

120415 Center for Strategic and International Studies (CSIS) Panel Discussion with Retired Brigadier General Kenneth Todorov, Former Deputy Director of the Missile Defense Agency; Retired Admiral Archer Macy, Former Director of the Joint Integrated Air and Missile Defense Organization; Retired Lieutenant General Richard Formica, Former Commanding General of the U.S. Army Space and Missile Defense Command; Retired Rear Admiral Joseph Horn, Former Aegis Ballistic Missile Defense Program Executive; and Thomas Karako, Director of the CSIS Missile Defense Project, on “Full Spectrum Missile Defense”

MR. THOMAS KARAKO: Thank you all for coming. I’m Tom Karako. I’m a Senior Fellow in the International Security Program here at CSIS and Director of the Missile Defense Project. That project launched earlier this year, in May, with Vice Chief of the Joint Chiefs of Staff, Admiral Winnefeld.

We’re here today to talk about what we’re calling “Full Spectrum Missile Defense,” and by that I really mean a set of issues, including the prospects for countering missiles left of launch, all forms of engagement, integration of offensive forces, including the so-called cost curve. I want to thank our sponsor for the event, Boeing Company, which sponsored several events this year in the missile defense speaker series. Let me set the stage a bit for what our topic is, why we’re talking about it, and who we have to so.

The panel today comes just after the year mark for a memo that came out last November, the so-called 8-stars memo, which was directed to Secretary of Defense Hagel by the Chief of Naval Operations Admiral Greenert and Chief of Staff of the Army General Odierno, which called on DOD to do a strategy assessment of the missile defense mission generally. There are several things worth remarking about that memo that I think will tee-up what we’re going to discuss here. One is that despite any policy statements to the contrary, they remarked that the policy statements say we will continue to outpace the threat. The memo remarked, actually, that the threat is outpacing us, outpacing our defenses.

They also remarked that our current strategy is unsustainable, which is perhaps a reflection, among other things, of our budget limits. It also called for a new and holistic approach to the BMD problem, one which incorporates left of launch and non-kinetic means. And, they called for more attention to doing all this in a more cost-effective manner.

So I think in part sparked by that memo, but not only because of that, there has been a fair bit of discussion about several of these concepts: left of launch, non-kinetic and the cost curve. The frequency of that discussion does not necessarily reflect the depth or sophistication of it. And so part of our purpose here today is to dig into some of those things and see if we can’t learn a little bit about how we ought to think about them. So I’ve asked our several panelists today to help us do just that.

For example, in terms of left of launch is it, as I think has sometimes been

portrayed, kind of a substitute for missile defense? Scud hunts, after all, are hard, as we've seen, for the United States and for partners like Saudi Arabia and the Emirates. On the non-kinetic side there may be a lot of opportunities, but at the same time there is no such thing as a magic wand. Just how concrete and how much faith ought we to place in those kinds of possible capabilities?

And cost curve, what exactly does that mean and how ought we to be thinking about it? Is the relative production cost of a THAAD interceptor, as compared to the relative cost of a Nodong, is that the right question to ask? How do we calculate the cost curve? What factors go into that and what are the right questions to ask? Is cost curve the right questions when making decisions about allocating resources? There's also real questions of capacity that I think we'll probably get into.

This panel is not merely a response to these current questions, but it's looking forward. 2016 is an election year and whoever comes in in the next administration will have to make some decisions about what our future missile defense strategy is going to be. Missile threats of various stripes frequently top the list of priorities, of threats, of these kinds of things, to our forces, to our allies, to our homeland. How are we going to deal with that evolving problem?

So in part this is about the issues I just said, but it's also about teeing-up a conversation really for the 2017 timeframe for the Missile Defense Agency, for the Department of Defense, and beyond. So now let me move to our speakers to address these things. In case it's not obvious, we've put together a panel of some pretty senior and distinguished retired officers with a lot of missile defense experience, but also reflecting a diversity of experience on the missile defense mission.

We'll have, first up, retired Rear Admiral Arch Macy, who is among other things, the former Director of the Joint Integrated Air and Missile Defense Organization. He'll give a high-level joint perspective. Then we'll have retired Brigadier General Ken Todorov, former Deputy Director of the Missile Defense Agency, who also will be speaking from a NORTHCOM and war fighter perspective. Retired Lieutenant General Nick Formica, the former Commanding General of U.S. Space and Missile Defense Command, but also with STRATCOM as Commanding General of the Joint Functional Component Command for Integrated Missile Defense. And finally, retired Rear Admiral Joseph Horn, among other things the former Aegis Program Executive.

So, we'll get started. We'll go in this order. And after they each go we'll have a conversation among ourselves and with the audience. Thank you.

Arch.

ADM. ARCHER MACY: Good morning, it's an honor to be here today. I like talking about this topic. I like to believe from time to time I have something to contribute. I do want to emphasize that I am a retired officer. I no longer hold an official position, so while I'm going to make some comments of what I think ought to be done

from a joint strategic perspective, I am not speaking for the Joint Staff or the U.S. government any more.

I believe, as Tom said, we need to highlight some of these issues for ballistic missile defense and start a conversation. We've been having it for a number of years now and we're reaching the point where certain things are coming to be fielded, are effective, and we are also seeing changes in the threat, not only in the technical threat but in the user threat and the number of people or entities which might find it opportune to use missiles against us given the right conditions.

As Tom said, regardless of who wins the election some 340 days from today, we'll have a new president and a new administration and they'll be leading the country and deciding on the planning and execution of our national defense starting in January of 2017. It seems reasonable to me to assume that they will undertake a review of the national defense strategy in its many parts and facets to determine what elements of that policy are satisfactory and which should be changed. This, of course, is exactly what the Obama administration did in early 2009, which resulted in the Ballistic Missile Defense Review, or the BMDR, that was published in February of 2010.

So as we look forward to a new administration and a new Congress in about 14 months, I think there's three areas ripe for discussion of BMD for them to consider and for us to have a discourse on as those decisions come to be. First, I believe we need a whole of government strategic plan and operational structure for BMD. BMD effectiveness is not based only on the Department of Defense.

Second, within the department we need a campaign to integrate the range of BMD capabilities from far left of launch all the way to the classic right of warhead intercept. There's a lot of stuff out there and we've got to figure out how to make it work together as best as it can.

And third, we need a change in the discussion of the cost of ballistic missile defense to better reflect the real environment and strategic details and resource decisions that have to be made. I'm going to talk about each of these. However, at this point I think we should briefly review the six priorities laid out in the 2010 BMDR, and these are in order.

The first, defense of the United States homeland against the threat of limited ballistic missile attack. Second, defend against regional missile threats to U.S. forces while protecting our allies and partners and enabling them to protect themselves. Third, test our developing capabilities to ensure that they can reliably and effectively help U.S. forces accomplish their mission. Fourth, develop and field a BMD capability that is fiscally sustainable over the long term. Fifth, base BMD planning on reasonable judgments about current and prospective threats to the United States and its allies, and ensure that the capabilities are adaptable. And six, seek to lead expanded international efforts for missile defense of allies and partners that will provide pragmatic cost-effective capabilities.

That's obviously a direct list out of the BMD report. I personally believe that any subsequent BMD review will find that these will remain the basic criteria for the ballistic missile defense of this nation, or for that matter, of any other nation which chooses to develop its own BMD capability. My comments today are constructed within that framework. They may find different ways to enact it, but those are the things that they're going to have to accomplish.

So talking about a whole of government strategy and a plan, here last spring I commented on the need to consider holistic ballistic missile defense strategy that encompasses all the elements of national power. This proceeds from the simple fact that we cannot afford to build enough interceptors to engage the quantity of threat missiles which can be presented to us. And even if we could, we can never expect a 100 percent probability of defeating all of them regardless of the techniques used. The realities of the limitations of physics and engineering, human error, and the cruel life of statistics, means one can never get there.

Therefore, ballistic missile defense cannot consist simply of defeating the launch, flight, targeting and arrival of all of the missiles an enemy could employ. We cannot simply play catch. Thus the real purpose of ballistic missile defense is to provide sufficient protection of our own critical assets long enough to allow other methods to end the threat. By this I mean that the enemy no longer has the ability or the desire to continue launching threats at us.

This must be accomplished by bringing all elements of national power to bear: diplomatic, information, other military capabilities, and economic. By use of this spectrum we present the enemy with an overwhelming decision to cease his actions, and in a deterrent fashion, by making it clear by our preparations, that he has no possibility of achieving his aims by use of ballistic missiles and in fact will suffer grievous harm for doing so. So the challenge is to develop a true whole of government organizational and operational approach to first prevent, and if necessary respond to, a ballistic missile threat.

We must consider in far greater detail the elements of DIME, the previous list of powers that can be effectively employed, and develop the plans and decisions points that will be necessary to use them. Given the flight times of ballistic missiles, ranging from a few minutes to something well less than an hour, this approach must be developed, resources and rehearsed well before the first enemy launch. We will have hours to days to be successful or to fail while doing so.

This, of course, becomes a more complex form of planning and execution perspective when considering regional defense with a territory and contributions and decisions of allied and neutral nations which must be incorporated. However, I can say from my own experience working with NATO, with the substantiation of ballistic missile defense within NATO and the acceptance of it as a core mission, there are a lot of discussions among the 28 nations and what it would mean and what decisions would be

made by whom and how much time would be available to make those decisions. The partner nations well understood the challenges and complexities and worked very hard to address them successfully. The ballistic missile threat is one that by its very extraterritorial nature tends to get everyone's attention.

So, the first challenge for the next government, executive and legislative, is to consider how and in what manner to develop this whole of government approach; and how just as critically to put it in place and make it operational. Within DOD, looking at the range of BMD capabilities from left of launch to warhead intercept, I've spent a good chunk of my life as an air defender of one sort or another. And in the final analysis of air defense -- and the same is true of missile defense -- it doesn't matter why the enemy missile did not hit, just that it didn't. That constitutes success.

