The Center for Transatlantic Relations

The Center for Transatlantic Relations, located at the Paul H. Nitze School of Advanced International Studies, near Dupont Circle in Washington, DC, engages international scholars and students directly with government officials, journalists, business executives, and other opinion leaders from both sides of the Atlantic on issues facing Europe and North America. Center activities include research projects and policy study groups; media programs and web-based activities; seminars and lectures.

The Center also coordinates the activities of the EU Center Washington DC—the American Consortium on EU Studies (ACES)—which has been recognized by the European Commission as one of a select number of Centers for European Union Studies in the United States. The EU Center is a partnership among five national capital area universities—American University, George Mason University, George Washington University, Georgetown University, and The Johns Hopkins University—established to improve understanding of the EU and U.S.-EU relations.

Center for Transatlantic Relations
American Consortium on EU Studies
EU Center Washington, D.C.
The Paul H. Nitze School of Advanced International Studies
The Johns Hopkins University
1717 Massachusetts Avenue, N.W., Suite 525
Washington, D.C. 20036
Tel. (202) 663-5880
Fax (202) 663-5879
Email: transatlantic@jhu.edu
Website http://transatlantic.sais-jhu.edu

CENTER FOR TRANSATLANTIC RELATIONS

GETTING TO "YES" ON MISSILE DEFENSE

The Need to Rebalance U.S. Priorities

&

The Prospects of Transatlantic Cooperation

JEFFREY P. BIALOS AND STUART L. KOEHL

Getting to "Yes" on Missile Defense

The Need to Rebalance US Priorities
&
The Prospects of Transatlantic Cooperation

Jeffrey P. Bialos and Stuart L. Koehl

Center for Transatlantic Relations
The Paul H. Nitze School of Advanced International Studies
The Johns Hopkins University
1717 Massachusetts Avenue, N.W. Suite 525
Washington, D.C. 20036
Tel. (202) 663-5880
Fax (202) 663-5879
Email: transatlantic@jhu.edu
http://transatlantic.sais-jhu.edu

Table of Contents

Introduction & Executive Summary[1]

The rush of recent events, including the post-September 11 drive to combat terrorism and the U.S.-led Operation Iraqi Freedom, has shifted attention away from the important but contentious issue of missile defense. Remember the highly charged "grand debate" of years past? This intense and urgent "all or nothing" discourse—should we or shouldn't we—has been replaced by an eerie silence and sense of complacency concerning U.S. missile defense policy. Yet decisions being made on missile defense today deserve to be in the forefront of military-political discourse—on a par with the war on terrorism and the reconstruction of Iraq.

The reality today is that there are a number of less "sexy" but nevertheless important policy, technological, economic and military issues concerning missile defense strategy that warrant serious public scrutiny and debate—on both sides of the Atlantic and across the political spectrum. Notwithstanding the polemics of years past, there are some prospects that we can "get to yes" on this complex subject. Specifically, as this essay addresses in detail:

(1) *It is irresponsible—indeed, cavalier—to be entirely opposed to developing missile defenses given the very real and growing spectrum of missile capabilities of potential adversaries and our imperfect, but improving, ability to address this threat*. To be sure, the recent controversy over the quality and use of available intelligence on weapons of mass destruction in Iraq suggest that we should not take at face value, and should carefully review, any assumptions about foreign missile development programs (e.g., projected capabilities and timing) that drive our policy. Congress and independent experts should carefully scrutinize the increasingly urgent tone of U.S. government reports in this area.

Nevertheless, the available evidence shows that the missile threat is real and growing; numerous potential adversaries appear to be developing, enhancing, and in fact fielding and utilizing a broad panoply of missile capabilities of various types and range. These include not only ballistic missiles, often the primary focus of attention, but cruise missiles, unguided rockets (large "free rockets"[2] and barrage rockets[3]), and even rocket-propelled grenades used effectively against U.S. forces in Iraq and Afghanistan. The full spectrum of missile capabilities also includes not only long-range intercontinental missiles under development in North Korea and elsewhere—again, the primary focus of recent policy debates, but also short and medium range systems and projectiles capable of doing significant damage to US and European interests.

In short, missiles of various sorts, armed with weapons of mass destruction or conventional payloads, seem poised to become the mainstay weapons of choice for potential adversaries of the United States and its coalition partners—both state and non-state—seeking asymmetric "equalizers" in an era of American military dominance. The technology to develop and produce increasingly lethal and precise missiles is more widely available in an era of increasing globalization of the economy, missiles are far more affordable than many other conventional alternatives (e.g., manned aircraft) and, as recent events in Iraq and elsewhere have demonstrated, these missiles have the potential to inflict real damage and achieve significant political and military results. Moreover, the United States now has realistic and improving (but by no means perfect) means of addressing some of these threats. The fielded, short range Patriot PAC-3 system has been successful and longer-range sys-

tems—from theatre to inter-continental—are being developed and tested.

(2) *After years of controversy, the "grand" political debate over missile defense in the United States—whether to withdraw from the Anti-Ballistic Missile (ABM) Treaty and deploy a defensive shield now—is over, and missile defense is and should be here to stay as an important element of a balanced U.S. defense policy for the twenty-first century.* While one can question the ABM withdrawal and deployment decision, these judgments have been made and have not to date produced the de-stabilizing consequences some had envisioned. In fact, there is today a mainstream bi-partisan consensus that: first, there is a felt need to develop defenses as one element of an overall security strategy to address this emerging threat; and second, various "soft" policy tools—from multilateral regimes and cooperative threat reduction programs to diplomacy and sanctions—are necessary and important but do not provide sufficient security (and, in any event, can be made more robust through fielding missile defense capabilities). Moreover, arguments over the extent of testing and technological maturity should not deter us from fielding whatever capabilities we have against long-range missile threats as they develop on an accelerated basis. Simply put, we today have no defense in place against a missile attack from North Korea or other rogue states, and some defense—however imperfect—is better than none.

Below the surface, there is not a clear consensus on the relative priority afforded missile defense as a part of overall US security strategy—an issue bound to become more prominent over time. Some view missile defense as a first line of defense not only against short and medium range capabilities of potential adversaries, but also against the long range strategic missile programs of countries like China and the Russian Federation. This philosophy—which essentially seeks to replace long-standing US strategic nuclear deterrence policy, based on the doctrine of mutually assured destruction, with reliance on a missile shield—is not widely accepted, however. The better view is that a strong missile defense should not be our recourse of first resort or replace our strategic deterrence posture, but should serve as an insurance policy against the small probability of long range attacks by rogue states and non-state entities and an effective counter against the near certain prospects of short and medium range attack against our homeland, regional interests and fielded forces. Missile defense thus should be combined with our deterrence posture, strong multilateral regimes, programs to dismantle Soviet-era weapons, robust diplomacy, the use of sanctions and other tools.[4]

In this regard, there are significant arguments that the United States should adopt more robust steps in these other policy areas to address both the threat to security posed by weapons of mass destruction and missiles capable of delivering them. However, the efficacy of these other elements of overall US defense strategy is beyond the scope of this essay, which focuses on the relative appropriateness of our missile defense policies and programs as one element of an overall US strategy.

(3) *We today need greater public scrutiny and debate in Congress and other appropriate forums are needed today on a number of crucial, but less glamorous issues that are relevant to shaping a balanced missile defense strategy and budget for the 21st century.*

The China Equation. We need to carefully consider the implications of our missile defense choices for our overall strategic relationship with China and the prospects of Chinese missile development and proliferation. In particular, the Bush Administration's plans to deploy up to forty ground-based interceptors at three launch sites "Midcourse" program (formerly called the National Missile Defense program) and add additional capability later in the decade, directly raises the question of what role missile defense plays in overall US strategy.[5]

Specifically, the initial objective of the "Midcourse" or NMD system was to protect against rogue state attacks or accidental launches of intercontinental ballistic missile (ICBMs). However, the Administration's FY 2005 budget proposal to accelerate the planned Midcourse deployment schedule and field earlier a more robust system capability (with more interceptors and sensors)—appears to exceed what is needed to defeat limited "rogue" state threats for years to come. While the Administration cites industrial base concerns (i.e., the need to produce interceptors at a minimal economic rate) as the rationale for this accelerated acquisition, it is fair to ask whether "mission creep" has set in. In this regard, is there a more profound underlying strategic imperative for the change in program schedule (if not in overall scope)? Is the Bush Administration, quietly and with little debate, moving towards reliance on a missile defense, rather than nuclear deterrence, diplomacy and arms control for overall security? Several factors suggest that the that China is the principal focus of this emerging strategy, with the accelerated deployment sized to defeat a Chinese ballistic missile attack.

In short, the proposed accelerated deployment schedule and overall system size of the Midcourse program warrants public debate and close scrutiny in Congress as it considers the Administration's 2005 budget request for missile defense. In particular, we need to consider the implications of this acceleration for Chinese missile proliferation and our strategic posture, and whether there are alternatives to the planned course of deployment. For example, should the United States, as an alternative, consider a deepened dialogue with China on missile defense issues? Should the U.S. contemplate the prospect of foregoing long-term planned deployments of additional interceptors in the U.S. "mid-course" missile defense program (i.e. beyond the initial capability designed for rogue states) in exchange for verifiable Chinese limits on its strategic missile development, deployment, and proliferation-related activities. In other words, is the prospect of these later deployments a more useful policy tool in achieving beneficial results through robust diplomacy than the actuality of their deployment?

Funding Allocations: How Many Eggs in Which Baskets? Even in an era of increased defense budgets, the United States lacks the resources to fully fund all defensive capabilities, including missile defense. While the United States has now shifted to a new paradigm that seeks to shape our security posture on the basis of potential "capabilities" of enemies rather than specific threats, the reality is that we lack a sophisticated approach for allocating resources between competing needs and need to develop a better, and more transparent methodology. Nevertheless, when current U.S. funding choices are viewed in the context of our overall security needs today, two key observations are possible:

- *Overall Funding Levels Make Sense but Proposed Increases Warrant Close Scrutiny.* While it is tempting to criticize the overall level of Bush Administration funding to date for missile defense relative to other defense needs (which is on the order of $9.1 billion or 13% of overall RDT & E and procurement spending), a reasonable case can be made that the growing nature of and reliance on missiles of various types and ranges by potential adversaries warrant expenditures of this magnitude. In this context, the Bush Administration's systematic approach to missile defense development—creating an overall architecture, exploring numerous technologies, and utilizing spiral development to field capabilities as they mature—seems appropriate. Yet, the magnitude of the Bush Administration's proposed FY 2005 increase in the missile defense budget—an additional $1.5 billion in

funding after a tripling of missile defense funding since 2000—warrants close scrutiny in Congress. As noted above this extra funding, which is mostly for the accelerated spending trajectory and deployment schedule for the mid-course system, is questionable, given the relative size and scope of the existing and near-term ICBM threat. Does the U.S. really need to acquire a robust capability (40 deployed interceptors) over 2005-08? Or, as suggested above, is this change really about a change in strategic policy and a shift toward missile defense and away from nuclear deterrence? Certainly, it is prudent to field *some* initial capability soon in order to deal with a rogue state attack, even before the completion of system testing and evaluation. However, there are serious questions about accelerating deployment of the full scale capability, which appears to be early to need, and in advance of full system maturity (from a technological and operational standpoint).

- *An Imbalance in U.S. Missile Defense Priorities?* A careful review of the facts suggests that the Bush Administration may be affording too much priority to defending against strategic ballistic missile threats (i.e., the small, and presently hypothetical, possibility that a rogue state could soon have the capability to launch long-range intercontinental ballistic missiles armed with nuclear, biological or chemical warheads against America) and insufficient funding to the very real and imminent range of missile threats (ballistic, cruise and unguided) to regional interests, deployed forces, and U.S. territory. The Administration's believes that distinctions between "national" and "theatre" missile defense are artificial and outmoded, and its budget tends to obscure funding distinctions on that basis. Nevertheless, some distinctions are real ones; not all of the technologies and architectures are interchangeable across systems of varying ranges and capabilities (and some technologies and architectures may not be needed for effective for medium and short range effective defenses). Moreover, funding decisions can affect the timing and robustness of fielded defenses against various ranges of missiles. Thus, in light of the emerging spectrum of capabilities (actually fielded and projected) of our potential adversaries and the real and imminent threat they pose to our interests, the United States should seriously consider directing greater funding toward undernourished theatre and tactical defense capabilities, and defenses against cruise missiles and conventional missiles (e.g., man-portable air defense missiles, barrage rockets and other types of projectiles). The continuing war in Iraq, recent missile attacks on commercial aircraft in Africa and other recent events highlight the range of missile capabilities that exist, and our relative lack of ability to defense against very short range and cruise missile threats. The Bush Administration therefore should conduct a complete review of U.S. capabilities against very short, short and medium range missiles (cruise, ballistic and even man portable air defense types) and develop an overall plan that includes traditional missile defense, missile warning, and other types of countermeasures. The United States also should take advantage of existing and developmental foreign defensive capabilities and technologies that exist (in Israel and elsewhere) rather than going it alone in this area of shared risk.

- *The Need to Maintain Competition.* Finally, we need to consider the implications of our missile defense acquisition strategies for competition, and the innovation and affordability it can produce, in relevant defense markets. A combination of "demand" and "supply" dynamics—the structuring of missile defense acquisition programs (various decisions over time to allow sole sourcing and the recent creation of a "national" contractor team) and the significant consolidation in the relevant markets—have limited the prospects for competition in this area where innovation is critical and costs continue to escalate. Congress should direct the Missile Defense Agency (MDA) to evaluate where competition can be introduced at reasonable cost and MDA should exercise more vigilant oversight of "make/buy" decisions by primes, all-purpose teaming arrangements and other competitive situations to ensure an environment that can best bring the innovation and affordability needed to our programs.

(4) *There appears to be a very slow, but nevertheless perceptible shift in the views of European leaders on missile defense from outright hostility and/or agnosticism toward an emerging understanding that its nations also face real and potentially growing threats—although the nature and degree vary depending on geographic location.* Yet, Europe today, preoccupied with the conventional military capabilities gap, chronic under-spending on defense, and the complex process issues related to reshaping its own institutions for defense and armaments, has no strategic approach or consensus on this issue. Thus, Europe too needs to openly and honestly debate the missile defense issue—it really has not done so to date—and develop—as Europe—its own realistic assessment of the missile threat and how to address it as part of an overall defense strategy for the twenty-first century. Such a debate will likely cement the reality that Europe should apply resources to missile defense as well and should do so as "Europe" rather than on a fragmented national basis. Indeed, missile defense is critical to the ability of European forces to participate in either high intensity, out of area NATO missions (e.g., through the NATO Response Force which was just stood up) or lower intensity "Petersburg" missions envisaged by the European Union's Headline goals. As the Operation Iraqi Freedom campaign makes clear, basic force protection requires at least some semblance of missile defense for these missions. Hence, Europe needs to maintain sufficient capability in this area as an "enabler" of its ability to project force rapidly.

