both sides of the Atlantic were beginning to come under great downward pressure. By 2008, economies in Europe and North America were reeling from the effects of the global financial crisis.

In Europe, this manifested itself in the form of several related sovereign debt crises, compelling Cyprus, Ireland, Spain, Greece, and Portugal to seek “bailout” loans in order to meet their sovereign obligations. Across the entire continent, European members of the Alliance slashed public expenditures. Defense budgets were a particularly easy target, given the lack of

major security threats and collective public exhaustion following nearly a decade of conflict in Afghanistan.<sup>11</sup>

Even *before* the financial crisis, many in Europe felt that defense spending was too high. In a 2006 study conducted by the International Social Survey Programme, 60 percent of Dutch, 57 percent of Danes, 49 percent of French, 56 percent of Germans, and 52 percent of Poles all felt that their governments should spend less or “much less” on defense.<sup>12</sup>

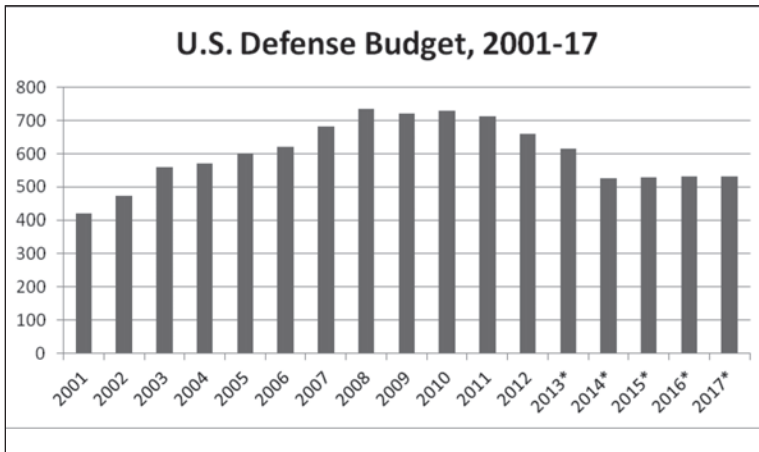
As a result of both the sovereign debt crisis as well as public support for reduced defense expenditures, European defense spending—which has actually been fairly steady in real terms over the last decade or more—indeed has dropped since 2009, as indicated in Figure 3.



**Figure 3. European Defense Spending in Constant 2010 Billions of U.S. dollars.<sup>13</sup>**

Meanwhile, the U.S. defense budget also became the object of significant cuts after 2010, as public exhaustion over two long wars mounted and as the government faced an increasingly dire budgetary situation following the collapse of the U.S. housing market

and the onset of the global recession. Most recently, the decision to cancel the fourth and final phase of the EPAA was reportedly based in part on the need to re-prioritize available budget resources from Europe to the Pacific theater.<sup>14</sup> Figure 4 highlights the U.S. defense budget since 2001.



\*Years 2013-17 Are Estimates.<sup>15</sup>

**Figure 4. U.S. Defense Spending in Billions of 2012 Dollars.**

To be sure, American officials recognized from the outset that the United States would be providing the bulk of the Alliance’s expanded missile defense capability through the EPAA. Nonetheless, American officials have been equally clear that they hope and expect the European allies to contribute to the common effort. In its 2010 *Ballistic Missile Defense Review Report*, the Department of Defense (DoD) argued that, “Regional deterrence must be built on a solid foundation of strong cooperative relationships and appropriate burden sharing between the United States and

its allies.”<sup>16</sup> When Secretary of Defense Robert Gates spoke to the press as the administration unveiled the EPAA, he noted that Washington expected allies to contribute:

One of our guiding principles for missile defense remains the involvement and support of our allies and partners. We will continue to rely on our allies and work with them to develop a system that most effectively defends against very real and growing threats.<sup>17</sup>

Similarly, during a press conference in February 2012, Gates’ successor, Leon Panetta, emphasized that Washington was urging its European allies to contribute to NATO’s missile defense effort.<sup>18</sup> More recently, Rear Admiral Mark Montgomery, the Deputy Director for Plans, Policy and Strategy at U.S. European Command, addressed burden sharing during the Allied Ballistic Missile Defense Upgrade Conference held in Berlin, Germany, on September 13, 2012, noting:

We must share the burden – to address capability and capacity shortfalls to close the gap for robust coverage and defense of all NATO European populations, territory and forces.<sup>19</sup>

In fact, Montgomery was quite explicit in noting that additional allied capabilities – specifically, upper tier surveillance and target cueing as well as additional shooter capacity – may be necessary to fully defend, versus simply “cover,” all European NATO territory, and would welcome European contributions.<sup>20</sup>

For their part, European members of the Alliance appeared to commit themselves to just such a course at Lisbon, in which NATO declared that its missile defense program would be based upon several prin-



ciples, including the “equitable sharing of risks and burdens.”<sup>21</sup> However, during an era of declining defense budgets on both sides of the Atlantic—and increasingly vocal American concerns about burden sharing—the ability *and* willingness of the European members of the Alliance to make good on such principles remains in doubt.<sup>22</sup>

## **THE TECHNICAL CHALLENGES OF BALLISTIC MISSILE DEFENSE**

Even if European leaders had the financial means and the political will to equitably share with their U.S. allies both the risks and burdens associated with Alliance-wide BMD, the question remains whether they will be able to overcome the technical challenges associated with “hitting a bullet with a bullet.” Such concerns—that is, the major technical challenges—have been at or near the core of European objections to BMD for decades.

The four key technical challenges in missile defense are target acquisition, discrimination, interception, and data networking.<sup>23</sup> Target acquisition is accomplished through extraordinarily powerful radar systems. Effective, powerful radar systems—in conjunction with early-warning satellites—are critical not simply for detecting and finding incoming missiles and warheads in general, but for enabling the launch of interceptors early in the trajectory of enemy missiles, which has particular benefits for the defender outlined in greater detail below. The NATO BMD system will rely on an advanced x-band radar developed and produced by the United States and based near Kürecik in central Turkey.<sup>24</sup> This radar system—the Army/Navy Transportable Radar Surveillance Sys-

tem, otherwise known as the AN/TPY-2 radar – is the same as that used in the Terminal High Altitude Area Defense (THAAD) BMD system.<sup>25</sup>

Unfortunately, the DoD Defense Science Board (DSB) – a civilian advisory panel whose purpose is to provide independent advice and recommendations on scientific and technical matters – concluded recently that the advanced x-band radar system employed in the EPAA and hence in the NATO BMD program is not, in some cases, fully adequate for a robust defense of Alliance territory. The DSB found that:

The current Aegis shipboard radar is inadequate to support the objective needs of the EPAA mission. For this reason, the TPY-2 land-based radars and the future Navy ship-based Air and Missile Defense Radar (AMDR) upgrade become critical components of the European defense scenarios. In some situations, *even the TPY-2's superior tracking range is not adequate for a robust defense, and a moderate increase in sensitivity would be very useful.*<sup>26</sup>

Additionally, the DSB argued that extremely high speed, high quality data exchange mechanisms are required, so the utility gained from even a powerful x-band radar could be greatly limited. Sharing of data among multiple sensors, including the x-band radar in Turkey, as well as among fire control nodes and interceptors, is absolutely critical to defending the largest amount of Alliance territory possible and hence the greatest number of member state citizens. Whether and how NATO is able to achieve a fully networked system is discussed in detail further below.

Assuming though that a target is acquired, the defender must next determine if the target is a threat, such as an incoming missile or warhead, and not a

separated rocket booster stage or a penetration aid/decoy. Target discrimination is essential to ensuring that the defender does not waste interceptors by shooting at missile “junk” or decoys, which is especially important given sometimes extraordinarily expensive interceptors.<sup>27</sup> Time is perhaps the most important factor in effective discrimination—that is, time to examine incoming objects with a variety of ground-based and interceptor-based sensors.<sup>28</sup> Nonetheless, target discrimination—which must occur during the mid-course phase of the trajectory to be an effective tool in husbanding scarce interceptor resources—is one of the most formidable technical challenges involved in mid-course defense.<sup>29</sup> Moreover, even if an x-band radar and an optical sensor on a launched interceptor gather data useful for discrimination, that data must be fused effectively and efficiently to be of any use.

Assuming target discrimination has successfully occurred, the next step in the process of missile defense is target interception. Even though the Aegis missile defense system—which will provide the backbone of NATO’s interceptor network—was actually designed during the Cold War as a means of defending against Soviet cruise missile attacks, upgrades have made it quite effective against ballistic missiles in tests conducted to date. The U.S. Missile Defense Agency (MDA) claims that from January 2002 to October 2012, the SM-3 missile successfully intercepted 20 of 23 targets.<sup>30</sup> It was only in April 2011, though, that an SM-3 missile successfully intercepted a target while relying on data conveyed to it by an x-band radar hundreds of miles away—this was the first time that the radar used to track an incoming target missile had been located off of the ship firing the interceptors and was a major achievement. But in a similar test in October 2012, an

SM-3 Block IA interceptor failed to hit an incoming short-range ballistic missile target.<sup>31</sup> This failure and other developmental challenges strongly suggest to some experts that the deployment of the SM-3 Block IB and the subsequent Block IIA could be significantly delayed beyond current timelines.<sup>32</sup> Moreover, the recent decision by the Obama administration to cancel Phase 4 of the EPAA and “restructure” the SM-3 Block IIB program suggests that the challenges regarding interceptor technology indeed remain serious. In the case of the SM-3 Block IIB, these challenges amounted to “good technical and economic reasons” for essentially cancelling the program.<sup>33</sup>