So what can we do to prevent that final occurrence? A defense plan has to have available to it all the regions of the ballistic missile defense operation to challenge its ability to hit. These include preventing launch, preventing successful flight, preventing successful navigation en-route to the target, and negation or destruction of the warhead or warheads that it's carrying. DOD is currently developing a variety of different ways to achieve effects in each of these regions, from the commonly termed left of launch to warhead intercept.

However, to achieve the level of protection we desire, all of these different techniques will have to be synchronized to some degree in time and space, as with any other military operation. As I talked about the whole of government approach, the inter-DOD ballistic missile defense campaign will have to have a structure for planning command and control to best enable it to use all of those different capacities. Further, this capability must be tested, trained and rehearsed before it is employed to be successful.

That is nothing new here. Anyone who has been through any command and staff school would say 'so what, that's how you do things'. The issue then becomes, as we include more capabilities that are not part of traditional intercept, the more we stray away from common missile defense and air defense doctrine, command organization and planning for air and missile defense, the more complicated it can become. This is compounded by the fact that many of the non-intercept techniques being developed are highly classified, so the number of people who are aware of them is very limited. This can significantly impede the effectiveness of those techniques in use against an overall BMD capability, because no one knows when to use them, how to use them, or that they exist -- or very few people do.

I therefore suggest the development of an overarching doctrine for BMD accompanied by planning and operational structures knowledgeable of all the detailed capabilities of the various available techniques. This will, of necessity, cross many service and combatant commander lanes in ways that are not currently connected, and will need to be trained and rehearsed well before the first threat enemy launch decision is made. This is a step down from a very high level joint doctrine that you get in [Joint

Publication] 3-01, but it's the level at which you're going to say we really have to put this together and people have to know the command and decision authorities and the scheduling and timing authorities, to most effectively lead them.

This may well call for unified command plan changes, always a very difficult discussion, and perhaps the establishment of a ballistic missile defense command that can conduct BMD operations, answering to the direction of the multiple effective combatant commanders. Bear in mind, in most cases a BMD flight that's longer than 1,000 or 1,200 kilometers is probably going to cross at least two AORs, two areas of responsibility. And now you've got to have two different commanders figuring out how to work together. In the next two years I suggest that the DOD consider the challenge of BMD from an entire doctrinal perspective, including the many different methods of operationally and tactically contributing to the success of the defense, and develop the organizational command and technical framework that will best enable its operations when called upon.

Lastly, a discussion of the cost of ballistic missile defense and a change, perhaps, to better reflect the real resource decisions that have to be made. There is, as Tom brought up, an ongoing discussion about the cost curve, often using the analogy of comparing the cost of the missile defense intercept to that of the threat ballistic missile, indicating that that's an appropriate concern. I submit that that is not the case. It doesn't matter.

If there is to be a cost comparison here, the more salient view is to consider the cost of the target, i.e. a city, to the cost of the threat ballistic missile, including its launch and targeting. That, of course, is nonsensical as we're not going to balance the cost of the threat missile to that of an American, or allied, city or deployed force and the lives it contains. What we really need to talk about is the affordability curve. This considers the question of, what is the best defense against ballistic missiles we can achieve using the various elements we have or are developing with the funds available?

In this position we can then develop the more pertinent questions, which include: what combination of all the contributions to missile defense provides the best overall capability at what cost? If that cost is not affordable, then do we need to provide additional resources? Or, if we cannot provide additional resources, then what other capabilities must be developed to provide the required defense that we need within the available resources?

There's nothing new about these questions. They're the same ones taught in any war college strategy course, and that we apply to other areas of warfare at which we plan, program and budget our defense. We now need to apply this broad spectrum planning and analysis outside of just the intercept capability to ballistic missile defense capability. This leads me back to my earlier two points as we consider the affordability question. It is not a single point solution or single department solution, and we must consider the integration of all capabilities in the best manner we can afford.

In conclusion, then, I offer three challenges for discussion and consideration over the next two years. How to develop across all the branches of government from the White House to DOD, State, Treasury, all the departments, a whole of government strategic plan and operational structure for BMD. Second, a DOD planning, organizing, equipping, training and rehearsing campaign to integrate the range of BMD capabilities from far left of launch to warhead intercept. And third, a change in the discussion of the re-sourcing of ballistic missile defense from the cost of the intercept to the affordability of a full government solution that provides the agreed upon level of protection.

Thank you for your attention and I'm looking forward to the discussion.

GEN. KENNETH TODOROV: Before I launch into what I've prepared to say, can I ask the admiral a question in the interest of the conversation? You said you'd been an air defender for a lot of your years in the service, and you made some great points about the holistic capabilities: end-to-end, offense, and defense. Cruise missiles are increasingly becoming a concern, particularly to the homeland. How does IAMD and the integrated air piece fold into this? Should it be a BMD only look or do you think we ought to look more broadly and start to bring in the integrated air piece. I think you would agree that we don't fight wars in vacuums?

ADM. MACY: From a homeland defense perspective I believe that it will be a sequential set of considerations. The interesting thing to me about ballistic missile defense is the physics of it, and it goes so far so fast. As I said, it's nine minutes from one part of the world to another, located east of us; and it's 20 to 25 minutes from another part of the world to us coming from a different direction.

That's physics, there's nothing classified about it. Any second level aeronautics degree student should be able to calculate that without too much work. So those ranges, those thousands of kilometers and the speed with which they occur, make them practically different than cruise missiles and attack bombers, because they just don't go that fast that far.

That said, they do need to be considered. They obviously are connected in many ways and do share a lot of the same sensors and in some cases the same interceptors, increasingly. In a regional fight it is a much more immediate solution.

So yes, the simple answer is yes. But I believe that -- again, going back to the priorities in the BMDR of homeland defense first, the immediate issue is dealing with the protection of the homeland. That is where we need to start building this full spectrum capability.

GEN. TODOROV: So should the next BMD really be the IAMDR?

ADM. MACY: It could be, I don't know. I would suspect that may be too much to bite off, and that you need to start off with okay, we are not comfortable with where we are at ballistic missile defense now, what can we do to significantly improve it. And

leave to the regional commanders the air defense fight, which they have a pretty good handle on at the moment.

GEN. TODOROV: Thanks, thanks for letting me ask you a question. Tom, thank you for hosting today, not only today but sort of the whole series that you've outlined. Your work here at CSIS has been exemplary. Thanks for advancing the ball and the conversation. My colleague members, all of whom are mentors to me -- I came to this business sort of later in my career and all three of them in different ways have shaped me in my views, and so I'm grateful to each of you and it's an honor to be with you on the panel today.

Tom asked me to put on two of my former hats. The same disclaimer that Admiral Macy described applies to me. They are former hats.

I was for a time at the United States Northern Command as the Deputy Director of Operations there. The day-to-day sort of operational care and feeding of the Ground Based Midcourse Defense System is where I cut my teeth. I was also for a time the Director of the Joint Integrated Air and Missile Defense Organization.

Arch did a great job of speaking for that perspective, so I'm not going to do that today. Most recently, the Deputy Director of the Missile Defense Agency until this past summer. And in my trade and my heart I'm an operator, so I always provide my operational guy perspective, and that's sort of how I'll come at this today.

This debate is an excellent one, and some of the questions that Tom posed in the beginning are really on the front burner of discussions in this community. I'm starting a Tesla Fund. I've got an eye on this car that I really like. I can't afford it, but every time I hear 8-star memo, every time I hear the term left of launch, for every time I hear something about the cost curve, I put five bucks on a jar. So thank you for I think \$25 today. I'm getting close to the Tesla, but I've still got a ways to go.

But my point is there's a ton of debate and a ton of conversation in this community about those things. And I'm not certain we all have a common understanding of what all those things mean, part of the reason you're doing this series. But a lot of people have -- they think they know what it means, and I don't proclaim to have all the answers, but I'm not even sure I know what they mean.

So I think the first thing we've got to do is advance the conversation and sort of come to some common understandings on what these things really mean to us. But here's what we do know. In my mind, we do know that the threat is doing this, in terms of quantity and quality and sophistication.

Admiral Winnefeld, if you heard his remarks this past summer here in this very room, he said things like, it's hard to do countermeasures and we always talk about the adversaries advancing capabilities. And he's right. But clearly from what we've seen, and you can read it in the open press, the capabilities are increasing and the numbers are

increasing. So that's a problem.

I agree that we can't -- the phrase is often used, we can't buy our way out of the problem. I absolutely agree with that too. Some of the things that Admiral Macy pointed out about a fresh look at this certainly apply, for that reason. We can't continue to be on a negative trajectory when it comes to the cost imposing the way ahead for this mission area. There will never be enough. Increasingly there are less and less, but we can never assume that we'll have enough to do everything we need.

So what are the other ways we can get at the problem? And by nature, this stuff is expensive. It's sophisticated. It's top of the science food chain, if you will. But as I'll point out towards the end of my remarks here, it doesn't always have to be expensive stuff that can contribute. And I'll explain that in a moment.

There's a lot of talk in the department about third offset. I'm sure that a lot of you are familiar with that, this notion that Secretary Carter has, and I think rightly so, emphasizing innovation. And so we need to consider that when talking about this problem. The Advanced Capabilities and Deterrence Panel, which is a group within the department that looks at ways and sort of endorses methods of getting at this problem, they are fully onboard with what does left of launch mean? What are some of the new capabilities that we might be able to get at this problem, for the reasons I mentioned?

But I find it interesting that in the face of that, and sort of this acknowledgement about third offset and the work that the ACDP is doing, that just this week Secretary Carter came out and said that, I think the quote was, "We will take disproportionate hits to research and development, to S&T, to new technologies." And I don't think it's because that's what he wants. I think that's really sort of what's being forced on the department based on the budget and based on some of the circumstances. Yes, the recent deal on the Hill is some stability, but it doesn't go far enough, in my mind, to solving the longer term problem.

