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Supporting Policymakers

Intelligence and US Missile Defense Planning

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Providing intelligence support to the US Government's complex endeavor to field an effective ballistic missile defense system is a daunting task. The acquisition of such a system is a major undertaking of the Department of Defense with expenditures on the order of $4 billion per year.[1] The cost of deploying the limited national missile defense system currently under consideration has been estimated at $26 billion by DoD and $30 billion by the Congressional Budget Office.[2] Moreover, missile defense has become a major domestic political issue, capable of stirring the emotions of politicians and voters alike. It is also a diplomatic issue, involving both constraints imposed by the Anti-Ballistic Missile Treaty (ABM) of 1972 and opportunities for expanded collaboration with friendly nations.

Beginnings of Missile Defense

The modern missile age began on 8 September 1944 when the first one-ton warhead of a German V-2 ballistic missile exploded in London.[3] Within a short time, the British devised a scheme for downing V-2s by concentrating antiaircraft artillery fire in a segment of the sky through which the missiles would be passing. British leaders abandoned the scheme, however, when they realized that duds in their barrage would fall back on London and cause more damage than a V-2.

Washington's postwar studies of Germany's missile efforts uncovered plans for a long-range missile capable of striking targets as far away as New York city. As a result of this and other information, within a year of the war's end, the US Army Air Forces (predecessor of today's Air Force) had commissioned two technical studies to examine the feasibility of an antimissile system that could destroy incoming missiles at altitudes up to about 100 miles and ranges out to 500 miles. Meanwhile, the US Army had initiated its Nike antiaircraft missile program, which led to America's first antiballistic missile interceptor, the Nike-Zeus. In 1958, the Defense Department consolidated the Air Force and Army programs, giving the Army primary responsibility for developing missile defenses for the United States.

During this period, the Soviet Union was also hard at work on missile defenses. By 1959, Moscow had completed the preliminary design of its first system. In March 1961, the Soviets carried out a test in which an interceptor destroyed an ICBM. The first American success came over a year later with an intercept of an ICBM warhead by the Nike-Zeus in July 1962. The US system evolved over the next few years into a two-layered system called Nike-X, which comprised the Nike-Zeus (renamed Spartan); a shorter-range, high-acceleration companion missile named Sprint; and a phased-array radar. Both the US and the Soviet systems relied on nuclear warheads to accomplish the kill of enemy reentry vehicles.

In 1967, President Lyndon Johnson attempted to interest the Soviets in an arms control treaty that

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would constrain the deployment of missile defenses, but the effort was unsuccessful. His administration then decided to deploy a limited version of Nike-X, called Sentinel, which would be capable of defeating an ICBM attack from a country with relatively unsophisticated missile technology, such as China.

When Richard Nixon entered office in 1969, he modified the Sentinel program so that it would protect America's ICBM fields against a Soviet attack and the rest of the continental United States against attack by a weaker foe. This new program, named Safeguard, passed the Senate by a narrow margin in the summer of 1969. Deployment preparations began at Grand Forks, North Dakota, shortly thereafter.

Like Johnson, Nixon pursued arms control agreements with the Soviets. His administration embarked on the Strategic Arms Limitation Treaty negotiations, one outcome of which was the 1972 ABM Treaty, which restricted both countries' deployment of missile defense systems. The original treaty allowed two fields of no more than 100 interceptors each, one protecting an ICBM field and the other the national command authority. In 1974, a Treaty protocol reduced the two allowed ABM fields to one.

As a result of technical shortcomings, Congress shut down the Safeguard system in early 1976, a scant few months after it had become operational. The problems that precipitated the program's demise included the vulnerability of the central phased-array radar to nuclear attack and the degradation in radar performance that would result from defensive US nuclear detonations. The Soviets, on the other hand, continued with their system. Today, Russia has the world's only deployed ABM system, although knowledgeable observers believe it suffers from the same limitations as Safeguard.