(5) *Despite the current state of Transatlantic relations—perhaps a post-World War II low—and longstanding problems inherent in Transatlantic armaments cooperation, Europe should want to engage with the United States if it wants to be serious about missile defense.* In geopolitical, economic, and security terms, the case for European cooperation is strong, because missile defense is a useful area for strengthening the Transatlantic relationship and NATO. Europe lacks the resources and technology to meaningfully go it alone in this area, and needs to leverage the enormous U.S. R & D spending.

U.S.-European efforts can lead to the creation of a truly international architecture for missile defense—with "plug and play" features—that can be a "win-win" proposition. It would not, as some Europeans believe, create European "dependency" on the United States, but rather mutual interdependence among coalition partners. Ultimately, an integrated and interoperable system of systems that affords protection against missile attacks to US and European territory, forces and interests is in everyone's interests.

While the model of cooperative engagement on missile defense will likely be different than in other Transatlantic projects, there are several fundamental realities to consider:

- Ironically, the Bush Administration's high priority on missile defense has been undermined by its own inability to follow through on, and work out, the technology transfer problems needed to facilitate international cooperation in this area. The United States needs to expeditiously resolve the very serious underlying technology transfer issues and other questions of roles and responsibilities soon; a failure to do so will essentially signal the end of serious cooperation in this field and again highlight the longstanding disconnect between U.S. armaments and export control policies.

- A Europe that fails to meaningfully engage on missile defense with the United States and either goes its own way or no way at all is a Europe that will move toward gradual disengagement from the United States in defense policy, armaments and in a broader geopolitical sense.

- For Europe to reap serious security benefits from missile defense (i.e., protection under an overall "systems of systems" shield) or real industrial benefits, Europe will likely need to, collectively, provide funding—necessitating trade-offs with other priorities—and provide its own elements of the shield.

Setting the Stage: A Changed Strategic Environment & Emerging Domestic Consensus

For most of the Cold War, there was a bipartisan consensus that the ABM Treaty was the cornerstone of a system of arms control agreements that ensured strategic stability between the United States and the Soviet Union, thereby preventing an unconstrained arms race and fostering enhanced deterrence. Missile defenses were viewed as tools that could potentially encourage the use of first strike capability and, therefore, undermine the underlying policy of deterrence.

Yet, over time, this U.S. consensus eroded as some came to see the ABM Treaty and other arms control agreements as instruments that had failed in their avowed purpose of ensuring our security against missile threats. The proponents of missile defense came to believe that only active defenses barred by the treaty could render the ballistic missile threat ineffective. Hence, by the late Cold War period, missile defense became a polarizing and defining issue. The Reagan Administration's Strategic Defense Initiative (SDI) whatever its technical merits, was labeled "Star Wars" by its detractors and produced a highly politicized environment.

As the U.S. debate raged on, Europeans remained, for the most part, either indifferent or actively hostile to the concept of ballistic missile defense. European leaders have tended to view missile defense in general, and SDI in particular, as technically impractical, prohibitively expensive, or strategically destabilizing—either by provoking a Soviet response, or by potentially de-coupling the United States from its Western European allies.[6] Also, despite various Presidential statements about sharing missile defense technology with our allies (and even with the USSR), practical cooperation did not materialize; this helped to blunt any positive European support for SDI and missile defense programs (although the experience of Operation Desert Storm created some European interest in more limited theater missile defense programs).

Today, however, missile defense must be assessed within a very different strategic and geopolitical environment. With the fall of the Soviet Union and the emergence of a Russia that is more democratic and becoming increasingly integrated into the international community, the risk of a major strategic nuclear exchange has receded. Through a series of agreements, the nuclear arsenals of the United States and Russia have been greatly reduced, and will continue to diminish over time making the world a somewhat safer place.

Yet, the end of the Cold War unleashed numerous de-stabilizing forces—from ethnic and regional rivalries to state-sponsored terrorism—that had long been suppressed by the bi-polar superpower confrontation. Even before the terrorist attacks on New York and Washington on 11 September 2001, it was clear that the United States and its coalition partners faced a broad range of both conventional and asymmetric threats to security, including the threat of ballistic missiles and weapons of mass destruction.

The United States and the international community responded in a range of ways to these new threats, including the creation of new global or multilateral frameworks and disciplines, cooperative threat reduction programs with Russia and other former Soviet states aimed at, among other things, dismantling old Cold War era weapons and capabilities, economic sanctions and diplomacy, and, in some cases, the use of force. In the missile and related non-proliferation arena, the new approaches included the Missile Technology Control Regime (MTCR), the 1992 Chemi-

cal Weapons Convention and the 1994 Vienna Document on the Negotiations of the Conference on Confidence and Security-Building Measures. And in February 2001, a new regime emerged—the International Code of Conduct on Missile Proliferation.

Yet, as events unfolded in the post-Cold War era, a new consensus began to emerge in the United States that: (a) these international frameworks, threat reduction programs and other "soft" measures alone—such as sanctions or diplomacy—cannot ensure the security of the United States, its allies, or its forces deployed abroad against real and projected missile threats; and (b) that a last line of defense—that is, active missile defense—is needed to protect the United States and, indeed, to make our other soft "tools" more robust and meaningful. In other words, the prospect that the United States and its allies could actively defend against a missile attack is likely to deter potential proliferators from investing in this option, and also is likely to be synergistic with other policy tools. Having missile defenses will make it more likely that those adversaries with the missile option would come to terms and, hence, will reduce the cost of "getting to yes" diplomatically.

Slowly but surely, the grounds of the missile defense debate began to change in the United States from the matter of "if" to the matters of "how" and "when." The Iraqi use of Scud missiles during the Desert Storm campaign in 1991, and the relative U.S. inability to defend against it, engendered considerable new thinking and new U.S. programs to upgrade the existing but ineffective Patriot missile system and develop other capabilities. Further, in 1996, the Clinton Administration initiated the National Missile Defense (NMD) program, a major R & D effort focused on developing capabilities to protect against the small but potentially devastating risk that inter-continental ballistic missiles might reach U.S. soil. Finally, the election of President George W. Bush, who made missile defense a centerpiece of his campaign, was perhaps the final culminating event. The Bush Administration's decision in December 2002 to withdraw from the ABM treaty and deploy the NMD System marked a clear "sea change" in U.S. thinking. In short, the reality today is that the consensus for missile defense in the United States stretches over two administrations, covers both political parties, and has broad public support.

The extent of this consensus on missile defense is evident in the consideration of the issue in Congress and the broader political arena. During the first two years of the Bush Presidency, a Senate controlled by Democrats approved and appropriated funds for virtually the entire Bush Administration missile defense budget with little real debate. Indeed, when some Senate Democrats attempted to delete $1.3 billion of a proposed $1.687 billion in spending authority for the program in September 2001, Senator Carl Levin (D-MI), then Chairman of the Armed Services Committee, urged its restoration, a motion that was adopted without dissent.[7]

Indeed, while some prominent Democrats have continued to press against NMD,[8] it is noteworthy that criticism by Democratic presidential candidates has been relatively muted to date. While there have been some calls for a reduction in missile defense spending, there have been no calls to abandon existing US programs or take a radically different direction. Most of the criticism focuses on re-allocating some of the missile defense spending to other needs. For example, former Vermont Governor Howard Dean proposes transferring $1 billion out of the annual missile defense budget to cooperative threat reduction and related programs—hardly a major change in focus.[9] Moreover, the increased U.S. focus on homeland security is likely to provide additional support for missile defense as one element of this new agenda. While homeland security encompasses protection of the territorial United States against a range of threats—notably terrorism—missile defense undoubtedly falls into this basket in the eyes of the public.

The Range of Twenty-First Century Security Threats: Viewing Ballistic & Cruise Missiles in Context

There is little doubt today that the risk of ballistic missile attack on the United States and its allies and forces is one of the major and growing security threats we face in the twenty-first century. It is important, however, to understand the nature, scope and immediacy of the threat and view it in the context of a range of other security threats we will likely face in the years ahead.

The Missile Threat: Real and Growing

At present, there are at least fifteen countries either in possession of ballistic missiles or working to acquire them; several of those also have active weapons of mass destruction (WMD) programs. Among the countries of particular concern today are China, India, Iran, North Korea, Pakistan, Syria, Vietnam, and Yemen. Until recently, both Afghanistan and Iraq could have been included in that list. The fact that many of these countries with actual or potential missile capabilities also occupy areas of regional instability and conflict is not coincidental; conflict and instability are spurs to missile proliferation and as conflict shifts to other areas, we are likely to see new threats emerge.

Significantly, since the Bush Administration took office, the publicly available U.S. intelligence estimates, security reports, and statements on missile proliferation have taken on a noticeably more urgent tone and conveyed more of a sense that foreign missile programs—especially those with strategic dimensions—are accelerating. As the CIA noted in its 2001 public estimate of the missile threat, most U.S. intelligence community agencies project that during the next 15 years the United States most likely will face ICBM threats from North Korea, likely the soonest, and later from Iran in addition to the strategic forces of Russia and China.[10] Moreover, as the CIA has further noted, "the trend in ballistic missile development worldwide is toward a maturation process among existing ballistic missile programs rather than toward a large increase in the number of countries possessing ballistic missiles."[11] In other words, as the report confirms, "[e]merging ballistic missile states continue to increase the range, reliability, and accuracy of the missile systems in their inventories—posing ever greater risks to U.S. forces, interests, and allies throughout the world."[12] Also noteworthy is the statement in the Bush Administration's Quadrennial Defense Review issued in 2001 that "in particular, the pace and scale of recent ballistic missile proliferation has exceeded earlier intelligence estimates and suggests these challenges may grow at a faster pace than previously expected."[13]

Particularly in light of recent questions about the quality, accuracy, and characterization of U.S. intelligence on weapons of mass destruction that arose with respect to Iraq, it is vital that we not take such statements and estimates at face value. While missile development programs are admittedly more difficult to conceal than "national technical means" than programs focused on nuclear, biological and chemical capabilities, we nevertheless must carefully review and consider the state of our knowledge. Specifically, Congress should evaluate the underlying assumptions of projected missile proliferation embodied in Administration proposals on the scope, level and timing of U.S. missile defense funding.

It also is important to discriminate between the immediacy and intensity of different types of missile threats posed by potential U.S. adversaries. The Bush Administration has been heavily, though not entirely, preoccupied with long-range intercontinental ballistic missile threats to the United States. Significantly, except in the case of North Korea, which today may have several ICBMs with nuclear payloads, the other strategic threats are speculative in nature—not here and now; future estimates vary in the likelihood, scope and timing of such projected strategic missile threats to the continental United States.

In sharp contrast however, there is today a range of tangible, immediate and growing missile threats in regional theaters and on battlefields to U.S. and allied interests, platforms, and military personnel. These risks are here and now and are not mere potentialities; we need not make policy on the basis of estimates. The reality and degree of this risk was borne out in the recent war with Iraq, in which some two dozen missiles were launched at coalition forces and fixed targets in Kuwait. Most of these were short-range ballistic missiles, of which about half landed far from target areas, and the remainder destroyed with a combination of Patriot Advanced Capability (PAC)-2 and PAC-3 missiles. Plainly, without the protection provided by such missile defenses, U.S. forces would not have been able to assemble in Kuwait, let alone enter Iraq.

Also, as Secretary of Defense Rumsfeld recently acknowledge, the cruise missile threat is growing.[14] Cruise missiles are generally not that expensive, low flying (which avoids enemy radar), and fly at ranges of 500-1,000 mph. Interestingly, only two missiles actually inflicted damage on populated areas (both hit shopping centers in Kuwait); both were modified Silkworm anti-ship cruise missiles. That such old and relatively unsophisticated missiles as Silkworms could escape detection and interception by coalition air defenses is a harbinger of the threat posed by the far more capable cruise missiles now in development or entering service. Indeed, as ballistic missile defenses improve, one might expect that potential adversaries will begin diverting their resources away from ballistic missiles and into cruise missiles. The availability of commercial, off-the-shelf, GPS-based guidance systems will permit a quantum improvement in the accuracy of even obsolescent anti-ship cruise missiles into potent, precision land-attack weapons.[15] Subsonic and capable of complex, pre-programmed flight paths, cruise missiles are also much more effective platforms for the delivery of chemical and biological weapons than are tactical ballistic missiles.[16]

The increased risk from short-range, shoulder-launched surface-to-air missiles (MANPADS) and other projectiles has also been made clear by the recent incidents in Iraq as well as the attack on an Israeli passenger airliner in Africa. These threats to both military and civilian targets are difficult to defend against and warrant serious consideration. Generally guided by infrared seekers that home on aircraft engine exhaust plumes, man-portable, shoulder-launched air surface-to-air missiles (MANPADS) have a range of up to 5 km, and are effective up to 4000 meters. While most military aircraft carry a range of "infrared countermeasures" (IRCMs) such as flares or IR beacons to jam or deceive missile seekers, commercial aircraft and many military transports do not. Because such weapons are easily smuggled and easy to conceal until used, they can be positioned around military and commercial airfields to attack aircraft as they take off and land. Flying low, and very slowly (and when taking off, heavily laden with fuel), aircraft are particularly vulnerable to attack at such times. Moreover, most existing IRCM systems require a certain amount of time to detect the threat and eject flares; during takeoff and landing, the necessary warning time is not available, thereby nullifying the effectiveness of conventional IRCMs against such close in threats.

Barrage rockets represent another serious very-short-range threat against which there are no viable countermeasures at present. Cheap and, when fired in large numbers, able to saturate an area with explosives, barrage rockets have a very short time of flight and relatively low trajectory that makes them difficult to intercept. Because they are ubiquitous and cost only a few thousand dollars each, it is uneconomical to intercept them with conventional air defense missiles (even an old Patriot missile costs more than $1 million per copy). The cost leverage, therefore, is strongly on the side of the barrage rocket. Large numbers also allow barrage rockets to saturate defenses. For this reason, the United States (in collaboration with Israel) has been trying to develop a range of weapons to defeat this threat, including the Tactical High Energy Laser (THEL), canon-launched guided projectiles, high-power microwave weapons (HPMs), and low cost "swarm" interceptors. However, most of these systems are still in the early stages of development, and will not be operational for many years.

