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TRANSCRIPT

Event

"A Conversation with Vice Admiral Jon Hill"

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SPEAKERS

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THOMAS KARAKO: We've got a great couple of events this morning. First up we've got a conversation with Vice Admiral Jon Hill. Everybody here knows who he is, the director of the Missile Defense Agency. He's taken over that post in June. We're going to have just a conversation for the next hour and then some Q&A from all of you, and then we're going to take a break, coffee break, and then we'll come back and have a panel discussion with a bunch of folks from industry to kind of say, OK, what's out there in the cone of the possible that we should be thinking about for the future.

So let's just go ahead and get started. Admiral Hill, thanks for coming out, again. This is, as you like to say, a big inflection point for the missile defense enterprise. I wonder if you might just sort of give us, at the big-picture level, what's changed and what is changing that affects your whole mission set and the agency?

VICE ADM. JON HILL: Well, great. Thank you, Tom. Good morning. Always great to be here at CSIS. I was commenting as we walked in that it's always such a diverse audience, different backgrounds. And I just think it's great. And it's always just good just kind of getting out of the normal doldrums of what you do day in and day out.

As you mentioned, missile defense really is at an inflection point. And it's really driven by threat. You know, when you look at our history, and really kind of my background, threat will drive what we do. And so I was reading a great article the other day by George Friedman from Geopolitical Futures. And he kind of simplified – he kind of talked about how things sort of started ballistically, right? So when you think about shooting a bullet that is ballistic, or a ballistic missile that's ballistic, and his point was that in general it depends how good the football player is, right, if he's going to hit his target. And in general, because of the inaccuracy of ballistic shots, you tend to either change your warhead type to have a more lethal blast radius, or you go down some other path, or you shoot a lot of them, right? In our world we call that raid.

Now, we responded to that through missile defense – ballistic missile defense with precision. Well, we came back to a hit-to-kill solution, although the enemy was just firing a lot to deal with his inaccuracies. What we're finding as we move into the future is almost a different view. And where George Friedman takes it down the path of precision-guided munitions as the way that you, you know, up your game from something as – you know, from an inaccurate ballistic missile. And what we're seeing the adversaries do is all of the above, right? It's precision guidance, it is maneuvers, it's just unpredictability.

The ballistic threats are very predictable. The future ballistic threats, not so predictable. Hypersonic threats, not predictable. And then when you get into cruise missiles, you know, for my Navy friends I see sitting around, you know, the unpredictably of a maneuvering cruise missile low on the deck is a very challenging – it challenges your sensor architecture, it challenges your fire control, and it challenges the methods by which you engage.

So I do believe that we are at an inflection point in how we're going to defend not only the homeland but our forward-deployed forces and our friends and allies. And we have to think differently. And so it's interesting to me. I had an old mentor of mine many years ago say, well, you know, Jon, there's always the right time for the right officer. And she recently told me, hey, you're the right guy for today. And

when I look, peer into the future, I recognize that it's time to adjust and be ready for the future.

KARAKO: And the other big piece is the threat. And we're talking about different actors, Russia and China, that is a big, big difference.

HILL: Absolutely, right. And so if you go back and look at our charter, right, we've always been focused on the North Korean threat, focused on a growing Iranian threat. I think as move into these other threat spaces, now you're talking about different adversaries. And so that's an inflection point and change for the Missile Defense Agency too.

KARAKO: All right. We got a lot of cover. I thought we might just start with homeland defense, kind of what's going on with the GMD program and the Next-Generation Interceptor, how we got here, your thoughts on all that.

HILL: Yeah. So GMD, as many of you know might know, you know, started roughly 15 years ago, when we put it in the ground. It's time to kind of recognize the fact that the nation, recognizing that defense is an important imperative, you could have chosen all those years ago to not defend, to say that the threat is just too hard. But the nation stood up and said: We're going to move very quickly to deploy capability and have a deterrent, right? So defense in itself is a deterrent. Defense certainly buys you time. And we've had 15 years of a capability stationed primarily up in Fort Greely, with the associated sensor architecture and globally deployed fire control, that I think has been very successful.

Whenever the time is right, Tom, I'd love to show the most recent flight test from the March time frame, and kind of give you a sense of that.

KARAKO: Now is good. Now is good.

HILL: Yeah. Why don't we do that, just since it's in the morning and maybe you haven't had your coffee yet. We'll show that as a start, and as a preamble to kind of get that video started. I would say that it was years in the making because of the complexity of what we were doing, an intercontinental ballistic missile-class threat, mimicking the architecture that many of you will recognize. So radars feeding the fire control system, the discriminating radars providing discrimination, talking to the missiles, firing of two interceptors. One of the newest interceptors and one of the older ones. Just to show that we can detect, engage, and once we've engaged the primary object that we can very quickly figure that out, through kill assessment, and move to the next lethal object. And that's – that was really the high-level view of it.