So in the face of third offset and new technologies and left of launch, and some even going as far as saying we can just sort of hit the pause button on what we have with hit-to-kill and rely on all this new whiz-bang stuff -- a technical term, whiz-bang. Some are saying as much as we can just stop the work on hit-to-kill and we can just rely on all this new stuff. And we are a way away from the, quote-unquote, "new stuff."

And so we have to face that reality too. I think Mr. Kendall said it right this week that we will take disproportionate hits on R&D and S&T. So they're at odds with each other, right, and I don't think in this debate we can ignore the value of hit-to-kill and all the work we've done, which is by the way hit-to-kill works. There are hit-to-kill deniers. I think the term I've heard recently is hit-to-kill deniers out there, and I disagree with them because I know first-hand that it does work, and we can talk about the stats.

The other point I'd like to make about the five dollar Tesla jar, when I hear 8-star memo, is that I certainly respect the two officers that wrote the memo and I kind of wish

that it hadn't been leaked. It wasn't their fault. I kind of wish it was at the FOUO level because there's been a lot of talk about it, almost disproportionately so. It is a very good perspective and there's a lot of validity to it, but it is just a service provider perspective.

So what I'd like to see is the 12 or 16-star memo, the combined NORTHCOM, PACOM, STRATCOM, EUCOM, throw in the combatant commanders perspective, and sort of compare those two side-by-side. It's easy for the combatant commanders to say, we want more because they don't pay for it. And I get the service perspective on 8-star memo, because they can't continue to fund this stuff.

By the way, they don't consider it their top priority. They have other priorities. They have other priorities for the services writ large, so I understand it.

But the 8-star memo is not the only sort of conversation piece out there. We need to consider what the other perspectives are. So let me talk about what I think the NORTHCOM perspective is.

I haven't been there for a few years but I maintain a lot of contact with, and have a huge respect for: Admiral Gortney; before him General Jacoby, who is an officer that I worked personally for; Admiral Winnefeld and General Renuart. You can go down the list of the last several commanders and I think they would all say the same thing. As long as they're charged with the responsibility of defending our homeland, which as Admiral Macy said is job number one, Ground Based Midcourse Defense is going to be front and center in their portfolio. They're never going to completely be comfortable in abdicating those responsibilities to the left of launch kind of stuff because they're ultimately responsible for defending our nation and our homeland, heaven forbid they have to, from a limited ballistic missile attack.

I've heard Admiral Gortney say in testimony he is confident in the system that we have today, that it can defend his area of responsibility. But I also know that he is in agreement with Admiral Syring, my former boss, when we said that we've got to continue to make upgrades and changes to the Ground Based Midcourse Defense System, things like improving the kill vehicle, which we're on a path to do with the Exo-atmospheric Kill Vehicle, and to follow that the Multiple Object Kill Vehicle which I think really gets at some of the -- we'll talk about that in the cost curve piece here in a moment.

So improving the capability of the existing capabilities of the GMD, we absolutely can't hit the pause button on our capabilities, because as I started with the threat is increasing. And so we too have to increase our capabilities: improving discrimination; improving our sensors, not only in discrimination capability but how we link those sensors together; contributions from our allies as well. And also things that we tend to ignore in improving some of the non-sexy parts of the GMD, like the ground systems and the infrastructure and the thousands and thousands of miles of cabling that goes to make this work. And C2BMC, the node that puts it all together and talks across

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seams of warfighters, those are the kinds of things that we can't take our eye off for the sake of left of launch, for the sake of a wrong-sided cost curve. We've got to figure out better ways to do it, but we must continue to do it.

I'd like to propose that there are challenges with left of launch, namely I think pre-emption. If your understand of left of launch is we're going to do everything before there's even an IR event in some country, that there's a missile potentially on our way, then we need to have discussions about pre-emption and what that really means. Are we, as a military and as a nation, within our toolkit to pre-emptively go after potential targets in advance?

Now clearly if one gets off the rail and we knock it down with GMD, then pre-emption is less of a factor because there's intent. But it goes back to deterrence. It goes back to deterrence for the nation and how does left of launch fit into that?

I'd like to propose something -- maybe I'll start a new contribution to my jar -- slightly right of launch. And what I mean by that is I think there's a lot of fruit and a lot of money to be made in the boost phase and the ascent phase of this discussion. So in some ways it would be easier from a deterrence standpoint and I think there's less problems if something leaves the rail and we've identified it as a threat to the defended area, what about the blue space? Can we knock it down there? What about the ascent phase? There's been a lot of good work done on that. I think we need to continue those efforts and not ignore those slightly right of launch efforts.

And in my mind hit-to-kill will always be part of the equation. It will always be a part of the warfighter's, the operator's toolkit. Yes, there are a lot of capabilities that could be brought to bear at left of launch, slightly right of launch, but at the end of the day hit-to-kill works. The deniers have their say, but the reality is GM is four for seven in its tests, particularly the last test. The intercept test was successful. MDA is on a path to deliver those capabilities again with advancing scenarios and degrees of difficulty.

THAAD, if you take the operational THAAD as it is deployed 11 for 11, getting beyond the long-range stuff. And if you get the PAC III, the Aegis BMD -- and Admiral Horn can talk a lot better than I can to it -- the numbers are very good, 21 for 25 I think on both of those, and it works. Let's continue to improve it. Let's make it part of the total war fighter's toolkit, as opposed to just ignoring or hitting the pause button on that.

How much is enough in terms of GMD for the NORTHCOM commander? How many interceptors does he, or one day she, need? I don't know.

But I would like to say that the path that we're on for 44 GBIs by 2017 is a good one. The efficiencies that we're taking to make the kill vehicle more lethal, more reliable, will help to get the shot doctrine that the war fighter has today to a lower level, something less than it is today. I think that's the goal, taking efficiencies, reducing shot doctrine, continuing our work on the kill vehicle and the multi-object kill vehicle that will follow it, those kinds of things that can make our existing systems more efficient. And

yes, it's still expensive work, but we have to undertake it. And I think that part of the total equation is certainly appropriate.

Let me shift to my other former hat, my MDA hat, just for a moment and talk about the future of MDA. Again, I'm no expert there but Tom has done a lot of good work recently, if you've seen some of the things he's put out about what MDA has come from where they started and what they were chartered to do, to the direction it has gone, frankly because they've been victims of their success.

If you take a look at the Missile Defense Agency's budget, it has declined commensurate with the rest of the department's budget. That is understandable. But if you take year-by-year in a bar graph of a budget that has been declining, each year more and more the Missile Defense Agency finds itself doing more procurement. They find themselves doing more operational kinds of things.

I sat at my desk as the deputy director with a red switch on my desk. It was linked to every GCC command center. And when the TPY-2 radar went down at Shariki, I was on the phone working operational kinds of things, making sure we got parts and men and women and equipment out to those sites to get them back operational again. I was talking to the warfighter.

There were operational kinds of things that I did in my job at MDA. I'm not sure that's the job that MDA really should be doing. I propose that we let MDA get back to their business at hand because the left of launch piece is important, the new technologies are important, and all the efficiencies that we need to take are important.

So we need to let MDA do less procurement for the services, which MDA is very good at doing. The services like it, they don't spend their money doing it, but we need to do less and less procurement and more and more of R&D new technologies advanced kinds of thinking. I would propose that and not let MDA get distracted with those other types of things. There are some issues there, and we can talk about those in the Q&A if you'd like.

I mentioned to Admiral Macy the IAMD piece. MDA has been chartered as the technical authority for integrated air and missile defense. So there's another whole conversation that we can have take place of how much does MDA expand its role, either in IAMD, in the air piece, or in a role in these new technologies, the new left of launch that seems to be so in vogue these days. So the identity of the Missile Defense Agency, I think, is a debate that we'll have. I take Admiral Macy's point about the potentially a BMDR 2.0 or a refreshed look at the charter of the Missile Defense Agency is in the offing.

One thing that I go on record all the time as saying is don't -- as you know, the 5000 series in acquisition, in MDA, have a different rule set for that. Don't take that away from the Missile Defense Agency. It would be a mistake in my mind. They do it very, very well and they respect the privileges that they have, I think to MDA's credit.

They need to continue to be allowed to do that.

Let me close my remarks by talking about the cost curve a little bit, because I know, Tom, that's something you wanted to talk about. I hear a lot, like I've mentioned, we need to get on the other side of the cost curve, or we are on the wrong side of the cost curve. And then sort of the conversation stops, often.

And so let me kind of throw out six things, six broad ideas. None of this is particularly deep, but I think is a jumping off point for some of the things I've been thinking about. How do we truly get to the right side of the cost curve, if that is the goal?

Number one is I think we truly, truly need to embrace innovation. And what I hear from the department on third offset and some of the approaches, is very welcome. However, as I mentioned, in the same breath, we hear cuts to R&D and S&T.

That flies at odds -- and again, I'm not casting blame on anyone for saying that. I think that's really been forced upon them as a matter of necessity. As an operator, I understand that readiness is important too, and we've got to keep our airmen, sailors, soldiers and marines operating with good confidence out there. So I understand why, but there is a little bit of a dichotomy there, where we're embracing innovation and new approaches and yet we're cutting R&D and S&T.

Number two, let MDA be MDA. Let them get back, if you will to the business of really focusing on the best and brightest minds in the nation, along with all the help we get from industry and things like this. Let them get back to thinking about new ways to get at the problem, as opposed to buying interceptors for services and running operationally things around the world.

Number three, I think we need to step up and really commit to the ideas within research and development that hold promise: the rail gun, directed energy, cyber, those kinds of things, those left of launch ideas, in addition to the slightly right of launch ideas that I posed earlier. All a part, by the way, of the chairman's vision for IAMD and missile defense for 2020.