Setting the Stage for SDI

The United States did not give up on missile defense in 1976, but refocused its research on non-nuclear means to disable enemy reentry vehicles. The principal concepts pursued by the Army and the Defense Advanced Research Projects Agency (DARPA) were kinetic kill--achieving a physical collision between the interceptor and target warheads--and directed energy--sending beams of light (laser radiation) or particles at or near the speed of light to disable a target booster or reentry vehicle. While this R&D was proceeding through the 1970s and into the 1980s, the Soviet Union was fast at work upgrading its ICBM force, improving accuracy and installing multiple independently targetable reentry vehicles (MIRVs) on each of its huge SS-18 boosters. Washington concluded that Moscow's upgrades increased the vulnerability of US ICBM's to a Soviet first strike, thereby reducing America's retaliatory and thus deterrent capability.

When Ronald Reagan assumed the presidency in 1981, he embraced the view of a number of prominent Americans--among them Senator Malcolm Wallop, Dr. Edward Teller, and Admiral James Watkins, Chairman of the Joint Chiefs of Staff--who favored missile defense as a response to the Soviet buildup. On 23 March 1983, underscoring that it would be "better to save lives than to avenge them," the President announced the establishment of a formal program to investigate the feasibility of missile defenses for the nation.[4] Formally called the Strategic Defense Initiative (SDI), this new program quickly was dubbed "Star Wars" by the media. It was administered by an organization called the Strategic Defense Initiative Organization (SDIO), headed by USAF Lt. Gen. James A. Abrahamson, formerly program manager of NASA's space shuttle program. Abrahamson reported directly to Secretary of Defense Caspar Weinberger. SDIO's initial steps included assuming control of the missile defense research and development programs underway in DARPA; the Army, Navy and Air Force; and the Defense Nuclear Agency. These programs focused on hit-to-kill interceptor development, target signature observations from space, and directed energy systems, mainly high-powered lasers. Funding averaged about $3 billion per year in the mid-1980s.

SDI prompted intense debate over whether it conformed to provisions of the 1972 ABM Treaty.

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Nevertheless, by 1987, SDIO had developed a Phase I architecture consisting of three sensor systems (ground-based, boost-phase, and space-based), two interceptor elements (exoatmospheric reentry vehicle interceptor system and space-based interceptor), and a command and control element (battle management, command, control and communications, or BMC3). It was a multilayered system designed to defeat a major fraction of Soviet ICBMs launched against US cities or the ICBM fields that constituted the core of the US deterrent. Secretary Weinberger gave permission for this architecture to go into the concept exploration and definition phase of acquisition in September 1987. Two years later, the notional architecture was modified to reduce system vulnerability to enemy attack. Constellations of small interceptors and detection and tracking satellites--"Brilliant Pebbles" and "Brilliant Eyes"--were substituted for the original relatively small number of large satellites.

Post-Cold War Shift

The Cold War ended in 1991. Proponents of missile defense attributed the collapse of the Soviet Union to SDI, saying that Gorbachev knew that Moscow did not have the resources to compete with the United States in the missile defense arena. The threat of a massive Soviet ballistic missile attack against the United States virtually evaporated. At the same time, however, according to a thorough review of America's security needs initiated by President George H. W. Bush after he took office in 1989, the likelihood of accidental or unauthorized missile launches against the United States and the probability of missiles being used in regional conflicts involving US forces were increasing,

The first operational engagement between offensive and defensive missiles occurred during the Persian Gulf War. When Iraq began launching modified SCUD missiles against Israel and Saudi Arabia in 1991, the United States modified its Patriot system, originally designed for air defense, to attempt to intercept the SCUDs. The results were mixed, but promising. As a consequence, President Bush endorsed a redirection of SDI to an architecture known as Global Protection Against Limited Strikes, or GPALS, comprising theater missile defenses, national missile defenses, and an overarching space-based surveillance system.

Congress took an active role in missile defense issues in the early 1990s. The Missile Defense Act of 1991 directed the Secretary of Defense to pursue a limited national missile defense (NMD) system aggressively, compliant with the ABM Treaty, for deployment by 1996 or as soon afterward as technically feasible. It also called for the development of advanced theater missile defense systems by the mid-1990s. Congress amended the act in 1992 to focus more attention on theater defenses. In the FY1993 authorization bill, Congress eliminated the requirement for fielding NMD by 1996 and placed greater emphasis on compliance with the ABM Treaty. It also removed the timetable for deploying advanced theater defenses, but directed the Pentagon to establish a Theater Missile Defense Initiative.