We also want to have ship on station to start tracking an ICBM threat, so as we go into the future of testing against those sorts of threats from ships, using the SM-3 missile, that we would have that risk reduction in place, as well as other assets where we were pulling data. It was – like most tests, you're data rich. You can capture a lot of information to kind of help you with the future of where you're going. So we'll kick it over to the video –

KARAKO: Well, I'll tell you what. I'll just ask the folks in the back to pull up the video, please, and we'll get started. Probably a slide or two in. As you mentioned, this is the 15th anniversary of the initial defensive capability, back in, I think, the last week of September of 2004, so. It's been up there for a while now.

HILL: Yeah. There it is. So there's the overview there. You'll see the ICBM launch from the lower left, and you'll see a TPY-2 out on Wake Island mimicking a radar that would be somewhere in the Pacific. You have the Sea-based X-band radar, the big golf ball as we call it. You see the ship out there. You see two missiles coming in. We launched from Vandenberg. Again, the newest configuration and one of the older configurations. You see Aegis Ashore reposited out of PMRF, and you'll see some other air assets and space assets in play. So this was the opportunity to work across multiple time zones, multiple ranges, having every asset that we have to collect the data, and to demonstrate and pull down data to show that we can do fire control quality data across the board. So we'll pop the video in whenever you're ready. I think you might have to advance to the next slide for that.

KARAKO: Yeah, I think they're working on it.

(Video presentation begins.)

MS.: March 25th, 2019. The Missile Defense Agency, or MDA, conducted a historic test of the nation's homeland missile defenses over the Pacific Ocean. This was the first test involving the launch of two interceptors, and it resulted in the intercept of a long-range ballistic missile target with countermeasures. Following their release from the missile in space, missile defense countermeasures are intended to trick the missile defense system into missing the lethal object. From the Marshall Islands in the Pacific to the coast of California, across more than 4,800 miles, MDA deployed two powerful radars, one on Wake Island and the other in the Pacific Ocean.

The two interceptors were ready in silos at Vandenberg Air Force Base in California. And they carried kill vehicles designed to collide with the target. Once launched from the Kwajalein Atoll, the target missile rocketed towards space, heading east in the direction of the United States. Following detection by satellites using infrared sensors, the forward-based radar on Wake Island saw the missile and tracked it as it ascended. The radar also saw the countermeasures released by the target, and sent this data to the command and control, battle management, and communications system – the brains of the missile defense system. This information on the target was then passed to the fire control stations in Colorado Springs and in Fort Greely, Alaska, which then sent the information to the Sea-Based X-band Radar, stationed in the Pacific Ocean.

The SBX radar picked up the target as it flew through space and collected additional and more precise information to send back to the fire control stations in the United States. Once the data was received by the warfighters operating the system, they fired the first, or lead, interceptor. Less than a minute later, they launched the second, or trail, interceptor. Accelerating into space, the interceptors burn through their first two stages, and the third stage of each interceptor propelled the kill vehicles towards the target. After receiving additional data from the radars, the two kill vehicles used their sensors to find the objects within the target cluster. They then maneuvered, with the lead kill vehicle zeroing in on and colliding with the primary target, obliterating it. The trailing kill vehicle was able to see through the intercept flash and debris to hit what the system determined to be the second-most lethal object, also destroying it through the force of impact.

This historic test provided the warfighter with increased confidence in the operation of America's homeland missile defenses, which stand ready around the clock to protect the country from long-range missile attack.

(Video presentation ends.)

HILL: OK. So –

AUDIENCE MEMBER: Hoo-ah.

HILL: Yeah, that's right. There you go. (Laughs.)

KARAKO: So you mentioned a bunch of sensors in that test – airborne, space-based. What's the significance of having all those sensors? And I don't know if this was the most number in a test every – what's the significance for that for kind of contributing to operational realism going forward?

HILL: Yeah, I think when you think of range-based sensors, oftentimes it's really about just making sure you accomplish what you wanted to accomplish, and if there is any sort of anomaly in the test you have the data to pull down and to assess. So that's primarily what we'll do when we go to any range. But when you bring in space-based assets from an operational perspective, when you afford the time and maybe even delay a test a little bit to ensure that you've got looks coming from other assets up in space, and you specifically put ships on station to collect data on their radar types, you get a lot of different phenomenology there that you can either assess for direct fire control or you can fuse that data for future use, or for some intended use downstream. So it's always good to have multiple ways of looking at things. In the video, you heard, you know, the GBI was going up, it was receiving updates from radars – terrestrial-based radars being fused up to the missile itself. And that's a big part of closing the fire control loop, to get to that precision guidance required for hit-to-kill.

