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"What are the Prospects, What are the Costs?:
Oversight of Ballistic Missile Defense (Part 2)"
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Chairman Tierney, Representative Shays, distinguished Members of the Committee, I very much appreciate the opportunity to appear before you today to support your examination of the Department of Defense programs in missile defense.

I am a Senior Advisor to the non-profit Center for Defense Information, a division of the World Security Institute, a Washington, D.C.-based national security study center. To help insure our independence, the World Security Institute and the Center for Defense information do not accept any funding from the Federal government, nor from any defense contractors.

In 2005 and 2006, I served on the nine-member Defense Base Realignment

and Closure Commission, appointed by President George W. Bush and nominated by House Democratic Leader, Nancy Pelosi.

Beginning in late 2004, I served on Governor Arnold Schwarzenegger's Base Support and Retention Council, from which I resigned to serve on the President's Commission.

From 1994 to 2001 I served in the Pentagon as Assistant Secretary of Defense and Director, Operational Test and Evaluation. In this capacity, I was principal advisor to the Secretary of Defense and the Undersecretary of Defense for Acquisition, Technology and Logistics on test and evaluation in the DOD. I had OSD OT&E responsibility for over 200 major defense acquisition systems including the present-day missile defense programs.

From 1959 to 1979, and again from 1981 to 1993, I worked at the Lawrence Livermore National Laboratory. Over those 33 years I worked on a variety of high technology programs, and retired from the Laboratory in 1993 as Laboratory Associate Director and deputy to the Director.

In my current capacity at the Center for Defense Information I am called upon to provide independent analysis on various defense matters. I have over 40 years of experience involving U.S. and worldwide military research, development and testing, on operational military matters, and on national security policy and defense spending.

Introduction

Mr. Chairman, there is a troublesome lack of clarity in public discourse regarding both the rationale for and the technical progress toward, a U.S. missile defense network. The reason for this confusion is clear when one examines the historical record. Quite simply, the public statements made by Pentagon officials and contractors are often at variance with all the facts at hand. In the ongoing administration advocacy to ensure continuing support for a missile defense program that is expected to cost hundreds of billions of dollars, it has become difficult to separate programmatic spin from genuine developmental progress, and claimed value from liabilities. In particular, there has been a lack of substantive discussion about the ways in which missile defenses can undermine America's arms control and non-proliferation objectives.

The Pentagon is developing a variety of missile defense systems, - land, sea, air, and space-based – but the Ground-based Midcourse Defense system (GMD) – formerly called National Missile Defense (NMD) – attracts the most attention from lawmakers and the media. It is the largest and most complex of the systems, and will be the most costly. It is also the centerpiece in the current Defense Department plan for defending the United States from long-range intercontinental ballistic missiles (ICBMs) fired by a hostile enemy, and for those reasons I will concentrate on that system today.

The Lack of Operational Criteria

In reviewing the status of U.S. missile defense programs, I want to stress at the outset the current programs have no operational criteria for success.

How good is the system supposed to be? Is 10% effectiveness good enough? What about 1%? Can the system handle realistic threats as documented in Intelligence Community threat assessments? How many interceptors should be required to defeat one target?

Without answers to such questions, it is very difficult for the U.S. Congress to evaluate these programs. And, as has often been noted by the GAO , it also makes it difficult for the GAO or for my former office in the Pentagon to evaluate these programs for the Congress.

This also explains why the warfighter, e.g. STRATCOM, has been reluctant to say that the United States has an operational capability or whether it would be effective.

Eight years ago President Clinton established four criteria against which he would make a deployment decision. The Clinton criteria, announced by the White House in December 1999, a year before he would make a decision, were:

1. "Whether the threat is materializing;

2. the status of the technology based on an initial series of rigorous flight tests, and the proposed system's operational effectiveness;

3. whether the system is affordable; and

4. The implications that going forward with National Missile Defense (NMD) deployment would hold for the overall strategic environment

and our arms control objectives."

At that time the goal was to be able to shoot down a single missile due to an accidental or unauthorized launch from Russia or China, not to be able to defend against a deliberate missile attack. But at that time there had only been only three NMD flight intercept tests, and because the last two of those three tests failed, the missile defense system clearly was shown not to be effective.

As a result, President Clinton did not have to spend much time considering the cost or the international relations aspects of his decision to not deploy the system. The system simply had not been shown to be effective, and that was that.

During the Reagan years, Paul Nitze, the highly regarded scholar and statesman, presented three criteria that any - in those days it was the Strategic Defense Initiative (SDI) - missile defense system must meet before being considered for deployment. The Nitze criteria were shorter and included two important military considerations: that the system be able to survive direct attack, and that the system be cost effective on the margin. Nitze's criteria were formally adopted as National Security Directive No. 172 on May 30, 1985. The Nitze criteria were:

1. The system should be effective;

2. Be able to survive against direct attack; and

3. Be cost effective at the margin - that is, be less costly to increase your

defense than it is for your opponent to increase their offense against it.

The Ground-based Missile Defense system being deployed in Alaska and California, and the proposed U.S. missile defense system for Europe, meet none of the above criteria, not the Clinton criteria and not the Nitze criteria. And new or different criteria for the system have not been established by the current administration.

Instead the Missile Defense Agency (MDA) is pursuing a path of "spiral development," sometimes called, "Capability Based Acquisition," concepts which have been taken to an unworkable extreme by the MDA. The extreme example is the overall Ballistic Missile Defense System about which the Missile Defense Agency insists, "There are currently no final or fixed architectures and set of requirements for the proposed BMDS."