The Clinton administration embraced the trend toward theater missile defenses (TMD) and de-emphasized NMD. In May 1993, SDIO was renamed the Ballistic Missile Defense Organization (BMDO), ending the SDI and GPALS eras. Secretary of Defense Les Aspin's bottom-up review of defense needs resulted in a sharp reduction in spending for missile defense from $39 billion for the period FY1994 through FY1998 to $18 billion for the same period, less than half. Of the $18 billion, $12 billion was earmarked for fielding effective TMD in the shortest possible time, $3 billion went for research to support a speedy deployment of NMD should a serious threat to the US homeland suddenly emerge (called a "technology readiness" program), and the remainder was to be spent for technology development.

After the Republicans assumed control of the House and Senate in early 1995, Congress undertook a major reassessment of the ballistic missile defense program. As a result, Congress upgraded the NMD program from "technology readiness" to "deployment readiness" status. A Joint Program Office for NMD was established, reporting directly to the head of BMDO. This program was structured to offer the president, after three additional years of development, the option of ordering

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the deployment of a limited NMD system that would be ready for use three years later.

In September 1999, the Intelligence Community (IC), prodded by a nine-member bipartisan commission headed by former (and current) Secretary of Defense Donald Rumsfeld, published a report that concluded that the ballistic missile threat to the US was greater than previously assessed; that even rogue nations like Iran could develop, in as little as five years, long-range missiles capable of reaching the US; and that the US might have little or no warning that such a threat had developed.[5] In June 2000, the administration announced that President Clinton would make an NMD deployment determination within six months. However, test failures and delays, as well as Russian resistance to modifying the ABM Treaty, caused the president in early September to postpone his decision, leaving the issue for the follow-on administration to deal with.

Identifying Threats

Intelligence analysts and collectors have multiple responsibilities for supporting the complex NMD decisionmaking process. The IC's contributions range from helping to determine the magnitude and timing of the threat--identifying probable enemies and providing the technical specifications for their ballistic missile systems--to assessing probable international reactions to US plans.

Beginning in 1995, the National Intelligence Council (NIC) issued a series of reports addressing current and future ballistic missile threats to the United States. The IC's report in September 1999 identified which countries were most likely to present ballistic missile threats to the United States over the next 15 years, absent significant political or economic changes in the threat countries or the world at large. Based on the limited data available and the judgment of engineers, the report concluded that the *most likely* ICBM threats would come from Russia, China, and North Korea, but that Iran would *probably* become a threat and Iraq could *possibly* become a threat within the time period. The latter three countries' missiles were likely to be fewer in number, limited to smaller payloads, and less reliable and accurate.[6] Nonetheless, in terms of technical development, the estimate projected that during the 2001-2005 period, North Korea, Iran, and Iraq could test ICBMs of varying capabilities--some capable of delivering several-hundred kilogram payloads to the United States.[7]

Intelligence estimates on major issues that involve strategic danger to the United States or its armed forces demand an all-source intelligence collection approach. Each member of the IC contributes what it can and all inputs are considered simultaneously in drawing the final conclusions. Satellites listen for telltale signals that suggest a test may be forthcoming and look for activities at test ranges. Agents seek documents giving project details and schedules and report on any shortages of materials or engineering design flaws that could delay missile programs. Collectors scan scientific treatises and monitor foreign country media for clues. If a test appears imminent, a US or allied aircraft or ship might move into position to collect technical data with radars and optical instruments.[8]

Collection, however, cannot answer all the questions. US missile experts need to interpret the data. They help to answer questions about whether an enemy "could" attack the United States, leaving the "will" or "would" questions to the judgment of the political analysts. Timing is critical. Fast action by policymakers can get ahead of the intelligence curve and render predictions inaccurate. According to *The New York Times*, for example, assessments of the pace of North Korea's missile development stimulated US diplomats to hold discussions with the North Koreans in early 2000, which apparently led them to slow down their efforts.[9] The constantly shifting nuances of official US policy on missile defense also present challenges to the IC's effort to ensure that its contributions remain relevant.