KARAKO: And you made a point, though, of also mentioning the Aegis Ashore site tracking this ICBM threat.

HILL: Right.

KARAKO: I mean, I think the significance of this has perhaps been lost a little bit. Why – what's the future utility of having an Aegis radar and Aegis combat system tracking an ICBM?

HILL: Sure. So in general, when you're dealing with the longer-range threats you try to leverage off-board sensors so that you can have an engage on remote capability. That's really the intent for Aegis to expand the battlespace as far as we can, because we have missiles that just outfly the organic radar. But when the organic radar can detect and track you want to use that because that gives you the most precise fire control solution. So it's really about precision. So engage on remote off-board, great. Expands your battlespace. I was raised in that world, and I think most, you know, COs of ships that float today, you know, love to have that locked up in their own radar before they fire, or while it's firing. So the significance of it is extended battlespace. And it does allow you – you know, if you go read our mission statement, right, it's always about, you know, all phases of flight at all ranges. And that's an important aspect of being able to track it.

KARAKO: So the Missile Defense Review talked about, you know, building Missile Field 4 and 20 new GBIs. Could you sort of speak to how that's going and what, for instance, the building of Missile Field 4 means kind of on a day-to-day basis?

HILL: Yeah. So I was up in Alaska a few weeks ago, and great trip, you know. As a deputy prior to working for General Greaves I was a stay-behind guy. So this – that was really the first trip

I decided to take was to go to Alaska because if you look at where MDA has gone over the years, right, we'll talk always about our – the primary workforce being in Huntsville, Alabama. And that's important. But when you start to deploy capabilities, that sort of center of gravity shifts to the operational side of the house very quickly. And I would say that the state of Alaska is incredibly important in what we're doing. When you think about the radars in Shemya, you think about the testing we do up in Kodiak, the missile fields, the radars going up in Clear. You know, that is clearly a center point.

So I wanted to make sure I had feet on the ground. So I went up to see the missile field in its state of construction, because it's one of the few opportunities where you can go up and see all stages. You can see a completed missile field, you can see the interceptors in the ground, and then you can see the various stages of construction. Pretty amazing time. Probably the only time I would have been able to do it. But Missile Field 4 becomes important even if we're not hitting the mark timewise for those additional 20 GBIs that we had intended, because it gives you the ability to do maintenance and to ensure that that is on track and ready to roll.

We have been constrained in the past. If we had a maintenance activity we needed to do – you know, pull the missile out, and it goes into a missile assembly building. But you can't really swap silos and move them around as freely as we need to. So in the interim we're going to use the additional silos that we have in Missile Field 4 for maintenance activity. It gives us the opportunity to upgrade the older missile fields by moving those interceptors over. So there's real value in it. And the fact that we are so far down the path on completing that field, we've got support within the Department and on the Hill to complete that missile field.

So to answer your question about, well, what about that extra 20? We're moving down the path. And we've talked about it before, where we had a requirements issue and we just weren't ready to complete that design. And we decided to reset the program. And we're in the position now to complete at the all-ground level. And we've come through two draft requests for proposal with industry. And it's important to engage with industry because we're doing things a little differently here. It's not just about what I'll call the warhead, the kill vehicle. It is now about that whole missile, from the booster on up through the warhead itself.

And you want to have as much discussion as you can with industry so that you can understand, art of the possible – we're getting a lot of criticism now, and rightfully so, on timelines and cost. And I think that's a healthy debate, and what can be done in the interim, and what can you do to pull that in in? And I think that what allows us speed as we go downstream, but also to ensure we have the right capability, that interaction with industry is really important. And we're in the middle of that now.

KARAKO: Great. Great. So the Next-Generation Interceptor is obviously going to, I think, soak up a lot of the discussion here. Is there a sense for kind of the tradeoffs between timeline and capability? Because, you know, especially since those interceptors in the ground are, some of them, fifteen years old. Realizing it's not fully out there on the street yet, but how are you thinking through that?

HILL: Yeah, so we're looking at all options as probably the best way to do it. As we – when we came through and terminated the RKV contract, the first response was, OK, how do we take care of the existing fleet? How do we get that existing fleet to be at the highest state of readiness for the longest amount of time possible? So we've come through that. We have a

very good understanding of what it's going to take to get there. I would say the specific course on what we'll do to maintain reliability levels at the highest level is still in discussion today.