Under this approach, spiral development or other "dynamic acquisition" concepts become like building a house while the floor plan is constantly changing. It makes for a very expensive house, and if your family ever gets to move in, they find they don't like how their topsy-turvy house turned out.

With dynamic acquisition processes, especially capability-based acquisition, there may be no established baseline for even the first increments. In missile defense, and a few other complex DOD programs, the problems with dynamic acquisition stem from a lack of definite requirements.

The Defense Science Board has advised the DOD that "Each spiral should be an enforced baseline," and adds, "There needs to be a careful assessment

of technological readiness, with risk reduction activity outside and preceding major program activity where significant technical risks exist." [1]

In missile defense, this advice is too often not heeded.

Without an enforced baseline of requirements or other established criteria, the Congress cannot rely on the Pentagon's cost estimates, or know whether an effective system will result. Without established criteria the Congress is buying another Winchester Mystery House, that famous 160-room Victorian mansion in San Jose, California, that was under continuous construction for 38 years without any master building plan. The maze-like house has staircases that lead to nowhere, second floor outside doors that open to nothing except a 10 foot drop, and oddly arranged rooms where you would least expect them.

For this reason, the criteria described above, both the Clinton criteria and the Nitze criteria, are still helpful today in helping us to gauge where we stand with missile defense, what we have gotten for the effort, and where we should be going.

In making his decision in December, 2004, to deploy the GMD system in Alaska and at Vandenberg AFB in California, President Bush appears to have had no criteria other than an ideological commitment.

Former Senator Sam Nunn has said it best: "National missile defense has become a theology in the United States, not a technology."

But when it comes to missile defense, theology is not enough.

Missile defense is the most difficult development the Pentagon has ever attempted, beyond any Army tank, Navy ship, high performance jet fighter or helicopter. And those developments often take 20 years or more. Missile defense has been under development in the United States for 60 years. As noted by the Chairman in your first hearing, a conservative estimate is that the U.S. has spent more than $120 billion on missile defense. From looking at figures from the Congressional Budget Office, I would estimate that since President Reagan's famous 'Star Wars" speech in 1983, about $150 billion has been spent. [2] And over the next five years, the Pentagon has requested another $62.5 billion for missile defense, with no end in sight.

If the Congress supports this spending on missile defense, by the end of 2013 over $110 billion will have been spent just since 2003, not counting the missile defense spending in the previous 20, 40, or 60 years.

The question before you today is what, if anything has really changed in the last eight years? Is the threat worse or less? Is the technology more tractable? Is the cost manageable and affordable in relation to other U.S. priorities? And is the danger to America growing because of the response of other countries to U.S. missile defenses?

<u>The Threat, or Not</u>

In your March 5, 2008, hearing, Joseph Cirincione testified that since 2001, the threat – especially the threat from intercontinental ballistic missiles that

can reach the United States – has gone down, not up. Yet the Missile Defense Agency claims that the threat from ballistic missiles is growing.

To motivate the need for missile defenses, the MDA has pointed to missiles in twenty countries. However, all but two of these twenty countries—Iran and North Korea—are either friends, allies, or countries from which we have no missile threat—for example, Israel, India, Pakistan, Vietnam, South Korea, Moldova, Ukraine, Saudi Arabia, and Egypt. Venezuela was recently added to the list. [3] Further, with the exception of Russia and China, none of these twenty countries—including Iran and North Korea—has ballistic missiles that can reach the United States. In October 2007, the White House announced: "America faces a growing ballistic missile threat. In 1972 just nine countries had ballistic missiles. Today, that number has grown to 27 and it includes hostile regimes with ties to terrorists." [4]

Vice President Cheney reiterated that estimate in a speech on March 11, 2008. The White House has not explained how it came up with twenty-seven countries, rather than MDA's already misleading claim of twenty.

Operationally, such estimates are pointless since the MDA says that it can only handle "an unsophisticated threat," that is, just one or at most two missiles from Iran (or North Korea), with no decoys or countermeasures. This is not because that would be a realistic threat, but because it is the toughest threat that MDA claims to be able to deal with.

It is not credible that Iran (or North Korea) would be reckless enough to

attack Europe, or the United States, with a single missile - with no decoys or countermeasures - and then sit back and wait for the consequences? As we know, ballistic missiles have return addresses.

Thus, if Iran were reckless enough to attack Europe or the United States, they wouldn't launch just one missile, and if they launched several missiles or used decoys and countermeasures, current U.S. missile defenses would not be effective.

Further, if Iran or North Korea were intent on attacking Europe or the United States, and if they believed that U.S. missile defenses worked, they likely would emulate Russia. Against Russian or Chinese ICBMs launched en masse, the most futuristic missile defenses would not be effective. This fact was recognized by Congress in 1974, when lawmakers voted to shutdown the Safeguard system (which relied on nuclear-armed interceptors) almost immediately after it was declared operational. It had become obvious that the system could not defend against an all-out Soviet attack.

We will not have a safer world if U.S. missile defenses cause Iran, North Korea, or other countries to build up vast arsenals of ballistic missiles to overwhelm our defenses.

U.S. missile defenses could create new dangers for America, stimulating a new arms race, and encouraging U.S. adversaries to build more and more missiles so as to overwhelm our defenses. By responding to the perceived "unsophisticated threat," we are motivating new threats for which we do not have technical solutions.

Decoys and Countermeasures

Decoys and countermeasures are the Achilles Heel of missile defense, are the Achilles Heel of the missile defense systems being deployed in Alaska and California, and also of the U.S. missile defense system proposed for Europe.