Providing Technical Specifications

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In addition to evaluating the threat environment, intelligence has a major role to play in identifying the detailed characteristics of enemy missile systems that will determine the design of US defenses. If these characteristics--such as the radar cross section or infrared signature of the reentry vehicle--are unknown or incorrect, the ABM system is likely to fail. Similarly, US system designers need to be alerted to any countermeasures, such as decoys or antisimulation (making reentry vehicles and decoys all look different), that an enemy missile system might employ to defeat these defenses. Accuracy is especially critical when the defensive system relies on hit-to-kill interception to disable the enemy payloads and decoys alike, as opposed to a "kill-everything" nuclear detonation.

Critical data on foreign missile systems are often unavailable, magnifying the challenges faced by the Intelligence Community. An enemy may have stringent information security measures, preventing US access to its missile program secrets. The country may not have decided which countermeasures to employ, preferring to learn more about the US system first. Or, due to competing priorities, our government might choose not to dedicate the necessary resources to this single intelligence problem to ensure a higher probability of collecting the needed data. And some data may remain uncollectable in any event.

When intelligence assessments are made based on incomplete data, the process may benefit from a "red team" approach--that is, employing one or more groups of US or Allied scientists and engineers to play the role of the enemy countermeasures designers, charging them to come up with various means they believe would defeat the US system. SDIO and BMDO sponsored such an undertaking.[10] The director of this program reported to the Director of Threat and Countermeasures, a position occupied by the author for eleven years, who reported in turn to the Director of SDIO/BMDO. This ensured a measure of independence from the program managers who might be inclined to shape the countermeasures work to preserve the promise of their systems.

In the early 1990s, with the aim of strengthening objectivity, Congress considered transferring countermeasures research from SDIO/BMDO to the Department of Energy, whose national laboratories, principally those at Los Alamos and Livermore, would perform the red team work. A review of the program by the Defense Science Board resulted in constructive recommendations, but the program was kept with its parent organization.[11]

Given that countermeasures analysis focuses on foreign activities directed against a US weapons system, a red team approach might conceivably be handled by the Intelligence Community; however, resource shortfalls, shifting priorities, and lack of proximity to data handicap potential IC leadership. The Community is not well resourced to take on major programs of a unique nature that benefit a single customer, unless, of course, it is the President or the National Security Advisor. During the early-to-mid 1990's, for example, lack of funding for measurement and signatures intelligence programs (MASINT) necessitated that SDIO/BMDO assume funding responsibility for one collector, then discontinue that support in order to take over responsibility for another, lest the latter cease critical operations supporting both the missile defense and intelligence communities. Other types of resources tend to be in short supply as well, namely engineers and scientists knowledgeable about ballistic missile systems and subsystems. The matter of priority also plays a role, with the defense customer's requirement for information at fixed points in his design schedule competing with unexpected crash projects for national policymakers that necessitate the redirection of key personnel. In addition, to understand the nature of the systems to be "defeated," red team members must keep up with the nature and progress of the US ABM program. One cannot do this remotely; it requires at least a part-time onsite presence, which the IC finds difficult to achieve. As a result, the IC has not assumed responsibility for countermeasures red teaming, although the Director of Central Intelligence formerly assigned an officer to provide managerial control over BMDO's countermeasures assessment efforts.

Gauging Foreign Reaction

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The IC plays a key role in helping policymakers anticipate international response to US missile defense plans, thereby enabling Washington to weigh potential political costs and benefits before moving ahead. Considerable controversy revolves around the relationship between US missile defense planning and the 1972 ABM Treaty with its 1974 protocol. The Treaty permits the two parties to deploy a limited defensive system in one small geographic area to defend either a cluster of ICBM's or a national capital. Defending national territory as a whole is expressly forbidden. To deter--or protect against--a missile attack by so-called "rogue" nations, however, US defense experts consider some form of territorial defense essential, with deployments in locations not permitted by the treaty.