And then where we are with the Next-Generation Interceptor, we have a sense of cost, we have a sense of time, but we have not awarded a contract yet, so I don't have the specifics on how far do we – are we able to pull that in, what will that configuration look like. We just don't know that yet. I get a lot of questions on, you know, what's this thing really going to look like? And, well, don't know, because it's a competition. And so we have a set of requirements that I think are very good requirements, will set us up for the long term. Our intent, by the way, was to make sure that our midcourse capability was going to be in place for a long time, because I think we're going to need it for a long time. The threat's not going away, and so it's important that we get it right.

KARAKO: Great. Well, why don't we shift – and realizing these things, of course, are blurred together – but shift to the regional side a little bit. What's the path forward? What's going on for Aegis, THAAD, and everything else?

HILL: Yeah. So my other trip that I recently returned from was being in Romania and in Poland. Again, to get feet on the ground, to understand state of play. So Romania was a great site to visit because the construction's complete, we have an operational site in place. I like to tell the story of driving up and having a Romanian security guard meet me along side-by-side with a Navy gate guard, you know, young sailor there. It's a small naval base. And it's being run by the Navy. The tactical operators are Navy. Same kind of sailors that serve on ships today. So it's a great story. And I'm asked all the time about what do you mean by transition and transfer? Well, that's just a great story because you can see it in live, living color.

Great site. And it's there for a reason, you know, primarily put in place to defend Europe against a growing Iranian threat. That's been well-known and understood. But obviously because of the neighborhood most of the discussions were about, you know, a different adversarial...

KARAKO: Something to the east?

HILL: Something to the east, right. And that's OK. It was a great conversation. And then I was able to then head off to Poland. I would say the importance of those sites and what we often forget is they're part of the European Phased Adaptive Approach, right, to protect Europe. But it's not just about two operational Aegis Ashore sites. It includes the ships that are operating in the area. We have our forward destroyers that are stationed out of Rota, Spain, and they deploy, and they're on patrol. They have a formidable capability on them. And but they're often forgotten because they may not be in the same place at one time. Which is right. It's a maneuver force. You want them to be maneuvering.

You want them in the area to provide that kind of protection for Europe. So I would say that the general tone and tenor in Europe is very positive in terms of the capability that those systems bring. It's representative of the power of maneuver forces at sea, sensors that can move and be relocated, the ability to move missile magazines, you know, across the ocean and have them stationed on land, and having a very well-trained group of sailors that are operating those – officers and sailors. So, yeah, great capability.

When you look at that capability and you look at what the end state will be for the European Phased Adaptive Approach, you look at the type of missile. The SM-3 Block IIA, Congress has directed us to go off and assess that program through a test to take on the longer-range intercontinental ballistic missile. We are working to go execute that next year. The pacing item has always been the target – because that wasn't originally in the plan. And so we are on a path to build and execute that. Again, the risk reduction that was done during the March test that we just showed, FTG-11, of having a ship out there collect data to do simulated engagements –

KARAKO: That's what was going at earlier.

HILL: And they executed a number of simulated engagements based on the tracks that they were having, and the use of data across the battle force that's enabled by C2BMC, our command and control battle management. I have high confidence we're going to be able to go in and be successful with that test. But then what does it mean if you – if you conduct a test? Does that instantaneously that capability is out at sea? The answer is no. You have to be able to do – you have to have the combat system upgrades in place, which we have installed in our Aegis Ashore sites.

And so they're ready to roll. And you have the missile production line. So pretty excited last week that we had the initial production decision made for the SM-3 Block IIA. So we're moving down the path to produce those missiles in numbers, get them out there. They're needed in the fleet. They're needed at Aegis Ashore. And if they have that capability to take down those longer threats, all the better. More tools for the combatant commanders at their disposal for a layered defense, in terms of ballistic missiles.

KARAKO: And that goes to the blurring between homeland and regional.

HILL: Yes.

KARAKO: It at least opens up some possibilities. And if I'm not mistaken, Congress has also said go look at that, at least for some pieces of U.S. territory. THAAD's been deployed in Hawaii on various occasions. Anything on the THAAD side of the house to talk about?

HILL: Yeah. Well, where I get excited about THAAD is the dynamic force employment that the Army's doing today. And so when we were upgrading the Romania site, that the Army just rolled in, coordinated with EUCOM, and put up the THAAD battery. It was there, demonstrated we can land it very quickly, did the upgrade on Aegis Ashore, and then THAAD pulled right out and back to garrison. To me, when you go back and you read the National Defense Strategy, that talks about this sort of dynamic, unpredictable force employment – perfect example. MDA, in support of the Army, to deploy THAAD quickly and to extract THAAD very quickly. Quick upgrades on Aegis Ashore, back online, you know, up and operating. To me, it's the kind of world that we need to live in.