To use a popular analogy, shooting down an enemy missile going 17,000 mph out in space is like trying to hit a hole-in-one in golf when the hole is going 17,000 mph. If an enemy uses decoys and countermeasures, missile defense is shooting a hole-in-one when the hole is going 17,000 mph and the green is covered with black circles the same size as the hole. The defender doesn't know which target to aim for.

In 1999 and in 2000, the U.S. Intelligence community provided assessments that North Korea or Iran would soon know, if they didn't already, how to field decoys and countermeasures.

A September 16, 1999 report by Robert Walpole, National Intelligence Officer for Strategic and Nuclear Programs, stated:

"Penetration Aids and Countermeasures

We assess that countries developing ballistic missiles would also develop various responses to US theater and national defenses. Russia and China each have developed numerous countermeasures and probably are willing to sell the requisite technologies.

Many countries, such as North Korea, Iran, and Iraq probably would rely initially on available technology - including separating RVs, spin-stabilized

RVs, RV reorientation, radar absorbing material (RAM), booster fragmentation, low-power jammers, chaff, and simple (balloon) decoys - to develop penetration aids and countermeasures.

These countries could develop countermeasures based on these technologies by the time they flight test their missiles." [5]

This assessment is not surprising since decoy and countermeasure techniques are described in the public literature and on the internet.

As Mr. Walpole noted, decoys can include objects that provide a close representation of the attacking enemy missile or its warhead encased in a re-entry vehicle. For example, a simple balloon in the shape of a cone – the shape of a re-entry vehicle – would travel out in space as fast as the RV itself and be confusing to the defender. An enemy missile could carry many of these balloons that are inflated at the time of stage separation and travel along with the re-entry vehicle and other objects, such as the "bus" that first housed all these objects, and debris from stage separation.

The debris from stage separation itself could act as a kind of decoy as that debris might reflect, turn, or tumble in a manner resembling the target re-entry vehicle.

Countermeasures could include chaff or debris deliberately scattered by the attacker with the target missile or warhead to reflect the search radar of a missile defense system. This might be short metal wires – like paper clips - of the proper length, or bits of metal foil to reflect the radar, or to cloud the view the radar might otherwise have of the target.

For missile defense systems that operate in the infrared, infrared burning pellets can be released by the attacker to confuse the defender. Even the angle of the sun can be important, heating various objects in the target cluster by different amounts. The five early, successful, GMD flight intercept tests that included simple round balloon decoys were all conducted so that the sun was shining away from the interceptor and "over its shoulder" so that the sun was not shining into the "eyes" of the infrared seeker on the interceptor. As a result, the sun was heating up those balloons and making them hotter and easier to spot than they would have been at other times of the day or at night.

Different missile defense systems prompt the use of different sorts of decoys or countermeasures by the offense. For example, the laser being developed for missile defense, the Airborne Laser, is to be a high power laser carried in a jumbo 747 aircraft. But if the enemy paints their missiles with an ordinary white paint, a white paint that is 90% reflective to the laser, then 90% of the laser energy bounces off. [6] To compensate for this, the Airborne Laser would need to be ten times more powerful and would need an aircraft bigger than a Boeing 747.

For radars, jamming or electronic interference with the radar is another common countermeasure. An enemy also can apply radar absorbing materials to the attacking missiles or re-entry vehicles to reduce their radar cross-sections and make them "stealthy" and less easily detected by radar.

In all out battle, missile defense radar and interceptor sites would be prime targets for an enemy.

The Inadequacy of the U.S. Ballistic Missile Defense System

Some would argue that if not a realistic threat today, North Korea and Iran may become a real threat in the future. However, the MDA FY-2008 budget request contains a remarkably candid statement: "This initial capability is not sufficient to protect the United States from the extant and anticipated rogue nation threat."

The full context of this statement is provided below:

> **"Close Gaps and Improve this Capability.**
>
> This initial capability is not sufficient to protect the United States from the extant and anticipated rogue nation threat. We therefore must close the gaps in the system and improve its capability to keep pace. Three key elements of this effort are additional Aegis BMD sea-based interceptors, the introduction of four transportable Terminal High Altitude Area Defense (THAAD) fire units consisting of radars and interceptors, and the introduction of a land- and sea-based volume kill capability (Multiple Kill Vehicle program) to address potential countermeasures. Additionally, to ensure full coverage of the United States against threats from the Middle East, we will upgrade an Early Warning Radar in Thule, Greenland. This radar, in conjunction with the radar at Fylingdales, UK provides the ability to track threats to the U.S. and Europe from the Middle East. Because we must protect these radars or risk losing the "eyes" of our system, we are planning to field ground-based interceptors and an associated ground-based midcourse radar site in Europe. This achieves four goals: protecting the foreign-based radars, improving protection of the United States by providing additional and earlier intercept opportunities; extending this protection to our allies and friends; and demonstrating international support of ballistic missile defense."

Clearly, the MDA sees the proposed missile defenses in Europe as a first

line of defense to protect existing radar sites in Greenland and the United Kingdom necessary to defend the U.S., not first and foremost to defend Europe.

And it certainly confirms the Union of Concerned Scientists report, *Technical Realities,* four years ago, which stated:

"*The ballistic missile defense system that the United States will deploy later this year will have no demonstrated defensive capability and will be ineffective against a real attack by long-range ballistic missiles."*

Indeed, today the GMD system still has no demonstrated effectiveness to defend the U.S., let alone Europe, against enemy attack under realistic operational conditions.

The MDA budget statement above also shows that an enemy bent on attacking Europe or the United States would attack the "eyes" of the system first.

Applying traditional military strategy, an enemy of Europe or the United States would first attack the radar proposed to be built in the Czech Republic as well as the existing radars in the United Kingdom and Greenland.