When the Cold War ended, the United States decided that its treaties with the USSR would remain in effect with the successor states, primarily Russia. If Washington moves ahead with deploying some form of missile defense beyond that expressly permitted by the ABM Treaty, the US has the choice of negotiating changes with Russia, withdrawing unilaterally from the treaty according to its provisions (six months' notice), or reneging on its earlier stand by declaring that the treaty is null and void because the Soviet Union that signed it no longer exists.

Tinkering with or abrogating the Treaty, in the eyes of key world nations, runs the risk of spawning a new arms race among the United States, Russia, and China. In 1972, the ABM Treaty was seen as a bulwark against unfettered nuclear arms competition between the United States and the Soviet Union. By limiting defenses, the reasoning went, each country could sustain an effective offensive deterrent against attack by the other with a limited number of ICBMs and submarine-launched ballistic missiles, a doctrine that became known as Mutually Assured Destruction. In reaction to current US missile defense planning, even those countries that already have substantial missile systems of their own consider their deterrent capability potentially threatened, noting there is no guarantee that the United States will not expand an initially small system focused against threats from "rogue" nations to a much larger system.

The Ballistic Missile Defense Organization's Countermeasures Program

Throughout its existence, BMDO has allocated from $20 to 30 million per year to threat and countermeasures work. About 60 percent of this has gone specifically to red team efforts carried out primarily by the Massachusetts Institute of Technology's Lincoln Laboratory, Sandia National Laboratory, the US Air Force Research Laboratory, and the Planning Research Corporation.

One particularly innovative effort, developed in response to a review by the Defense Science Board in 1991, was called the "Skunkworks" program--later renamed the Countermeasures Hands-On Program (CHOP). It comprised a series of teams of highly educated but largely inexperienced, young engineers who emulated adversary nation engineers charged with finding ways to defeat a proposed US missile defense system. Each team was assigned a specific adversarial country and given a specific system or tier of systems to defeat under notional battlefield conditions. Controllers, in consultation with referees from the Intelligence Community, regulated the information that the teams were given about the US system and the technology that they were permitted to apply. Early on, each team identified up to twenty concepts it believed held promise for accomplishing the mission and then narrowed the list using criteria such as the likelihood of successful operation, estimated effectiveness, and ease of fabrication. The team then proceeded to build a prototype and subject it to standard laboratory testing. Because of budgetary limits, only the most promising of the countermeasures developed by the teams between 1993 and 1999 were moved to a flight test phase. Each of the flight-tested devices performed largely as expected and provided useful

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information to US missile defense system planners. Subsequent reports by the teams helped the Intelligence Community search for evidence of real work on countermeasures of similar nature being undertaken by potential adversary countries.

A second innovation attacked the problem of predicting which countermeasures were most likely to be employed by an adversary, given the dearth of hard intelligence. Called the Threat Risk Assessment Program (TRAP), this initiative examined various countermeasures concepts on the basis of their expected effectiveness and their difficulty of implementation. Two matrices were developed for each US defense system evaluated, including Patriot, Theater High Altitude Area Defense, Navy Area Defense, Navy Theater Wide, and National Missile Defense. The first matrix arrayed the system's critical functions--such as search, detection, tracking, discrimination, endgame, and kill assessment--against various types of countermeasures, including jammers, signature modification, decoys, debris, evasive maneuvering, and hardening. It assessed the impact of each countermeasure on each critical function. The systems engineers and the red team made these evaluations collaboratively based on notional designs, CHOP prototypes and experiments, and computer simulations. Next, the red team estimated the likelihood an adversary would employ each countermeasure, based on the countermeasure's technological complexity, the adversary's engineering capabilities and perception of the countermeasure's effectiveness, the weight and other performance penalties a countermeasure would impose, the measure's expected reliability, its ease of maintainability in the field, and so on. Then a second matrix was constructed arraying the estimated effectiveness of a given countermeasure against the likelihood it would be employed. Clearly a countermeasure that ranked high in both effectiveness and likelihood would constitute a significant threat to the US system.