Number four, I think industry has to step up and help. The approach that industry is taking, which is a collective approach towards the Re-designed Kill Vehicle is a good one, sharing ideas, being willing to cooperate and collaborate on, as Admiral Syring used to say, the best of the breed, for the RKV. It's a great approach. It takes some selflessness on the part of our industry friends, and I understand profit loss, but I also understand the needs of the nation and I ask industry to help us with that.

When you buy an Apple computer it talks to your iPhone, your Mac book, or whatever it is. All those devices talk to each other. When partners in industry field systems, not only do they not necessarily talk to other industry, other partner systems -- I won't name names -- but they don't talk amongst themselves within that whole company. So interoperability, which is again an imperative in the chairman's vision for how we get

at this, has got to sort of rise. I guess I'd call to action my industry friends that you at least consider that, more interoperability not only amongst yourselves but amongst your competitors, and amongst other nations as well.

Number five, don't ignore the goodness that passive defense brings. There's a method to my madness in how I chose these. I went back to the chairman's vision. Passive defense can relatively, comparative to the expensive stuff, is relatively cheap stuff: denial, deception, mobility, hardness, good old military information operations which every war fighter would want, as a partner, to use. We don't utilize that stuff nearly enough.

And what about the firing doctrine. You know our friends and partners in Israel see a threat that's coming over their head and it's not going to hit anything, guess what, they let it go. And I'm not a tactical operator of these systems, and I guess there would be a debate about this, but what about starting to instill the idea that we don't need to send interceptors up to hit that thing if it's going to land somewhere that's benign and is not a part of the defended area. Just an idea, it's something we need to consider again getting at the right side of the cost curve.

Finally, as I mentioned, but I'll foot stomp it, we can't abandon hit-to-kill. We have to look for efficiencies in how to make it better. It's always got to be a part of the war fighter's toolkit. For GMD, some in industry have proposed a two-stage GBI, which I think is a great idea. General Formica and I were talking just yesterday about a global GBI that some partners in industry have proposed. It's a great idea. It holds a lot of merit. We need to look at those kinds of ideas to make hit-to-kill more efficient not only in GM but in all facets of hit-to-kill in the shorter ranges as well.

So I'll close there. I just wanted to thank you, Tom, again for being a part of the discussion. I'm an optimist, as I always say. I was humbled to serve in uniform with the best and brightest minds that are attacking this. And I continue to be humbled by all the people working on it. There's tough challenges ahead, the questions you posed are really good one. But I'm glad we're having a conversation about it and sharing ideas. Thanks for attending. I appreciate it.

MR. KARAKO: Thank you. General Formica.

LTG (Ret) RICHARD FORMICA: Good morning, Tom. Thanks again to you for hosting this. It's a privilege to be on this panel with these distinguished colleagues of mine, both in uniform and now out of uniform.

As Tom said in the introduction, I'm Lieutenant General Dick Formica, retired from the Army on 1 October 2013. I'm currently employed by CALIBRE Systems in Alexandria, Virginia. My comments, like the others on the panel today, reflect my opinions and my thoughts, and I'm not speaking for the government, my previous commands or for anyone else. These are my thoughts and my opinions.

As Tom said, my last assignment was as the Army Space and Missile Defense Command and Army Forces Strategic Command, Commanding General, in Huntsville, Alabama. I was assigned as U.S. Strategic Command's operational commander for the Joint Functional Component Command - Integrated Missile Defense. So what does that mean?

In those positions I had responsibility to organize, man, equip and train our space and global missile defense forces under the Department of the Army, and I was the Army's force provider of space and BMD forces to U.S. STRATCOM, U.S. Northern Command, and the geographic combatant commands. I actually have some thoughts on the role of MDA and some of the things that Ken was talking about, we can address that in the Q&A. I was also responsible for integrating the operational capabilities of missile defense forces with U.S. STRATCOM, U.S. Northern Command and the other geographic combatant commands, and with the Missile Defense Agency as material developer for the BMD systems.

Our number one priority, as Admiral Macy indicated, was to defend the homeland against a limited missile defense attack from a rogue threat. Our second priority was to defend our forces, friends and allies in the regions, and these came from the BMDR that Admiral Macy referred to. To achieve our number one priority to defend the homeland meant: placing the appropriate emphasis on continued upgrades to our global missile defense capabilities, many of which were referred to by General Todorov, including improvements in the missile fields at Fort Greely and Vandenberg; continued improvements in the capabilities of the interceptors themselves; upgrades to early warning radars; the deployment of the five ground-based radars around the world for improved tracking and fire control; integration with Aegis ship radar capability to provide track quality data; and a command and control network that put all of the components together.

We were continually challenged to balance the many needs of the global missile defense system with the global requirements for regional capabilities that came from the geographic combatant commands, within the funding that's available for missile defense. In the next few minutes I'd like to talk about this from a little different construct. I want to refer to four tensions or four tradeoffs that I observed during my tenure. I think these tensions provide a good context for the discussion to get after some of the questions that Tom asked us to consider today in terms of left of launch and cost curve and the like.

I'll briefly mention the first three, and we can talk about those in the question and answer if you want, but spend a little bit more time on the fourth one as it gets after it a little bit differently than left of launch discussion. The four tensions as I saw them, and see them today, were: global versus regional, capability versus capacity, operational capabilities versus tests, and offense-defense mix. And again, I'll briefly address each.

Global-regional. As you've heard and know already, there's just not enough missile defense funding to meet all of the requirements for both the global missile defense system and those requirements of the regions. So we had to continually balance,

in our assessment of the allocation of funds and resources, the demands of: the BMD system, GBI reliability, inventory, sensors, etcetera; with the demands for regional capabilities: Aegis, Patriot, THAAD, that continually came in through the combatant commanders, and much of which was the object of the so-called 8-star memo.

We relied on operational assessments to assess risk, and I think that's not an insignificant part of this as we balance the various tensions. We identify the risk so that leaders can make the decisions on what levels of risk they're willing to accept. But you make those assessments, consider the risk, and then make recommendations to achieve the right balance between global and regional capability. Our forces use a global force management process to manage the missile defense capabilities and to allocate them among the combatant commands.

Capability and capacity. There are a fixed amount of dollars available to spend on missile defense, so with those dollars you have to ask yourself, are you going to increase operational capability by developing new systems or do you simply improve the systems that you currently have? Do you increase the limited capacity of the units, systems and interceptors that you already have, and in that way raise capability? So again, there's a balance here, and this gets to some of the modernization funding. How much do you put into modernizing to go after new capabilities, or just increasing the quantities of what you currently have?

We do need to increase the inventory of GMD to mitigate the growing threat; and to address the requirements of the combatant commanders, to increase inventories of the regional capabilities as well. This is also necessary to reduce the strain on the missile defenders from repeated and extended operational deployments. The decision to field 14 additional GBIs, for instance, and to place them at Fort Greely was part of increasing GMD capacity.

This issue also exists for the Army's theater missile defense forces as well. The Army's Patriot and THAAD units are strained to meet operational demands. There are not enough Patriot battalions or THAAD batteries to meet those demand currently. The Patriot force in the Army is 15 battalions. There are currently no plans to add more, though from time to time that discussion does come up. And we are slowly building the THAAD force, but again, not enough to meet demand.

Those units generally maintain about a one-to-one dwell, here a year, gone a year, back a year. The challenges that we have in meeting both material production, Army force structure and manpower and funding, all contribute to the current numbers of Patriot and THAAD units that are available. And again, if you'd like to talk about that more during question and answer I'd be pleased to.

The third tension was between operational capability and test. Again, do you spend dollars improving operational capability and/or capacity, or do you spend those dollars or a portion of those dollars on tests? Every dollar you spend on one isn't available to spend on the other.

Now in order to validate the capability of the system, it is important to the warfighter to maintain a rigorous test program. Testing gives operators confidence in the system that they're going to employ, and it enables them to develop and practice tactics, techniques and procedures. We saw the benefit of a test program on 22 June, 2014 with the successful intercept of CE-2 GBI, which has strategic implications for the nation and reinforce confidence in the system. A rigorous testing regiment is critical to our missile defense capability.

Offense-defense mix. Clearly we need to invest in missile defense capabilities, but we cannot rely on defense alone. There will never be enough interceptors, as we've heard, to stop all the missile threats that we face. So we must employ strategic and operational offensive capabilities to defeat or degrade threat missile systems and to hold the threat at-risk should they launch missiles at us. We need to have the right balance of offense and defense capabilities.

On this last tension, the approach that we took was important to me. I came to the missile defense business for the first time at SMDC. I had grown up as a field artilleryman and a fire supporter in the Cold War. And so I understand the challenges of being outnumbered.

We fully expected to face a Soviet artillery threat that had far more artillery units, systems and ammunition than we had. It's important to note that our anticipated prosecution of the counter-fire fight to defeat those artillery systems was never intended to be a stand-alone operation. First, it was inherently part of combined arms operations and relied on rapid offensive maneuver and counter-reconnaissance to set the conditions for the counter-fire fight.

In our Air-Land-Battle doctrine, we planned to employ both proactive and reactive counter-fire. Pro-active counter-fire included deep interdiction by the United States Air Force and the Navy, deep Apache helicopter strikes, and deep fires from MLRS rockets. We also planned to integrate electronic warfare and other non-lethal systems.

In missile defense, as you heard, we know we're going to fight outnumbered. And there will be more inexpensive missiles out there aimed at us than the number of high dollar interceptors that we'll have to protect our valued assets. And so it makes great sense to me to include offensive operations in our strategy and have this discussion that's so often referred to as left of launch. It's not so different than employing proactive counter-fire to take out the enemy's artillery systems as a necessary complement to our highly capable and effective reactive counter-fire systems. And it is consistent with our current air defense doctrine, which includes attack operations as one of the four operational elements of theater missile defense.