<u>The Limitations of GMD Flight Intercept Tests</u>

Flight intercept tests with parts of the GMD system have been ongoing for nearly a decade.

In 2000, there had been three GMD flight intercept tests; as of today there have been 13. Seven of these 13 tests have been successful, but six have

failed. By that measure the system is doing slightly better than 50%. But in the last five years there have only been 5 flight intercept tests, and three of those have failed, a success rate of only 40%. Two failures occurred when the interceptors failed to get off the ground. Those two failures occurred for different reasons, but twice in a row, GMD interceptors failed to get out of their silos.

Thus, in the past five years there have been just two successful GMD flight intercept tests. At that rate, it would take the Missile Defense Agency 50 years before they could be ready for realistic operational testing. The MDA still must carry out successfully about 20 more flight intercept tests of different types before the system might be ready for realistic operational testing. If they do not improve their rate of success, it could take them 50 years to achieve 20 successful flight intercept tests.

From a target discrimination point of view, during the past five years the flight intercept tests have been simpler and less realistic than the tests in the first five years. None of the GMD flight intercept tests have included decoys or countermeasures during the past five years.

In addition, developmental tests also are needed to demonstrate that the system can work at night or in bad weather, can work when the sun in shining in a disadvantageous direction, can work when the enemy re-entry vehicle is spin-stabilized to minimize its radar cross section, and alternatively can work when tumbling and not spinning, can work when multiple attempts are needed to bring down a single target, and can work when more than one missile is launched by an enemy.

The MDA has fallen far behind in demonstrating these capabilities. Consider seven examples:

1. In the Clinton administration, the first test with a tumbling enemy RV [7] was planned to have been in early 2001, but it hasn't happened yet. So that's a slip of at least 7 years if MDA would try a tumbling RV soon, which is unlikely.

2. The first nighttime test [8] was to have been on December 11, 2002. It still hasn't happened either. So that's at least 6 years behind schedule if they tried a nighttime test later this year. Also unlikely.

3. The first test with decoy balloons that closely resembled the target RV was to have been in the Summer of 2002. Again, no chance this will happen any time soon.

4. In March 2002, MDA told Congress the first GMD test with multiple targets, that is, with several mock enemy missiles launched at once could take place as early as 2005. Now it is unknown when that might happen.

5. The MDA has never had a successful flight intercept test where the target is launched from Kodiak and the interceptor from Kwajalein, that is, a long-range flight intercept test more closely resembling a real ICBM trajectory.

6. In past flight intercept tests, with the interceptor based at Kwajalein, MDA has waited until the mock enemy target launched from Vandenberg

nearly reached Kwajalein before attempting an intercept.

This maximized the time to track the target and be sure of its trajectory, but left too little time for a second try if the first try missed. The Missile Defense Agency has said that their intended mode of operation will be to try more than once to hit an enemy target to increase the probability of success. But to do this requires taking the first shot much earlier so that there could be time for a second, third, or fourth attempt, something they've never tried.

7. The MDA also has never demonstrated in a flight intercept test that they can redirect or steer the Exo-atmospheric Kill Vehicle (EKV) with successive In-flight Target Updates to the correct target despite other confusing objects or decoys in the target cluster. To discriminate between similar looking or confusing objects, the system will have to be able to redirect the EKV in real time to focus on a new object different from another object the EKV may have picked out incorrectly. This has never been demonstrated in a GMD flight intercept test.

A Pervasive, Enduring Problem ~ Not a "Glitch"

Even a single technical issue can be intractable despite years of trying to solve it. The difficulty of resolving even a single technical issue was revealed in a recent GAO report. [9] The GAO report stated:

"Second, confidence in the performance of the BMDS is reduced because of unresolved technical and quality issues in the GMD element. For example, the GMD element has experienced the same anomaly during each of its flight tests since 2001. This anomaly has not yet prevented the program from achieving any of its primary test objectives, but to date neither its source nor solution has been clearly identified."

The GAO is describing an EKV anomaly that has persisted in GMD flight intercept tests for seven years, since 2001. If not corrected this anomaly could cause the EKV to temporarily lock onto the "wrong" target and miss the real target.

To solve the problem MDA implemented improved cable shielding, which was to have been tried out on a flight intercept test on December 11, 2002, but that test failed for other reasons when the EKV failed to separate from its booster.

The next opportunity to confirm the effectiveness of the shielding fix in a flight intercept test came two years later, but that test failed when the interceptor failed to get off the ground (December 15, 2004).

The EKV problem was then to have been corrected in a test three months later. That test also failed when it became the second flight intercept test where the interceptor failed to get out of its silo (February 13, 2005), although for different reasons than the first.

The EKV anomaly still has not been corrected, and was exhibited again in the two most recent flight intercept tests (September 1, 2006 and September 28, 2007).

After the better part of a decade, the MDA has not found the root cause of this unresolved problem.

Cost and Cost Effectiveness at the Margin

As noted earlier the United States has already spent over a hundred billion dollars on missile defense.

In FY-2009 the president's budget request asks for $12.4 billion for DOD spending on missile defense. The Missile Defense Agency itself accounts for $9.4 billion of that total.

On top of that, the DOD FY-2009 budget request calls for another $62.5 billion to be spent over the next five years.

If the Congress supports this spending on missile defense, by the end of 2013 over $110 billion will have been spent just since 2003, not counting the missile defense spending in the previous 20, 40, or 60 years.

Since there are no criteria established for the system, not even the Missile Defense Agency itself can say what the eventual costs might be.

The costs are open ended and there is no end in sight.

