



The Changing Nature of Ballistic Missile Defense



*A Center for Technology and National
Security Policy Event Summary*

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On June 3-4th 2009, the National Defense University hosted a conference entitled, "The Changing Nature of Ballistic Missile Defense." This event was held at Fort Lesley J. McNair and attended by 185 participants, with more than 250 total registrants.

All information and sources for this paper were drawn from participant remarks and unclassified presentations. The views expressed in the following summary do not reflect the official policy or position of the Center for Technology and National Security Policy, the National Defense University, the Department of Defense, or the U.S. Government.

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SUMMARY OF PARTICIPANT OBSERVATIONS

- BMD is a system fundamentally shaped by political constraints.
- Since BDM interceptors are integrated into a global network, the line between tactical and strategic defense systems is blurred.
- The proliferation of accurate, longer range missiles is increasing sharply.
- As Russia and the U.S. draw down their large offensive stockpiles, BMD complicates the offense/defense balance.
- While Russia seeks assurances BMD will not undermine its nuclear deterrent and national prestige, it will not press for a new ABM Treaty.
- Most American participants resisted the notion the U.S. should negotiate a new ABM Treaty.
- U.S. assurances to Russia could describe numeric and/or geographic limitations on BMD systems, along with a general principle to limit the scope of any integrated network.
- Most participants favored establishing a BMD system in Europe which links its capabilities to the progress of the Iranian missile threat.
- Experts generally agreed the most effective BMD system would incorporate a layered, globally integrated network with an emphasis on early interception during the ascent or boost phase.
- Some participants believed space-based interceptors could provide global coverage of missile launch, but would employ untested technology and likely incite concerns over the “weaponization of space.”
- Large BMD deployments may encourage nuclear armed states to develop a range of countermeasures which includes producing more missiles, developing jamming and decoy stratagems, or employing asymmetric means of delivery.
- The possibility BMD could worsen U.S.-China relations troubled several participants.
- Some participants questioned the current maturity of technology and testing to meet the current and anticipated level of a sophisticated threat.
- Participants were most supportive of sea-based interceptors, particularly the Aegis SM-3 variants (Blocks), which might also be deployed on land.

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Towards a MAD-less World: The Offense/Defense Equation Revisited

The object of deterrence is to persuade potential aggressors that:

- An attack against the U.S. or its allies would be difficult.
- The cost of hostile action would outweigh any potential benefits.

BMD systems are directed against states that:

- Possess small stockpiles of nuclear weapons.
- Are unlikely to employ alternative methods for delivering a nuclear weapon.
- Rely on relatively “unsophisticated” long range missiles.

BMD would threaten strategic stability if:

- Established nuclear powers believed the systems threatened their nuclear deterrent.
- Established nuclear powers could not safely rely on conventional deterrence as a surrogate.
- New nuclear powers were encouraged to develop large scale production of long range missiles.
- All nuclear powers shifted focus to rely on other methods for delivering nuclear payloads.

Diplomatically, deploying an U.S. BMD system is likely to mean:

- Compromise/collaboration with Russia.
- Consent (implicit or explicit) from China.
- NATO cooperation.
- Ratification for 3rd site agreements by Poland, Czech Republic.
- Public transparency about the geographical and operational limits of the system.

Changing Nature of the Threats

U.S. deterrence strategy is intended to influence:

- Established nuclear states with whom the U.S. has long-standing relations.
- Developing nuclear states whose mix of forces is in flux.
- Emerging nuclear states with limited/breakout capabilities (rogue states).
- Potential nuclear aspirants.

Participants debated whether the traditional nuclear triad could effectively deter:

- Emerging nuclear powers with limited/breakout capabilities (rogue states).
- Nuclear aspirants.
- Non-state actors.

In a multi-polar world, calculations about deterrence are complicated by:

- The variety of nuclear inventories and emerging technologies.
- The proliferation of nuclear technology among state and non-state actors.
- Uncertain safeguard measures.
- Undeveloped nuclear doctrines.
- Cultural/communication gaps among competing actors.
- Politically unstable nuclear states.
- The possibility of non deterable, nuclear armed adversaries.

Participants suggested an effective strategic deterrent should include:

- An agreement between Russia and the U.S. to cap nuclear warheads to around 1500 each.
- A modernized nuclear triad (bomber force, ICBMs, SLBMs).
- Additional capabilities, such as...
 - Layered, integrated ISR.
 - Flexible targeting for next generation of bombers.
 - Conventional prompt global strike.
- BMD programs which focus on mobile, boost phase interceptors.