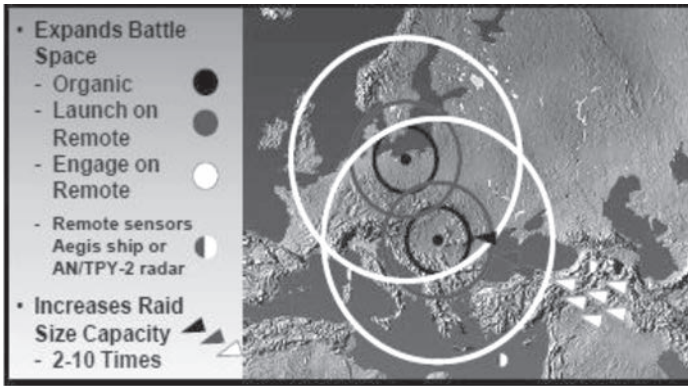
Even if most technical challenges can be overcome, in order to achieve the shoot-assess-shoot firing doctrine that experts agree is the most cost-effective means of conducting BMD, interceptor speeds are nonetheless critical—without a fast interceptor, there is not enough time to fire additional rounds.<sup>34</sup> The National Research Council postulates that with two interceptor sites—at least one of which would be located in northern Europe, such as the planned site in Poland under the terms of NATO’s missile defense plan—and an interceptor speed of 4.0 km per second (km/s), the Alliance could achieve a shoot-assess-shoot firing doctrine.<sup>35</sup> Unfortunately, the maximum speed of the SM-3 Block IA missile—the type currently deployed on the USS *Monterey* and in operation today as part of the NATO BMD system—is reportedly between 3.0 and 3.5 km/s.<sup>36</sup> The SM-3 Block IB—the next iteration of the Standard Missile scheduled to be fielded by the MDA as part of the NATO BMD architecture in 2015—has the same speed. The more advanced SM-3 Block IIA, scheduled for deployment in 2018 under current plans, reportedly will be capable of traveling

at speeds of up to 4.5 km/s.<sup>37</sup> In theory then—and again assuming technical challenges uncovered during the test and evaluation phases of the SM-3 Block IIA’s development are overcome—the Alliance would be able to achieve a shoot-assess-shoot firing doctrine.

In the meantime, it is also theoretically possible to cover more Alliance territory with more interceptor sites. To cover *all* Alliance territory full-time with fielded technology would require, according to one estimate, eight ships armed with interceptors. Assuming an A-B-C rotation model common to NATO and U.S. military operations—in which one unit is training for deployment, one unit is deployed, and one unit is undergoing post-deployment refit and rest—24 ships would therefore be necessary for round-the-clock, complete coverage of Alliance territory.<sup>38</sup> This is roughly equivalent to the *total* number of frigates in the entire inventory of the European member states capable of being equipped with interceptors; perhaps unsurprisingly, few allies are interested in pursuing this objective in the short- or mid-term.<sup>39</sup>

The final great technical challenge involved in successfully implementing BMD—especially in a multinational context exemplified by the NATO BMD plan—is that of data fusing/networking. Ideally, all space-, ground-, and interceptor-based sensors are networked in real time with all command and control nodes, allowing for data fusion and hence an effective defense. Indeed, the DSB noted that effective networking of dispersed sensors and interceptors is a critical enabler for regional missile defense, such as envisioned in the NATO BMD plan. Without it, operationally useful large-area defense is practically impossible, unless, of course, the Alliance was willing and able to field many more sensor and interceptor

assets than is currently envisioned or even realistically possible.<sup>40</sup> As seen in Figure 5, without effective networking of at least the forward-based radar in Turkey with the planned interceptor sites in Poland and Romania, the defended area—represented by the black rings—is indeed quite small and falls short of “regional” missile defense.<sup>41</sup> If, on the other hand, the “remote” radar in Turkey is networked effectively with the interceptor sites, regional missile defense—at least that represented by the white rings—is theoretically possible.



**Figure 5. Larger Defended Areas Made Possible Through Fully Networked Remote Sensing.**

In addition to the engineering challenges associated with real-time networking of sensors and interceptors, the Alliance faces “techno-political” challenges in this realm as well. The very nature of NATO—an intergovernmental organization comprised of sovereign states—means the Alliance will need to overcome hurdles related to sovereignty. One of the ways in which concerns over sovereignty manifest themselves is with regard to sensor data classification. In

some cases—particularly with regard to the sensitive technology behind the AN/TPY-2 radar—such hurdles are significant, and individual allies such as the United States must use caveats to govern the releasability of raw data feeds to its allies.<sup>42</sup>

Data networking, plus the three other major challenges outlined above—target acquisition, discrimination, and interception—have, in fact, served to dissuade many in the West from even attempting to muster the budgetary and political resources necessary to overcome these hurdles. Additionally, on top of all this sits a more theoretical argument against investing in missile defense—rooted in technology, but not of such a technical nature as the subjects discussed above—that has served to inhibit America’s NATO allies from jumping on board with missile defense in years past. That is, some Europeans—as well as many on the left of the political spectrum in the United States—have long believed that any system of missile defense would undermine the global nonproliferation regime as well as notions of deterrence such as mutually assured destruction. The implications of missile defense could include an imperative among nuclear-armed countries to place their arsenals on a hair trigger—to avoid losing the initiative and having their nuclear weapons made irrelevant by an effective missile defense system. Thus, a nuclear arms race would develop as nuclear powers strived to develop sufficient numbers of arms to overwhelm any enemy’s missile defense system.<sup>43</sup>

In sum, technological challenges and related issues, budgetary belt-tightening, and a lack of unambiguous public support all stood in the way of NATO expanding its appetite for missile defense. And yet, the Alliance moved forward anyway.

## SO WHY DID THE ALLIES AGREE?

In the face of significant reasons for *not* doing so discussed above, the NATO Alliance nonetheless decided in 2010 to dramatically expand the ALTBMD program to cover all Alliance territory and populations in Europe. The reasons for this appear to be four-fold.<sup>44</sup> First, as discussed above, there was a growing consensus in the late 2000s among European elites—that is, political and military decisionmakers inside government as well as the informed, engaged epistemic community outside of government—that the threat to Europe of ballistic missiles was growing, not receding.<sup>45</sup> This meant that governments that were adamantly opposed to expanding NATO's BMD efforts in the past—such as Germany, Norway, and Spain, and which, in some cases, appeared to almost parrot Russian talking points on the same—found themselves gradually getting behind efforts to include the defense of NATO territory and populations in Europe in Alliance missile defense planning and programs.<sup>46</sup> In some ways, NATO BMD appealed to many of these same allies because it represented a return to classic Article 5 sorts of concerns. Article 5 is the part of the NATO treaty that essentially commits the allies to consider an attack against one to be an attack on all. In this light, expanding BMD to include European member state territory and populations appealed to many in the Alliance because it would be a great example of NATO contributing directly to the defense and protection of its member states. This stands in contrast to the far-flung missions in Afghanistan or off the Horn of Africa, which perhaps lack the same appeal among average European citizens.<sup>47</sup>



Second, and most importantly, the United States made it clear to its European allies that Washington would be willing to have the EPAA comprise “by far the lion’s share” of NATO’s missile defense program, as noted earlier.<sup>48</sup> This was particularly gratifying to European ears; given the defense budget challenges outlined above, there would be no requirement for the European members to contribute much of anything in terms of sensors or interceptors. Instead, Washington only asked that NATO include the EPAA as part of the alliance’s broader missile defense program—specifically, the ALTBMD program designed to provide a command and control framework. Doing so would essentially require the European allies to agree to expand ALTBMD from focusing primarily on lower-tier, tactical missile defense to addressing more directly upper-tier, theater-wide missile defense. According to NATO officials, in a study conducted after the Lisbon summit, the estimated cost to expand ALTBMD in this way—specifically through expansion of the command and control mechanisms—would amount to less than €200M, funded with NATO common funds, spread out over 10 years.<sup>49</sup> Even for European allies facing shrinking defense budgets, most in Europe perceive this as a relatively small outlay. Washington’s offer therefore represented a serious bargain for the European members of NATO, at least from a cost-benefit perspective.

Third, viewed from another perspective, for a relatively small collective price and little in the way of national commitment, all of the European allies received a seat at the table of theater missile defense. Under the George W. Bush administration’s plan for a European “third site,” the United States negotiated bilateral arrangements with Poland for the emplace-

ment of interceptors and with the Czech Republic for the construction of a radar site, leaving other Alliance members and the Alliance organization itself on the sidelines. In contrast, the Obama administration's proposal to place the EPAA under NATO auspices—and the Alliance's approval of same—meant that *all* of the allies would have a voice and hence the chance to influence the future shape of Alliance BMD policy and operations.

Finally, many allies have decided that some limited BMD coverage is better than no coverage at all.<sup>50</sup> As explained above, there are significant technical challenges involved in missile defense, and as will be described below, there are major gaps in coverage of allied territory at present that are likely to persist for years. Nonetheless, several allies believe that at least a minimally capable system provides some deterrent benefit vis-à-vis potential adversaries that may consider using or developing ballistic missiles.