Some of the elements of the planned GMD system of systems do not yet exist. For example, SBIRS-High and the Space Tracking and Surveillance System (STSS) are billions of dollars over budget and years behind schedule. The GAO has reported repeatedly on the difficulties with these systems.

If, as the MDA asserts, the system can already defend the United States when two major satellite systems for missile defense – SBIRS-High and STSS – do not exist, why should the Congress appropriate funds for these satellite systems? And if these satellite systems are required, how can the MDA claim that the system defends us today?

While carried in the R&D portion of the DOD budget, the GMD program is one of the biggest procurement programs in history. MDA is planning to buy hundreds of new interceptors between now and 2013. This includes 20 more interceptors for the GMD system in Alaska and California, 111 SM-3 interceptors and 100 Terminal Sea-based interceptors for the Aegis BMD system, 96 THAAD interceptors, and about 400 new Patriot PAC-3 interceptors, and 10 new interceptors for the proposed missile defense system in Poland. This adds up to about 635 new interceptors proposed to be bought in the next five years. The cost for these new interceptors does not include new Navy ships to be bought or modified, two dozen new Patriot batteries, new THAAD fire control systems and FBX radars, nor the proposed new satellite systems, nor all the ground support equipment connected to these systems.

However, the threat being used to justify these enormous purchases has been exaggerated, and if it were real the proposed missile defense systems couldn't deal with it anyway.

This is an example of what Paul Nitze was talking about when he proposed the criteria of "cost effective at the margin."

It is easier for an enemy to increase its offenses than it is for the defender to increase its defenses against those new offenses. It is cheaper for an enemy to build more missiles as the Soviet Union did during the Cold war, cheaper for an enemy to add decoys or countermeasures, and cheaper to change the nature of an attack by firing many missiles at once or by firing them in unpredictable ways.

And if an enemy is going to attack the United States or Europe, the first thing they would attack would be the missile defense radars themselves, as those are the "eyes" of the system. To defend those "eyes" would require building defenses for U.S. defenses, ad infinitum, and would be prohibitively costly.

Incomplete Information for the Congress and the Media

Too often the MDA makes incomplete public statements. Particularly in recent years, both the DOD and the MDA have made statements about GMD effectiveness or capability that are at best inaccurate.

At a March 18, 2003, hearing before the Senate Armed Services Committee, Edward "Pete" Aldridge, U.S. Undersecretary of Defense for Acquisition, Technology and Logistics assessed the effectiveness of the deployed GMD system in the event of an actual attack. In that hearing Aldridge was asked by Senator Evan Bayh (D-Ind.) how effective the system to be deployed in 2004 would be against a North Korean missile launched at the United States.

Aldridge's response was, "As of today the projected effectiveness would be in the 90 percent range."

The Senator followed up, "If you're advising the president of the United States, and there is a possibility of the North Koreans hitting Los Angeles or San Francisco with a nuclear warhead, you are advising him that we would have a 90 percent chance of taking that down before it can get there, as early as the end of fiscal year 2004, and if millions of lives depend on it, that's your answer?" "Yes sir," Aldridge responded. [10]

Undersecretary Aldridge was mistaken. The United States did not have that capability in 2004 and still doesn't today.

The MDA Director at the time was asked later about Aldridge's assessment by a reporter from *Defense News*. The MDA Director gave an academic explanation of how Aldridge could be mathematically correct. The article reports the Director as saying that the initial system would be 90% effective if more than one interceptor was launched at an enemy missile "if you assume a certain level of success for each [interceptor] missile, which doesn't have to be very high, not greater than 50 percent…[and] if you did a math probability calculation and if you use six of those [interceptor] missiles to attack a single incoming warhead. … Secretary Aldridge was very correct. On a pure math basis, [Aldridge] was correct." [11]

Neither then nor since has the MDA conducted a GMD flight intercept test where they demonstrated the capability to bring down an enemy missile by firing six interceptors.

If it would require six interceptors then the proposal to place 10 interceptors in Poland will be inadequate against even two missiles from Iran.

On a more serious matter, the Pentagon may not have given the President accurate information about the capabilities of U.S. missile defenses. In an interview taped at the White House on July 6, 2006, President and Mrs. Bush appeared on *Larry King Live from D.C.*

This was two days after North Korea had tested a Taepodong-2 missile which fell apart about 40 seconds into its flight and flopped into the sea.

At one point Larry King asked the President what would we do if North Korea launched a missile at the US.

Suggesting we had a missile defense system that could shoot it down, the President replied, **"If it headed to the United States we've got a missile defense system that will defend our country."**

The very next day at his news conference in Chicago, the President was asked the question again, and said, "**Yes, I think we had a reasonable chance of shooting it down. At least that's what the military commanders told me."**

When the President said that the ground-based system hadn't had a successful flight intercept test in four years. In the two most recent attempts, the interceptors never got off the ground and failed to leave their silos. And in the only other recent attempt at that time, the kill vehicle failed to separate from its booster and missed its target.

Another example of incomplete information is the MDA description of the capabilities of the Sea-based X-band radar as being able to discriminate and track a baseball-sized object over San Francisco if the radar were located in Chesapeake Bay. [12]

What MDA doesn't say is that this might be true if the baseball was not moving and was standing still. As Cornell physicist George Lewis has explained, this is because to discriminate and track the baseball as MDA describes would require about a hundred and twenty pulses from the radar integrated over about 3.8 seconds. [13] But in that amount of time, a real enemy missile would have traveled nearly 17 miles and would no longer be in the field of view of the radar. And taking a clear moving picture with the SBX of that hypothetical baseball is something the MDA has not demonstrated. Thus, unless enemy missiles are going to stop in mid-air, and wait for the radar to get a clear picture, this description does not give the Congress a realistic appreciation for the operational capabilities of that radar in battle.