To its credit, the Bush Administration has recognized that missile defense must be conceived of in broader terms than merely the strategic threat—which is, after all, the most unlikely—and has recast its policy in broader terms, viewing overall missile defense as an integral part of a new strategic triad, together with offensive nuclear forces and advanced conventional capabilities.[17] Of course, part of the rationale for this effort to "blend" various types of missile defense is tactical; blurring the distinctions helps to shore up the support for and dampen the controversy over long-range missile defense.

Why Is Missile Proliferation A Leading Security Threat?

Despite the uncertainties surrounding projections of foreign missile development, the reality is that for geopolitical, economic and technological reasons, this security threat to here to stay and will likely grow in significance. The growth and projected growth of foreign missile programs are in part a reflection of the overwhelming U.S. military dominance in the world today. Continued stable U.S. investment in defense capabilities during the 1990s, a time of overall worldwide global decline in defense spending, has left the United States as the only superpower. A string of events, from the 1991 Gulf War to the Balkans to Afghanistan and the recent Iraqi campaign, has confirmed our preeminence. Moreover, from a military standpoint, there is virtually no sign of a peer competitor on the horizon for years to come. In this environment, how can a potential U.S. adversary hope to gain some military advantage or threaten U.S. interests? Plainly, potential adversaries—individually and collectively—lack the resources, industrial capabilities and, for the most part, technical competence to produce major defense platforms that can compete with the U.S. in air, on land and at sea or can meaningfully project power and lethal force against the United States and its allies. For example, what country can realistically develop and produce a fighter to compete with the F-22 or Joint Strike Fighter? Moreover, it remains to be seen what nations would have the requisite trained personnel and infrastructure to maintain such advanced systems.

Thus, with such conventional, symmetrical responses to the military prowess of the United States and its coalition partners effectively foreclosed to potential adversaries, it is inevitable that an increasing number of countries are seeking "equalizers" through asymmetrical strategies and responses. For some countries, that response takes the form of state sponsored terrorism—either directly or through the control and/or sponsorship of sub-national entities. For others, it takes the form of weapons of mass destruction combined with unconventional delivery sys-

tems—ballistic and cruise missiles. Some countries have pursued or are pursuing all of these paths.

Hence, these nations—mostly rogue states—have little choice but to husband their resources for realistic and asymmetric "equalizers," from low tech to high tech. This reality drives potential adversaries to focus on areas like ballistic and cruise missile technology (sometimes combined with chemical and biological warfare capabilities), which are cheaper and within their skill sets. Commercially available technologies such as GPS and inexpensive laser-gyro inertial guidance packages make these weapons capable of precision as well as area attacks, thus placing fixed targets and deployed forces at risk. As the Bush QDR properly highlights, the significant diffusion of missile and related technologies in a globalized economy makes it far more likely that our potential adversaries can cost-effectively develop more accurate and reliable ballistic missiles of various ranges and potentially lethal payloads.[18] Precision guided missiles—from battlefield to regional—and other asymmetric capabilities derived from available commercial technology are likely to be weapons of choice. The technology is available, the price is better, and the consequences significant.

Thus, ballistic missiles are effectively the "poor man's" weapons of choice—the way of the weak confronting the strong. The strategic logic behind this approach is clear. Take, for example, the country deciding whether to acquire a force of multi-role strike aircraft. At a cost of about $50 million per aircraft, a squadron of just twelve aircraft costs $600 million, to which must be added the cost of ordnance, fuel, spare parts, pilot training, and a complex base infrastructure. For all this, the country gets an insignificant force that may be quickly eliminated in the opening moments of any war with the United States and its coalition partners. On the other hand, the same $600 million investment could potentially yield up to one hundred ballistic missiles on mobile transporter-erector-launchers, hundreds of Tomahawk-type cruise missiles with mobile truck launchers, or thousands of weaponized UAVs. Moreover, these forces will require only a fraction of the manpower, maintenance support, and infrastructure of manned aircraft. They are much more likely to reach long range targets, and, if combined with WMD payloads, they can exert a considerable deterrent capability not just over local rivals, but over the great powers as well. Thus, from the vantage point of potential adversaries, missiles or UAVs with WMD payloads unfortunately represent a logical approach—especially in the absence of effective missile defenses.

In a typical paradox of strategic logic, the U.S. success in Iraq—the show of American supremacy in twenty-first century warfare—as well as critical technological and economic limitations, are likely to propel some nations toward escalating missile proliferation activities.

The Missile Threat in Context

While recognizing the importance and growth of the missile capabilities of potential adversaries, it is important to evaluate that risk in a broader context. Specifically, it is critical to recognize that missiles are only one of a broad panoply of twenty-first century security threats the United States faces; these include not only the traditional regional and other threats, but also a host of new "asymmetric" threats, some technologically leveraged and others not—from biological and chemical weapons of mass destruction delivered by missiles and other means—to cyber terrorism, information warfare and other forms of government sponsored terrorism. Thus, while the risk of missile attacks—a primary Bush Administration focus—is certainly one of these threats, it is only one. Indeed, as Under Secretary of Defense Jacques Gansler noted in September

1998, "we can expect a diverse and unpredictable threat—both asymmetrical and traditional; often combining more traditional conflict with acts of terrorism."[19]

The full range of threats has been identified in the last several Quadrennial Defense Reviews—the major defense planning document for the Department of Defense—and has resulted in a number of new military requirements and acquisition programs. What September 11 essentially drove home is that these threats are not simply theories of Pentagon planners, but are, to varying degrees, realistic prospects that need to be addressed for the United States and its coalition partners to be secure.

In sum, in light of the strategic landscape and nature of the threat we face today and in the foreseeable future, a reflexive opposition to missile defense is no longer a reasonable policy position. Rather, we must now focus on the difficult questions of evaluating foreign capabilities, structuring appropriate programs and allocating scarce resources.

Current U.S. Missile Defense Strategy and Programs: Issues to Consider

The Bush Administration's "Architectural" Approach

The Bush Administration's missile defense program did not start on a clean slate, but it is built on a range of pre-existing Clinton Administration development and acquisition programs. Today, these activities are organized around a single integrated concept: an overall ballistic missile defense architecture—in effect, an integrated "system of systems." The idea is to develop the architecture in a "block" or spiral development approach designed to add new capability as the technology matures, upgrade existing capability through technology insertion, evolve requirements, and procure additional enhanced capability as needed. In effect, the approach is to build a little, deploy a little, upgrade a little, and deploy a little more—thereby getting available capability fielded more rapidly than in the past. This approach also has certain other operational advantages such as the seamless interoperability of long-range and theater elements.

Toward this end, the U.S. Missile Defense Agency (MDA), has restructured the existing Clinton programs into a single, integrated acquisition program—with a budget averaging about $7-8 billion per year—that includes a layered set of activities and technology projects which cover: long-range missile defense (i.e., attacks on U.S. soil by intercontinental ballistic missiles); medium range defense (so-called theater missile defense); short-range tactical defense (on the battlefield); and cruise missile defense. As articulated in National Security Presidential Directive 23 (entitled "National Policy on Ballistic Missile Defense"), the Bush Administration has taken the view that the distinction between "theater" and "national" missile defense was artificial—due in large part to the ABM Treaty—and outmoded. The Administration thus has eliminated this distinction from its lexicon and focused on developing a layered set of defenses capable of intercepting missiles "of varying ranges in all phases of flight."

The overall missile defense "architecture" includes a range of integrated activities designed to function as a "system of systems," including: multiple sensors (various kinds of space, ground, and airborne radar supplemented by space- and ground-based infrared and electro-optical sensors) that can identify, classify, track and provide quality targeting information concerning missile threats; real-time, secure communications channels and battle management/C3I systems; and mobile and fixed interceptors on land, sea, and potentially, in the air. One of the Bush Administration's most significant changes has been a greater emphasis on long-range missile defense. The Administration is now pursuing an expanded and "layered" effort seeking to develop multiple approaches to attack missiles at different points in their flight path—from "boost intercept" in the early period after launch as the missile ascends, to "Mid-Course" intercept as the missile reentry vehicle coasts through space, to later-stage intercept as the missile descends through the atmosphere.

This "let a 1,000 flowers bloom" approach now includes the developmental Airborne Laser (ABL) program, which will mount a high-powered chemical laser on a Boeing 747 platform to intercept ballistic missiles in the boost phase, and the Sea-Based

Midcourse (SBM) Defense, now also known as the Aegis-Based Missile Defense (Aegis BMD), which is designed for mid-course interception of ballistic missiles in both the theater and the national arenas—thus blurring to some extent the distinction between long-range and theatre range shipboard missile defense. This latter program is effectively a merger of several shipboard TMD and NMD programs (Navy Upper Tier (NUT) and Navy Theater-Wide (NTW)), all of which utilize the Navy's Aegis air defense radar (as well as land and space based sensors), battle management system, and new ship-based interceptors (Standard SM-3 missile and/or a kinetic kill vehicle).

The most developed of the long-range U.S. capabilities is the Clinton Administration NMD program (now, Mid-Course Segment), which is focused on developing a system capable of defending all fifty states from a limited attack by intercontinental or submarine-launched ballistic missiles. This capability will not defend against a major strategic attack by Russia (like the type envisioned during the Cold War) or short-range submarine-launched strikes, but against small attacks by rogue states and "mistake" launches of a small number of ballistic missiles from Russia or China.

During his last year in office, President Clinton deferred to his successor any decisions on fielding the system in light of the system's technological immaturity and the implications of the decision for the ABM Treaty. In 2002, however, President Bush made two important decisions. First, he decided in June to withdraw from the ABM Treaty—a sea change in nuclear policy done to legalize the move to NMD deployment and facilitate new technological approaches such as airborne or space-based laser systems, sea-based systems, and enhanced and expanded ground-based systems. Second, freed of the constraints of the ABM Treaty, the President decided to move to deploy the initial NMD capability in 2004.

The initial mid-course capability to be deployed by the end of FY 2004 consists of about ten Ground-Based Interceptors (GBIs), X-band Engagement Radars (XBRs), Upgraded Early Warning Radars (UEWR), an enhanced Space-Based Infrared Satellite System (SBIRS), and a battle management/command, control & communications (BM/C3I) system. Under the Administration's proposed FY 2005 budget, an addition ten interceptors will be deployed by the end of FY 2005, for a total of twenty operational interceptors fielded by the end of that fiscal year. Between FY 2006-2008, the budget calls for deployment of twenty more interceptors, for a total of forty operational interceptors by the end of FY 2008. Plans call for twenty-six interceptors to be deployed at Fort Greeley, Alaska; four at Vandenburg AFB, California (primarily for testing but also capable of operational use), and ten at a third site yet to be identified. Significantly, this deployment timetable reflects a compression of the Bush Administration's FY 2004 plans, which would have only had twenty interceptors in by FY 2008. By 2010, an additional 25 interceptors will be added, presumably with enhanced performance characteristics.

In the arena of intermediate or theater missile defense (TMD), MDA is developing a number of capabilities together with the U.S. Army and Navy. As noted above, the Aegis BMD program addresses shipboard defense needs. The advantage of shipboard TMD is obvious: one can rapidly deploy a defensive capability that does not require "landing rights" from host nations; and a ship-based system has inherently more powerful radars and a larger missile capacity than mobile land systems that must fit into C-130 transports. The premier U.S. Army TMD system remains the Theater High Altitude Area Defense System (THAADS). Mounted on trucks, and deployable by C-130 transport, THAADS is intended to provide an upper tier defense against short and medium-range ballistic missiles.

The Army also has two ongoing lower tier TMD systems: the Patriot Advanced Capability III (PAC-3) and the Medium Extended Air Defense System (MEADS). PAC-3, now operational in Iraq and apparently very successful against short-range missiles, was developed in response to the perceived shortcomings of the older PAC-2 Patriot missile used in Operation Desert Storm. Unlike PAC-2, which had a high explosive warhead, PAC-3 is a hit-to-kill missile, or "hittile," that physically collides with the target. Being much smaller than the PAC-2, 16 (vs. 4) missiles can be carried on each launcher. The multi-national Medium Extended Air Defense System (MEADS) program now underway—and in the process of yet again being restructured—is designed to address a number of deficiencies of the Patriot capability (i.e., its size, semi-fixed positioning, and lack of 360-degree engagement coverage for maneuvering troops).

Key Issues to Debate

When viewed in context, the Bush Administration's systemic approach to missile defense development is logical and appropriate given the projected foreign capabilities we are likely to face. Yet, there are a number of important issues that warrant serious debate and should not be left "below the radar screen."

The Implications of ABM Treaty Withdrawal & NMD Deployment for Missile Proliferation. First, the U.S. decision to withdraw from the ABM Treaty and deploy the NMD system remains controversial. Were these actions really necessary now, or could and should we have waited? While one can in retrospect debate the wisdom and necessity of ABM withdrawal decision or the early NMD deployment, there is really little point is doing so today. For better or worse, the decisions have been made and largely accepted (albeit with a mix of concern and lack of enthusiasm) by our allies. Moreover, ABM withdrawal does not, at least to date, appear to have had the de-stabilizing consequences some had envisioned. Significantly, there is no apparent evidence that the U.S. withdrawal from the ABM Treaty has, at least to date, inspired a new round of missile proliferation—beyond what would have occurred anyway—or undermined other arms control regimes. And, far from undermining U.S.-Russian relations, the withdrawal was in fact coupled with further reductions in the strategic forces of the United States and Russia and may fuel U.S.-Russian cooperation on developing effective missile defense.

The China Proliferation Calculus. Perhaps the key long-term missile proliferation issue to monitor is Chinese missile development—an issue the Administration appropriately does not publicly address but nevertheless appears to be working to defend against. As noted above, the NMD system was not initially designed to address a full-scale Chinese missile attack. However, the U.S. midcourse capability—as it is now projected to come on line under the Bush Administration's FY 2005 Budget—could potentially defend against such a Chinese attack unless and until China significantly increases the size of its arsenal beyond its current force of approximately 20 ICBMs.