## **ALLIED CONTRIBUTIONS TO DATE**

Having committed to expanding ALTBMD and hence NATO BMD to include defense of allied European territory and populations during the Lisbon summit in mid-November 2010, the Alliance was prepared to promulgate a draft technical study on the broad outlines of its BMD system, including the number, type, and ideal locations of systems necessary to augment the EPAA.<sup>51</sup> Interestingly, that study concluded that NATO needed not one, but two, AN/TPY-2 radar systems.<sup>52</sup> However, that broad, system-wide study—written by a multidisciplinary team within NATO headquarters called the Missile Defense Project Group—was never approved for release be-

cause of disagreements among the member states on whether and how to identify the threats against which any theater-wide NATO BMD system would defend.<sup>53</sup>

Instead, the Missile Defense Program Group at NATO headquarters pushed forward with a technical study that only addressed the necessary command and control elements, hence excluding sensors and shooters. That study – the Battle Management, Communications, Command, Control, and Intelligence (BMC<sup>3</sup>I) architecture study – lays out the command and control requirements for ALTBMD expansion as well as for interoperability with the counterpart American system known as the Command and Control, Battle Management, and Communications (C<sup>2</sup>BMC) system. In October 2012, the study was submitted to Alliance member states for review, with at least two noteworthy characteristics:

First, the study – perhaps somewhat naively – reflects the Alliance’s assumption that there will be no “bolt from the blue” attack against NATO territory.<sup>54</sup> Put another way, the Alliance expects to have advance warning of any emergent ballistic missile threat, and it has explicitly ruled out planning for a surprise attack. Advance warning will then permit the Alliance to position the BMD-capable Aegis ship(s) and deploy point air and missile defense capabilities – such as Patriot systems – for the radar site in Turkey.

Assuming there will be some period of forewarning reflects the significant confidence NATO has – perhaps *overconfidence* – in member state national technical means of surveillance and early warning. It also may reflect the simple fact that the Alliance believes defending against a surprise attack is impossible given finite resources and capabilities.

The second noteworthy characteristic of the BMC<sup>3</sup>I architecture study is that, perhaps somewhat counter-intuitively, it did not define in any detail the Initial Operating Capability (IOC) or Full Operating Capability (FOC) for Alliance missile defense. Typically, military capability requirements for IOC and FOC would be initially addressed in a document like the BMC<sup>3</sup>I architecture study, and then spelled out in greater detail in a subsequent defense planning process document developed by NATO's military authorities. That set of capability requirements would then be used by NATO's Force Generation staff to solicit contributions from the member states. NATO member states—specifically the defense establishments in each country—would also use that list of requirements to justify defense budget requests in domestic bureaucratic battles over resource prioritization.<sup>55</sup>

In the NATO BMD context though, the situation has been *completely* reversed. In 2012, NATO force generation staff officers began informally soliciting member states for potential contributions, even before a formal defense planning process had begun. Those member state offers—*all* of which are accepted by NATO—will then be used to build the statement of requirements that will define IOC and FOC.<sup>56</sup>

At the same time, the €200M figure cited in the 2010 cost study has effectively capped the capabilities of the Alliance's BMC<sup>3</sup>I system. In order to fit the system within that spending cap, NATO planners have had to accept increased risk associated with the BMC<sup>3</sup>I design, relative to the initial architecture study of the broader system completed in 2010 but never promulgated.<sup>57</sup>

Therefore, it appears that NATO will reverse-engineer its way into both a command and control architecture as well as a broader missile defense system

architecture that will be virtually useless against a surprise attack, driven only in part by a realistic assessment of the threats the Alliance faces, and shaped decisively by the fiscal and political wherewithal of member states to contribute assets to the collective effort. While it is certainly not unusual for Alliance decisionmaking to be driven by factors other than or in addition to an objective assessment of threats, the degree to which the Alliance has placed the cart before the horse – in essentially building its BMD system statement of requirements based on what the allies offer – seems particularly noteworthy in this case.

Meanwhile, the Alliance has at least committed to the €200M figure. In fact, NATO's mid-term resource plan, which looks ahead 5 years, has a specific BMD line item that will fund BMC<sup>3</sup>I expansion. In July 2013, the Alliance affirmed its commitment by issuing a decision to program the necessary funds according to the resourcing plan.<sup>58</sup>

Some Alliance members have also stepped up to make tangible contributions. Foremost among them have been Germany, Poland, Romania, Turkey, and Spain, which have each offered facilities or land, signed basing agreements, or otherwise agreed to host U.S. and allied elements of the NATO BMD system. For example, Germany hosts a NATO BMD cell at Ramstein Air Base. The BMD cell's multinational staff is currently 10 strong, with a plan to increase to 22 personnel under NATO's impending reorganization and following the establishment of a BMD Operations Center (BMDOC) at Ramstein.<sup>59</sup> This operational hub synthesizes real-time data from the NATO BMC<sup>3</sup>I and U.S. C<sup>2</sup>BMC networks, relays it to shooters for cueing, and provides notifications to all other NATO commands.

Elsewhere, Poland and Romania will each host an Aegis Ashore interceptor site—at a base near Redzikowo in Poland and at the Deveselu Air Base in Romania—and have each signed agreements with the United States to do so.<sup>60</sup> After a lengthy period of internal deliberations, Turkey agreed to host an AN/TPY-2 radar site operated by the United States but under NATO operational control.<sup>61</sup> Spain has agreed to home port four additional U.S. BMD-capable Aegis ships.<sup>62</sup>

American officials recognized quite clearly though, that unless Washington applied at least some minimal level of pressure, the allies were unlikely to contribute much toward common missile defense efforts beyond basing rights.<sup>63</sup> Hence, even before the 2012 Alliance summit in Chicago—and certainly well before a statement of requirements existed for the Alliance-wide missile defense architecture—the United States began pushing its European allies to offer tangible missile defense assets.<sup>64</sup> However, only two European member states—Germany and the Netherlands—have offered actual missile defense assets. Germany has committed roughly one-quarter of its Patriot units to Alliance missile defense—it was unable to commit more largely because the rest of its Patriot systems are not configured for missile defense or are otherwise unavailable for NATO missions. The Dutch have committed Patriot forces as well.<sup>65</sup> Additionally, the Netherlands is in the process of upgrading the radar systems of four *De Zeven Provinciën*-class frigates, at a cost of roughly €250M. The upgraded volume search radars will support missile defense efforts with improved tracking capability of threats during the boost phase.<sup>66</sup>

The paucity of upper tier BMD contributions reflects the reality that few of the European allies have

any existing capabilities in this area. However, several European allies have expressed interest in investing further in missile defense:

- Germany may purchase SM-3 missiles for its *Sachsen*-class frigates, as well as upgrade several frigates with more advanced sensors, delivering one per year starting in 2018.<sup>67</sup>
- France is developing an over-the-horizon radar and an infrared, space-based observation system, as well as Surface-to-Air Missile Platform/Terrain (SAMP/T) interceptors for use in BMD.<sup>68</sup>
- Senior leaders in Poland have declared their intent to acquire a national missile defense system.<sup>69</sup>
- The United Kingdom (UK) is considering upgrades that might enable it to contribute Type 45 Destroyers to the theater missile defense effort.<sup>70</sup>
- Norway could upgrade its *Fridtjof Nansen*-class frigates with modifications to the SPY-1F radar system.<sup>71</sup>
- Italy has expressed interest in contributing its two new *Horizon*-class frigates, further developing its Aster air defense interceptor capabilities for use against ballistic missiles, and using the design and development results from the Medium Extended Air Defense System (MEADS) program in its national contribution to NATO missile defense.<sup>72</sup>

Despite these intentions, there remain serious questions about whether the European allies will have the wherewithal to make the future investments and upgrades they have committed to—or in some cases are merely considering—particularly in light of the

dire budgetary situation facing their defense establishments as discussed earlier. For example, by one estimate, the German share of future NATO BMD efforts over the next decade or more could climb up to €8B, a staggering figure for a country that has decided to cut €8.3B from its defense budget between 2011 and 2015.<sup>73</sup> Indeed, on a related point, Germany already has plans to cut 50 percent of its Patriot units as part of broader defense restructuring.<sup>74</sup> Similarly, there has already been speculation that new French President Francois Hollande may ultimately reduce France's already limited role in NATO's missile defense program.<sup>75</sup> The UK has not given any indication that it intends to acquire a national missile defense system. Even though Norway may upgrade the radar on some of its frigates, it still considers the Russian submarine threat a much higher priority. Hence, according to one analyst, most of the planned European member state contributions seem destined to remain illusions.<sup>76</sup> At best, it seems that most of the European allies are determining first what they need for national defense capabilities and only *then* examining whether and how those capabilities can contribute to NATO efforts. According to one NATO official, "We'll be relying mainly on the U.S. contribution for quite a long time for now."<sup>77</sup>

Some in the U.S. Congress have also become suspicious regarding the ability of the European allies to contribute meaningfully to the missile defense effort. In the House version of the fiscal year 2013 (FY13) National Defense Authorization Act (NDAA), the House Armed Services Committee made clear its view that, "NATO [should] provide financial support for the U.S. contribution to Europe's missile defense given the budget environment."<sup>78</sup> In fact, the House went so far

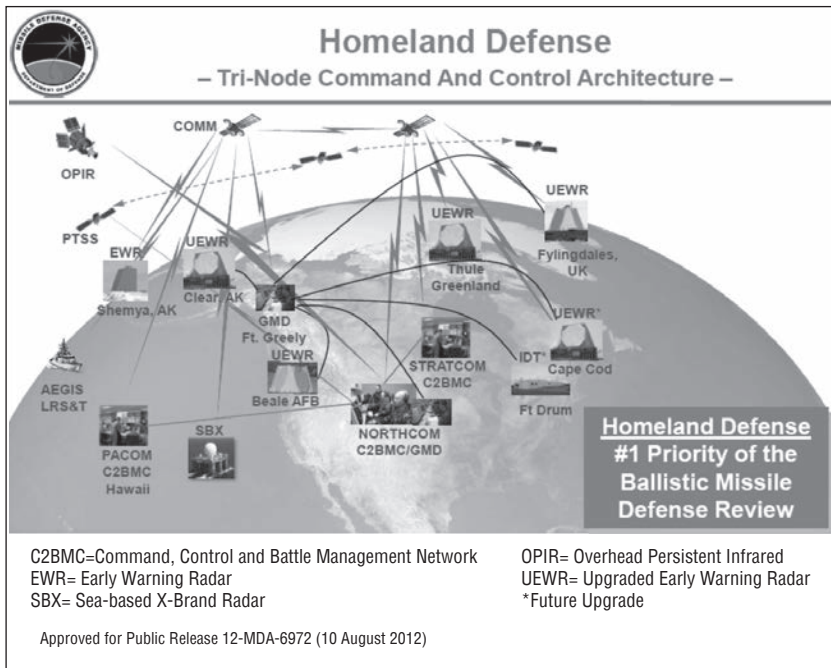


as to hold back 25 percent of the EPAA funding until the Secretaries of Defense and State provided a report on the cost-sharing arrangements for missile defense in Europe and until the Secretary of Defense submitted to NATO a pre-financing request for expenses related to missile defense in Europe.<sup>79</sup> Ultimately, the funding exclusion and pre-financing requirement were watered down in House-Senate negotiations over a final version of the FY13 NDAA, but that compromise (or conference) version of the NDAA bill, now signed into law by President Obama, still obligates the Secretary of Defense to provide a report to Congress on the financial, in-kind, and other forms of support provided by non-U.S. members of NATO to Alliance missile defense.