Just last week, in a letter to the Boston Globe, the MDA Public Affairs Director overstated GMD target discrimination capabilities. He wrote, "Your conclusion that the current technology cannot discriminate decoys from actual warheads is likely based on the word of so-called experts - people who have no access to information on advances in decoy discrimination technology because of the highly classified nature of such data. Five successful intercept tests from 1999 to 2002 used the type of decoys we would expect from countries such as North Korea and Iran, and future tests will introduce more challenging decoys to keep up with expected

threats." [14]

I am familiar with those five tests, and the types of decoy balloons used which were not classified. All of those five tests used balloons that did not resemble the target reentry vehicle. Thus, when Col. Lehner uses the word "discrimination" in his letter to the Boston Globe he is talking about discriminating between an elephant and a human, the elephant being the decoy balloons used in those tests that were far brighter than the target RV and of a different shape. However, the MDA has not demonstrated that the GMD system can discriminate between two "elephants," or two "humans," that look alike, that is, decoys that actually resemble the real target, and especially not without advance information about the two objects that no enemy would ever willingly provide.

In those five tests the defender was provided, and used, advanced information about how both the mock enemy target and the balloons would appear to the kill vehicle sensors. To continue my analogy, the defenders were told in advance what the "elephants," - the balloons - would look like, and what the "humans," - the mock enemy warheads - would look like, so that they would know what to look for. A real enemy might do something quite different, as for example, disguising their warheads with decoys that looked similar.

On the other hand, it is helpful that MDA acknowledged what the intelligence community has already said, namely, that if Iran or North Korea has the technical know how to field ICBMs carrying nuclear weapons and long-range missile guidance systems, it also knows how to field decoys and

countermeasures. It is also helpful that MDA acknowledged that the MDA needs to introduce more challenging decoys into its future flight intercept tests.

The Ability to Survive Direct Attack

The major elements of the U.S. missile defense systems are vulnerable to direct attack. For example, the floating Sea-based X-band Radar (SBX) is literally a sitting duck.

So also are the early-warning radars in Greenland and in England, as would be the radar proposed to be sited in the Czech Republic.

Many of the systems of U.S. missile defense program are housed in ordinary buildings providing no more protection that would a common warehouse.

But an enemy needn't bother attacking U.S. missile defense sites with bombs, munitions or Improvised Explosive Devices.

According to the DOD Inspector General in a report released on February 24, 2006, and as reported by *Federal Computer Week*, "the BMD system may have been left wide open to hackers with such serious security flaws that the MDA and its contractor, Boeing, may not be able to prevent misuse of the system." The report suggested that these security flaws made the system vulnerable to hackers who could cripple the missile defense network. [15]

The Nuclear Environment

The Pentagon does not explain it, but we need to remember that if we ever need to rely on missile defenses against enemy ICBMs it would be in an all out nuclear war.

In all out nuclear war some of those enemy missiles will reach their targets, including the ones that U.S. missile defenses miss.

Some enemy ICBMs might be equipped with warhead fuses to go off before an approaching interceptor would reach them.

Some enemy ICBMs might be deliberately triggered to explode at high altitude, to cause EMP effects and disrupt U.S. military command and control including U.S. missile defense command and control systems.

So when we talk about "realistic operational conditions," that includes the effects of the nuclear environment – mushroom clouds, blast, neutrons, x-rays - on U.S. missile defense silos, radars, satellites, and command and control installations.

There is no evidence that missile defense could be depended upon under those conditions.

The Role of Diplomacy

In 1999, former Secretary of Defense William Perry made a series of diplomatic trips to convince North Korea to stop developing and testing long-range missiles. He was remarkably successful in encouraging them to

enact a missile testing moratorium that held for some time. In fact, as news of his success reached the Pentagon, officials there joked: "There goes the threat!" The Pentagon appreciates a good threat to justify its programs, and the joke underscored that the most effective route in dealing with nuclear and missile proliferation threats can be through creative diplomacy, not military technology. Dollar for dollar, Dr. Perry was the most cost-effective missile defense system the United States ever had, and he showed that effective diplomacy is hard to beat.

Unfortunately, the Bush administration did not sustain and support that agreement, especially that the U.S. would stop threatening North Korea, and so North Korea went back to developing long range missiles. Now that Ambassador Christopher Hill is achieving diplomatic success with North Korea, not unlike Dr. Perry's success eight years earlier, people in the Pentagon must be saying, "There goes the threat," once again.

If North Korea and the United States continue to make progress in face-to-face negotiations and in the Six Party Talks, there will be little justification for the presumed-to-be-effective missile defense systems in Alaska, California, and Japan.

And once again, Ambassador Hill has shown that diplomacy, not technology, is the most cost-effective missile defense system.

Implications for the Overall Strategic Environment and U.S. Arms Control Objectives

At the G-8 Summit in early June, 2007, the strategic implications of

proposed U.S. missile defenses in Europe were on full display. In the weeks preceding the G-8 Summit, Russian President Vladimir Putin had set the Bush administration – and the world – back on its heels with talk of Russian missiles aimed at Europe in retaliation for proposed U.S. missile defenses in Poland and the Czech Republic. This set the stage for what the Bush administration thought might be a G-8 confrontation over its proposed missile defense system. Then on June 7, Putin proposed a smart missile defense technical and policy solution that demonstrated that the Pentagon had not adequately anticipated how U.S. missile defenses might be viewed by other countries, especially Russia. Putin proposed missile defense cooperation with the United States by locating the radar, proposed for the Czech Republic, in Azerbaijan

However, Putin's proposal opened up new options for U.S. cooperation that America may need. For example, a second radar site is planned for a powerful, transportable Forward-Based Radar whose location is yet to be determined but is intended to be closer to Iran than the site in the Czech Republic. Negotiations over this second radar site could bring additional Russian objections.