Through intelligence collection and analysis, including the red team concept, the US Government has gained an understanding of both the enemy missile threat and how various levels of defenses would perform against the threat. This understanding, although not perfect, allows the missile defense decisionmakers to estimate the cost of achieving a desired level of protection.

Attempts to predict foreign response to potential US actions almost always suffer from a dearth of hard information. This is not so much because of weak intelligence collection capabilities as it is because foreign leaders tend not to make firm decisions until they see what action the United States actually takes. This forces the intelligence analyst to rely more on historical and cultural data, mirror imaging, polling, and other techniques to form his or her judgments. The lack of firm data inevitably leaves the process vulnerable to the mindsets and preconceptions of the analysts--and their reviewers and customers--which further reduces the chance of accurate predictions.[12]

Conclusion

The strategic stakes and high cost of moving forward with a missile defense system mandate close support from the Intelligence Community, despite the challenge of producing sophisticated and objective analysis while working with limited data. It becomes critical to pool the specialized expertise of each sector of the IC, work closely with system designers as well as policymakers, and employ all possible analytic tools to avoid individual and corporate mindsets. Supported by the IC, BMDO has strengthened traditional analytic processes through innovative red teaming and threat risk assessments. It is the nature of intelligence, however, that unequivocal answers to the key questions of threat and response simply cannot be provided. In their place, the IC provides an array of probabilities and possibilities to assist the nation's leaders in their continual search for the best

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approach to missile defense.

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Notes

(1) Ballistic Missile Defense Organization press release, "FY2001 President's Budget," 4 February 2000.

(2) Congressional Budget Office, "Budgetary and Technical Implications of the Administration's Plan for National Missile Defense," April 2000.

(3) The brief history of the US antiballistic missile program presented here is drawn largely from materials provided by the Ballistic Missile Defense Organization's historian, Dr. Donald Baucom.

(4) The full text of former President Reagan's speech is available on line at: www.tamu.edu/scom/pres/speeches/rrsecure.html.

(5) Appointed to chair the Commission to Assess the Ballistic Missile Threat to the United States by the Director of Central Intelligence, Rumsfeld was selected from among candidates proposed by the Speaker of the House of Representatives, the Majority Leader of the Senate, and the minority leaders of both houses of Congress. The publicly released version of Commission's report is available at: http://fas.org/irp/threat/missile/rumsfeld/. The unclassified version of the NIC's report "Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015" can be found at: www.cia.gov/cia/publications/nie/nie99msl.html.

(6) NIC report, "Foreign Missile Developments and the Ballistic Missile Threat to the United States through 2015."

(7) Statement for the Record to the Senate Subcommittee on International Security, Proliferation, and Federal Services on "The Ballistic Missile Threat to the United States," by Robert D. Walpole, National Intelligence Officer for Strategic and Nuclear Programs, 9 February 2000. See: www.cia.gov/cia/public_affairs/speeches/nio_speech_020900.html.

(8) Jeffrey T. Richelson, *The U.S. Intelligence Community*, 4th ed. (Boulder, CO: Westview Press, 1999), pp. 155-157, 182, 221-226, 231, 262, 278.

(9) Jane Perlez, "U.S.-North Korea Talks on Missile Program Set for March," *The New York Times*, 31 January 2000, p. A1.

(10) Michael C. Sirak, "BMDO: 'CHOP' Shop Helps Create Robust Missile Defenses," *Inside Missile Defense*, 21 April 1999. For budget information on BMDO's countermeasures program, see: www.acq.osd.mil/bmdo/bmdolink/pdf/bmdopress.pdf.

(11) See "The Ballistic Missile Defense Organization's Countermeasures Hands-On Program (CHOP): Origins and Evolution," 11 August 1997, pp. 3-6. Report is available from the author of this article.

(12) For a discussion of the issue of superiors overruling analysts wrestling with sparse evidence, see Harold P. Ford, *CIA and the Vietnam Policymakers: Three Episodes 1962-1968* (Washington, DC: Center for the Study of Intelligence, 1998), pp. 143-152.

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