## **THE ARMY'S ROLE IN NATO BALLISTIC MISSILE DEFENSE**

While the European allies determine their contributions beyond hosting and basing, the DoD has been implementing the first phase of the EPAA and hence of NATO BMD. When most uninformed observers think about missile defense and the military services, they typically think of the roles played by the Air Force and the Navy. The U.S. Army is usually an after-thought, with some justification. After all, the Navy owns and operates the BMD-capable Aegis ships, and the Air Force is more often associated with missiles than the Army. Nevertheless, the Army has played and continues to play a critical role in NATO BMD in two ways – in establishing and now operating the AN/TPY-2 radar site in Turkey, and in providing Title 10 support and services to all DoD entities in the European theater.<sup>80</sup>

In establishing the AN/TPY-2 radar site in Europe, the Army faced significant challenges. First among them was that, generally speaking, it seemed there were few lessons learned from previous, similar efforts in establishing AN/TPY-2 sites in Israel and in Japan. So, for example, there were no checklists on what was needed in terms of personnel, training, organization, materiel, and facilities – the result was that, in the view of one observer the MDA arrived in Turkey ready to set up the radar system, but did not plan for or bring anything else like communications equipment, which is vital for the operation of the radar system.<sup>81</sup> Instead, much of this responsibility rested with the Army.



**Figure 6. The BMD elements of “Homeland Defense” as envisioned by the MDA.**

Site selection and preparation was also challenging for the Army. Officials from the MDA chose the Kürecik site over another location in Turkey that was much better suited with respect to infrastructure, citing homeland defense as the primary justification. Interestingly though, while the MDA's own briefing slide (Figure 6) on homeland missile defense includes foreign facilities in the UK and Greenland, the Kürecik site is not featured.<sup>82</sup> Outside analysts also concluded that the radar site in Turkey – as well as the broader EPAA – would be, “at best less than optimal for homeland defense.”<sup>83</sup> More recently, the U.S. Government Accountability Office (GAO) cast significant doubt on the EPAA's utility for homeland defense.<sup>84</sup>

In any case, the MDA also claimed that the Kürecik site had fiber optics, a septic system, water supply, and power lines, even though the site had been abandoned by the Turkish military a decade prior, and the odds that all of these systems were in good working order were therefore poor. The result was that initially at least, much of the infrastructure was nonfunctional. Amidst what one official termed “a desolate expanse,” the Army personnel sent to establish and operate the radar at the site had to live in what another official called, “deplorable conditions,” including living in tents during the harsh, snowy winter.<sup>85</sup> Today, the U.S. Army transports water to the hilltop site via a route that must be cleared of snow on an almost daily basis during winter. Additionally, there are few signs that the Turkish government is prepared to upgrade the electrical lines, which are inadequate for meeting the massive power demands of the AN/TPY-2 radar.<sup>86</sup> As a result, generator fuel must be constantly supplied along a treacherous route up the mountain to operate the radar and facility.

In managing the radar site at Kürecik, which has been operational since December 2011, the Army is also responsible for rotating military personnel to the site. The Turkey site had been predominantly contractor, but plans are underway to staff the facility almost entirely with military personnel. The 10th Army Air & Missile Defense Command (AAMDC) based in Kaiserslautern, Germany, and consisting of roughly 150 personnel, oversees the site in Turkey. But it has been stretched thin by its responsibilities to manage and lead the operation of the AN/TPY-2 radar in Israel as well. The 10th AAMDC has operational control over a smaller missile defense detachment of roughly 43 personnel that is tasked with actually operating the site in Turkey. Unfortunately though, and as suggested above, roughly 120 personnel are necessary to fully operate, protect, and sustain the site at Kürecik. This difference of about 80 personnel must be filled by 10th AAMDC personnel, contractors, or others from U.S. Army Europe (to which the 10th reports).<sup>87</sup> When considered in combination with the personnel requirements for the site in Israel, it seems clear the 10th AAMDC is simply not structured to handle both missions – “There aren’t enough soldiers . . . it’s a nightmare to manage.”<sup>88</sup>

In addition to operating the radar site in Kürecik, the Army is also responsible for providing Title 10 support throughout the European theater of operations. Specifically, U.S. Army Europe (USAREUR) – the Army Service Component Command (ASCC) for the U.S. European Command (USEUCOM) – provides Army support to all other services. USAREUR is the DoD executive agent in Europe for conventional ammunition, military immunization, mortuary affairs, the Armed Services Blood Program Office, veterinary

services, military postal services, and customs inspection. This means that even if the U.S. Navy operates the Aegis Ashore equipment planned for Poland and Romania—which is the current plan—the U.S. Army will still retain responsibilities with regard to some base operations and security.<sup>89</sup>

## **IMPLICATIONS FOR THE ARMY AND THE U.S. MILITARY**

If optimistic expectations for European contributions to NATO's missile defense program do not come to fruition as a result of any of the many factors discussed earlier in this monograph, there is reason to expect that the United States will carry most, if not all, of the burden of providing missile defense for Europe well into the future.<sup>90</sup> Given the Army's limited but vital role in NATO BMD, this could mean significant implications for the Army—including but also going beyond those challenges identified above—in terms of materiel, personnel, organization, training, operations, and budgets. Admittedly, it is somewhat difficult to determine with any degree of specificity the *precise* implications, since the EPAA is designed by definition to be "adaptive." Nonetheless, some implications seem clear given the direction of NATO BMD efforts and U.S. BMD policy today.

### **Materiel.**

The DoD is planning on procuring a total of 11 AN/TPY-2 radar systems, at a cost of roughly \$200M each. Six of those are designated for use in THAAD batteries, leaving five radars for use in the "forward-based mode." Of the five forward-based mode AN/

TPY-2 radars the United States has planned for, three are currently operating around the world – in Israel, in northern Japan, and in Turkey. A fourth is reportedly operating in Qatar, and a fifth is likely destined for southern Japan.<sup>91</sup> Yet another radar has been discussed for Asia, perhaps in the Philippines.<sup>92</sup> As described earlier in this monograph, there is already evidence that another Europe-based AN/TPY-2 forward-based radar, in addition to the one currently operating in Turkey, may be required for effective coverage of NATO member state territory – this will be especially so if European sensor contributions do not materialize. Given the state of European defense budgets noted earlier, it seems the United States will indeed need to procure at least one and possibly several more AN/TPY-2 forward-based radars, particularly if NATO is going to fulfill its stated objective of covering all member state territory. Additional AN/TPY-2 radars will also be necessary for training purposes and to provide some minimal back-up capability should one of the deployed radar systems break and need repair – it is highly likely that the Army – not the MDA – will need to fund these purchases.<sup>93</sup>

The DoD faces a similar dilemma – that is, growing demand and insufficient supply – with regard to THAAD batteries.<sup>94</sup> In Europe, the MDA has proposed using a THAAD battery – and the AN/TPY-2 radar that accompanies it – in a surge capacity, presumably if threats justify an additional, temporary deployment of American missile defense assets.<sup>95</sup> Given the lack of interest among the European allies in investing in and fielding interceptors, this appears to be prudent planning. However, it is unclear whether six THAAD batteries will be sufficient to meet demands of the U.S. military in Europe and elsewhere around the globe,

especially when considering the need to have a battery available for training purposes and the necessity of having back-ups available. For example, in response to provocations from North Korea, the United States decided in April 2013 to deploy a THAAD battery to Guam, and shortly thereafter Guam's Congressional Delegate requested that the unit be permanently based there.<sup>96</sup> Ironically though, the DoD has steadily cut the number of planned THAAD batteries from nine in its Fiscal Year 2011 (FY11) budget proposal, to seven in its FY12 proposal, to six in its FY13 budget proposal.<sup>97</sup>

### **Personnel and Organization.**

Given the likelihood that additional U.S. radar systems will be necessary in Europe and the possibility that additional THAAD batteries need to be developed, the Army faces a potential manpower management challenge. This will be compounded by the plan<sup>98</sup> to replace the vast majority of contractor operator/maintainers with military personnel between 2014 and 2016.<sup>99</sup>

As noted in the previous section, the 10th AAMDC based in Germany is already finding it difficult to fully staff both the deployment in Israel and the deployment in Turkey today. As the U.S. Army downsizes from its wartime peak of the last decade, it will likely continue to face significant challenges in filling today's requirements as well as potentially larger, future requirements – this will be especially so if the Army must develop additional AN/TPY-2 radar and/or THAAD units. Unfortunately, there is not yet a dedicated Military Occupational Specialty (MOS) for AN/TPY-2 radar operator/maintainers, and the Army may face other challenges as it seeks to rotate