From the outset, the Poland/Czech Republic arrangement had raised questions about who exactly it was defending against? Was it really to defend against Iran, as advertised, or was it an attempt by the United States to locate missile defenses close to Russia and to defend the U.S. from Russia? Or was it part of a broader plan to establish U.S. military bases and a U.S. military presence closer to the Russian border?

In October, at a news conference following Russia-EU summit in Portugal,

President Putin drew the analogy with the Cuban missile crisis in 1962 when the Soviet Union based missiles in Cuba that could easily reach the U.S.

"The situation is quite similar technologically for us. We have withdrawn the remains of bases from Vietnam and Cuba, but such threats are being created near our borders," Putin said.

Just as 46-years ago America saw Russian missiles in Cuba as an alarming threat, Russia clearly feels that the proposed U.S. missile defenses in Poland and the Czech Republic are too close to its territory.

Of course, the Soviet missiles in Cuba were offensive, and the proposed U.S. interceptors in Poland are to be defensive. Nevertheless the U.S. proposal is in direct violation of the Joint Declaration issued in conjunction with the Strategic Offensive Reductions Treaty – also known as the Moscow Treaty – signed by Presidents Bush and Putin on May 24, 2002. That Joint Declaration calls for joint U.S./Russian research and development on missile defense technologies, and U.S./Russian cooperation on missile defense for Europe. The Bush proposal to establish U.S. missile defenses in Europe was neither joint or cooperative, and was undertaken unilaterally almost before the ink had dried on the Joint Declaration.

Putin also noted that the U.S. decision to deploy missile defenses close to Russia was presaged by the unilateral withdrawal in 2002 of the United States from the Anti-Ballistic Missile Treaty, which President Nixon and Soviet Communist Party Secretary Leonid Brezhnev signed together in Moscow in 1972.

Given the inconsistency of the U.S. relative to the aforementioned accords, it

is not surprising that Russia might regard the proposed U.S. interceptors as potentially offensive. The proposed U.S. interceptor missiles are two-stage variants of a proven launch vehicle, Pegasus missiles, which have enough payload and thrust to carry satellites into low-earth orbit. Accordingly, these missiles could easily carry nuclear warheads aimed at Russia. Russia may not be willing to take the Pentagon's word that these missiles are for defense only, and do not carry a lethal offensive payload. If Russian verification and inspection provisions are to accompany the deployment of U.S. missile defenses in Europe, those agreements themselves could take years.

Also, since the proposed GMD missile defense systems in Poland and the Czech Republic could not cover all of Europe, some members of Congress raised questions about why the United States would chose to "defend" some European countries and not others.

Ever since President Reagan's "Star Wars" speech in 1983, the U.S. has been saying it wants to cooperate with Russia on missile defense but through six administrations under Reagan, Bush 41, Clinton, and Bush 43, real cooperation has not been realized. Putin's proposal opened up new avenues for U.S./Russian cooperation.

Perhaps Russia and the United States will cooperate on missile defenses, but if they acknowledge that these missile defenses are not effective under realistic operational conditions, then the real benefit would be to show that Russia and the United States can cooperate closely on a difficult matter, not to actually defend Europe from Iran.

And if the MDA will not acknowledge that missile defenses are not effective

under realistic operational conditions, pretending that U.S. missile defenses actually might work in an all-out war, then they are also pretending that those U.S. missile defenses might work against Russian missiles. If those defenses are located where they might be effective against Russia, this is something which Russia cannot accept.

Russia has indicated strongly that it will not accept U.S. missile defenses being deployed in Eastern Europe. Russia has threatened to pull out of the Conventional Forces in Europe (CFE) Treaty, potentially restarting the Cold War; Russia has resumed strategic bomber training flights; Russia has threatened that it may have to aim offensive missiles at Europe; and Russia has announced the successful development of new offensive ICBMs with maneuvering re-entry vehicles that U.S. missile defenses could not stop.

Russia has also said they want the U.S. to stop the deployment of attack weapons in space, which they also find threatening.

Will our adversaries just build more and more ballistic missiles to overwhelm our missile defenses? Will they turn instead to cruise missiles, against which our ballistic missile defenses are helpless? Or will they attack us through our ports with containers containing nuclear, chemical or biological weapons? And what about terrorism, against which missile defenses are useless?

By spending such colossal sums on ballistic missile defense it is as if we have defined how our adversaries will attack us. We have declared that our adversaries will use ballistic missiles first and foremost – not cruise missiles,

not cargo shipments, not terrorism – even though our ballistic missile defenses are not effective against realistic ballistic missile threats. And we are choosing to ignore the international consequences of that choice, as well as the budgetary and technical consequences.

Just as the United States needs to think through how other countries may react to U.S. missile defenses, so also do NATO, Poland, the Czech Republic, and Japan.

For example, one option for the Poland or the Czech Republic is to make a decision similar to that made by Canada in 2005, when Canada decided not to participate in U.S. missile defenses. While still committed to NORAD, Canadians were skeptical that U.S. missile defenses would be effective. Also Canadians did not want to contribute to an arms race in space, and were concerned about the costs.