Specifically, the Bush Administration's apparent rush to deploy a full set of 40 interceptors quickly (in the next 3 years) coupled with other proposed additions to the midcourse system (upgraded Cobra Dane and Early Warning Radars, two deployable early warning radars, enhanced battle management systems), is early to need for, and not justified by the so-called "rogue state" missile threat. In this regard, the initial planned deployment of approximately twenty interceptors would probably have been ample to cover any realistic rogue state capability for years to come. Even under optimistic assumptions that North Korea can deploy six to ten No-Dong 3 missiles capable of reaching Hawaii and Alaska in the coming years (which is uncer-

tain given its economy and other factors), a U.S. fleet of twenty interceptors would, under pessimistic assumptions, probably be sufficient to handle attacks of up to eight missiles with reasonable confidence (assuming the launching of 2-3 U.S. interceptors for every missile fired). Hence, there appears to be little apparent need for further deployments of Mid-Course interceptors (this would be extreme overkill against North Korean capabilities) unless the full range of potential Chinese capabilities are taken into account. Under various scenarios (e.g., a U.S. "shoot-shoot" strategy for missiles directed against Hawaii and Alaska, and a "shoot-look-shoot" for missiles aimed at CONUS),[20] the second and third phase Mid-Course systems appear adequately sized to meet the anticipated Chinese nuclear missile threat.

In short, when the proposed midcourse plans are viewed in this context, one has some sense (if no direct evidence) that the current U.S. thinking and long-term deployment plans for the midcourse system are in part shaped by the long-term threat posed by China, the only potential U.S. peer competitor on the horizon, and the need to ensure the security of the United States as a way to avoid the decoupling of Taiwan. If true, this marks a potential shift away from nuclear deterrence to missile defense as a prime element of the strategic equation—at least with respect to China. Certainly, Congress should carefully evaluate this prospect in the context of its examination of the proposed 2005 budget's acceleration of the Mid-Course system's deployment and its consequences for non-proliferation and the U.S.-China relationship.

Indeed, China does figure prominently as a potential adversary in the Administration's long-term thinking (as reflected in the Bush QDR, noted above). The Bush QDR states that "[a]lthough the United States will not face a peer competitor in the near future, the potential exists for regional powers to develop sufficient capabilities to threaten stability in regions critical to U.S. interests. In particular, Asia is gradually emerging as a region susceptible to large-scale military competition."[21] Lest there be any doubt what that means, the QDR then goes on to say that in Asia, "[t]he possibility exists that a military competitor with a formidable resource base will emerge in the region."[22] Thus, it is not a leap of faith to surmise that the Bush Administration's focus on long-range missile threats and national missile defense reflects concern over an emerging Chinese ballistic missile capability.[23] There also has been ongoing concern over Chinese proliferation of missile technology by certain Chinese entities and the apparent absence of effective Chinese government regimes to address this problem.[24]

The real question for the future is whether this apparent Administration strategy of deploying sufficient Mid-Course capability to protect against potential Chinese missile capabilities will cause China to accelerate or enhance its missile development program and increase the size and accuracy of its ICBM arsenal on a shorter time-table—which could be potentially de-stabilizing.[25]

In effect, the Bush Administration's strategy appears to make the calculation that China, faced with a fielded U.S. Mid-Course capability (and other defense components as time goes by), will decide it is prohibitively expensive to develop and field the large strategic missile force with effective countermeasures needed to create a credible nuclear deterrent that could hold continental U.S. targets at risk (and, hence, potentially "decouple" the United States from the defense of Taiwan—or resource-rich areas in the South China Sea). Given China's other modernization needs as it transitions to a globalized economy, this judgment may prove correct.

Yet, whether this holds true remains to be seen and uncertainty over the implications of the U.S. Mid-Course deployment will remain for years to come. It is also possible that the prospect of a robust U.S. missile defense could lead China to divert funding to

other break-through capabilities, or areas like cruise missiles, to avoid the prospect of NMD defenses—creating a form of asymmetrical proliferation that would require yet further U.S. spending.

Thus, in this uncertain environment, the United States should consider a range of options, including a deepened dialogue with China on these issues. Just as arms control agreements with the Soviet Union proved to be security enhancing, so can arms control agreements with China. The United States could hold out the prospect of foregoing the second and the third Mid-Course deployments in exchange for: a) verifiable Chinese agreements on limits for its ballistic and cruise missile deployments and development efforts; and b) concrete Chinese actions to curtail missile proliferation. This would be a use of the prospect of robust missile defense to achieve greater security and would obviate the need to bear the cost of the additional interceptors (production of which could, if needed, be ramped up relatively quickly). However, this approach requires an overall strategic framework for U.S.-China relations—encouraging its internal reforms and participation in global institutions and norms—the acceptance of which is not clear today. Do we engage China in the hopes of developing a long-term cooperative partner or vilify it and create the self-fulfilling prophesy of China as a potential adversary?

Deployment In Advance of Comprehensive Testing & Validation. Another set of questions concerns the accelerated pace of development and deployment of the Mid-Course capability—which is much faster than the usual testing and evaluation cycle customarily followed in U.S. defense acquisition programs. Critics of the accelerated schedule view the program timeline as politically rather than technologically driven, and inconsistent with our overall approach to defense development.[26]

On balance, however, especially in light of recent events, it is hard to quarrel with the Bush Administration's decisions to take some testing short-cuts to the traditionally slow, but rigorous U.S. approach to weapons development in order to field at least some, albeit imperfect, long-range missile defense capability today. As discussed above, there is a very real risk that a rogue state (most likely North Korea) will acquire intercontinental ballistic missiles armed with weapons of mass destruction (including nuclear payloads) in the coming years. Moreover, the reality today is that the United States has no defense against this type of foreign missile capability. Thus, the Administration struck an eminently reasonable balance between "our desire for perfection in the missile defenses we deploy and our desire to have as soon as possible a defensive capability where none exists today."[27] As Under Secretary of Defense Aldridge aptly noted, a 90% chance of intercepting such missiles is better than a zero chance.

Subsequently, these limited capabilities can be refined and improved through the MDA's innovative "spiral development" plan as technologies mature. While innovative in the United States, this type of "early to field" approach has long been standard operating procedure for the Israel Defense Forces and has the potential for allowing early fielding and incremental development in response to "real" operational conditions. While there is some merit to criticisms that the NMD system's testing and evaluation has been insufficient or unrealistic,[28] it is hard to see that they offset the rationale for an expedited deployment. First, it should be recognized that the United States has in the past successfully employed accelerated development cycles for strategically vital systems, most notably the Polaris Submarine-Launched Ballistic Missile System (in which missile, launch system, guidance system, and submarine were all developed concurrently to very rigid milestones). Moreover, assertions about the quality and quantity of NMD testing and evaluation may be overdrawn.

According to the MDA's FY 2004-2005 Biennial Budget Submission Overview, in the 2001-2 period, the United States conducted 55 flight tests, including 17 intercept tests and 60 ground tests. Over the next two years (2003-2004), the U.S. plans to conduct an additional 68 flight tests and 58 ground tests. These figures are for system and major subsystem tests only, and do not include many additional tests at the lower subsystem and component level. Hence, when compared to other air and missile defense systems, this level of testing is rather typical. Also, all tests are likely to be at least somewhat artificial and no level of testing would satisfy some critics who maintain a philosophical objection to missile defense. To put matters in some perspective, the U.S. has only conducted *one* end-to-end test of a nuclear-armed ballistic missile in the entire history of the U.S. nuclear deterrent force. Yet, no one questions the effectiveness or reliability of U.S. *offensive* nuclear weapons for their lack of testing under "realistic" conditions.

Finally, one should approach with skepticism arguments against fielding the Mid-Course capability on the ground that would-be proliferators will develop a range of effective penetration aids (PENAIDS) or countermeasures. In effect, these arguments, set forth in the second *National Missile Defense Review* (the so-called "Welch Report")[29] as well as by the Federation of American Scientists,[30] are designed to suggest that the technology for missile defense is not perfected and is too easy to design around. However, neither the Clinton nor Bush Administrations have seen fit to cancel the program on this basis because: (1) the simplest and, therefore, most likely countermeasures are easy to detect and circumvent; and (2) the most difficult countermeasures are also technically, operationally, and financially difficult for potential proliferators to implement.[31]

Resource Allocation Choices: Where the Rubber Hits the Road. With the "cosmic" issues of ABM withdrawal and deployment as yesterday's news, it is perhaps tempting to declare the debate on missile defense over and move on to another "flavor of the day." However, the reality is that there are critical issues of priority and resource allocation that are very important to the future of our missile defense strategy:

- Is U.S. emphasis on long-range missile defense relative to intermediate and short range missile defense needs appropriate given the need for protection of our troops in the battlefield?
- Is our overall allocation of resources to missile defense appropriate in light of the types of capabilities adversaries are likely to develop?

Regrettably, these significant issues are largely being addressed with little public debate or scrutiny. Simply put, the "politics" of missile defense and the advent of a Republican-controlled Congress have sucked all the available oxygen away from this issue and made it difficult to question or seriously debate the Administration's resource choices and priorities. Indeed, the new focus on homeland security reinforces this dilemma. Administration officials now routinely tie budget requests on missile defense to the "vulnerability of our homeland" to "assault from distant regions" involving ballistic missiles with nuclear, biological or chemical weapons that "could inflict damage that far surpasses what we experienced" on September 11.[32] Nevertheless, the important missile defense decisions now being made should be front and center in the political discourse.

The issue of priorities is really about funding choices—the allocation of resources between competing needs—and must be considered from the perspective of a Senior Acquisition Executive (SAE) at the Pentagon, who has the difficult job of allocating scarce resources among a wide range of acquisition programs in order to defend against the range of capabilities that potential adversaries might develop.

How should and do SAEs make these choices? The new U.S. defense strategy, which has gradually emerged in practice over recent years and was finally codified in the Bush Administration's 2001 QDR and 2002 National Military Strategy, focuses on meeting a potential adversary's "capabilities" rather than planning on the basis of threats such as specific regional conflicts that might emerge (i.e., the model of two regional conflicts that has long dominated our planning). The new approach reflects the idea that the United States does not know with confidence what nations will pose "threats" to U.S. interests in the future, but can anticipate the "capabilities that an adversary might use" against the United States or its allies.[33] In practice, this approach means, "developing and sustaining a portfolio of key military capabilities to prevail over current challenges and to hedge against and dissuade future threats."[34]

The dilemma is that even in an era of significantly increased defense budgets, the United States lacks the resources to fully fund *all* defensive capabilities across the continuum against all types of threats that might be envisioned. Moreover, the projected capabilities of potential adversaries vary significantly in likelihood and timing (will they be realized and, if so, how soon) and in potential magnitudes of adverse consequences—thus, making the choices difficult. Also, we need to recognize that the shift from "threat" to "capabilities" also is probably not "black and white" and to some extent is overstated. In focusing on the capabilities that potential adversaries are in the process of trying to acquire, it is hard not to consider the immediacy and likelihood of such acquisition and the consequences if they are acquired.

Thus, this analysis necessarily brings some elements of a "threat" based calculation into the equation. Country A or B or C may be trying to develop some capability but the cost, technology, and potential consequences may suggest it should be low on our priority list. A further complication is the fact that the relationship between resource allocation and capabilities is not linear. Some high-leverage capabilities can be acquired at relatively low cost, while others require greater investment. Determining the exact ratio of resource inputs to capability outputs and matching those to current and projected adversary capabilities requires a highly sophisticated set of analyses.

Therefore, under this new "capabilities" paradigm, hard funding choices must be made. In a sense, the SAEs today are like portfolio managers; they need to balance risks by maintaining a "diversified" portfolio of options and do not have the funding to fully fund all of the options (although there is more funding in this post-September 11 era than in previous years).

Unfortunately, though, the new "capabilities" paradigm does not provide a ready-made analytical framework for weighing the likelihood and magnitude of such projected adversarial capabilities and prioritizing the spending across the range of defensive options.

Making these choices is at this juncture more art than science and involves a series of complex and subjective judgments; there is no objective or transparent formula, and a range of institutional, political and other considerations are inevitably considered.

Indeed, today there is no publicly available information in any level of depth on the methodology by which the Defense Department is making these choices, and a look into the "black box" would undoubtedly not produce pretty results. While we can provide reams of analysis and data to justify estimates of how much we believe it might cost to develop or procure or build a particular system or capability, we have little analytical basis or data that supports our choices between various systems in terms of overall outlay or timing. Thus, over time, we need to make these considerations transparent and develop a better methodology. Today, however, we are essentially left with little in the

way of objective standards and need to simply apply our best judgment to resource allocation decisions.

Overall Missile Defense Spending: A Case of Over-Allocation? When viewed in this context, there is a serious question whether the overall dollars being spent on missile defense is too high relative to the range of other capability-based threats we are likely to face in the years ahead. For example, the Missile Defense Agency received $9.1 billion out of $61.8 billion in RDT&E funding in FY 2004.[35] In effect, this budgetary allocation is tantamount to saying that 14.7% of the capability-based threats we face are missile based. Are we putting too much of our resources into the missile defense "capabilities" basket?

When viewed in light of the wide range of military capabilities of potential adversaries, this overall funding level can be seriously questioned. Certainly, funding of certain other important DoD capabilities seems disproportionately small. For example, the Defense Department only proposed to budget $1.4 billion for FY 2004 for unmanned aerial vehicles, an important emerging capability that can be used for a variety of surveillance and combat purposes against a range of threats. Also, one can take the view that greater spending in areas such as transport aircraft, sealift ships, or even real-time inventory control systems can yield more in terms of force multipliers than the next marginal dollar invested in missile defense. Further, one can question whether we should be spending more on other means of combating missile proliferation and weapons of mass destruction (recognizing that missile defense really is and should be the last line of defense against the ballistic missile threat). For example, our funding of cooperative threat reduction (CTR) programs like Nunn-Lugar, designed to assist Russia and the former Soviet Republics destroy or neutralize their stockpiles of weapons of mass destruction and safeguard nuclear materials, has only been awarded approximately $400-$450 million per annum in recent years. Is U.S. spending on this and other types of precautionary measures too low? Probably so.

While it is tempting to conclude on this basis that missile defense is overfunded, the analysis above—which suggests that missiles are a major asymmetric tool and perhaps a weapon of choice for potential adversaries seeking advantage over a dominant U.S. military capability—indicates we are right to allocate a significant amount of funding in this capability area. The fact that other areas such as CTR may be under funded does not really detract from this reality. In this regard, there are numerous other "capability" areas that deserve cutting to finance other priorities such as CTR well before we curtail our missile defense spending. Thus, while the question is worthy of debate and we should develop a more objective and transparent methodology, it is difficult to quarrel with the overall magnitude of our expenditures on missile defense.