Soldiers to an overseas, months-long hardship tour at a remote site on a hilltop in the middle of Turkey or elsewhere.<sup>100</sup>

### **Training.**

With increased manpower demands come increased training demands. The Army is planning on acquiring radar training devices and simulation tools, but with so few actual radars, and most, if not all, of them deployed, the Army is likely to face difficulties in training Soldiers for these missions. BMD is taking on increased importance in U.S. defense policy – the 2010 *Ballistic Missile Defense Review* (BMDR) report notes, “Missile defenses are an integral part of U.S. military and diplomatic strategies wherever the United States has security commitments.”<sup>101</sup> Indeed, plans are underway to develop “phased adaptive approaches” not just in Europe, but in other locations around the world.<sup>102</sup> Despite this though, BMD is not yet in the core curriculum or even offered as an elective at the U.S. Air Force Air War College, at the U.S. Army War College, or in any of the Army’s leadership schools.<sup>103</sup> The result is that Army officers – such as those commanding AAMDCs around the world – are serving in strategic BMD positions with only limited formal military training and education in their specialty, relying mostly on on-the-job-training.<sup>104</sup> Moreover, the Army will not have an institutional training base for developing AN/TPY-2 operator/maintainers until sometime in fiscal year 2015 (FY15). Until then, all training for this mission will be conducted by defense contractors.<sup>105</sup>



## **Operations.**

As described above, the Army's current contribution to the implementation of the EPAA is a single AN/TPY-2 radar site in Turkey, as well as Title 10 support for all U.S. forces in the European theater that support NATO BMD. However, it is quite possible that the Army's involvement will grow from an operational perspective. Part of this growth—such as an additional AN/TPY-2 radar in Europe—will likely result from the lack of appropriate sensor contributions by the European allies, assuming complete coverage of allied territory is the objective.<sup>106</sup> But part may also stem from the need to augment the planned Aegis Ashore sites with point defense systems such as U.S. Patriot batteries, or to base a THAAD battery in Europe for use in the event of a crisis, all of this largely because the European allies appear unwilling or unable to invest in interceptors.

## **Budgets.**

Increased operating tempo (OPTEMPO), new training mechanisms, more manpower, additional units dedicated to the BMD mission, and more hardware acquisitions all add up to increased spending. Unfortunately, the budgetary picture as it exists today looking forward—even without these additional requirements—is somewhat murky. The MDA is currently developing a complete or “life-cycle” cost estimate for the systems that will comprise the EPAA, in part as a response to GAO recommendations. Those recommendations were based on a study that found that:

DOD has not established life-cycle cost estimates for EPAA and therefore is missing an important management tool for preparing budgets, monitoring progress and assessing long-term affordability of its revised approach to BMD in Europe.<sup>107</sup>

The DoD faces some challenges in pulling together accurate life-cycle cost estimates, since some of the costs are unknowable at present. Those costs are unknowable because the DoD cannot predict the future with complete accuracy, but more specifically because, thanks to different manufacture dates, the AN/TPY-2 radars are not all perfectly identical and because the EPAA is designed by definition to be “adaptive” as circumstances demand. In any case, most of the currently identifiable costs for operating the AN/TPY-2 radar in Turkey will transfer from the MDA to the Army between 2014 and 2016. At present, the Army is planning to allocate roughly \$21M per year for the operation and maintenance of the AN/TPY-2 radar in Turkey.<sup>108</sup> This figure is far less than the MDA had estimated for future operations and maintenance costs at similar radar sites in northern Japan and Israel – roughly \$39M per year per site.<sup>109</sup>

Whether the Army’s estimates on future costs prove accurate or not, those costs will be borne out of existing Army budget plans, not out of defense-wide budget plans. Perhaps more worrisome from the Army’s budgetary perspective is the prospect of needing to fund the operations and maintenance of additional sites and assets, whether they be AN/TPY-2 radars, THAAD batteries, or Patriot battalions in the event that European contributions to NATO BMD do not materialize, and the DoD is directed to fill the gap. Any additional such costs will most likely be taken out of the Army’s existing budget plan.

In addition to the more obvious acquisition, operations, and maintenance costs, there are also less visible costs to the DoD and the Army:

- To grow the military manpower necessary to staff additional BMD units or operate and maintain additional BMD assets;
- To form new BMD units necessary to meet the operational demand;
- To develop the institutional capacity and the facilities necessary to train military personnel in the operation and maintenance of BMD assets; and,
- To educate military leaders at various echelons in the strategic importance and employment of BMD assets.

Mitigating the negative repercussions of taking on these and other costs will require a detailed, all-encompassing planning effort, only parts of which appear to be underway today.

## CONCLUSION

As described and explained above, NATO's decision to expand the Alliance's BMD program was somewhat surprising in several respects. In particular, lukewarm support for BMD, tightening defense budgets, and major technical challenges together would have led one to expect that the Alliance would *not* expand the ALTBMD program to include defense of all European member state territory and populations. Despite these inhibitors, the Alliance has moved forward with a significant expansion of ALTBMD.

The reasons for this expansion included the fact that the majority of the new BMD systems would be

developed and fielded by the United States in the form of the EPAA. For cash-strapped European members of the Alliance eager to influence NATO's BMD efforts but unable to devote funds on par with the United States, Washington's proposal to include the EPAA in an expanded ALTBMD effort comprised an offer too attractive to refuse. Additionally, many allies have come to believe that a limited BMD, however imperfect, is better than nothing. Finally, there is some evidence indicating that public opinion in Europe has become more favorably disposed toward BMD than has ever been the case.

Despite the American offer to allow the EPAA to constitute the lion's share of NATO's expanded BMD program, Washington made clear to its allies that it expected them to contribute to the common defense. Several allies have offered land or facilities, and many have pledged to provide future capabilities and assets. However, hardly any have actually contributed tangible upper tier BMD assets to date. Given the lukewarm public support for BMD, declining defense budgets and the cost of overcoming technical hurdles, it seems very likely that tangible Alliance contributions in the form of sensors and interceptors will remain minimal in the extreme over the next decade.

The lack of tangible allied contributions—as well as the major technical challenges facing components of the NATO missile defense system still in development—will have significant implications for the U.S. Army, which has a vital role in NATO missile defense today. In particular, the Army is likely to face increased manpower demands, materiel requirements, and training needs. Additionally, Army units involved directly in or in support of BMD are likely to face a higher OPTEMPO than currently projected. As

a result of all these increased requirements, it seems unlikely that current Army and DoD budget projections will prove valid—instead, all available evidence currently points to increased budgetary requirements. There is evidence indicating that the Army and the DoD are planning to address some of these additional requirements, but not necessarily all of them. Regardless, it appears that the Alliance’s decision in 2010 to expand ALTBMD to cover all Alliance territory and populations in Europe will exacerbate the perceived imbalance in transatlantic burden sharing. This will be the case particularly if the EPAA provides little if any benefit to the defense of U.S. territory, which the cancellation of Phase 4 appears to have now affirmed.<sup>110</sup> Some have dismissed the burden sharing issue associated with the U.S. role in NATO BMD, arguing that the system envisioned under the EPAA is vital to U.S. national interests, which have always included the security of Europe.<sup>111</sup> While European security is without a doubt vital to U.S. national interests, it is equally clear that the lack of burden sharing in BMD is nonetheless likely to become a perennial irritant in transatlantic relations.

## ENDNOTES

1. See, for example, Peter Baker, “Obama Reshapes a Missile Shield to Blunt Tehran,” *The New York Times*, September 18, 2009, p. 1; Michael D. Shear and Ann Scott Tyson, “Obama Shifts Focus of Missile Shield,” *The Washington Post*, September 18, 2009, p. 1; and Amy Butler, “U.S. Scraps European Ground-Based Interceptors in Favor of SM-3s,” *Aerospace Daily & Defense Report*, September 18, 2009, p. 1. For a more thorough treatment of the European Phased Adaptive Approach (EPAA) roll-out plus key challenges, see Daniel Goure, “The Obama Administration’s Phased Adaptive Architecture: Technological, Operational and Political Issues,” *Defense & Security Analysis*, Vol. 28, No. 1, March 2012, pp. 17–35.

2. *Lisbon Summit Declaration*, North Atlantic Treaty Organization, November 20, 2010, available from [www.nato.int/cps/en/nato-live/official\\_texts\\_68828.htm](http://www.nato.int/cps/en/nato-live/official_texts_68828.htm).

3. Robert G. Bell, "The Why, What, and How of Missile Defense at NATO," speech delivered at the American Institute of Aeronautics and Astronautics annual Missile Defense Conference in Washington, DC, March 21, 2011, available from [nato.usmission.gov/speeches/mdatnato.html](http://nato.usmission.gov/speeches/mdatnato.html).

4. The degree to which European publics have been aware of the ballistic missile defense (BMD) issue in the first place is, of course, open to question. Certainly during the 1980s – when Ronald Reagan proposed the Strategic Defense Initiative – and during the early 2000s – when George W. Bush secured American withdrawal from the Anti-Ballistic Missile Defense (ABM) treaty – European publics have been very aware.

5. *Missile Defence in Europe – The Political and Security Dimensions*, Paris, France: European Union Institute for Security Policy, February 2008, available from [www.iss.europa.eu/uploads/media/policyBrief\\_001.pdf](http://www.iss.europa.eu/uploads/media/policyBrief_001.pdf).