Left of launch, then, is not really new and is an important element of an overarching approach to missile and integrated air defense. But it cannot be, in my view,

a replacement for missile defense systems. We can't say, okay, we're going after left of launch and therefore we can reduce our expenditures in missile defense. Offensive operations are necessary to compensate for the shortage of existing missile defense systems. We need to employ them to even begin to approach the capacity we need to have to defend our critical assets.

Offensive operations offer three complements to our active missile defense capabilities. First, they reduce the enemy's missile launch, command and control, and logistics capabilities, and in my mind go beyond just Scud hunting. Two, they serve as a deterrent to a potential adversary considering missile launches against the United States or its allies. And third, they provide effective and appropriate response to one that does.

While it's an important element in our overall approach, as you heard from my colleagues on the panel, there are challenges associated with offensive ops that need to be addressed. The first and arguably the most difficult, as General Todorov brought up, is the authority to employ them. This is particularly so in pre-conflict conditions or in an escalation of tensions surrounding a developing missile launch scenario. A decision to pre-empt a launch, and therefore initiate military action, will not be made lightly and certainly would have to consider the policies of not only the United States but allies and partners.

Second, left of launch, whatever the target you're going after, requires good, reliable, high level intelligence and ISR capabilities to precisely identify and target missile systems. And if we were having a panel to talk about shortages, you could have a panel of former ISR guys up here talking about the same challenges with demand for ISR, as there is for availability in those capabilities.

And third, we must continue to invest in and develop effective non-lethal applications which can deter or preclude a missile attack from occurring. So all that said, I'm an advocate of offensive operations left of launch as an essential element of and in balance with, an effective and appropriately funded missile defense posture. It's not either/or. We must invest in both left of launch and missile defense. And it's important that we get that balance about right.

Thank you.

MR. KARAKO: Admiral Horn.

ADM. JOSEPH HORN: Good morning. I'm Joe Horn, the Vice President of Naval Programs for Thalys Defense and Security Incorporated. I retired from the Navy over a year ago after 34 years of service.

I am both pleased and delighted to be with you today and to be participating on a panel with such distinguished gentlemen. I have known each of them over a number of years, and in Arch's case far too many to count. I know each are professionals in every sense of the word.

I'd like to also thank our CSIS hosts, particularly Dr. Karako, for putting this panel together, and I hope my participation is up to the task. It is also great to see so many old shipmates in the audience, and I am certainly glad to see each and every one of you. Our purpose here today is to set the stage for a larger later discussion about how we think more broadly and comprehensively on missile defense, and to include in the discussion some thoughts on left of launch.

My last nine years in the Navy ran the gamut from cruiser commanding officer to OPNAV N-86 resource officer to MDA deputy director to Navy Combat System PEO. Aside from the sharp decrease in fun, you can quickly see that I've had the good fortune to have participated in the operation, budget generation, and development of a number of the systems that we're going to discuss or that we are discussing, over the years. And that has provided me with a perspective I'd like to share with you as we all shape this future discussion.

I am also listed as the Navy rep, and as the other panel members are quick to point out, I need to be clear that I'm not speaking for the Navy. While I may have a modicum of experience with Navy missile defense efforts, I am not empowered to speak for the service. The opinions that I will voice here are my own.

That said, the Navy is not new to missile defense and the engineering discipline and rigor that it takes to hit a bullet with a bullet in outer space or a supersonic cruise missile just above the surface of the ocean. Through its close relationship with the Missile Defense Agency, the Navy continues to develop and employ integrated air and missile defense systems that are increasingly capable. And from its modest beginnings in Navy laboratories and industry IRAD efforts, to the highly successful build a little, test a little regimen of the USS Lake Erie, to the breathtaking performance and promise of Aegis Baseline 9 in USS John Paul Jones, the Navy has researched, funded and jointly developed systems that are the envy of the world's navies.

The Navy currently has 33 BMD capable ships and is modernizing roughly three Aegis destroyers a year to provide integrated air and missile defense capability to their ships. SM-3 inventory is increasing and that growth is reflected in the number of SM-3 missiles loaded on deploying ships. The first Aegis Ashore, which will reach declared technical capability before the end of the year and four BMD capable DDGs, are now home ported in Rota, Spain. New construction DDGs, DDG-113 and follow, will be built with baseline 9 IAMD capability.

Between January of 2017 and September of 2019 six new construction DDGs will report for service with this capability. SM-6 is proving itself to be an incredible missile with the utility to serve both as the workhorse of Navy air defense and also relieve the SM-2 Block IV as the sea-based terminal weapon, for the Navy. Meanwhile, rigorous IAMD testing, that build a little, test a little I talked about earlier, continues in the USS John Paul Jones, DDG-53.

Despite our tremendous progress, however, as we look to the future there are several areas that we need to address. First, I think as each of the panel members have said, we will never be able to develop and deploy the active defense necessary to counter every ballistic threat. We simply cannot afford to do so. Therefore, while not an active defense denier by any stretch, I believe it is high time that we develop a comprehensive examination across a time continuum and look for areas that enable us to take advantage of our strengths, not just active defense.

In the 1980s Navy strike groups employed outer air battle as a strategy to defeat waves of Soviet attack aircraft before they launched anti-ship cruise missiles. Attackers were met by fighter aircraft at the most extreme range from the aircraft carrier possible. Killing the archer before he released his arrows, it was said at the time, was more efficient and effective than dealing with every missile around the carrier. This strategy was expected to reduce the number of ASCMs (ph) that had to be dealt with in the inner screen, making shipboard defense more manageable.

I submit left of launch efforts similarly shape the battlefield and are worthy of our attention. While not a silver bullet -- again, I'm not a denier. I've spent most of my professional -- the last seven years, working on those systems. But we need to take a holistic view and examine these threats from birth to launch looking for every opportunity to kill them on the ground before they launch or render launch ineffective, just to make active defense more manageable. I suspect we are doing some of this in the services today, but we need to continue to do so and as all the panelists have said, look to integrate and synchronize that capability.

In this budget environment we must do more to achieve balance and reduce costs. We need to balance capability versus capacity. Pacing the threat is extremely important, but an extremely capable solution of one is a loser. Elegance comes at a price and often limits our ability to be able to procure it in the numbers necessary. The commander of naval service forces has been speaking for some time about modernizing shipboard combat systems to enable smaller more frequent updates, instead of taking a ship off-line for a year or more to modernize it.

We also need to balance the confidence we achieve in operational testing of our new development systems with the resources required for that testing.

As noted, operational testing is critically important. Yet unconstrained, the cost of such testing becomes prohibitive and begins to shape developmental decisions. Testing builds confidence, there is no doubt. However, we are entering an era where the price tag for some of these tests requires resources that can significantly impact departmental budgets. There has to be a better way to achieve this confidence, but yet do it in a fiscally responsible way.

We need to continue to put pressure on us in industry to reduce the cost of each intercept. Multi-year buys of missiles and competitions are two ways that come to mind that the acquisition community throughout the Department of Defense is using to reduce

cost of each round. New weapons development is also an opportunity to get on the right side of the affordability curve, as Admiral Macy offered. Lasers and rail guns offer a promise, but they are far from ready and need to continue development.

Lastly, we need to depend more on our allies. Earlier last month in the Hebrides the Maritime Theater Missile Defense Forum, a collection of allied navies joined together to advance collective missile defense capability, conducted an exercise where a track was acquired by an allied ship and passed to a U.S. destroyer who then conducted the engagement. This level of cooperation should serve as a building block, with the ultimate goal of fully participating in EPAA for like assignments.

Again, I remind you that our purpose here is to shape the future discussion. These are areas that I believe can help lead us in a more affordable, efficient, collective fashion. I appreciate the opportunity to speak to you today and I thank you for your attention.

(Applause).

MR. KARAKO: Thank you, to all of you gentlemen. I appreciate the thought that you have each put into this. The fact that you all came with very carefully prepared statements really reflects the fact that I think this conversation goes into some depth and goes into some detail that you just don't usually hear at these kinds of conversations about missile defense around town, frankly.

A handful of things that got brought up: policy, organizational and funding challenges, I think, were very interesting. Allow me to first pose some questions to all of you. The first of which is the organizational. Admiral Macy, you talked about a BMD command, and a couple of folks talked about the identity of the Missile Defense Agency going forward. And when I say the identity, I mean in terms of should MDA be doing the procurement? Should it be kind of a combat support agency? Thoughts about those two components of the organizational side of things, from anybody who would like to weigh in?

ADM. MACY: I threw a hand grenade out there first, and so yeah, I think the idea of a BMD command and the function of MDA certainly needs to be discussed. However, I would hope that that doesn't get lost in the bigger discussion of how you have this whole of government and whole of defense capability. I would submit that the discussion of the BMD command is how you would enable that, how you would operate it.

First we need to decide what it is, what will be included in it? What are the interactions among the different departments and agencies external to DOD, and what are the actions of the different departments, services and other agencies within DOD? Sort that out, and then you can get into a discussion of BMD command.

And then separately, I think, that will provide a place to start the discussion of what is MDA. How do you balance the interest of the services? I think one of my

colleagues mentioned that BMD is not a prime mission area of the services. The Army has land warfare, the Navy has naval warfare, etcetera.

They all contribute to BMD but they would not view that as being prime. So you get into the issues of balancing budgets and making budget and resource decisions. You, as the secretary of the service, have the responsibility for your service. You certainly want to do the best for the nation, but you were chosen to lead your service. That's what you're expected to do.

Separately, then, across the department, you need to figure out these issues. And then again, it extends even further when you start to bring in other departments: State, Treasury, and etcetera. So while those are certainly important and interesting discussions, I would hope that we don't let the diving into the individual well of each of those prevent us from seeing the field that's around us.

GEN. FORMICA: A couple of comments. I appreciate the thought that Admiral Macy put into the notion of a BMD command. I can attest that I have not yet come to that conclusion.