Interestingly, on January 3, 2008, the South Korean Defense Minister announced that South Korea also will not participate in the overall U.S. missile defense system, preferring to sustain their Sunshine Policy with North Korea. [16]

Poland and the Czech Republic each have their own point of view, but they share some concerns in common. Neither country faces a threat from Iran, but by hosting U.S. missile defenses in their territory they could motivate new animosity in Iran and other Muslim populations towards Poland and the Czech Republic.

In an actual ballistic missile defense battle, Poland and the Czech Republic would become the first targets that an enemy would attack, as simply a matter of ordinary military tactics.

By attacking the proposed Czech radar, an enemy could blind the system so that it could not see attacking missiles, and by attacking the interceptors in their silos, an enemy could disable the interceptors themselves.

Taken more broadly, Europe as a whole also does not face a threat from Iran, but by cooperating with the U.S., Poland and the Czech Republic might cause Europe to become a more frequent target of terrorists or even to be viewed less favorably by Iran.

Also, to the extent that Russia sees the proposed U.S. missile defenses as a threat, Russia might retaliate in some ways towards Poland or the Czech Republic, especially if U.S./Russian relations turned unusually sour. For example, President Putin indicated last year that Russia might target Poland and the Czech Republic, and threatened to deploy Russian medium-range offensive missiles in the Russian enclave of Kaliningrad on the Polish border.

Conclusion

The level of debate both in America and in Europe has not been adequate to inform the public about the limitations and liabilities of missile defense.

Thanks to belated but successful negotiations with North Korea, and a new National Intelligence Estimate for Iran, there appears to be no urgent threat, and if there were U.S. missile defenses are not adequate to the task, because

of the artificial constraint that an enemy would only attack with one or two missiles, and would use no decoys or countermeasures.

The U.S. proposal to establish missile defense sites in Poland and the Czech Republic has alienated Russia to a degree not seen since the height of the Cold War, and for no good purpose since the proposed U.S. system in Europe has no demonstrated capability to defend the United States, let alone Europe, under realistic operational conditions.

It is a truism that Americans and the U.S. military have a tendency to count on technological breakthroughs to solve thorny national security problems. Many Europeans hope that U.S. technology could be relied upon to solve international conflicts, too. Technology has produced some amazing advances, such as personal computers and the Internet which have changed our lives at home and at work. But too often America relies on technology as the first, best hope to save us from our problems. This is apparent in fields as diverse as defense, medicine, and the environment. By appealing to a single-point technological fix, we hope we can avoid dealing with the long-term problem. In national security, as in other fields, we use our hope for technological relief as an excuse to avoid dealing with our adversaries – sometimes at a very high cost in political and economic terms; sometimes in dangerous self-delusion about our own military capabilities in the global environment in which we all exist.

End Notes

[1] Reference: Enabling Joint Force Capabilities, DSB, 2003.

[2] See Congressional Budget Office, "The Long-Term Implications of Current Defense Plans and Alternatives," various years.

[3] 2007 Space and Missile Defense Conference, "Future Opportunities and Challenges facing our National Security with particular emphasis on the Emerging Missile Defense Threats and Space Operations." August 14, 2007.

[4] White House Fact Sheet: Defending America and Its Allies Against Ballistic Missile Attack, *President Bush Explains Need For Missile Defense System In Europe, Discusses Progress Defending America From Attack,* Office of the Press Secretary, October 23, 2007.

[5] Statement for the Record to the Senate Foreign Relations Committee on Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015, by Robert D. Walpole, National Intelligence Officer for Strategic and Nuclear Programs, September 16, 1999.

[6] For example, see work on reflective white paint by NASA et al.

[7] A test with a tumbling RV is important because an enemy might no"spin up" its warheads for greater accuracy. If aiming at Los Angeles an enemy doesn't need accuracy. Sometimes in tests the U.S. will have trouble spinning up an RV and it will tumble. An enemy could have that trouble also. A tumbling RV presents a "blinking" signal to the GMD sensors. But other objects in the target suite - traveling along in space with the warhead RV - are tumbling also, for example the bus, and other pieces of metal or debris from stage separations. If the GMD system cannot tell one object that is tumbling from another, it won't know which one to aim for.

[8] Nighttime tests are important because the GMD system uses infrared heat sensors to "see" the target. At night the enemy reentry vehicle may not have been exposed to the heat of the sun, and so it could be colder and harder to see.

[9] "Assessment of Progress Made on Block 2006 Missile Defense

Capabilities and Oversight," Statement of Paul Francis, Director, Acquisition and Sourcing Management. Page 7.

[10] March 18, 2003, hearing before the Senate Committee on Armed Services.

[11] Gopal Ratnam, "Delay May Slow Missile Defense Effort, Kadish Says," *Defense News*, 14 April 2003, p. 34.

[12] For example, testimony by MDA Director Henry Obering before the Defense Subcommittee of the Senate Committee on Appropriations, April 25, 2007, where in response to a question from Senator Byron Dorgan, Lt. Gen. Obering said, "If we place it in Chesapeake Bay, it could actually discriminate and track a baseball-sized object over San Francisco."

[13] G. Lewis, draft, "The U.S. Missile Defense Radar Program," April 5, 2008.

[14] Letter to the Editor, Boston Globe, Rick Lehner, U.S. Missile Defense Agency, Washington, DC., April 11, 2008.

[15] DoD Inspector General (IG) report, *Information Technology Management: Select Controls for the Information Security of the Ground-Based Midcourse Defense Communications Network* (D-2006-053) (http://fcw.com/article92640-03-16-06-Web)

[16] "S. Korea Opposes Joining US Missile Defense System" The Korea Times, January 3, 2008