While overall spending on missile defense over recent years probably can be justified, one can seriously question the Bush Administration's recently proposed 2005 increase in missile defense spending of $1.5 billion—a mark up of 16 percent over 2004 appropriations. Significantly, 66% of this increase is intended primarily to accelerate full deployment of the mid-course segment. The funding allows for fielding the initial capability and adding quickly to it, and includes not only accelerated acquisition of interceptors but upgraded early warning radar and additional sea-based radar sensors designed to make the interceptors more effective.

As noted above, it certainly is prudent to field *some* initial capability soon in order to have at least some way of dealing with a rogue state attack even in advance of fuller system testing. However, one should have serious doubts about accelerating deployment of yet

additional, full-scale capability in current circumstances. However, Congress should closely examine this acceleration of the mid-course program and the acquisition of so much capability in the short-term in light of:

- the already large increases in spending over the last five years (when missile defense spending roughly tripled from $3.6 billion in 2000 to $9.1 billion in 2004);
- the "early to need" nature of the accelerated and full deployment as it relates to rogue state threats; and
- the immaturity of the technology.

The Administration seems to tie some of the acceleration to industrial base considerations such as the need to maintain the interceptor production line at a "minimal rate" and support continued evolutionary system improvements.[36] Congress should closely scrutinize these assertions and seek to review the supporting analysis. The questions to consider are what is the real "minimal" sustaining rate needed to maintain design and production teams, and whether it really makes sense to keep a "hot" line in place for years to come. While there are times when sustaining a full production line is justified, and supports both affordability and innovation, there are other times and circumstances when gapping a production line makes more sense. In short, the facts really matter.

An Over-Emphasis on Long-Range Ballistic Missile Defense. One also can seriously question the funding choices the Bush Administration is making between long-range missile defense capabilities and other capabilities—notably, theatre and short-range defense important to troops in the field and defenses against cruise missiles. Under the 2004 budget, the bulk of MDA's total funding—approximately $6.2 billion out of $9.1 billion—is for various aspects of long range missile defense—the small and theoretical likelihood of a long range missile attack on U.S. soil with unconventional payloads, rather than the immediate and pressing threat of theatre and tactical missiles or the potential threat of cruise missiles.[37] While the Bush Administration has sought to eliminate the distinction between missile defenses of varying ranges, the reality is that there are differences—not all technologies are interchangeable—and spending allocations can affect whether and when we fund varying types of capabilities against varying ranges of missiles.

Regrettably, the Bush Administration's restructuring of missile defense into a single integrated system for the FY 2004 budget tends to obscure the actual allocation of resources for long-range vs. short-range systems. The following table attempts to provide some transparency and evaluate overall procurement and R&D funding for missile defense by categorizing program elements by the amount of spending for purely long-range applications, theatre and tactical applications, and "dual-use" applications (e.g., system architecture, BM/C3I, certain sensor systems, and basic technology research).

As the table shows, fiscal year 2004 funding for purely long-range systems accounts for nearly two-thirds (63.5%) of total missile defense funding while purely theater and tactical systems account for less than 22.3%. Another sizable portion of funding (the "common" funding column in Table 1) is for overall system elements applicable to both NMD and TMD. However, in reality the bulk of this funding—possibly as high as two-thirds—is probably for architecture for long-range missile defense, architectures that might not be needed for shorter range missile defenses. Indeed, even if we assume an even division of that category between NMD and TMD, the resource allocation ratio would still be nearly 3-to-1 in favor of long-range systems. This spending disparity is likely to be further exacerbated in 2005 in light of the Administration's proposal to spend an additional $1.5 billion—principally

Table 1: Allocation of Resources in Missile Defense, FY 2004 Appropriations (RDT&E & Procurement)

System Element	Long Range	Short Range	Common	Total
Mid-Course Defense System	$3,613	$0	$0	$3,613
Boost-Phase Intercept	$400	$0	$226	$626
BMD Technology	$100	$40	$100	$240
BMD Sensors	$200	$50	$156	$406
BMD Interceptors	$301	$0	$0	$301
BMD Targets & Testing	$200	$200	$211	$611
BMD Products	$0	$0	$343	$343
System Core	$150	$84	$100	$334
THAADS	$0	$148	$0	$148
PAC-3	$0	$1,270	$0	$1,270
International Programs	$148	$0	$0	$148
Total	**$5,112**	**$1,792**	**$1,136**	**$8,040**
Percentage Allocation	**63.58%**	**22.29%**	**14.13%**	**100.00%**

Source: Missile Defense Agency, *FY 2004 Biennial Budget Request, Program Costs by Weapons System*

on fielding the mid course system. The disparity increases yet more in the out years of the Future Years Defense Plan (FYDP) for 2004-2010 as production of tactical missile defense systems winds down and deployment of Blocks 2006-2010 accelerates.

The Bush Administration's clear emphasis on long-range missile defense spending reflects a number of factors. First, it underscores the immaturity of long-range systems as compared to theater systems, where we have been spending considerably for a longer period of time. Second, the technical challenges involved and desire to field some long-range defensive capability very soon (the mid-course option) drives the spending stream to some extent; this program eats up considerable funding in the next few years. Yet, the predominant factor in the Bush Administration's overall long-term funding emphasis on "long-range" threats reflects is its decision to fund a variety of different and sometimes exotic technologies, with the objective of developing a robust, "layered" defensive shield. The rationale for this degree of emphasis on long-range threats reflects some mix of ideology, post-Cold War nuclear theory hangover, and logic.

Advocates for this funding priority can reasonably point to a number of considerations in its favor. First, the technical challenges in the long-range area make some of the spending disparity inevitable. Second, a layered long-range defense makes sense. It certainly is prudent to fund some research and development in various areas to see what does and does not work and field capabilities as they become available. Finally, it certainly is the case that some of the "exotic" technologies being developed for long-range missile defense, such as the Airborne Laser system, are highly flexible and could be applied against theater ballistic missile threats (and possibly even air-breathing threats like cruise missiles).

However, there are limits to this logic that impact our spending levels and timing. First, even assuming that all of these technologies mature, it would probably not make sense to fully field all of these types of defenses—from directed energy to kinetic kill vehicles. This could amount to strategic overkill and would starve other important funding needs. Second, the potential spill-over benefits from long-range to theater missile and short-range defense miss the point; while much of the

technology is potentially scalable to theater applications (particularly in the critical areas of sensors and BM/C3I), direct funding of these capabilities in existing theater programs undoubtedly would accelerate the rate at which theater-based solutions can be fielded. Finally, the argument that a layered defense could reduce overall systems costs must be greeted with healthy skepticism. It may be the case, for example, that the addition of a "boost phase intercept" layer could reduce the number of re-entry vehicles entering mid-course, which in turn would reduce the number of ground-based interceptors needed to defeat the threat. Yet, it is difficult to believe that the present value of long-term cost savings in the out years offset the enormous R & D outlays in today's dollars. This "spend more today for savings tomorrow" argument—one often heard in the halls of the Pentagon—lacks credibility. Moreover, on our present trajectory, we probably will have 100 interceptors built before we know whether other layers will obviate the need for them.

As discussed above, missiles of varying kinds are shaping up as the "poor man's" option in an era of asymmetric warfare. We are seeing this played out on a daily basis in Iraq where short-range, close attacks using various projectiles are causing serious problems. Simply put, the U.S. appears to be under-invested in the spectrum of capabilities needed against the broad array of missile threats, including cruise missiles and medium- and short-range missiles. The capabilities include not only "missile defense" in the form of missile intercept-based systems but also warning systems, countermeasures, passive defenses, etc.

Thus, given the capabilities of potential adversaries, a dollar invested in this area today probably will yield greater impact in the near-to-mid term in terms of real protection and security. Indeed, at program reviews in the Pentagon, Army representatives regularly seek more funding and more rapid development of these other capabilities. Further, it is important to consider the emerging cruise missile capabilities of potential adversaries. The air defense community generally considers this far more dangerous than the ballistic missile threat and that our defenses are underdeveloped. Flying at low altitude and in ground clutter, cruise missiles are difficult to detect with ground-based radar; when relatively inexpensive, low-observables technology is applied to cruise missiles, they become difficult to detect even with large, airborne radar systems such as AWACS.[38] Moreover, unlike ballistic missiles, which fly a predictable trajectory, cruise missiles can be programmed to follow an elaborate flight path that can evade sensor and air defense coverage. Short detection ranges make interception difficult for most air defense systems lacking an "over-the-horizon" (OTH) capability—which includes all systems currently in service. By comparison with ballistic missile defense, this area too seems seriously under-funded.[39]

Moreover, other short-term missile defense needs are developing. The Iraq war highlights the relative ineffectiveness of U.S. defenses against short range projectile attacks (whether MANPADS, barrage rock-

On balance, when the broad range of adversarial capabilities and U.S. needs are considered, it would appear that too much funding in the next 5-7 years is directed to the theoretical long-range threats rather than the "here and now" theatre and tactical capabilities we need to protect our troops in the field and host populations against ballistic and cruise missile threats—as highlighted by the recent war in Iraq.

ets or other projectiles). The relatively low cost (less than $10,000), ubiquity (many thousands have been produced and sold on the black market), and lack of warning time has made these weapons a very real, effective and growing concern. Can and should the commit its forces to future combat without better protection? Moreover, this threat is likely to grow in the near term as these weapons become increasingly accurate and have improved resistance to countermeasures like jamming. In the aftermath of the recent attack on Israeli flights in Africa, there is growing concern over shoulder-launched, surface-to-air missile attacks against U.S. commercial aircraft. While we have some limited capability in development against such threats (electro-optic warning and infrared countermeasures), it has not yet been perfected for fighter and transport aircraft—especially against very sudden, ground-based attacks shortly after take-off. Thus, we also need more focused R & D efforts by DoD on the short range problem to protect our military forces and potentially our commercial fleet against MANPADs and other projectile threats. Equipping the U.S. commercial air fleet itself would be a very expensive proposition in total with the dollar amount depending on the type and sophistication of the missile threats we protect against. One recent estimate indicates that it will cost about $10 billion to retrofit the 6,800 planes in the U.S. commercial fleet with basic protection.[40] The U.S. Department of Homeland Security (DHS) is taking initial, limited steps—under urging by Congress—to develop protection for U.S. aircraft against short range shoulder-launched missiles. In January 2004, DHS issued three small contracts ($2 million each) to investigate the feasibility of installing counter-measures against MANPADs on commercial airliners. When viewed in context, this initial effort seems significantly under funded, narrow in scope and not terribly open to potential foreign sources of supply. Rather than evaluate existing foreign systems already in place (including various laser based systems in Israel) and capabilities in development,[41] the DHS only issued contracts only to three U.S. bidders—two to U.S. firms that will seek to adapt to commercial use high end, developmental laser based countermeasure systems being designed for fighter jets and transports and the third to explore flares. While these approaches certainly should be explored, they should not be the only ones evaluated. By so limiting the field, DHS has effectively left the taxpayer without at least the benefit of exploring potentially less costly foreign solutions designed against such short range, close in threats. Moreover, some potential foreign participants were apparently told that DHS would not consider flare-based solutions, and yet one of the teams (led by United Airlines) is precisely exploring this type of approach. In short, if the United States is to be serious about achieving "best value" solutions for US forces and the public, it should be willing to open program participation to include consideration of the most potentially effective technologies and solutions—regardless of whether their origin is domestic.

In sum, there is a reasonable basis to conclude that the Bush Administration has too heavily focused our missile defense funding on the long-range (strategic) threat relative to medium-, short-range and cruise missile threats. Thus, the next Administration also should order a complete review of U.S. capabilities and programs related to short- and medium-range missiles and develop an overall, holistic plan that includes traditional missile defense, warning, and countermeasures in order to fill in the clear gaps in our defense capabilities. This review also should focus on utilizing existing capabilities and technologies from abroad. For example, Israel, with its need for cutting edge capability in close proximity warfare, very well may have developed solutions that we should seek to utilize given the priority of the needs. In

the areas of missile countermeasures, Israeli firms have capability that should be carefully examined. Other countries also may have useful technologies. The United States should be more open to considering these foreign solutions to real security needs.

Competitive Industrial Environment. A final issue of concern is the competitive industrial environment for missile defense. Notwithstanding the enormous amount of spending on missile defense, there are real questions whether the programs have been structured so as to ensure a competitive market environment.

As a threshold matter, it is well established that competition in defense markets helps to facilitate innovation, affordability and better program technical and schedule performance. The dilemma is that maintaining a competitive environment often requires carrying more than one supplier through a number of program phases—which means additional up-front costs and less learning curve benefits. Yet, the reality is, and history teaches, that dual sourcing or maintaining two competitors can have long term competitive benefits that offset short-term, up-front development costs associated with the introduction of a second supplier (either in development or production). Moreover, there are other types of approaches to maintaining competition, including open architecture, build-to-print, and other approaches that can be shaped to the circumstances.

When viewed in this context, what is striking about the MDA programs is that, from top to bottom, the competitive opportunities, and prospects of a competitive environment for the future, are very limited. The programs are characterized by major competitions early in the program life that tend to lock in contractors for many years with few, if any, downstream competitive opportunities even in subsystem areas. For example, the radar on the THAAD and NMD programs was selected on a competitive basis in 1992 and the same contractor remains in place today—over a decade later—with no opportunity for competitions in the interim. In a number of the programs, decisions to go sole source have been made at various phases on the basis of determinations that the existing contractors were the only qualified sources, and that other suppliers lacked the experience, facilities, know how and equipment to effectively compete. The ramp up or learning curve process for such other sources would also have required significant expenses and duplication of RDT & E expenditures. This type of environment eliminates the threat of competition and its benefits. In short, a series of demand-side decisions by Pentagon acquisition executives (at both senior and program levels) over recent Administrations and the enormous supplier consolidation of recent years has resulted in a situation where there are no more than three, and sometimes only two, qualified suppliers for critical system components such as the interceptor, radar and IR sensors, BM/C3I systems, boosters, and systems integration. Table 2, below, illustrates just how consolidated the competitive base for missile defense has become, not only in long-range, but in medium- and short-range systems as well.