Some speakers believed congressional support for BMD programs:

- ‘Turned a corner’ when Patriot missiles proved their worth during the 1991 Gulf War
- Has been generally enthusiastic, despite a brief slump during the 1990s after a series of failed tests
- Is divided on the 3rd site. Congress has shown more support for a NATO solution. Nevertheless, it has allocated funds which will be activated following Czech and Polish approval.

Strategic Assessment

Quotable: “We will be able to put hundreds of interceptors in the air at a given time...within the next several years.”

Quotable: “The technological and operational challenges of intercepting threat missiles in the ascent phase (The phase after powered flight, but prior to the deployment of objects or executing maneuvers in post-boost) is significantly less challenging than boost phase intercepts yet achieves almost the same benefits.”

MDA’s mission is to protect U.S. and allied forces against:

- Ballistic missiles of all ranges.
- Ballistic missiles in all phases of flight.

Operationally, a missile defense system must integrate:

- Battle management centers.
- Sensor network (*Current Status: “requires more emphasis”*).
- Communications (*Current Status: “requires more emphasis”*).
- Command and Control (*Current Status: “requires more emphasis”*).
- Layered network of interceptors, for multiple shot opportunities (*Current Status: mid-course interceptors have been deployed*).
 - Ground Based Interceptors (GBI) (*Current Status: Deployed*).
 - Navy’s Standard Missile-3 (SM-3) (*Current Status: Deployed*).
 - Army’s Terminal High Altitude Area Defense (THAAD) (*Current Status: Deployed*).

The missile threat has evolved as:

- Missiles have grown more accurate, reliable, long range, transportable, and easier to support in the field.
- There has been a dramatic proliferation of short and medium range ballistic missiles, totaling approximately (figures exclude NATO, US, Russian and Chinese stockpiles)...
 - 5,487 Short Range Missiles (less than 1,000 km)
 - 354 Medium Range Missiles (between 1,000 - 3,000 km)
 - Less than 59 Intercontinental Missiles.

The MDA believes ascent phase interception holds the greatest promise for the development of BMD because:

- Interception occurs before missiles can take defensive measures.
- Early targeting allows time for more 'shots' at missile swarms.
- It represents the most economical development path.
- Early interception represents a “hedge against threat growth.”

Layered Defense: Boost Phase, Mid-Course, Terminal

Most experts agreed:

- Boost Phase (during early stage) interception of ballistic missiles offers the most effective defensive advantage.
- Ascent Phase interception may give missile time to deploy some countermeasures, but still offers many defensive advantages.
- Terminal Phase interception, after decoys have been destroyed/slowed by atmospheric re-entry, ranks as the *third* most effective defensive strategy.
- Mid-course interception is the most problematic phase.

Phase Targeting Considerations

BOOST	Ascent Phase	MIDCOURSE	Descent Phase	TERMINAL
Boost Phase		Mid-Course Phase		Terminal Phase
<ul style="list-style-type: none"> • Visible missile plume • Missiles travelling slowly (during early stage) • Countermeasures limited • RVs bundled together in one target 		<ul style="list-style-type: none"> • Exo-atmospheric • Decoys deployed • Multiple Re-entry Vehicles 		<ul style="list-style-type: none"> • Decoys deployed but slowed by atmosphere; warhead can maneuver • Multiple Re-entry Vehicles

**The architecture for an effective BMD system should include:*

- A layered, integrated defense under the control of combatant commanders and with...
 - Pervasive sensors
 - Advanced discrimination
 - A large inventory of upgradeable, mobile interceptors
- A heavy emphasis on naval systems
- Mobile, land-based interceptors
- Space-based interceptors deployed for maximum coverage

* Note: This hypothetical architecture takes no account of other strategic and political considerations, and represents only a narrow appraisal of BMD system requirements.

The U.S. should place special emphasis on developing and deploying new:

- Miniaturization technologies (mounted on high speed interceptors).
- SM-3 missiles.
- Space based interceptors (views on this were mixed).

BMD offers political advantages which may alter how states evaluate:

- The regional balance-of-power.
- Theater defense against conventional attacks.
- The dramatic proliferation of missile technologies.
- Protection against accidental launches.

Support for a 3rd Site was mixed:

- Some participants regretted the initiative, saying it had unnecessarily provoked Russia.
- Others called the project a useful “insurance policy,” and urged policy-makers to take a hard line when dealing with Russia.
- Most participants agreed that Russian concerns over security were a pretext for less transparent motives (for example, ‘paternity rights’ over Eastern Europe).
- Most participants rejected any compromise with Russia which would constrain the expansion of BMD systems.
- All participants agreed more cooperation with Russia is necessary.