6. Jan Červenka, "Citizens on U.S. Anti-Missile Radar Base in Czech Republic," press release by the Public Opinion Research Centre (Prague), December 3, 2010, available from [cvom.soc.cas.cz/en/international-relations/citizens-on-u-s-anti-missile-radar-base-in-czech-republic-december-2008](http://cvom.soc.cas.cz/en/international-relations/citizens-on-u-s-anti-missile-radar-base-in-czech-republic-december-2008); see also Steven A. Hildreth and Carl Ek, *Long-Range Ballistic Missile Defense in Europe*, Washington, DC: U.S. Library of Congress, Congressional Research Service, April 26, 2010, pp. 12, 16.

7. The U.S. decision to cancel Phase 4 of the EPAA has evidently not changed Moscow's perspective. See Gabriela Baczynska, "Russian Lawmaker not Reassured by U.S. Missile Defense Plan," *Reuters*, March 17, 2013, available from [www.reuters.com/article/2013/03/17/us-russia-usa-defence-idUSBRE92G0CU20130317](http://www.reuters.com/article/2013/03/17/us-russia-usa-defence-idUSBRE92G0CU20130317).

8. Stephan de Spielgeleire, "Missile Defense – A Collaborative Dutch Policy Analysis," Briefing presented at the RUSI Missile Defense Conference in London, May 31, 2012.

9. *Transatlantic Trends: Key Findings 2007*, pp. 19-20, available from [trends.gmfus.org/files/archived/doc/2007\\_english\\_key.pdf](http://trends.gmfus.org/files/archived/doc/2007_english_key.pdf).

10. Interview with a senior French field grade officer and a senior German field grade officer, both assigned to NATO's international staff, October 16, 2012; see also Justin Vaisse, "French Views on Missile Defense," Washington, DC: The Brookings Institution, April 2001, available from [www.brookings.edu/research/articles/2001/04/france-vaisse](http://www.brookings.edu/research/articles/2001/04/france-vaisse).

11. Stephen Fidler and Alistair MacDonald, "Europeans Retreat on Defense," *The Wall Street Journal*, August 24, 2011; Zachary Selden, "The European Debt Crisis and American Security Policy," *Parameters*, Vol. XLII, No. 1, Spring 2012, pp. 17-26.

12. "Role of Government IV," *International Social Survey Programme*, 2006, available from [zacat.gesis.org/webview/index.jsp?object=http://zacat.gesis.org/obj/fStudy/ZA4700](http://zacat.gesis.org/webview/index.jsp?object=http://zacat.gesis.org/obj/fStudy/ZA4700).

13. *Military Expenditure Database, 1988-2011*, Stockholm, Sweden: Stockholm International Peace Research Institute (SIPRI), available from [milexdata.sipri.org](http://milexdata.sipri.org).

14. David M. Herszenhorn and Michael R. Gordon, "U.S. Cancels Part of Missile Defense That Russia Opposed," *The New York Times*, March 16, 2013, available from [www.nytimes.com/2013/03/17/world/europe/with-eye-on-north-korea-us-cancels-missile-defense-russia-opposed.html?\\_r=1&](http://www.nytimes.com/2013/03/17/world/europe/with-eye-on-north-korea-us-cancels-missile-defense-russia-opposed.html?_r=1&).

15. *National Defense Budget Estimates for FY 2013*, Washington, DC: Office of the Under Secretary of Defense (Comptroller), March 2012, available from [comptroller.defense.gov/defbudget/fy2013/FY13\\_Green\\_Book.pdf](http://comptroller.defense.gov/defbudget/fy2013/FY13_Green_Book.pdf).

16. *Ballistic Missile Defense Review Report*, Washington, DC: U.S. Department of Defense, February 2010, p. 23.

17. Robert Gates, *DoD News Briefing with Secretary Gates and Gen. Cartwright from the Pentagon*, September 17, 2009, available from [www.defense.gov/transcripts/transcript.aspx?transcriptid=4479](http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4479).

18. Leon Panetta, Media Availability with Secretary of Defense Leon Panetta, February 1, 2012, available from [www.defense.gov/transcripts/transcript.aspx?transcriptid=4967](http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4967). "We're going to continue to push on missile defense, and we are making gains there," said Secretary Panetta.

19. Mark Montgomery, *Allied BMD Upgrade Conference Opening Remarks*, unclassified briefing delivered in Berlin, Germany, on September 13, 2012.

20. *Ibid.*

21. North Atlantic Treaty Organization, *Lisbon Summit Declaration*, November 20, 2010, available from [www.nato.int/cps/en/natolive/official\\_texts\\_68828.htm](http://www.nato.int/cps/en/natolive/official_texts_68828.htm).

22. Oliver Thränert, "NATO and Missile Defense: Opportunities and Open Questions," Zurich, Switzerland: Center for Security Studies, December 2010. What the Europeans have contributed to date is addressed later in this monograph.

23. While these challenges apply to all BMD systems, this monograph will focus mostly on the systems that comprise the planned NATO BMD system.

24. The AN/TPY-2 radar system was established at Kürecik, Turkey, in December 2011. See Randall M. Hendrickson, "Ballistic Missile Defense Update," Briefing delivered to the 2012 Space and Missile Defense Conference in Huntsville, AL, August 14, 2012, available from [missilethreat.wpengine.netdna-cdn.com/wp-content/uploads/2012/10/Ballistic-Missile-Defense-Update-August-14-2012.pdf](http://missilethreat.wpengine.netdna-cdn.com/wp-content/uploads/2012/10/Ballistic-Missile-Defense-Update-August-14-2012.pdf). In the fourth and final phase of the EPAA, the Missile Defense Agency (MDA) plans on adding an as yet undeveloped Precision Tracking Satellite System (PTSS), with the U.S. Air Force as lead service, but this is in addition to the AN/TPY-2, not a replacement.

25. For simplicity's sake and unless otherwise noted in this monograph, any reference to the "AN/TPY-2" radar refers specifically to the AN/TPY-2 in "forward-based mode" (FBM). In this mode, the radar operates independent of Terminal High Altitude Area Defense (THAAD) interceptors, utilizes different software, and functions as part of a broader missile defense network.



26. Emphasis added. "Science and Technology Issues of Early Intercept Ballistic Missile Defense Feasibility," Washington, DC: Defense Science Board, September 2011, p. 26. The AN/TPY-2 radar system was chosen for the EPAA, in part because of its limited ability to see into Russian airspace. See "SM-3 BMD, in from the Sea: EPAA & Aegis Ashore," *Defense Industry Daily*, February 14, 2013, available from [www.defenseindustrydaily.com/Land-Based-SM-3s-for-Israel-04986](http://www.defenseindustrydaily.com/Land-Based-SM-3s-for-Israel-04986).

27. The SM-3 Block IA interceptor—the kind used today in NATO's interim capability—costs between \$9 million and \$10 million per unit. The SM-3 Block IB is estimated at \$12-15M per interceptor. Meanwhile, *The Economist* estimates that a ballistic missile might cost as much as \$1 million per unit. See [www.economist.com/blogs/dailychart/2010/12/chinese\\_missile\\_ranges](http://www.economist.com/blogs/dailychart/2010/12/chinese_missile_ranges).

28. L. David Montague and Walter B. Slocombe, in a letter from the National Research Council in response to questions posed by Representatives Michael Turner and Loretta Sanchez, April 30, 2012, available from [hosted.ap.org/specials/interactives/documents/nas\\_response.pdf](http://hosted.ap.org/specials/interactives/documents/nas_response.pdf).

29. Intercepting enemy missiles as early as possible in their trajectories enables the defender to determine whether his initial defensive shot was successful and, if not, to launch another round—this is the so-called "shoot-assess-shoot" firing doctrine. However, at least two major studies have concluded that due to extremely short time windows, early intercept is not realistically achievable, even under the most optimistic set of deployment, sensor capability, and missile technology assumptions. The current NATO BMD architecture consists of SM-3 missiles launched from Aegis ships—those missiles currently deployed as well as future upgraded variants to be launched from Aegis Ashore sites are all mid-course interceptors. See "Science and Technology Issues of Early Intercept Ballistic Missile Defense Feasibility," p. 33; and National Research Council, "Making Sense of Ballistic Missile Defense: An Assessment of Concepts and Systems for U.S. Boost-Phase Missile Defense in Comparison to Other Alternatives," Washington, DC: National Academies Press, 2012, p. S-6.

30. Missile Defense Agency fact sheet, "Aegis Ballistic Missile Defense Testing," October 2012, available from [www.mda.mil/global/documents/pdf/aegis\\_tests.pdf](http://www.mda.mil/global/documents/pdf/aegis_tests.pdf).

31. "Ballistic Missile Defense System Engages Five Targets Simultaneously During Largest Missile Defense Flight Test in History," Missile Defense Agency news release, October 25, 2012, available from [www.mda.mil/news/12news0011.html](http://www.mda.mil/news/12news0011.html).

32. "SM-3 BMD, in from the Sea: EPAA & Aegis Ashore," *Defense Industry Daily*, December 13, 2012, available from [www.defenseindustrydaily.com/Land-Based-SM-3s-for-Israel-04986](http://www.defenseindustrydaily.com/Land-Based-SM-3s-for-Israel-04986). The SM-3 IB was to be deployed by 2015, but current estimates point to 2018.

33. "U.S. Announces EPAA Phase IV cancellation, increase in number of GMD national missile defense interceptors from 30 to 44," *Mostly Missile Defense*, March 15, 2013, available from [mostly-missiledefense.com/2013/03/15/u-s-announces-epaa-phase-iv-cancellation-increase-in-number-of-gmd-national-missile-defense-interceptors-from-30-to-44-march-15-2013/](http://mostly-missiledefense.com/2013/03/15/u-s-announces-epaa-phase-iv-cancellation-increase-in-number-of-gmd-national-missile-defense-interceptors-from-30-to-44-march-15-2013/).