The Bush Administration has further added to the complicated structure in missile defense markets by establishing a so-called "national team" composed of government laboratories, key contractors and others to work together on overall system architecture. Significantly, under this new approach, some of the very same companies that are members of the "national team" and participate in overall system architecture decisions and trade-offs also participate in the underlying programs as integrators or producers of one or more system components. To address the perception of organizational conflicts of interest posed by this structure, internal corporate firewalls have been put in place to create separation between each firm's national team participation and its participation in system components. Nevertheless,

Table 2. Missile Defense Industrial Participation

Program Name	Prime	BM/C3I	Sensors	Weapon
Ballistic Missile Defense System	Boeing	Lockheed Martin	Raytheon	Boeing
THAADS	Lockheed Martin	Northrop Grumman	Lockheed Martin	Lockheed Martin
PAC-3	Raytheon	Raytheon	Raytheon	Lockheed Martin
Aegis Missile Defense	Lockheed Martin	Lockheed Martin	Lockheed Martin	Raytheon
Airborne Laser	Boeing	Lockheed Martin	Lockheed Martin	Northrop Grumman (TRW)
Space Surveillance & Tracking	Northrop Grumman (TRW)	Not Applicable	Raytheon	Not Applicable

despite the best of intentions, one should have a healthy skepticism that this competitive remedy will be sustainable over the long term and will create an environment conducive to fostering competition and innovation within missile defense markets. Experience teaches that firewalls are generally useful for short periods but over time prove difficult to enforce and, hence, are not generally as useful as long-term solutions for addressing structural competitive issues. Moreover, in this case, it is not clear that any independent monitor or other official is charged with overseeing enforcement of the firewalls.

Finally, at this writing, the prospects for future competitive opportunities appear limited as well. Many program decisions are locked in, and opportunities for competition in areas like radar are extremely limited on existing programs. Yet, the reality is that some of these program areas—for example, missiles used as kill vehicles and radar—are produced in volume and, hence, dual competitors could potentially produce competitive benefits. Recent decisions to develop an alternative kill vehicle suggest at least some prospect of competitive sourcing in this area.

Accordingly, Congress should direct the MDA to do a full-scale competitive assessment of these programs—at a system and subsystem level—and identify discrete areas where competition can be introduced at reasonable cost. Where possible, MDA should consider restructuring its program strategies for the future with competitive benefits in mind and should consider common procurement across programs of key elements where competition can be introduced. MDA should be directed to engage in more robust oversight over its prime contractors and to make sure that all "make-buy decisions" by primes are subject to its review, that all elements are fair and impartial, and that all subsystems are competitively procured, absent compelling reasons to make sale-source selections. Moreover, all proposed teaming agreements should be examined for their competitive consequences. Subcontracting arrangements, like meagerest acquisitions, condone significant market consequences.

The Merits & Prospects of Transatlantic Engagement

The final question is the merits and prospects of deepened Transatlantic engagement on missile defense. On this issue, there are two fundamental points to consider:

- Whether Europe should, in its own interest, want to take action to address the security risks posed by the ballistic missile threat; and
- Whether Europe should view engagement with the United States as the most sensible and cost-effective strategy for creating an overall international "system of systems" architecture and facilitating its ability to operating with coalition partners (the United States and others) in both high-end and low intensity conflicts.

The Threat Viewed From Europe

Significantly, Europe must make its own assessment of the nature and degree of threats it faces in light of both its geo-strategic position and its international commitments. It is time for an open and honest debate in Europe over missile defense. In a sense, Europe has been considering issues of missile defense in a strategic vacuum—a lack of overall framework for considering threats to European interests and potential responses.

Overall, European views on missile defense appear to be evolving from hostile or agnostic toward an emerging recognition of a growing threat, particularly in senior leadership circles and defense communities. Specifically, one has a sense that Europe is coming—perhaps haltingly—to the view that:

- The U.S. withdrawal from the ABM Treaty and decision to deploy the Mid-Course segment did not cause the sky to fall—either in terms of promoting U.S.-European de-coupling or instability in the strategic relationship;
- The technology may exist to achieve effective missile defense; and
- The threat to European interests is growing (i.e., missile attacks are no longer viewed purely as an American nightmare).[42]

Henry Kissinger aptly characterized the situation in his comment that Europeans view missile defense like a trip to the dentist—"something that isn't liked but which has to be done."[43]

At the same time, such emerging European views, which are still nascent and by no means universal, are tempered by other elements of the European perspective. First, there is not a consensus that missile defense is the way to address the threat; some continue seek to rely on "soft power" and frameworks like the draft International Code of Conduct on Missile Proliferation.[44] Second, Europeans wonder how they would ever pay for missile defense believing that doing so would create trade-offs with other priorities that Europeans are not ready to make and that European publics are largely unworried about the threat. When one listens to skeptical voices on missile defense in Europe, one has a sense that these views are rationalizations of the reality that Europe cannot afford missile defense and, hence, won't do anything about it.

Today, the threat is much more widely recognized as is the need to address it. Operational experience in Kuwait and Iraq is eroding technical skepticism, and there are few now who say that missile defense is a pipe dream—at least at the theater level. In addition, many of the old arms control shibboleths against missile defense are being overturned. There is recognition in Europe that the U.S. withdrawal from the ABM Treaty did not cause the sky to fall and, indeed, was followed by yet another round of strategic arms reductions between the United States and Russia. Finally, there is growing recognition that if Europe is to field a serious military capability—whether for low intensity missions envisaged by the EU Headline goals or high intensity missions as part of the planned NATO Response Force, it cannot be entirely dependent upon the United States to defend that force from ballistic missile attack. Force protection requirements would likely require that any European commitment of forces out of area be supported by some missile defense capabilities. Indeed, the NATO Supreme Allied Commander has indicated that he will not field NATO forces, such as the emerging NATO Response Force, without protection against the missile threat.

Of course, Europe does not speak with one voice on the issue and, understandably, there is a continuum of views. The United Kingdom, perhaps the most forward-leaning European ally on missile defense, issued a "Public Discussion Paper" in 2002 which noted that: (a) there was no current threat to the UK from long-range ballistic missiles; (b) there is a future threat from North Korea, Iran, Iraq, Libya and Syria; and (c) that the UK Government has a responsibility to "take stock of the issues involved, and to consider our options for addressing this potential threat, including whether we should play a role in the U.S. programme."[45] Of the other NATO allies, Italy, with its perception of a missile threat from Libya and its participation in the MEADS program, also appears leaning towards acceptance of missile defense. Other states are more ambivalent, and a few, such as France, are downright hostile.[46] In short, there is the potential of an emerging consensus for theater missile defense in Europe. However, the prospects of "getting to yes" on long-range missile defense remains more problematic as numerous countries do not perceive themselves as threatened.

Prospects of Broadened Transatlantic Cooperation

The remaining, and perhaps most significant question, concerns both the prospects and merits of Transatlantic cooperation on missile defense. As Europe develops its strategic thinking on missile defense, what can we do together for mutual benefit and how can we do it?

Enhanced Cooperation Will Build On Existing Efforts. International cooperation on missile defense will not take place on a blank slate. The United States has had ongoing varying types of cooperative efforts with the Germany, Israel, Italy, Japan, Russia and the United Kingdom in this field. To date, such efforts, with several exceptions, have been relatively limited in scope and funding, and focused on the basic science and technology level. Indeed, total projected U.S. funding for international cooperative missile defense efforts is $769 million over the FYDP—or the small sum of approximately $154 million per annum.[47] Moreover, most of the collaborative efforts have focused on theater rather than long-range missile defense. And the track record on these programs has been decidedly mixed, offering some best practices and some lessons learned.

Historically, the Reagan Administration held out the prospect of Transatlantic cooperation on SDI as an inducement for Europeans to support this early form of mis-

sile defense. Yet in the end, there was very little actual cooperation for several basic reasons. First, the U.S. program never achieved the scale and momentum anticipated. Second, there was a real U.S. institutional bias against sharing what was considered the technological "crown jewels" with the Europeans. In these circumstances, it is not surprising that, with few exceptions, Europeans remained cool toward and eventually lost interest in SDI.[48]

In more recent times, most international collaboration has involved TMD programs, in which U.S. allies have invested more than $250 million over the last decade.[49] The most significant Transatlantic cooperative program in missile defense is the MEADS program. Plagued by problems of program funding, technology transfer, mixed support from the Army, and Congressional concerns, MEADS has experienced numerous delays, come close to cancellation several times and is seriously behind schedule. As part of a risk mitigation program, the system will initially be deployed with the PAC-3 missile, making it, in effect, a lighter, more mobile Patriot system. Moreover, the program continues to be at risk and additional problems are likely.

At this writing, the United States has apparently proposed the integration of MEADS into the PAC-3 program, which raises a series of yet-to-be answered questions concerning joint U.S.-European management, technology sharing and the like. In all events, the MEADS program has not been a model for Transatlantic cooperation although it does provide lessons that are useful for the future. Specifically, it is critical to any cooperative engagement that:

- Commitments to multi-year funding be obtained from all governments involved up front; and
- A technology transfer roadmap or plan be agreed to in advance.

The United States also has cooperated with its Allies, especially Japan, in the area of shipboard missile defense. Faced with a ballistic missile threat from North Korea, the Japanese are seriously considering adopting Aegis BMD using their Kongo-class destroyers with upgraded radar and SM-3 missiles. As Aegis proliferates through European navies, Aegis BMD has the potential to become the foundation for European TMD and even long-range systems.

Finally, NATO, through the Council of National Armament Directors (CNAD), is conducting a series of feasibility studies designed to elaborate NATO requirements for missile defense, including a layered theater missile defense system.[50] These efforts are useful in bringing attention to the problem and forging consensus. Already, as affirmed by NATO Defense Ministers at a Ministerial last June, there is an Alliance consensus on "the need to deploy theatre ballistic missiles defenses to protect our deployed forces." Moreover, there is an emerging view at the expert level that NATO should provide the backbone command, control, and intelligence architecture for a layered theater system. Also, there are questions whether NATO should itself acquire NATO-owned and operated TMD interceptors and sensors as a core element of the NATO Response Force in order to facilitate NATO operations in high intensity conflicts. In this regard, one emerging view is that the NATO Response Force will not be effective without such NATO-owned and operated capabilities because: 1) out of area missions will require missile defense as a means of force protection; and 2) NATO cannot rely on indefinite national commitments or ad hoc national pledging of Patriot capabilities—a time consuming prospect—for real-time, rapid entry missions.[51] While these developments are promising, the dilemma is that reaching consensus on such a requirement and moving to a full-fledged program with committed funding will likely take years in the NATO context.

The Bush Administration Initiative for Enhanced International Cooperation. Building on these efforts, the Bush Administration has sought to engage a range of allies in deepened cooperative engagement on missile defense—both government-to-government and industry-to-industry—and last year sent teams to twelve European capitals to develop support for this effort. In effect, the United States has created a new cooperative model for this effort—different than the Joint Strike Fighter "pay-to-play" model and other applicable models. This policy has been fully articulated in National Security Presidential Directive 23 issued on December 16, 2003, which states in clear terms that: 1) U.S. missile defense will focus not only on protecting the United States and its deployed forces, but friends and allies; 2) the Secretaries of Defense and State shall "promote international missile defense cooperation…and shall negotiate appropriate arrangements for this purpose;" and 3) DoD shall structure the missile defense program so as to "encourage industrial participation by friends and allies, consistent with overall U.S. national security."[52]

The basic concept is that, at the government-to-government level, U.S. coalition partners have the opportunity to make different national contributions to an overall missile defense architecture designed to protect the United States, its friend and allies, and deployed forces against the full panoply of missile threats: some nations may provide radar, others optical sensors, and yet others geographic sites for subsystems or interceptors. For example, the United States has requested that the Governments of the United Kingdom and Denmark upgrade their early warning radar (at Flyingdales Moor, UK and Thule, Greenland respectively) and allow the United States to utilize it for missile defense.

As Under Secretary of State John Bolton said in describing this approach, "friends and allies have different motivations in approaching the issue of cooperation—some are interested in the benefits of industrial cooperation and technology transfer; some believe more strongly than others in the missile defense both politically and militarily; others approach this from the perspective of building a close bilateral relationship with the United States."[53] The overarching U.S. goal of this new effort is, as with many cooperative engagements, geo-political in nature—to encourage U.S. allies to "buy in" to the U.S. missile defense policy. However, an additional and important goal is to create a multi-national missile defense architecture with various coalition partners having "plug and play" elements or roles in the architecture depending on national capabilities and needs. In other words, the effort is not only to buy Europe into a system that protects the continental United States but also an overall architecture that protects potential European targets as well.

Similarly, the United States has encouraged industrial cooperation on missile defense. Pursuant to U.S. government urging, Boeing, the prime contractor on the NMD program, has in fact, entered into cooperative agreements with Europe's BAE Systems (UK), EADS (France & Germany) and Alenia Spazio (Italy), among others, with a view toward exploring areas of potential technological cooperation. In encouraging such industrial collaboration, the United States has shrewdly recognized that buying in foreign

The idea is to create an "international" system of systems for missile defense—with nations participating on a voluntary basis and with "plug and play features" that allow nations to participate in different elements of the architecture.

firms to the program could help to facilitate their governments' cooperation as well.[54]

To date, the United States has only had limited initial success to obtaining the "buy in" of U.S. allies. The "ball," so to speak, is largely in Europe's court on the nature and degree of cooperation. The early announcements of cooperation have been largely predictable. In the United Kingdom, where there has been some public and parliamentary debate over the subject of missile defense—certainly more than elsewhere in Europe, the UK government announced in February 2003 that it would accede to the U.S. request for an upgrade to the BMEWS tracking radar at Flyingdale Moor. While the UK government sought to publicly hedge its bets by stating that the Flyingdale decision should be considered on its own merits and in no way committed the UK to participate in the US missile defense program, the UK has in fact taken a series of other steps that suggests a deeper commitment (including amendments to a bilateral MOU to establish technical partnerships and facilitate technology transfer as well as the UK consideration of creating a Missile Defense Technology Center to support its own programs).

Some other countries can be expected to participate as well, although cooperation has been slow in developing, and no other European nations have signed up to bilateral cooperation agreements with the United States on missile defense. Poland asked to join the system by establishing a long-range radar station on its soil and the Czech Republic may follow. The United States has also been in dialogue with Denmark over locating radar sites in Greenland. Italy and Spain also are reasonably likely to participate given the nature of the threats they face. However, some of the uncertainty over international cooperation relates to what the relative roles and responsibilities of other participant nations will be; at present there is not sufficient clarity in this area for potential partners to make serious long-term commitments.