Lessons of BMD Testing and the Way Ahead; Testing, Timelines and Cost Effectiveness

The pace of BMD development has been slowed by:

- Limited target availability
- Poor target performance
- Test range constraints
 - Environmental Regulations
 - International treaties (INF, START)
 - Test capabilities insufficiently developed
- Competing requirements for component commands

MDA testing has been criticized for:

- Overly scripted testing
- Producing and fielding poorly tested/modeled assets
- Emphasizing mid-course interception

The MDA is revising its test procedures by:

- Allowing the operational community to design tests
- Using 'red team' analysis

Critics of the MDA say rogue nations are likely to employ penetration aids and countermeasures such as:

- Separating and spin-stabilized RVs.
- RV reorientation.
- Radar absorbing material (RAM).
- Booster fragmentation.
- Low-power jammers.
- Chaff.
- Simple (balloon) decoys.
- "Anti-simulation" warheads (missile disguised to look like a decoy).
- Swarm missile attacks (multiple launches).

Enduring Issues of BMD Development

The popularity of missile defense technologies has depended on its purpose, for example:

- Theater missile defense for troops, as in the Gulf War, is widely seen as necessary.
- National Missile Defense has been a controversial idea since its conception in the 1960s.

Debate about NMD has historically been:

- Politically Polarized.
- Emotional (apocalyptic images).
- Influenced by well-informed, biased, high-profile interest groups.

Proponents of NMD typically argue the completed system:

- Would primarily be used to counter relatively small nuclear states (rogues) from staging a preemptive attack.
- Could also be employed in the event of an accidental launch.
- Represents only a limited defense.

For policy-makers, a successful BMD system offers important advantages which could:

- Allow the U.S. to maintain its technological edge over peers and near-peers.
- Diversify the DoD's offense/defense portfolio.
- Act as a stabilizing influence in volatile regions.
- Deter nuclear aspirants from pursuing WMD programs.
- Contribute to U.S. soft power abroad.
- Counter the proliferation of missile technology.
- Serve as force protection for U.S. and allied conventional forces.

Defending the United States

BMD supports traditional U.S. national security goals of:

- Deterrence
- Dissuasion
- Damage limitation, in the event deterrence fails
- Security assurances to U.S. friends and allies

Deterrence can fail as the result of:

- Irrational, risky action
- Flawed assessments
- Accident
- Cultural misunderstanding
- Miscommunication
- Institutional momentum
- Political Instability

BMD represents the best option for countering a growing missile threat which has seen:

- A sharp increase in the number of missile systems
- The proliferation of more capable systems with increased payload, range, and accuracy

Participants disagreed about how the DoD should prioritize the development of a layered BMD system:

- Some favored ground-based interceptors, emphasizing the successful history of a relatively long program with a well established infrastructure.
- Others argued space-based interceptors would provide a more affordable, technically feasible, and complete defensive architecture.
- Most agreed sea-based systems represented a promising supplemental defense.

Some participants were critical of the Obama administration’s current plan to:

- Cap the production of Ground Based Interceptors at 30.
- Close GBI production assembly lines (2012).
- Shift investment focus to predominately theater missile defense.
- Have no inventory of GBI’s on hand for liability testing.
- Provide no upgrade path for completed systems.

Most Participants lauded the administration's emphasis on:

- Ascent phase interception (changed from mid-course)
- Theater (dual use) missile defense systems (Aegis, Patriot)

Ground, Sea, and Space Interceptors: Operational Pros and Cons

Interceptors	Pros	Cons
Ground-based: GMD	<ul style="list-style-type: none"> • Programs underway • Provides limited protection 	<ul style="list-style-type: none"> • Limited, fixed geographical coverage • Few ‘shots’ available (3), and only during descent phase • Interception possible only after countermeasures deployed
Sea-based: AEGIS; SM-3	<ul style="list-style-type: none"> • Wide coverage: Mobile interceptors can be moved to trouble spots for early warning • Can be used as force protection for carrier battle groups and deployed ground forces • Currently the most reliable system available 	<ul style="list-style-type: none"> • Ascent, mid-phase interception only • Geographically limited (not ideal for inland strikes) • Number of interceptors constrained by the number of available navy vessels
Space Based (theoretical)	<ul style="list-style-type: none"> • Global coverage • Could be expanded to counter a massive barrage • Domain gives best opportunity for early interception, close to launch site • Maximizes ‘shots’ available (100+) during all phases of missile trajectory 	<ul style="list-style-type: none"> • Requires a complex constellation of 1,000-100,000 orbiting interceptors, with supportive architecture • Would likely create a political backlash, “weaponization of space” • Could increase the chance of debris fields and space junk

Europe, 3rd Site Issues, and Iran

The Czech Republic supports a third site on its territory, primarily because it:

- Considers U.S. threat assessments of Iran credible.
- Views BMD as a defense insurance policy against Iran.
- Values its close ties to the U.S. and seeks to deepen relations.