34. "Science and Technology Issues of Early Intercept Ballistic Missile Defense Feasibility," p. 26. In addition to allowing for a shoot-assess-shoot firing doctrine, intercepting enemy missiles as early as possible in their trajectories enables the defender to limit debris from a destroyed enemy missile falling on its territory or that of other countries along the missile's trajectory. It also reduces the odds that the attacker can deploy penetration aids or decoys designed to fool the defense, and it essentially expands the scope of defended territory by casting a larger so-called "defended shadow."

35. "Making Sense of Ballistic Missile Defense," p. S-11.

36. Laura Grego, "The Anti-Satellite Capability of the Phased Adaptive Approach Missile Defense System," Federation of American Scientists, Public Interest Report, Winter 2011, p. 2, available from [www.fas.org/pubs/pir/2011winter/2011Winter-Anti-Satellite.pdf](http://www.fas.org/pubs/pir/2011winter/2011Winter-Anti-Satellite.pdf). Robert Wall, "Intercept Starts Long Road to Sea-Based Missile Defense," *Aviation Week and Space Technology*, February 2002, p. 34.

37. "The European Phased Adaptive Approach at a Glance," The Arms Control Association factsheet, November 2012, available from [www.armscontrol.org/factsheets/Phasedadaptiveapproach](http://www.armscontrol.org/factsheets/Phasedadaptiveapproach).

38. Interview with a civilian official from the Missile Defense Agency, October 16, 2012; interview with a senior U.S. field grade officer based in Brussels, Belgium, October 16, 2012. The U.S. Navy's force generation model does not follow the A-B-C model precisely, but the math is nearly the same – that is, for every three ships in the inventory, one can be deployed at any given time.

39. Spain has five, The Netherlands has four, Germany has three, Denmark has three, the UK has six, Italy has two, and France has two. Jeroen de Jonge, "The European Contribution to BMD," briefing given at the Royal United Services Institute, June 2012, available from [www.rusi.org/downloads/assets/deJonge\\_Part\\_One.pdf](http://www.rusi.org/downloads/assets/deJonge_Part_One.pdf).

40. "Science and Technology Issues of Early Intercept Ballistic Missile Defense Feasibility," p. 28.

41. Nancy Morgan, "Ballistic Missile Defense Overview," briefing offered to the Royal United Services Institute, May 30, 2012, available from [www.rusi.org/downloads/assets/Ms\\_Nancy\\_Morgan.pdf](http://www.rusi.org/downloads/assets/Ms_Nancy_Morgan.pdf).

42. Interview with an official from Office of the Secretary of Defense for Policy (OSD[P]) September 19, 2012.

43. George N. Lewis and Theodore A. Postol, "A Flawed and Dangerous U.S. Missile Defense Plan," *Arms Control Today*, May 2010, available from [www.armscontrol.org/act/2010\\_05/Lewis-Postol](http://www.armscontrol.org/act/2010_05/Lewis-Postol).

44. Another analyst has argued that the European allies agreed to expand the North Atlantic Treaty Organization Ballistic Missile Defense (NATO BMD) for use as a bargaining chip in trying to get the United States to withdraw nuclear weapons from Europe. However, the authors uncovered no evidence supporting this hypothesis. See Karl-Heinz Kamp, "NATO's Chicago Summit: A Thorny Agenda," NATO Defense College Research Paper, No. 70, November 2011, available from [www.ndc.nato.int/download/download.php?icode=308](http://www.ndc.nato.int/download/download.php?icode=308).

45. Interview with a civilian official from the Missile Defense Agency, October 16, 2012; interview with a senior U.S. field grade officer based in Brussels, Belgium, October 16, 2012; interview

with a senior French field grade officer and a senior German field grade officer, both assigned to NATO's international staff, October 16, 2012.

46. Interview with an official from OSD(P), September 19, 2012.

47. "Article 5" refers to what many believe to be the most important part of the treaty establishing NATO—the article that essentially means an attack on one is an attack on all. Interview with a senior French field grade officer and a senior German field grade officer, both assigned to NATO's international staff, October 16, 2012.

48. Robert G. Bell, "The Why, What, and How of Missile Defense at NATO," speech delivered at the American Institute of Aeronautics and Astronautics (AIAA) Missile Defense Conference, March 21, 2011, available from [nato.usmission.gov/speeches/mdatnato.html](http://nato.usmission.gov/speeches/mdatnato.html).

49. Interview with officials of the NATO international staff, October 16, 2012.

50. Interview with a civilian official from the Missile Defense Agency, October 16, 2012; interview with a senior U.S. field grade officer based in Brussels, Belgium, October 16, 2012.

51. Interview with officials of the NATO international staff, October 16, 2012. The 2010 architecture study was preceded by a 2009 scenario development effort that was itself based on a 2007 ballistic missile threat assessment.

52. Interview with officials of the NATO international staff, October 16, 2012.

53. Interview with a civilian official from the Missile Defense Agency, October 16, 2012; interview with a senior U.S. field grade officer based in Brussels, Belgium, October 16, 2012.

54. Interview with two field grade officers assigned to the Ballistic Missile Defense Operation Center (BMDOC) October 18, 2012.

55. This became the subject of significant discussion in the halls of NATO headquarters during the deliberations on the still-born, broad 2010 NATO BMD requirements study, as several European member states pushed to have most technical capabilities described using the word “shall,” rather than “should” — the former would provide them with strong defense budget request justifications in their respective capitals, while the latter would not. Interview with a civilian official from the Missile Defense Agency, October 16, 2012; interview with a senior U.S. field grade officer based in Brussels, Belgium, October 16, 2012.

56. Interview with a senior field grade officer involved in NATO force generation, October 17, 2012.

57. Interview with officials of the NATO international staff, October 16, 2012.

58. Interview with an official of the NATO international staff, October 17, 2013.

59. Interview with two field grade officers assigned to the BM-DOC, October 18, 2012. This is particularly noteworthy since most directorates and offices within NATO will see cuts, not growth, as a result of the reorganization.

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64. Interview with a senior field grade officer involved in NATO force generation, October 17, 2012.

65. Ivo Daalder, “A New Shield Over Europe,” *The International Herald Tribune*, June 7, 2012, p. 6.

66. "Dutch Order Navy Radar Improvement," *United Press International, Inc.*, June 27, 2012, available from [www.upi.com/Business\\_News/Security-Industry/2012/06/27/Dutch-order-navy-radar-improvement/UPI-43601340825309/](http://www.upi.com/Business_News/Security-Industry/2012/06/27/Dutch-order-navy-radar-improvement/UPI-43601340825309/).

67. Nicholas de Larrinaga, "Germany considers SM-3 BMD capabilities," *Jane's Defence Weekly*, May 3, 2012; interview with a civilian official from the Missile Defense Agency, October 16, 2012; interview with a senior U.S. field grade officer based in Brussels, Belgium, October 16, 2012.

68. Interview with a civilian official from the Missile Defense Agency, October 16, 2012; interview with a senior U.S. field grade officer based in Brussels, Belgium, October 16, 2012; "SAMP / T Successful on a Franco-Italian Missile Defense Test," *Defense Update*, March 7, 2013, available from [defense-update.com/20130307\\_samp-t-successful-on-in-a-franco-italian-missile-defense-test.html](http://defense-update.com/20130307_samp-t-successful-on-in-a-franco-italian-missile-defense-test.html).

69. Marcin Sobczyk, "Poland Wants Missile Defense System of Its Own," *The Wall Street Journal*, August 16, 2012.

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73. Bernd Kreienbaum, "European Missile Defence Architecture—A Chance for European and Russian Defence Technologies?" *2012 RUSI Missile Defence Conference*, London, UK, May 30-31, 2012, available from [www.rusi.org/downloads/assets/Bernd\\_Kreienbaum.pdf](http://www.rusi.org/downloads/assets/Bernd_Kreienbaum.pdf); and Clara Marina O'Donnell, ed., "The Implications of Military Spending Cuts of NATO's Largest Members," *Analysis Paper*, Washington, DC: The Brookings Institution, Center on the United States and Europe, July 2012, available from [www.brookings.edu/~media/research/files/papers/2012/7/military%20spending%20nato%20odonnell/military%20spending%20nato%20odonnell%20pdf](http://www.brookings.edu/~media/research/files/papers/2012/7/military%20spending%20nato%20odonnell/military%20spending%20nato%20odonnell%20pdf).

74. Interview with a German field grade officer, October 18, 2012.

75. Tom Withington, "French Defence Policy: A New President, a New Era?" *Jane's Defence Weekly*, May 10, 2012.

76. Karl-Heinz Kamp, "NATO's Chicago Summit: A Thorny Agenda," NATO Defense College Research Paper, No. 70, November 2011, available from [www.ndc.nato.int/download/downloads.php?icode=308](http://www.ndc.nato.int/download/downloads.php?icode=308).

77. Interview with a civilian official from the Missile Defense Agency, October 16, 2012; interview with a senior U.S. field grade officer based in Brussels, Belgium, October 16, 2012; and, interview with a senior French field grade officer and a senior German field grade officer, both assigned to NATO's international staff, October 16, 2012.

78. House Report (H.R.) 112-479 on the National Defense Authorization Act for Fiscal Year 2013, May 11, 2012, p. 113.

79. H.R. 4310, the National Defense Authorization Act for Fiscal Year 2013, as passed by the U.S. House of Representatives on May 18, 2012, pp. 72-73.

80. "Title 10" refers to the title in U.S. Code that pertains to the roles, functions, and missions of the armed services. In this context, "Title 10 support and services" refers to requirements to organize, equip, train, and maintain Army forces in the theater and provide support to other services in accordance with executive agent responsibilities.