The Merits of Transatlantic Engagement on Missile Defense. A critical question is whether these types of governmental and industrial collaboration on missile defense make sense and will be productive, or will they be a repeat of the unproductive collaboration on SDI of years earlier? Plainly, such cooperation does make sense for the United States, which has held out its hand in partnership on this issue. As noted above, the U.S. interests are largely geopolitical. The United States will build the capability with or without our allies, but would prefer to do it with "buy in" from our allies. Also, the United States has little need for foreign technology or, for that matter, funding. Collaboration will, however, enhance the robustness of the U.S. system; such prospects as upgraded radar and locations for other subsystems are very useful but not required. Moreover, the notion of an international "system of systems" for missile defense—with plug and play components—is an intriguing one. It can help cement geo-political underpinnings of NATO and add to the effectiveness of the system.

Thus, the underlying question is whether such cooperation makes sense for Europe from either a security or industrial standpoint. At first blush, there is every reason for Europe to "say no" to missile defense. First and foremost, the U.S. split with France and other allies over Iraq threatens to undermine Transatlantic collaboration in any armaments area. Also, the Bush Administration acted unilaterally—the withdrawal from the ABM Treaty, among others—to establish its policy in this, as in many other areas.

The Mixed Track Record of Transatlantic Cooperation: The Disconnect Between Armaments Policy and Technology Transfer Policy. Moreover, the track record of transatlantic armaments cooperation is mixed at best, and gives rise to a series of very real concerns about the prospects for engagement on missile defense:

- *The Technology Transfer Conundrum.* First, the overriding reality is that the United States' armaments policy continues to be disconnected from its technology transfer policies. Over a number of Administrations, the U.S. government has agreed to—indeed, promoted and led—the creation of international armaments programs like the JSF with great fanfare and expectations. At the same time, however, the very same Administrations have acquiesced in the imposition of technology transfer restrictions on these programs that have in practice made such collaboration difficult. In the case of JSF, for example, the U.S. government has made a series of restrictive decisions that effectively bar technology release and cooperation on key subsystems of the platform, including avionics and radar, even with close allies like the United Kingdom. These decisions were made under a variety of US government review processes, including national disclosure policy and the review of low and counter low observables. Moreover, the United States imposed over 70 provisos on a long-awaited global project license—the first ever issued—which was intended to make cooperative programs easier. Yet, the combination of exceptions to the license and the scope and cost of compliance burdens imposed by the GPA raise questions whether this "global license" approach has any merit.

To date, the Bush Administration's inter-agency review of address the technology transfer issues associated with missile defense is struggling and is at least 6 months behind schedule. While the Administration announced in December 2002, in National Security President Directive 23, that it would conduct a six-month study of impediments to international cooperation on missile defense and specific issues associated with squaring missile defense cooperation with the MCTR, there has been no action to date. Facilitating cooperation on missile defense in the context of MCTR, which does not distinguish offensive and defensive missiles, poses considerable challenges.[55] Moreover, while the Administration has approved certain technical assistance agreements for industrial cooperation on missile defense on a case-by-case basis, these had come with "killer" provisos that effectively block in-depth cooperation.

In short, this overall state of affairs serves to underscore the serious disconnect between US armaments policy and tech transfer policy and the difficulty involved in overcoming tech transfer hurdles and bureaucracy even where senior Administration support is present. Incredibly, an Administration that has: strongly committed to missile defense as a top priority; announced

Thus, a key threshold issue on missile defense cooperation is whether the Bush Administration, which is now reviewing the issue, is able to facilitate sufficient technology transfer in light of the MCTR rules and other U.S. rules and policies. European governments will undoubtedly seek access to technology as a quid pro quo for missile defense cooperation. Therefore, a U.S. decision to significantly restrict technology transfer due to constraints imposed by the MTCR regime and other US policies would seriously undermine the prospects of cooperation.

missile defense cooperation with allies with great fanfare; and even appointed an emissary to NATO to focus on the issue, nevertheless has not been able to follow through and expeditiously clear our the tech transfer regulatory underbrush on missile defense. *It should be recognized that this disconnect between overall US defense strategy and technology transfer decision-making is non- partisan in nature. It has existed across a number of recent Administrations, and reflects the difficulty involved in ensuring that the bureaucracy effectively translates overall Administration strategy into cooperative armaments realities.*

- *Workshare Strains.* Moreover, stresses in the JSF program—over work share—also may lead some in Europe to question yet additional U.S. collaboration in missile defense. While European partners on JSF were told not to expect industrial benefits on a dollar-by-dollar basis—participation would be on a "best value" basis, the expectations of participation have not been met. European firms find it difficult to compete against U.S. contractors that have years of advance developmental funding in various areas. There is concern throughout the JSF partner countries' on these issues that undoubtedly will spillover into the missile defense cooperative arena. Despite enlightened talk of "best value" buying, "jus retour" is alive and well when governments spend scarce resources on defense.
- *The "Dependence" Factor.* Further, there are questions of "dependence" that have arisen on both sides of the Atlantic. Some in Europe fear that buying into an overall U.S. architecture will leave them militarily dependent on the United States for their defense. The same argument has been made about the JSF program—that European partners will be held hostage to U.S. decisions on a host of issues, from configuration, to sales, to technology sharing. In the United States, there are questions of industrial dependence; it remains to be seen whether the United States would allow foreign firms to have roles that require any U.S. reliance on foreign suppliers. In other words, it may be that "security of supply" considerations could limit the foreign role to less significant aspects of the system.
- *Programmatic Considerations.* Finally, programmatic considerations may make serious industrial collaboration complex. For one thing, the U.S. programs are already well down the road, making it difficult to include foreign firms even with the best of intentions. At best, these firms may have the prospect of being subcontractors on these programs—subject to significant limitations on their roles and technology sharing.

Why Europe Should Engage Anyway: The Case for Cooperation

For a number of reasons—from geopolitics to economics to security, collaborative engagement on missile defense would appear to be sensible for Europe. First, this is one of the few areas where the United States has sought meaningful security collaboration with its allies. In an era of significant Transatlantic tensions over a range of issues—from global warming to Iraq—and gradual de-coupling in armaments due to budgetary and capability gaps, missile defense is an area where the United States and its allies can work together cooperatively—to the benefit of the alliance.

One should not underestimate the geo-political imperatives that could drive future cooperation in missile defense. The war with Iraq created significant rifts in the Alliance, and relations between the United States and several key allies, as well as between European countries within the Alliance, remain distant and uncertain. In particular, U.S.-French relations are perhaps at a post-World War II low point. Inevitably, there will be a move to mend fences and restore trust and confidence. Armaments cooperation has proven to be a good way of achieving those objectives: when US and European officials, military officers, and industries work together to implement a common program objective, links are established that can carry over into other areas of the Transatlantic relationship. Cost sharing may provide a pragmatic rationale for cooperation, but the creation of a stronger Transatlantic bond at the government, military and industrial levels may pay greater dividends in the long run.

In this connection, fears of dependence arising from Transatlantic missile cooperation are misplaced. The more accurate model is one of interdependence. The JSF program is a case in point. The United States is reliant on foreign suppliers to provide specific elements of the platform (i.e., because foreign firms provide particular components for all of the aircraft, U.S. and foreign), and its foreign partners are reliant on the United States as well for delivery of the assembled aircraft and other program elements. Such interdependence is geo-politically useful as it binds the United States and its allies together and essentially requires mutual cooperation.

Second, the reality is that Europe lacks the necessary funding and technology to go it alone in this area and address the range of emerging threats.[56] Given that the United States has invested more than $60 billion over the last 20 years on various missile defense programs, it is clear that Europe collectively would be hard pressed to develop anything remotely similar in capability. Indeed, not sur-

For Europe, the stakes are high. Without US cooperation, it is unlikely that Europe will be able to develop more than the most basic of missile defense systems. And, without effective missile defenses, Europe will be unable to deploy military forces across the spectrum of low- to high-intensity contingencies—unless the United States provides that "enabling" capability, either by deploying its own forces or its own systems in support of European forces.

prisingly, the European defense industry is significantly behind the U.S. industry in capabilities relevant to missile defense; most European capabilities are derivatives of cooperative programs with the United States like MEADS. Thus, if Europe is to have a significant missile defense capability at either the long-range or theatre level, it must do two things. First, Europe has to confront the issue as Europe and decide on an overall strategic approach—what capability is needed and what resources to deploy in this area. Fragmented European efforts will not be sufficient in this arena. Second, Europe needs to engage in cooperative development with the United States and gain access to U.S. transformational research and development.

The evolution of European security strategy suggests Europe will eventually see the need for missile defense. Under the EU Headline Goals, Europe is committed to establishing an expeditionary force for low intensity conflicts. The recent statement by EU High Representative Javier Solana strongly suggests Europe will likely seek to establish more robust, flexibly and rapidly deployable forces for high intensity, out of area missions where circumstances warrant a first line of defense. Significantly, a European expeditionary capability assembled either under the NATO Response Force for high intensity conflicts or under EU Headline goals for Petersburg tasks would be at risk without an indigenous missile defense capability and would be forced to either rely on the United States or forego the mission. Thus, Europe will likely need an active missile defense to protect its personnel.

Moreover, without missile defense capabilities, several European countries are likely to be at risk in the near future as missile threats develop. This could, in turn, constrain European strategic options in a number of scenarios. Thus, ironically, European dependence on U.S. missile defense capabilities—military and industrial—would likely be exacerbated if Europe chooses not to cooperate with the United States rather than through enhanced cooperation.

However, for Europe to obtain serious security and industrial benefits from cooperation on missile defense, there is one fundamental threshold requirement: European governments will need to bring some funding to the table (either separately or together—possibly in the context of procuring NATO owned and operated capabilities). Without such funding, it remains to be seen how Europe can obtain the protection of any missile defense shield against long-range missile defense. It is highly doubtful, in other words, that the United States would pay to provide a missile interceptor station somewhere in Europe that would protect European soil from missile launchers.

Moreover, European funding is important for Europe to reap industrial benefits from the cooperation. Indeed, the United States has encouraged consistent European spending on missile defense and has apparently laid out a multi-tier framework for cooperation (borrowing from the JSF model) that connects European partners' investment plans to potential contracts (although in a less concrete fashion than in JSF). Clearly, it is naïve to think that any significant U.S. RDT & E funding would flow down to European firms for so-called "noble" work on missile defense architecture. The reality is that foreign firms have a very small participation in U.S. RDT & E spending generally (in the range of 0.5 % in 2003). Moreover, the United States has made it clear that there will be no additional funding for these Transatlantic industrial collaborations. Hence, foreign industrial participation will largely depend on the willingness of European governments to contribute funding and/or on the ability of foreign firms to contribute needed, and not otherwise available, technology.

Of course, while the United States has technology leadership in many areas, there may be some "niche" that Europe has to

offer, such as broadband wireless communications and network, and advanced sensors (millimeter wave radar, and electro-optics, as well as space-based sensor systems for early warning and for target tracking). Thus, the U.S. primes may include such European capabilities on a "best value" basis. However, for a variety of reasons, European industrial participation is likely to be very limited in the absence of European governmental funding.

Obviously, funding is particularly difficult in Europe given the current budget situation and under-funding of defense generally. This difficulty is magnified by the fact that Europe, as Europe, has not considered its needs in missile defense or developed a plan to develop capabilities. Thus, for collaboration to be meaningful, Europe needs to engage together on this issue and find the needed funding relative to its needs. Europe acting as Europe, perhaps through the European Union or a smaller group of like-minded countries, is more likely to do this than individual European nations. Thus, the United States should be prepared to enter into a dialogue with the European Union or a smaller group of nations on these issues and should recognize that bilateral cooperation in this area is likely to be significantly limited.

Conclusion

At the end of the day, missile defense is and should be here to stay as a key element of U.S., and in all likelihood, European defense strategy for the twenty-first century. The threats are real and there is an emerging consensus about creating defenses against it. While the "macro" issues of ABM withdrawal and initial fielding of the U.S. midcourse segment are behind us, there are very legitimate issues that warrant debate on both sides of the Atlantic. We now need to focus on making the right choices to provide a better balance of capabilities between various strategic, regional, force protection, and homeland security needs.

Moreover, U.S.-European engagement on missile defense is potentially, but not inevitably, a win-win proposition—binding alliance partners together geo-politically, creating a layered, multi-national plug and play "system of system" architecture, and enhancing our ability to fight wars together. And, an enhanced coalition war fighting capability is likely to have beneficial spill-over effects on the broader Transatlantic relationship; it is axiomatic that countries that fight wars together tend to have congruent interests in a range of areas. But for this to happen, Europe needs to begin to seriously consider its missile defense needs soon and apply resources to the task and the United States needs to resolve the underlying technology transfer issues and questions of roles and responsibilities. Thus, with hard work and good will, multi-national cooperation between the United States and its allies offers "win-win" from the standpoint of strengthening the alliance and our mutual security.

Endnotes

1. An abridged version of this paper appeared in the January 2004 issue of the *International Spectator*, published by the *Instituto Affari Internazionali*, Rome.

2. Free Rockets such as the Soviet-era R-75 Luna (FROG-7) and its U.S. counterpart, the MGR-1 Honest John, resemble short-range ballistic missiles, but are unguided: they must be aimed at their target and follow a ballistic trajectory like an artillery shell.

3. Barrage rockets, also known as multiple-launch rockets, are a form of short-range unguided artillery fired in salvos from a multiple-tube launcher. With ranges of anywhere from 10-100 km, they are relatively inaccurate (unless fitted with a guidance system, which few have), but compensate through the large number of rockets in a single salvo (anywhere from eight to twenty-four). Insurgents in Iraq, copying tactics developed by the Viet Cong in the 1960s, have taken to firing Russian-made 122mm rockets singly from improvised launchers (a piece of stove pipe or a trough will suffice), sometimes using a timer and a 12-volt battery to fire the rocket from an unmanned position. While these have little chance of hitting a high-value military target, their value as a weapon of harassment, terror and demoralization should not be underestimated.

4. There are significant arguments that the United States should adopt more robust steps in these other areas to address both the threat to security posed by weapons of mass destruction and missiles with any payloads. However, these issues are beyond the scope of this essay, which focuses on the relative appropriateness of our missile defense policies and programs as one element of an overall US strategy.

5. Because the Clinton Administration chose to defer the decision to deploy National Missile Defense in favor of the incoming administration, the FY 2000 Defense Budget Request did not include any money for actual production or deployment of the midcourse system. According to testimony by then USD (AT&L) Jacques Gansler, the Department of Defense at the time projected a deployment date of 2005 with "high but manageable risk," said deployment covering only the first increment of interceptor missiles. See *BMDO RDT&E Budget Item Justification (R-2 Exhibit), PE 0603871C NMD—DEM/VAL* (February 1999) and Jacques Gansler, "FY 2000 Budget for Ballistic Missile Defense," *Testimony Before the House Armed Services Subcommittees on Research & Development and Procurement*, 25 February 1999.