Negotiations about Deployment of BMD in Europe have been complicated by:

- The slow pace of negotiations during the Bush administration (2003-2007).
- Strident coverage in the European news media.
- Delayed ratification by the Czech parliament (now in transition) of a BMD agreement first signed in 2008.
- Uncertainty about the Obama administration's intentions.

Participants assessed three scenarios which the Obama administration should consider when finalizing its plans for a 3rd site in Poland and the Czech Republic:

1. Abort the program in order to rely on extended deterrence to counter Iranian capabilities.
2. Construct a BMD system designed to counter Iranian missiles, including *strategic, long range* (continuation of previous administration's efforts).
3. Construct a BMD system based on the new architecture designed to counter Iranian *short and medium range* missiles ("sub-strategic").

Most participants favored the third scenario (above) because a "sub-strategic" system:

- Might alleviate Russia's public concerns that BMD technology undermines the country's strategic deterrence and would decouple the issue of MD from negotiations about reduction of strategic offensive weapons (START).
- Could be upgraded as the range of Iranian missile capabilities grows.
- Would politically link BMD to the progress of Iranian missile programs, pressuring the regime to desist production.
- Allow time for the U.S. to more fully test an effective BMD.
- Allow further discussion and consensus-building within NATO.

Most participants viewed Russia's cooperation as an essential precondition for deploying BMD. However, disagreement arose over how fully the country should be integrated into any completed system because:

- The conflict in Georgia has made Russia appear less trustworthy to many Europeans.
- Russia's contention - that a 3rd site could undermine its nuclear deterrent - seems disingenuous to most military experts.
- Many believe Russia's motives for opposing BMD are grounded in:
 - Ongoing competition with the U.S.
 - Desire to protect its political prestige and national dignity.
 - Historical primacy (sphere of influence) in Eastern Europe.
 - Uncertain relations with NATO.

Russia: Cooperation or Arms Control

Russia has criticized the development of tactical *and* strategic BMD because:

- Interceptors are integrated into a global network, essentially blurring the line between tactical and strategic systems.
- The U.S. has refused to negotiate on numeric or geographic limitations on a developed system. This raises a specter of doubt on whether...
 - The 3rd site in Europe is the first installment on many more.
 - The U.S. would deploy thousands of space interceptors.
 - The U.S. would “cover the seas” with sensors and interceptors.
- The geographic location of a 3rd site in Eastern Europe appears aggressive

Russia is likely to seek American assurances that any BMD system would be limited:

- In scope (number of interceptors, radar stations, and sensors).
- Geographically (certain regions would be off limits).

When addressing the issue of arms control, an important point of debate was whether the Obama administration should allow the START Treaty to expire in December 2009:

- Those in favor suggested the new administration complete the many ongoing DoD policy reviews now underway before re-negotiating the START treaty.
- Those opposed advised keeping START in place as part of a cautious approach to creating new policy.
- Most participants rejected any agreement which set new limitations on U.S. conventional capabilities.

BMD and the Asian Challenges

Several participants presented evidence North Korea relies on Soviet era rocket components procured from abroad. This suggests the regime:

- May not be capable of producing all necessary components indigenously.
- May draw on some inventory of expendable supplies.
- May have access to an active network of smuggled missile technology.
- May be one of many recipients which have benefited from stolen/sold Soviet missile technology.

Some Chinese experts have argued the U.S. has acted to undermine Chinese deterrence. They cite the:

- Development of space based radar.
- Ability to target mobile missiles.
- Deployment of BMD.
- Lack of BMD transparency and confidence building measures.

APPENDIX A: DISCUSSION QUESTIONS

Q: Can the U.S. maintain deterrence with BMD systems and a low cap on offensive systems?

A: Yes, but other nuclear powers (excepting Russia) cannot.

Q: How would shrinking nuclear stockpiles affect U.S. deterrence strategy?

A: Reductions are desirable, but a low threshold exists at which point a U.S. run BMD system would destabilize the strategic balance. At that point, BMD has the potential to overwhelm the offensive strategic arsenal and put MAD/deterrence at risk.

In a world of fewer nuclear missiles, would BMD systems act as a destabilizing influence?