I think the point that there needs to be an operationally responsive way to link the systems so that we can respond to a threat whether it's in the EUCOM AOR, CENTCOM AOR, or the homeland, PACOM, any of the geographic combatant commands, is an important point that merits the kind of discussion that Admiral Macy is advocating. Whether or not this requires a command and going through the challenges of just who it would work for and how it would be operationally aligned, I think, is another part of the discussion. We do need to have systems that are interoperable, that are connected, that work closely with allies, and that allow each of the combatant commanders the authorities and responsibilities to meet their current and projected future responsibilities. And so I think that is an important part of the discussion.

As to the role of MDA, I think MDA is well suited as the material developer for our missile defense systems. They do it well. I had the opportunity to watch them up close for almost three years. They've got the capability to deliver, as we've heard today, very effective systems from GBIs to Aegis to THAAD and Patriot.

I think having them continue to focus on the development of those systems keeps it in the right place, keeps the focus on the development of that material in the appropriate agency. The services, at least from my experience during my time in the Army, the Army recognizes the role it plays in providing trained and ready forces across the full suite of ground combat, which includes air and missile defense. The Army is challenged today to make very difficult force structure, end-strength and resourcing decisions, and has to balance the number of BCTs, for instance, with the number of Patriot battalions and THAAD batteries.

And to the Army's credit, those forces are holding their own. Nobody's talking about reducing the number of Patriot battalions, and we're talking about growing

THAAD batteries. So the Army recognizes its requirement to meet its responsibility to provide, organized, trained and ready forces to include missile defense forces.

I want to speak a little bit about General Todorov's duties as the deputy director of MDA and having a hot phone when the radar goes down. First of all, I applaud MDA for having that capability. But I would tell you that this is evolutionarily changing.

There was a time when every TPY-2 that was fielded was not only fielded but the combatant commands routinely had to go to MDA as the only solution to any challenges associated with manning and equipping those radars. But, within the last several years, the radars have in fact transitioned from MDA to the service. They are, in fact, Army systems today.

And we've seen that evolution already occur inside the Army, accepting more and more of its rightful responsibility to organize, man, equip and train those forces, recognizing that the equipment -- I should have held off on that because as the material developer, MDA still was the equipper of the TPY-2, and I would submit that's a good place for it to remain. But the rest of the (DOTMLPF), the doctrine, organization, Training, Material, Leadership, Personnel, Facilities) to sustain those systems, rightly shifts evermore to the Army as it assumes its responsibility. We've already seen that. I think the day will come and go when MDA may not be responding to every combatant commander when a TPY-2 goes down, but still be the material developer responsible for ensuring that those parts and replacement capabilities are available.

ADM. HORN: I'd like to agree with General Formica in that I think we've got it about right. My observation is that the Navy over time has come around to the idea. We are where we are in baseline 9, for example, is due to the contributions of the missile defense professionals in the Missile Defense Agency, along with our own Navy laboratories and industry. We are clearly benefiting in that. We can have a discussion all day about procurement, in or out and how that proceeds, but I think the Missile Defense Agency has sort of worked very well for the Navy over the years and certainly done well in this mission area.

Arch's comment on the BMD operational command, again with General Formica, I'm sort of from Missouri on this. I'd need to take a longer look before I'd be willing to sign up. I understand it on its merits and I certainly appreciate the Admiral's thoughtful way of talking through it, but I think I'd have to look through it a little more.

GEN. TODOROV: I figured you were going to get on me for that red switch thing, because I know the guy who does that does it very well. But de facto, for whatever the reason, more and more in my time at MDA was sort of a shared enterprise of trying to make sure that the BMDS globally was working right. IAMD would have a piece of that. They did a great job.

But if it came down to specific TWTs (ph) for the Cobra Dane radar in Shemya or something, that was very much -- MDA was still in that game and in that mix. The

expectation was, MDA needs to do something about it. In a way, we almost -- were not BMD command. I share my colleagues' to my left thoughts on that.

I think there's a lot of challenges, command and control, unity of effort-wise, with that. I understand the merits of it, but in a way we're sort of gravitating toward that. I guess I'd go back to my point of we've got to go the other way.

I acknowledge it has to be done somewhere, but MDA, per the existing charter, what we're chartered to do, I don't think it belongs in their job jar. And there's too much else on the plate, important stuff, that they've got to be focused on. I frankly saw sort of we're being pulled in so many directions in my time at MDA.

We're helping the Israelis with their programs, very important stuff. The IAMD piece, which is hugely important as a former commander and director, I get it. Someone has got to do it. They're a victim of their own success in many ways. They're pretty good and successful at what they do, and so anything related to missile defense must be MDA's job.

There's a lot of debate about where, when we're talking about left of launch, some have suggested to give it to Admiral Jim Syring. He'll take it on. I'll tell you, the bandwidth is just not there. There's too much other important work to do. So I guess I'm not posing a very substantive solution about where it goes, because it has to go somewhere, but unless you rethink the charter of the organization, I don't think it belongs with them.

ADM. MACY: More missile defense jobs with less budget to do them.

ADM. TODOROV: Yeah.

MR. KARAKO: I think you guys have done a fantastic job of hitting all the points that I was hoping to get on, so why don't we open it up to questions from the audience. There's a lot of folks out there that have thoughts. Let me go to Sidney, first.

MR. SIDNEY FREEDBERG: Sidney Freedberg, Breaking Defense. Gentlemen, good to see you all in one place. It's a target rich environment for me. To look at the left of launch piece for a moment, obviously there's one part of that that's potentially a pre-emptive strike. It gets very sensitive and complicated.

There's the other part that all of you have touched on, but one always hears it touched on it but then moves on, that I'd love to delve into a bit, which is the cyber and electronic warfare parts of it. You do have these complex kill chains that rely on computers, rely on various forms of electronic transmissions, that you can break at some point before the adversary can launch, unless they're doing dead reckoning of a ballistic missile on a nice target like a city. Conversely, even more-so perhaps, our whole system requires links and warnings and sensors to get to left of launch. How are those capabilities evolving?

MR. KARAKO: How much enthusiasm do we have about these things?

GEN. FORMICA: I'll start with that, and I'm going to do my best not to go to jail, Sydney, for that or any other reason. Your question reinforces the comment that I made earlier that left of launch is far more than just Scud hunting. There are a wide range of targets associated with their ability to deliver missiles that you would want to go after. I think it's fair to say that the full suite of lethal and non-lethal capabilities need to be considered and employed as appropriate. And that includes EW and other non-lethal capabilities.

I believe, to your question, Tom, there's plenty of -- I don't know if enthusiasm is the right word. I think it's fair to say that as we continue to develop our BMD capabilities, we need the full suite, from GMD to everything in between. I think there's a general consensus that we need to pursue both lethal and non-lethal capability. I don't think there's a tension there. I think it's a complementary capability and we need to have both.

ADM. MACY: Sydney, I observe that you exactly brought up the part of the point I was trying to make, because you can't talk about very much of it. And I also remember the piece of paper I signed when I retired, so I'm not going to go to jail either. But it's who knows about which stuff and how do you best use it all together, if you have five capabilities, whether they're cyber or EW or telephony or magic fairy dust?

Do they work best in the order of 1, 2, 3, 4, 5; 5, 4, 3, 2, 1; 2, 3, 5, 1? We need to figure that out. We need to have enough people who understand what each of them is and how they might interact to solve that. And then we have to find a way to be able to use that when the time comes. And the fact that only a very few people know what number 5 and number 4 and number 2 are, is going to make it very difficult to do that effectively.

So solving the classification, the compartmentation problem, as well as how you examine them, how you test them, how you interrelate them? We don't want to be shutting down all of the television stations on the West Coast by trying EW [electronic warfare] techniques. I got close to doing that once, and we don't want to do that again.

So that's the issue that comes in. You exactly brought up the problem. As Dick said, I think there's a lot of capability. There's a lot of interest. There's a lot of possibility out there. A lot of the stuff that I remember seeing, yeah that would be pretty cool if we could get that to work, for a piece of the problem.

But it's not going to be the answer. There is not a magic button out there that we're going to eventually put on the president's desk that he mashes and the missile threat goes away. So that's a big prompt challenge for the department to figure out how to do.

MR. KARAKO: And it sounds like the hand grenade of a BMD command -- at least a notion of how to put those pieces together?

ADM. MACY: The BMD command is offered as a way to put those pieces together, not only to figure out which ones work in which order, but then to employ them in that order. And remember, it's less than an hour from point A to point B on any scenario that you want to choose anywhere on this planet, unless you go the long way around in retrograde orbit, and no one is going to do that. It's not worthwhile.

So just the physics get you. So the demand of time is going to demand a way of command and control, communications, integration, etcetera that has got to respond on that timescale. You don't get to say, wait a minute, I need another two hours. It hit an hour and a half ago.

GEN. TODOROV: The command and control piece that Admiral Macy brings up is a huge one. The other excellent point is who knows about it and how do you employ it? We've got to get it out of the dark world, and that's hard to do for obvious reasons for the capability that Sydney's talking about. But it's hard enough with white weapons on white world assets.

I remember the cycle of provocation with North Korea in my NORTHCOM days. We were watching stuff get fueled and anticipating a launch date of a space launch vehicle, always on point in case it went awry or started to head someplace we didn't think it should be heading. And I was on the phone with the PACOM, J3 or the STRATCOM folks, or General Formica's folks, about those two ships that were off the Sea of Japan.

They had a regional role. Really they were sort of on-point for the NORTHCOM commander. Where do we move those assets? Where are they best suited? Far be it for the NORTHCOM guys to try to tell the PACOM guys where to steam the ships. That was sort of an awkward conversation to have.

And so this whole business of across the seams of the COCOMS is really a difficult challenge. It's hard enough when you're talking about acknowledged things and assets that are easily moved or where our radars are pointed or arrayed. Are they arrayed to really watch for a long-range shot, or are they arrayed for a regional shot?