81. Interview with a senior U.S. field grade officer assigned to the U.S. Army in Europe, October 19, 2012.

82. Randall M. Hendrickson, "Ballistic Missile Defense Update," briefing presented at the 2012 Space and Missile Defense Conference in Huntsville, AL, August 14, 2012, available from [missilethreat.wpengine.netdna-cdn.com/wp-content/uploads/2012/10/Ballistic-Missile-Defense-Update-August-14-2012.pdf](http://missilethreat.wpengine.netdna-cdn.com/wp-content/uploads/2012/10/Ballistic-Missile-Defense-Update-August-14-2012.pdf).

83. L. David Montague and Walter B. Slocombe, in a letter from the National Research Council in response to questions posed by Representatives Michael Turner and Loretta Sanchez, April 30, 2012, available from [hosted.ap.org/specials/interactives/documents/nas\\_response.pdf](http://hosted.ap.org/specials/interactives/documents/nas_response.pdf).

84. Desmond Butler, "Flaws Found in U.S. Missile Shield," *The Miami Herald*, February 9, 2013, available from [news.yahoo.com/apnewsbreak-flaws-found-us-missile-shield-081826501--politics.html](http://news.yahoo.com/apnewsbreak-flaws-found-us-missile-shield-081826501--politics.html).

85. Interview with a senior U.S. field grade officer assigned to the U.S. Army in Europe, October 19, 2012; interview with a senior civilian official assigned to the U.S. Army in Europe, October 19, 2012.

86. The AN/TPY-2 radar reportedly requires up to 1.3 megawatts of electricity. See [raytheon.mediaroom.com/index.php?s=43&item=1329](http://raytheon.mediaroom.com/index.php?s=43&item=1329).

87. Correspondence with a U.S. field grade officer from the 10th Army Air & Missile Defense Command (AAMDC), January 31, 2013.

88. Interview with a senior U.S. field grade officer assigned to the U.S. Army in Europe, October 19, 2012; interview with a U.S. field grade officer from the 10th AAMDC, October 18, 2012. These challenges may become magnified as the U.S. Army downsizes following the end of war in Afghanistan.

89. Interview with a senior U.S. field grade officer assigned to the U.S. Army in Europe, October 19, 2012.



90. Moreover, even if the Europeans provide all that they have committed to date, the United States will still likely surge forward additional air and missile defense assets in the event of a crisis.

91. Adam Entous and Julian E. Barnes, "Pentagon Bulks Up Defenses in the Gulf," *Wall Street Journal (Online)*, July 17, 2012, available from [online.wsj.com/article/SB10001424052702304388004577531331722511516.html](http://online.wsj.com/article/SB10001424052702304388004577531331722511516.html); Karen Parrish, "U.S., Japan Begin Coordination on Second Radar Installation," *American Forces Press Service*, September 17, 2012, available from [www.defense.gov/news/newsarticle.aspx?id=117880](http://www.defense.gov/news/newsarticle.aspx?id=117880).

92. Adam Entous and Julian E. Barnes, "U.S. Plans New Asia Missile Defenses," *The Wall Street Journal*, August 23, 2012, p. A1.

93. Correspondence with a civilian official from the Army staff involved in missile defense issues, January 29, 2013.

94. Interview with officials from the Army staff involved in missile defense issues, September 20, 2012; interview with a U.S. civilian official from the Office of the Deputy Chief of Staff, Army G8, September 19, 2012. The Army has identified a requirement for nine THAAD batteries, three more than the six currently planned.

95. Randall M. Hendrickson, "Ballistic Missile Defense Update," briefing presented at the 2012 Space and Missile Defense Conference in Huntsville, AL, August 14, 2012, available from [missilethreat.wpengine.netdna-cdn.com/wp-content/uploads/2012/10/Ballistic-Missile-Defense-Update-August-14-2012.pdf](http://missilethreat.wpengine.netdna-cdn.com/wp-content/uploads/2012/10/Ballistic-Missile-Defense-Update-August-14-2012.pdf).

96. Karen DeYoung, "U.S. to Deploy Anti-Missile System to Guam," *The Washington Post*, April 3, 2013, available from [articles.washingtonpost.com/2013-04-03/world/38241106\\_1\\_north-koreans-missile-threat-defense-secretary-chuck-hagel](http://articles.washingtonpost.com/2013-04-03/world/38241106_1_north-koreans-missile-threat-defense-secretary-chuck-hagel); Sabrina Salas Matanane, "Bordallo Wants Missile Defense System Permanently on Guam," *KUAM*, April 12, 2013, available from [www.kuam.com/story/21950116/2013/04/12/bordallo-wants-missile-defense-system-permanently-on-guam](http://www.kuam.com/story/21950116/2013/04/12/bordallo-wants-missile-defense-system-permanently-on-guam).

97. "Missile Defense Agency Fiscal Year (FY) 2011 Budget Estimates," January 15, 2010, available from [www.mda.mil/global/documents/pdf/budgetfy11.pdf](http://www.mda.mil/global/documents/pdf/budgetfy11.pdf); "MDA Fiscal Year 2012 Budget

Outline,” available from [www.mda.mil/global/documents/pdf/budgetfy12.pdf](http://www.mda.mil/global/documents/pdf/budgetfy12.pdf); and “Missile Defense Agency (MDA) Fiscal Year 2013 Budget Outline,” available from [www.mda.mil/global/documents/pdf/budgetfy13.pdf](http://www.mda.mil/global/documents/pdf/budgetfy13.pdf).

98. According to an agreement with the MDA, beginning in fiscal year 2014, the Army is responsible for the funding of the operation, security, common support equipment maintenance, military pay, and other associated costs such as housing and quality of life facilities for the AN/TPY-2 radar site in Turkey. It is during this time that the Army will begin to replace all MDA-funded contractors with Soldiers.

99. Current estimates are that roughly 100 military personnel—largely security and operator/maintainers—will be necessary for each AN/TPY-2 forward-based mode radar site.

100. Interview with two U.S. officials from the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology, September 19, 2012. The Army may have in place a Military Occupational Speciality (MOS) for radar operator-maintainers by late 2014.

101. U.S. Department of Defense, “Ballistic Missile Defense Report Report,” February 2010, p. 24, available from [www.defense.gov/bmdr/docs/BMDR%20as%20of%2026JAN10%200630\\_for%20web.pdf](http://www.defense.gov/bmdr/docs/BMDR%20as%20of%2026JAN10%200630_for%20web.pdf).

102. *Ibid.*, pp. 25-27; see also Frank A. Rose, “U.S. Missile Defense and Regional Security, remarks at the Second Annual Israel Multinational Missile Defense Conference, Tel Aviv, Israel, July 25, 2011,” available from [www.state.gov/t/avc/rls/169023.htm](http://www.state.gov/t/avc/rls/169023.htm).

103. Interview with two U.S. officials from the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology, September 19, 2012.

104. Interview with a senior U.S. field grade officer assigned to the U.S. Army in Europe, October 19, 2012.

105. Interview with two U.S. officials from the Office of the Assistant Secretary of the Army for Acquisition, Logistics and

Technology, September 19, 2012. Both the institutional training base and the training devices are slated for late 2014.

106. The Alliance heads of state and government stated clearly in 2010 at Lisbon, Portugal, that they had decided to “develop a missile defence capability to protect all NATO European populations, territory and forces.” During the Chicago summit in 2012, they reiterated, “Our aim remains to provide the Alliance with a NATO operational BMD that can provide full coverage and protection for all NATO European populations, territory and forces.”

107. “Ballistic Missile Defense: DOD Needs to Address Planning and Implementation Challenges for Future Capabilities in Europe,” GAO-11-220, Washington, DC: Government Accountability Office, January 2011, p. 13, available from [www.gao.gov/assets/320/315170.pdf](http://www.gao.gov/assets/320/315170.pdf).

108. Interview with two U.S. civilian officials from U.S. Army Europe involved in budgetary matters, October 19, 2012.

109. Interview with a U.S. civilian official from the Office of the Deputy Chief of Staff, Army G8, September 19, 2012.

110. Even if the SM-3 Block IIB missiles intended for Phase 4 were developed and deployed, the utility of this missile in U.S. homeland defense would most likely be limited. Although the SM-3 Block IIB was expected to be faster than its predecessors and potentially capable of intercepting intercontinental ballistic missiles (ICBMs), the Defense Science Board argued that Iranian ICBMs launched against California, for example—which would follow a trajectory almost due north and over central Russia—could not have been intercepted by fixed SM-3 Block IIB interceptor assets based in Europe. See “Science and Technology Issues of Early Intercept Ballistic Missile Defense Feasibility,” p. 21.

111. See arguments attributed to Jim Townsend, Deputy Assistant Secretary of Defense for Europe/NATO Policy, in James Joyner, “NATO Missile Defense: An American Affair,” October 12, 2010, available from [www.acus.org/new\\_atlanticist/nato-missile-defense-american-affair](http://www.acus.org/new_atlanticist/nato-missile-defense-american-affair).

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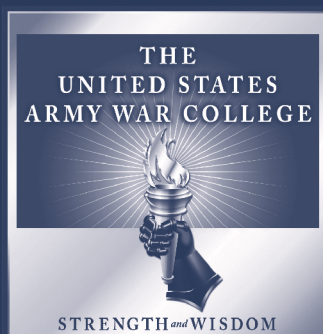
**Authors  
Mr. Steven J. Whitmore  
Dr. John R. Deni**

**Editor for Production  
Dr. James G. Pierce**

**Publications Assistant  
Ms. Rita A. Rummel**

**\*\*\*\*\***

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