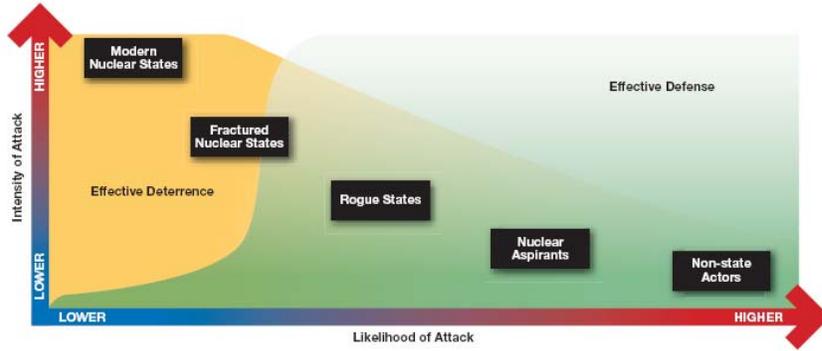
A: In great measure, it depends on how the U.S. collaborates with other nuclear powers. Over the long term, it seems likely that rogue states capable of producing ICBMs would have an incentive to produce more missiles.

Q: What policies could the DoD adopt which would mitigate any potentially negative effects?

A: DoD could emphasize 'sub-strategic' BMD systems for theater defense. Transparency is always a help here. Broader questions must be resolved at the political level.

APPENDIX B: FIGURES

Integrating Deterrence and Missile Defense

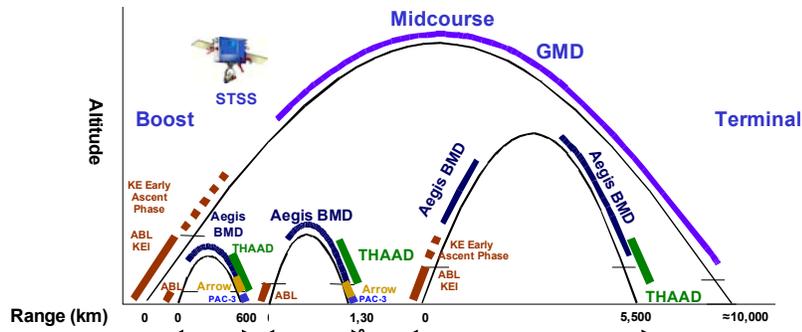


The second nuclear age requires a more flexible, comprehensive military strategy that fuses deterrence and defense

Dr. Robert Haffa, Presentation



What Are We Testing Against ?



• Thousands Built, Widely Available
 • Commonly Land-Launched
 • Sea-Based Launch Demonstrated By Iran, India

• Many Exist In Third World
 • More On The Way

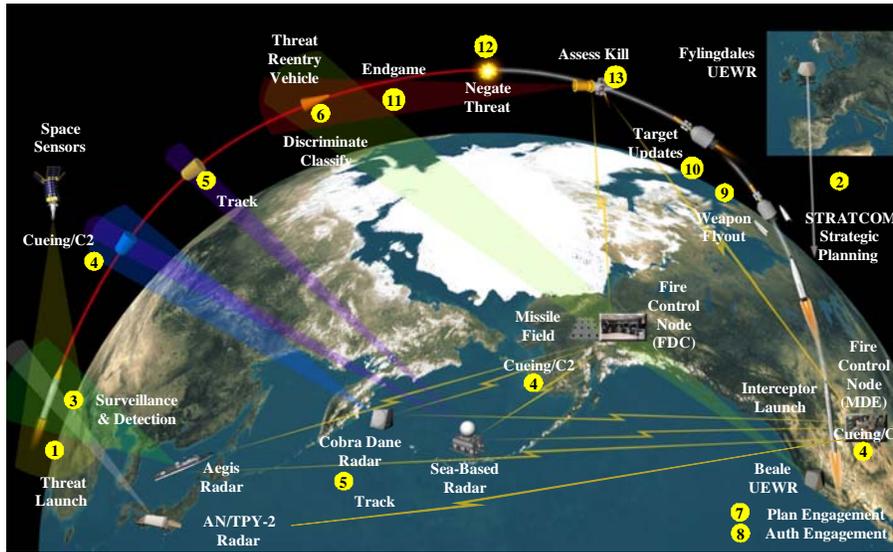
• A Few Exist In Third World
 • Not Yet Tested As Ballistic Missiles

Maj Gen Chris Anzalone, Presentation



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BMDs Engagement Requires A Global, Integrated Sensor Network



Maj Gen Chris Anzalone, Presentation

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