Those are complex, vexing problems. So maybe the idea of a BMD command, in that realm has merit. But you're still working within the space of the geographic combatant commanders somewhere. So there's no easy button for that one, I guess I would say, particularly for the kinds of things that Sydney is talking about when there's programs that are sort of hush-hush things.

But there is an appetite for it. People are working on it. So progress on all the fronts continues.

ADM. HORN: I was only going to add to what already has been said. I think

there's a realization among senior leaders of the need. I think there's direction to accommodate that need, at whatever classification level it is proceeding. And I think the real challenge will be the synchronization and the integration of those efforts, as has been said by each of the panel members.

MR. KARAKO: Okay, we've got a number of people with questions. I'm going to try to go in the order I see them. I see Mr. Richard Fieldhouse.

MR. RICHARD FIELDHOUSE: Thank you, Richard Fieldhouse, independent consultant. Having had the good fortune to work with all of you in your previous careers, it's great to see you all again. I want to ask a question that really focuses somewhat on Admiral Macy's broad and overarching construct, but it goes to something that everyone has talked about with the left of launch concept and trying to get at this before you have to intercept a missile.

And that is, our missile defenses will presumably be most effective if nobody ever launches a missile at us. A big part of the job that I presume you all are paid to get is to help convince other nations never to launch missiles at us. In that regard, Admiral Macy, the question is, to what extent is your construct including efforts to demonstrate capabilities or to provide some deterrent value so other nations see this is not a missile system, a defense system, we can defeat; there's a whole range of things and it's really hard and we're not going to achieve our objectives and it's not worth it, getting that kind of deterrent capability into the calculation of a potential adversary? And I'm assuming it will be similar for all of the comments you made about pre-active defense measures.

ADM. MACY: Well I think it's time perhaps for part of this discussion to renew the discussion, maybe not replace but to renew, the discussion on the deterrent value of missile defense. Certainly demonstration of capability is part of deterrence, so that people believe that you will do what you say you will do; or rather that people believe that you can do what you say you can do. There needs to be, in my mind -- and I am not an expert in deterrence, I can think of a few people who are -- I'm certainly not one of them. But it needs to include not only demonstrations, it needs to include an explanation of intent.

It needs to include the consideration of what decisions might be taken -- I won't go so far as to say red lines, but to do so. But yes, it all has to be a part of that. And again, it has to be a part of whole of government. It has to make the potential aggressor believe that the value that he perceives from using it is outweighed by the deterrent value, the grievous harm that he will suffer by doing so. In simple terms, to steal a phrase from a colleague that I've long admired, every day you want the bad guy to wake up and look at the United States and say today is not the day.

GEN. FORMICA: I think it's safe to say that's the approach that we take. That's one of the reasons why you can see missile defense from a combatant commander perspective. It's U.S. STRATCOM's mission to do deterrence, global strike, and missile defense, all in one combatant command, providing and integrating those capabilities with

the regional combatant commands who in each of their geographical combatant commands bring the same capability and the same intent to deter regionally through a full suite of offensive and defensive capabilities.

MR. JOHN HARPER: Thank you. John Harper with National Defense Magazine. I was hoping to get each of your perspectives on two controversial missile defense projects.

One is the proposed East Coast ballistic missile defense site. DOD, I guess, has undertaken some studies about potential places to put that, but there seems to be some opposition based on the cost of building something like that. So I was hoping you could talk about whether you think that site needs to be built in the near future or whether scarce defense dollars, missile defense dollars, could be better spent elsewhere.

And the other controversial program is the JLENS cruise missile defense program, which as you know was recently suspended after the aerostat became untethered and flew away to Pennsylvania. Do you think that that program will eventually be restarted? And just on a broader level, how serious is the cruise missile defense threat to the homeland? Thank you.

GEN. TODOROV: I'll jump on it first, if I can, because I've got strong opinions on both. In a perfect world, the third site would be great. The world is not perfect and the budgets are limited. And so the direction that Admiral Syring advocates for, and obviously his bosses in the department agree with and advocate for, is that we've got other priorities right now other than the third site.

As I mentioned, improving the existing GMD system between RKV and the follow-on MOKV, improvements in discrimination, improvements to the infrastructure of the system to make it more efficient, are in my mind a priority over a third site. I will say that the work that the department was asked to do on environmental work should a third site sort of come to fruition, I think is a good idea. I know in the next 12 months there will be sort of a best site decision that will be made. The environmental work will be done, so we've got that step out of the way, which as you know from a legal standpoint, environmental standpoint, a lot of important work needed to be done. So at least we've got that work on the shelf.

I would like to ask, though, that before we commit to putting silos and interceptors in the ground, we really kind of flesh out that idea that some have proposed about a transportable GBI system. Let's just do an analysis. Let's compare the cost of that. Let the warfighter decide what the warfighter gains from a mobile system that maybe the Intel will dictate should be at Vandenberg this year. And maybe as things develop with our potential adversaries around the globe, maybe that shifts somewhere. So why lock us into another sort of fixed site if that idea has merit? I'm not a poster child for it. I'd actually like to know the analysis myself, so I'm not saying that that necessarily is better, but let's flesh that out, let's look at it before we decide on putting a permanent site somewhere.

With regard to JLENS, I have always said that I love the capability that it brings. I don't really love the platform that it's brought on. But I think the cruise missile problem is real.

As Admiral Winnfield said -- if I can just say something that he said when he was here in July -- the homeland is always going to be the number one priority. He saw that the cruise missile problem was maybe starting to eclipse the regional problem and that we needed more contributions from our allies on that. And so the cruise missile challenge from more near-peer competitors is very real. It comes with little warning, should it come, heaven forbid.

And we as a nation are right now not particularly well equipped to identify, to gauge intent and to complete the kill chain on that. So what happened to JLENS was unfortunate and I'm afraid it gets a lot of bad press and people yucking it up a little bit over the balloon that flew away. I've got it. The platform is not great.

But let's not focus on the platform. Let's focus on the capabilities that are brought by the platform. Let's restart that test and let the war fighter tell us how effective -- which I think the results of that test will demand that we continue to work along those lines for the problems I stated. We've got to get at that cruise missile problem.

MR. KARAKO: Can I quickly follow up to you on the first part? This has got to be a stating or unpacking of the obvious, but whether it's a third site or mobile or whatever, in the context of what we've just been discussing about, perhaps reducing the number of interceptors you decide to operate, but also time and space, why is it that -- in the way you've put it, consistent with everything you just said -- why is it that having something, not just in Alaska or Vandenberg, is helpful in that kind of world?

GEN. TODOROV: Well, to be able to have options. Even a third site somewhere east of the Mississippi, particularly for the Southwest Asia problem, allows for the opportunity of a shoot-look-shoot. It doesn't in itself provide that capability, but again, giving the war fighter options, particularly if there's some sensors that are added to it on the East Coast, I think gives the homeland a better perspective from sort of both sides of the equation.

It potentially gives you a second shot opportunity should you have the means to determine that you potentially didn't hit it on the first try, or it maneuvered or a countermeasure defeated you. I mean, I'm getting way ahead of ourselves. Those really aren't clear and present dangers today.

But just having a different geographic -- it's really a matter of kinematics. And the geography and all gives the war fighter more options. So in some ways it's worth exploring further.

GEN. FORMICA: You asked for all of our opinions, and I would just echo what

General Todorov said. I was on record in command, and my opinions haven't changed since. The value of a site in the eastern United States to provide extended battlespace and to reduce the vulnerability of our current systems, all of that has tremendous operational merit.

But it comes at a significant cost. And when we assess the tensions, the cost of that site, it was my recommendation then and would remain my opinion today that the limited missile defense dollars that we have available to us are used on GBI reliability, persistent sensor coverage in depth, and for me increased funding and testing. Those were priorities for me, for those dollars, as opposed to a third site.

I don't know if mobile GBI is the right phrase, maybe transportable. There's a distinction in terms of the timing it takes to do it. I'm enamored by the thought of a transportable system that would require less developed infrastructure and could well provide some of that operational capability, if this were to develop and be capable. I think, like General Todorov, it has merit.

I'm not going to throw myself too much on the JLENS thing other than to say I agree with the notion that it brings great capability. The reason that we have it and chose to do a test, is because of the capability it provides to enable the joint kill chain. And I just thank God that we didn't stop the first time Orville and Wilbur Wright crashed an airplane. Look at where we are today.

So I'm not suggesting that JLENS is going to become the next airplane. But I am suggesting that we don't throw the capability away because it had an unfortunate problem. Let's fix that problem, test that capability, see what it provides and then make a decision based on that.

ADM. HORN: I would only add the decision on a third site, to do it or not, is ostensibly an engineering decision left for Admiral Syring and the professionals at the Missile Defense Agency, and I would defer to them. But JLENS, it would be really sad to see that go away. From a Navy perspective, it serves as a gateway into Army systems that ships afloat can use and access. To us, it's a very good interoperable, opportunity for joint sharing of data and we ought to maintain it.

GEN. FORMICA: I'll just add, because we talked about tensions, if at some point we determine that it is a useful system, it just becomes another part of that tension because it means more investment in capability, force structure, man power, and someone has got to pay that bill.

MR. JAMES KIESLING (ph): James Kiesling, I'm here as a private citizen, never mind what I do for a day job. General Todorov, you commented that you're essentially at hazard of your own success, and you also said it's important to maintain the DOD 5000 exemptions. I might suggest those two issues are closely linked.

Realistically, if MDA was structured in a consistent standard manner you would

not find yourselves the victims of everything coming down the block. I believe as of last year the department, and MDA with Navy, had a disconnect on a major acquisition issue, and I believe as a result things were deferred. We anticipate that it will be a much more successful outcome following 5000 style approaches. So that's a piece of information.

With that in mind, why is it a good idea to have MDA exempt from 5000? For example, you make up your own threats.

GEN. TODOROV: The last piece of your example?

MR. KIESLING: The MDA is responsible for its own threat definition.