6. See, e.g., Shirley Williams, "Missile Defense Will Split NATO," *NPQ*, Vol.17 No.3, Summer 2000. Ms Williams is the UK Liberal Democrat spokesman on foreign affairs. See also James M. Markham, "Star Wars Gives European Officials a Splitting Headache; The Technology is Irresistible but the Strategic Rationale Could Take a Lot of Hard Selling, *New York Times*, 7 April 1985, Sec.4 , p.3 ; Thomas Valasek, "Europe's Role in National Missile Defense," *Center for Defense Information Issuebrief* Ch.8

7. Ballistic Missile Defense Agency, *President's FY 2001 Budget Request* (Press Release), February 2000.

8. See, for example, Fred Kaplan, "Build It and It Will Work: The Bush Administration's Missile Defense Fantasy," *Slate*, 22 May 2003

9. See Howard Dean for America Website, paper on "Homeland Security, at p. 4.

10. Director of Central Intelligence, "Foreign Missile Developments and the Ballistic Missile Threat Through 2015," *Unclassified Summary of a National Intelligence Estimate*, at 5.

11. Id. at 5.

12. Id. at 8-9.

13. *Quadrennial Defense Review* (2001), at 6-7.

14. See L. Cruz, "Rumsfeld: Cruise Missiles Post Growing Threat to U.S.," El Paso Times (Dec. 11, 2003).

15. Application of GPS guidance upgrades to a Styx or Silkworm-class cruise missile would provide reduce its circular error probability (CEP) from several hundred meters to less than ten meters over a range of 100-200 km, allowing the missiles to be used against point targets such as buildings, rather than against area targets like cities.

16. Because of their high terminal velocities, ballistic missiles must release chemical and biological payloads within a very narrow window—neither too high to allow excessive dispersal of the agents, nor too low to allow them to disperse over a wide area; because of warhead heating during reentry, the payload must also be thermally insulated, which results in reduced warhead capacity. In comparison, cruise missiles can be programmed to fly at the optimal release altitude and speed, and to make repeated passes over the target area to ensure saturation. Generally powered by air-breathing engines, cruise missiles also carry a much larger payload relative to overall weight than do ballistic missiles.

17. See "Testimony of US Secretary of Defense Donald H. Rumsfeld Before the Senate Armed Services Committee on Ratification of the Moscow Treaty," 25 July 2002; see also *National Security Strategy of the United States*, Office of the President of the United States (Washington, DC), September 2002, pp. 13-17.

18. Id. at 6.

19. "Technology and Future Warfare," The Honorable Jacques S. Gansler, Under Secretary of Defense for Acquisition, Technology and Logistics, International Institute for Strategic Studies, 40th Annual Conference, Oxford, United Kingdom (September 3 1998).

20. In a "shoot-shoot" strategy, two or more interceptors are launched in a salvo against each target in order to raise the cumulative kill probability. Inherently wasteful, this strategy is adopted when the engagement timeline does not allow for post-intercept kill assessment. When sufficient time is available, a "shoot-look-shoot" strategy is preferred: a single interceptor is launched at each target, the effects of the intercept are assessed, and a second missile launched against the surviving targets. Under certain conditions, a "shoot-look-shoot-shoot strategy may be adopted to ensure a very high cumulative kill probability.

21. *Quadrennial Defense Review Report*, U.S. Department of Defense (September 30, 2001)., at 4.

22. Id. at 4.

23. See Charles D. Ferguson, "Bait and Switch: Is Anti-North Korea Missile Defense Designed for China?, *Journal of the Federation of American Scientists*, Vol.52 No.6, Nov-Dec 1999

24. See Wire Story, "US official criticizes China on missile proliferation," at www.spacewar.com (July 25, 2003) (quoting testimony of Paula DeSutter, Assistant Secretary of State for verification and compliance before US-China Economic and Security Review Commission) ("We continue to see problems in the proliferant behavior of certain Chinese entities and remain deeply concerned about the Chinese government's often narrow interpretation of nonproliferation commitments and lack of enforcement of nonproliferation regulations.")

25. Chinese missile development is dynamic, and changes in funding and other factors can affect the pace that improved capabilities are fielded. At present, China has about 20 DF-5 (NATO Designation CSS-4) liquid-fuel ballistic missiles designed in the 1970s with 1960s Soviet technology and not deployed until the 1980s. A new missile, the DF-31 (NATO Designation CSS-X-9) is scheduled for deployment in 2003. A solid-fuel, 3-stage missile with a range of 8000 km, the DF-31 is armed with a single 1 megaton reentry vehicle, and is substantially more accurate than the DF-5; a submarine-launched derivative (JL-2) is also in development. Unlike the silo-based DF-5, the DF-31 is road-mobile on a transporter-erector-launcher (TEL) trailer, which makes it much more difficult to detect and preemptively target. A longer-ranged development, designated DF-41, is in development and could be fielded by 2010. The combination of road mobility, longer range and greater accuracy, makes the DF-41 a potential threat to targets in Hawaii and the West Coast of the United States.

26. See Pike, "Rushing to Failure, op.cit.

27. See Kadish April 2003 Testimony, at 7.

28. For expert views that NMD system and component tests to date have been conducted under "sterile" conditions, and, hence, do not assure that the NMD system would actually work under operational conditions, see, e.g., Philip E. Coyle, Senior Advisor, Center for Defense Information, "Missile Defense Testing," *Testimony Before the House Government Reform Committee, National Security, Veterans Affairs and International Affairs Subcommittee*, 11 June 2002

29. Panel on Reducing Risk in BMD Flight Test Programs, "National Missile Defense Review," US Missile Defense Agency, November 1999

30. John Pike, "National Missile Defense: Rushing to Failure," *Journal of the Federation of American Scientists*, Vol.52, No.6, Nov-Dec. 1999

31. The simplest countermeasures include inflatable RV decoys, chaff (radar-reflective metallic strips) and active can be discriminated from real RV targets by a variety of technical means. See entry "PENAIDS" in Edward N. Luttwak and Stuart Koehl, *Dictionary of Modern War*, HarperCollins (New York) 1990, p.454.

    Moreover, inclusion of PENAIDS on ballistic missiles requires the offload of other payloads, which may not be practical for adversaries whose missile inventory is limited in the first place. Past studies indicate that the most effective countermeasure against this kind of midcourse intercept defense is a "depressed trajectory" flightpath; i.e., instead of flying a "minimum energy" parabola that yields the greatest range, the missile flies in a lower trajectory that reduces time of flight and increases the difficulty of interception. That, however, severely reduces the range of the missile, which again, may not be practical for range-constrained systems under development in North Korea and China.

32. See Submitted Testimony of Lieutenant General Ronald T. Kadish, Director, Missile Defense Agency, Fiscal Year 2003 Budget, Defense Subcommittee of Senate Appropriations Committee, 17 December 2002

33. QDR, at 14.

34. Id. At 15.

35. Office of the Comptroller, US Department of Defense, RDT&E Budget (R-1), *Biennial Budget Request, FY 2004-2005*

36. See "Fiscal Year (FY) 2005 Budget Estimates Overview," Missile Defense Agency website, at 6.

37. Includes $5.1 billion in program elements exclusively for long-range missile defense, and $1.1 billion in program elements common to both long- and short-range missile defense. See Table 1 for details.

38. Simple application of radar absorbent materials, together with reshaping of the missile nosecone and engine air intakes can reduce the radar cross section of a typical cruise missile by as much as 20 dB—making it practically invisible to conventional radar from a frontal aspect.

39. While cruise missile defense capability is being built into the PAC-3 and MEADS systems, as well as Navy "point defense" systems like the Rolling Airframe Missile (RAM) and NATO Enhanced Sea Sparrow Missile (ESSM), all anti-cruise missile efforts are hindered by the lack of an "over the horizon" targeting sensor. Hence the cornerstone of MDA's anti-cruise missile effort is the Joint Land Attack Cruise Missile Defense Elevated Sensor System (JLENS), a large, tethered aerostat equipped with a powerful air search and engagement radar. JLENS is funded at an annual level of about $29 million per year, and will not be deployed prior to 2007. The much larger and more ambitious Air Force High Altitude Airship (HAA) is just entering the concept definition phase.

40. See "Lawmakers" US To Fit Planes With Missile-Defense Systems," *Dow Jones Newswires* (May 15, 2003).

41. For example, Rafael has developed a directed infrared countermeasures (DIRCM) system called Britening, that combines passive missile

warning detectors with a JAM-AIR laser that blinds the infrared seeker of the incoming missile, all controlled by a self-activating System Processing Unit. Elbit offers a similar laser-based system called MUSIC, while Elta and IAI offer flare-and-decoy dispenser system called Flightguard, which has been installed on more than 150 aircraft worldwide, including several large Boeing VIP aircraft and German C-130 transports. Israeli systems are said to be characterized by very rapid reaction times, which are essential for defending aircraft during the extremely vulnerable takeoff and landing phases of flight.

42. For an overview of evolving European attitudes, see "Antimissile Defense: the implications for European industry," *Assembly of Western European Union*, *Interim European Security and Defense Assembly," 47th Session* (5 December 2001) (Document A/1759); "General Report on Missile Defense and Other Challenges to Alliance Unity," *NATO Parliamentary Assembly*, *International Secretariat* (Oct. 2001): Pierre, Andrew J., "Europe and Missile Defense: Tactical Considerations and Fundamental Concerns," *Arms Control Today* (May 2001)

43. Quoted in Gregory Piatt, "US Must Build Missile Defense System, Rumsfeld Tells Conference," *Stars & Stripes*, February 4, 2001.

44. Under the draft code created in February 2001 at a meeting in Paris attended by over 78 countries, signatories would pledge to give yearly descriptions of their ballistic missiles and alert others of impending missile tests. Of countries with significant missile programs, only Iraq and North Korea did not participate. A second round of negotiations was scheduled for 2002, but apparently never occurred.

45. This cautious approach is a continuation of the UK's traditional approach to the issue, which has included: a 1985 *Memorandum of Understanding on Cooperative Research for the Strategic Defense Initiative*, which has resulted in a very close relationship between UK and U.S. R&D facilities dealing with basic missile defense technologies; the 1998 Technology Readiness and Risk Assessment Program, a three-year study on the protection of UK forces (resulting in the threat assessment incorporated into the 2002 *Public Discussion Paper*); and participation in NATO feasibility studies. Overall, then, UK missile defense efforts have been, until the present, focused more on research and technology rather than on systems development (such as the joint German-Italian-US MEADS program). Overall, the MoD's missile defense budget is only about $6 million per year.

46. France's opposition is entirely logical given its small strategic and tactical nuclear force, which would be seriously devalued if missile defenses were widely deployed.

47. Most of that funding will go to the joint US-German-Italian MEADS program, which will transition to engineering manufacturing development (EMD) beginning in FY 2004.

48. See "SDI Gives Europe a Splitting Headache," op. Cit., and Stuart L. Koehl, "The Strategic Defense Initiative and Its Potential for European Industry," *Journal of Social*, *Political and Economic Studies*, Vol.10, No. 4 Winter 1985. and Gianni Agnelli, "Consequences for European Economic Development," *The European Defense Initiative: Some Implications and Consequences*, High Frontier Europa (Rotterdam) 1985.

49. Two other TMD programs are being developed in cooperation with Israel: the *Chetz*, or Arrow Missile Defense System; and the Tactical High Energy Laser (THEL). The former is similar to THAADS, but is a larger, fixed-site system with greater area coverage, intended to defend the densely populated coastal plain of Israel against missiles from Iran, Iraq, and Syria. THEL is a high-energy laser designed to intercept very short range missiles and artillery rockets such as are used by Hezbollah to bombard northern Israel. The Arrow has had a much smoother development path, possibly because it was a bi-lateral program, and because Israel took the lead in the design of many of the critical components. As THAADS encountered problems, *Chetz* was several times put forward as an alternative solution to the Army requirement, and there has in fact been some "reverse technology transfer" from Chetz into THAADS. THEL has had similar success for similar reasons: close collaboration between the U.S. and Israeli participants and a two-way path of technology transfer.

50. A US-chaired Theater Missile Defense Project Group (TMD-PG) is examining a plan for a layered theater missile defense system through analysis of various defense concepts by NATO industries to define a system architecture. Another NATO Missile Defense Feasibility Study was initiated at the Prague Summit.

51. See Remarks by Robert G. Bell, NATO Assistant Secretary General for Defense Investment, Conference Co-Sponsored by Institute for Defense Analysis & *Forum du Futur* (Paris, France, April 2003) http://www.nato.int/docu/speech/2003/s030403d.htm)

52. The full text of NSPD-23 can be found on http:/www.fas.org/irp/offdocs/nspd/nspd-23.htm. It was not released by the White House in its complete form although a shorter fact sheet has been released.

53. Under Secretary of State John Bolton, "Missile Defense in a New Strategic Environment; Policy, Architecture, and International Industrial Cooperation after the ABM Treaty," *Fourth RUSI Missile Defense Conference*, London, United Kingdom (Nov. 18, 2002).

54. See Graham, Bradley, "U.S. Controls Hamper Foreign Role in Missile Defense," The Washington Post, Oct. 19, 2003, at A27 (noting comments of U.S. special representative to NATO Evan Galbraith that he outlined to Secretary Rumsfeld, shortly before he took office, the idea that if foreign firms could participate in missile defense "then we could have them lobby their governments to have the right to participate." Rumsfeld "thought that was a good plan," Galbraith said.)

55. See Graham, Bradley, "U.S. Controls Hamper Foreign Role in Missile Defense," The Washington Post, Oct. 19, 2003, at A27.

56. For a useful discussion of spending constraints and implications for European spending on missile defense, see Tomas Valasek, "The Economics of European Missile Defense," *Weekly Defense Monitor*, Center for Defense Information (June 7, 2001), at 1.

About The Authors

Jeffrey P. Bialos currently serves as Executive Director of the Transatlantic Security and Industry Program at the Johns Hopkins University's Paul H. Nitze School of Advanced International Studies Center for Transatlantic Relations and a partner in the law firm of Sutherland, Asbill & Brennan. Mr. Bialos previously served in a number of senior positions in the Clinton Administration, including most recently as Deputy Under Secretary of Defense for Industrial Affairs.

Stuart L. Koehl is a defense analyst serving as a Fellow at the Center and focuses his research activities on Transatlantic security and industrial issues. He has worked on a variety of air and missile defense programs and written a several of articles on European participation in missile defense.