GEN. TODOROV: Well, I'm just a very practical guy. And prior to my time in MDA, as I mentioned, I was the director of JIAMDOD. One of my seats at JIAMDOD was as co-chair of one of the PFCB panels that sort of played into the whole process with the services. And so I've experienced seeing both sides at work.

I am not an acquisition officer. I was not brought that way. I am far from the expert, as Rick Glitz (ph) to your left will attest. He bailed me out of many acquisition conversations when I was on the Joint Staff because I was just a neophyte to it. I'd never been in the J8 world.

But I have practical experience at seeing it work from my time there, and then seeing MDA's more streamlined process. I join those, I guess, who would say acquisition reform is ripe. I'll leave that to the experts on how to do it.

Again, it goes back for me to the proof was in the pudding. I saw that the process was just far less cumbersome at MDA. And I still think a valid process with checks and balances along the way, that allowed for the war fighter to have a voice, that allowed for senior decision makers in the Department to have the final say, and I just think it worked a lot more efficiently. So that's why I was a fan of it. Perhaps my colleague, Admiral Macy, who is much better -- or Admiral Horn, certainly -- can talk from a more expert standpoint than can I.

ADM. MACY: As you know, Jim, it originally started with the decision to speed the fielding, which could not be accomplished within the standard system. If you look at the improvements that have gone on over the last -- what is it now, 16 years, I can't do the math fast enough, 18 years -- it still might be the case. Certainly the things that have occurred, which have not been so good, might have been mitigated by having to follow the JCIDS (ph), but at the other side, the brutal fact is that whether we like it or not ballistic missile defense is terribly political. So it's going to be driven by political decisions which may not be as firmly rooted in engineering as one would like from time to time.

So I agree that in general I would say MDA has been successful in moving things along. I've been at MDA. There have certainly been mistakes made.

I'm not sure those would have been prevented by operating within the JCIDS system. So I'm somewhat of the mind of, I don't see that it's that broken so I'm not sure how badly it needs fixing. I haven't seen notable failures or successes in either the JCIDS process, which I spent a great deal of my life, or in the missile defense process, of which I've been associated for a great deal of my life, to say that one answer is as good as the other.

Within the missile defense world, we have the challenge of the rate at which fielded technology of the threat is growing. It is much faster than new tanks and new submarines and new anti-ship missiles. Whether it's because people are selling it from one to the other, we can leave for a different discussion. But back to the resilience and the flexibility with which you need to answer the evolving threat, I think it is going to make it very difficult to operate in the way that the JCIDS and [DoD instruction] 5000 system, as it has been historically operated, over the last 20 years.

Now, could you improve those? If you could, then it would be a time to look at it. Admiral Winnefeld talked about it. General Cartwright talked about it. Steps are being made.

My observation, admittedly from the outside for four years, is I have not seen a significant increase in the rate of the wagon rolling downhill. It may come. But until I see the wagon pick up a little bit, again I'm somewhat of the view that yeah we could do better, but I'm not sure how we're going to improve it by moving at this point from one to the other.

ADM. HORN: I'd only add, having been a program executive both under 5000 and in the Missile Defense Agency, the pace at which you can develop technology is faster without 5000 simply because of the amount of oversight that you receive under 5000, can be crushing. There are professionals on both sides. Everybody is dedicated to operating within the guidance they've been given. That said, the ability to speed to the fleet in the Missile Defense Agency would far exceed what I experienced under 5000.

MR. PETER SWACK: Retired Brigadier Peter Swack, former defense attache to Moscow to '14, now at NDU. My question, very simply, and it's a Red Team question, with your vast ballistic missile and air defense backgrounds, could you give us just some broad insights and perspectives on what you saw, what we saw, with what the Russian Federation did with its air and sea-launched cruise missiles, and employment now of an S-400 into Syria? Just from your perspective, how you see that and could that in any way add or alter the calculus going into any future review in 2016 for the next administration?

ADM. MACY: I'll take the first cut at it. You may have been there when I was doing the negotiations with the Russians on missile defense, which was an interesting experience. Two parts, the cruise missiles and the S-400.

We have long known that the Russians had cruise missiles. I would say that this

is their first opportunity to use them and they were making a point. We also used cruise missiles, we used Tomahawks, first in Desert Storm, as a way to address part of a military problem that we perceived. And people knew that the U.S had it, but there was shock and awe at what was accomplished by the Tomahawks that went downtown that first week. Truth in advertising, I was a part of the Tomahawk program at the time, so yeah we were working hard to make sure they worked.

So I'm not surprised. I think it was an opportunity for the Russians to do two things. It's an opportunity to demonstrate a capability that we have these things and they really work. The other is to demonstrate a capability that yeah, we're going to use our stuff in this political environment -- which all warfare is, if you come down to the end of the old Clausewitz examination.

The S-400s I think to me, as an air defender, is strictly a political statement to apply pressure to the anti-Syrian government elements like the US, Britain and most of the rest of the civilized world, making a statement, because there is no threat that requires a 400 plus kilometer air defense system in Syria. He could have done it just as well at less cost to send much shorter range stuff. But again, as in most things, I believe it was a political choice to send their latest and greatest to Syria to make a statement.

MR. KARAKO: Anybody else? Why don't we bring it up here to the front?
Peter.

MR. PETER HUESSY: Thank you, gentlemen. Peter Huessy from the Air Force Association. I have two brief questions. First, I'm in the business of public diplomacy. What does Congress not understand that you do that we'd better work on? And you could complement by telling me what they do understand and get. The second question, is there a role for missile defense in defending maritime threats to the United States, particularly missiles that might employ an EMP?

ADM. MACY: I'll take the second one first because I'll have to re-query you on the first part. I didn't get it. To me, the role of missile defense is to prevent the effective operation of a ballistic missile being used against us. Whether it's a kinetic warhead to land on a city, or whether it's EMP, the intent is the same. It is missile defense to defend against ballistic missiles.

As I said, the final result and the simplest analysis to an air defender of any type, but certainly for missile defense, is if the lethal object does not function as intended, that's success to me. For whatever reason it didn't, I don't care: it never launched, it didn't get there, it couldn't navigate, yadda, yadda, yadda. So absolutely missile defense has a place in EMP.

You then get into an interesting thing about is it ASAT, is it nuclear, etcetera, but fundamentally if I am a decision maker and have knowledge of an inbound EMP device, I need to take whatever steps I can to prevent its use due to the grievous harm it will do to us. On the diplomacy side I'm not sure I understand where you were going.

MR. KARAKO: He was asking, what does Congress understand well and perhaps not so well on the missile defense front?

ADM. MACY: One man's opinion; I think every one of us has testified to Congress on this topic one or more times. There are members and their staffs who understand it very, very well. One of the former staffers is sitting in this room. There are members and their staffs who don't understand it, and bluntly speaking as a private citizen, that may be because they're not interested or they don't wish to because the conclusions may be contrary to positions that they wish to hold for their electoral purposes.

That said, everyone in life has their preconceived biases, notions and pressures. I noted, as I think many people here have seen either by observing or by participating in hearings, that there's always two conversations going on in any hearing. It's the overt one and the covert one. And then the third conversation is the one you have with the staffs and the members back in the coffee room during voting breaks, which may be of a very different tenor and a very different content -- classification aside, a very different tenor and content.

I always enjoyed testifying on the Hill and talking to the Hill, either with the members of their staffs. They were, the vast majority, seriously interested in trying to do the best they could for their constituents and for the country. We may have distinctly disagreed on the answer to that question, but they were no less dedicated for the attempt.

GEN. TODOROV: I agree with you.

MR. GREG THIELMANN: Greg Thielmann, Arms Control Association. A recurring theme here was the balance, the tradeoff on so many issues, between procuring enough interceptors early enough and the cost and operational testing or R&D. I have a question about the threat assessments and if there's a price to be paid in terms of misallocation of assuming that a threat is coming earlier than it actually is. I have in mind, for example, the official acknowledgement this year that the Iranian ICBM is no longer likely before 2015.

And secondarily, the memory that Admiral Gortney has labeled the North Korean KN-08 operational in spite of the fact that it has never flown. It has paraded but not flown. Do these things have a cost in terms of siphoning money away from necessary R&D and qualitative improvements in missile defense capabilities?

GEN. FORMICA: I'll just say of course the threat has to be appropriately considered. We'll never have perfect assessments of threats. I think we do a reasonably good job across the combatant commands, both at STRATCOM and in the department, to assess those threats and to encourage the Missile Defense Agency to then be able to build the kind of capabilities to counter those threats on a timeline that meets the threat as we anticipate it.

If we get it a little bit wrong, the question is on what side do you want to err as you weigh the threat and the risk that they propose? And I think it's important. Certainly there are tradeoffs there. We don't want to overbuild capability for threats that will never materialize. But we do want to do a rational, reasonable assessment of threat and the risks they pose, and to provide capabilities to counter those threats.

ADM. MACY: One of the -- probably the most successful destroyer squadron commander in U.S. Navy history was a guy named Arleigh Burke. He once observed that the difference between a hero and a failure in warfare is about 10 minutes. So you have to tend to err on the side of being ready, because it's better to be ready too early than not ready when you need to be. That's always the game or the problem or the decision that anybody who is responsible for the development of defense has to consider.

MR. KARAKO: Any closing words, gentlemen. We're about out of time.

GEN. FORMICA: I'll add one. I would have included it in my opening remarks, and I wish I had, but we have lots of discussions about missile defense. I've said this often times when I've spoken in public forums.

A lot of times the discussions are about policy or technical capabilities and threats. And I'd just like to bring it back home and remind us that by far and away the Soldiers, Sailors, Airmen, Marines and Civilians who develop, deploy and operate our missile defense systems at home and around the world, are by far and above the most critical missile defense capability that our nation has, and they merit our appreciation and support.

MR. KARAKO: Well said. I hope you will please join me in thanking these gentlemen for helping us out here.

(Applause).