If you see how all the services today are very quickly deploying in areas where they traditionally have not deployed in a while, and see them going in and doing that, that's exactly what we want the forces to do. So our role as an agency is to fully support what the services need in terms of ships forward deployed out – down on – out on the edge, where they need to be, and making sure they've got the sparing and support, the training, those sorts of things. And that's just really the role of the agency.

KARAKO: Another pretty cool piece of THAAD and really THAAD-Patriot was I think a recent test up in Alaska. I'm talking about, you know, remote launch stuff, but also kind of the JEON stuff for USFK.

HILL: Yeah, we're pretty excited about that. That's a tough environment, out on the peninsula. And we worked initially with General Brooks, now with General Abrams, out there in theater to do that integration. And that integration wasn't as easy as most people might think. In an earlier discussion, we were talking about the – I would say, the risk of talking about plug and play. Not everything necessarily plugs and plays. When you have radars that are built – purpose-built for part of the battlespace, and another radar that's built maybe in a different frequency band, which is true for THAAD and Patriot, and you have missiles that speak to those radars in a different frequency, and they're purpose-built for different parts of the battlespace, one might be multi-mission, another might be BMB-specific.

When you say, hey, go integrate, that's not so easy. But we did move down a path. We laid down the priorities that we needed to do for USFK. And that is going along well. We have had a remote launcher test. And so if you can separate the launchers from the battery and move that out forward, that is expanding your battlespace. It's almost like an engage on remote kind of capability because you have moved the battery out further. Gives the combatant command, again, lots of, lots of flexibility. If you can then launch a Patriot missile using THAAD data, and vice versa, that's the path we're going down. We've gone through a couple of those tests so far. We have one or two more to go before we can declare capability and materiel release with the Army.

What I like about that capability is it's not unique to the peninsula in South Korea. It is extensible to any combatant command. And I think we'll see a demand signal once we have that capability fully tested and certified for deployment.

KARAKO: Great. And of course, very closely related – when you talk about the fact, of kind of getting beyond the bumper sticker of sensor-shooter integration, it's not so easy. But that would seem to suggest – all the more reason why, from a BMDS-wide, or a missile defense system wide enterprise – all the more reason to make sure things are being coordinated. You know, configuration control, all this kind of stuff, to make sure that it doesn't get more stovepiped.

HILL: You bet. And so – now I'm getting really excited, Tom. So the – if you just look at the Pacific theater, for example, where you have an integrated THAAD and Patriot capability, and then you tie in the ships that are off the coast, right? And then you sort of imagine, well, if we're going to be defending against those sorts of threats, you want to be able to leverage as much data as possible, right? Anywhere you go, it's usually about sensor limitations. So if you have some sort of missile defense event happening, we're not going to be out there by ourselves. There will be ships off the coast. You want to have that data into C2BMC that you can feed to the THAAD and Patriot batteries. If you have aircraft in the area that have exquisite sensors on them, you want those sensors tied into C2BMC so that data can be fed to those ships, to those Patriot batteries, to those THAAD batteries.

That's the world we're living in today. It really is a multidomain environment. And doing things like integrating THAAD and Patriot and bringing them into the same link architecture with Aegis ships, and then having them tied into the same sensors, that are tied into the homeland defense Ground-based Midcourse Defense fire control system, you now have a multidomain environment where you're leveraging everything – whether it's

unmanned air vehicles or it's aircraft. And I think it really does provide a problem set and changes the calculus for the adversary. And so we're moving down that road very aggressively, and I think that is part of our future. It is not something we're going to complete and put on the shelf. It is part of the future.

KARAKO: And that's always been the vision, of course. The word "integrated" is right there in the definition of the agency in the BMDS…

HILL: Right, yeah, but I would say, you've got to carefully engineer each kill chain, right? So it's not as easy as, oh, well, we're going to take in this HAWK battery and everything's going to play well. You've got to make sure that's fully engineered, and that it makes sense, and that the data can move, and that that data can be ingested. One of the reasons I mention radars that operate at different frequencies and uplinks that are at different rates and things like that is because you have account for that. And it's – there's real engineering work to be done there.

KARAKO: Of course, there's also the multinational, as well as multidomain, multisystem, but at least the interoperability with partners and allies. We got a lot of exercises that contribute to that, but other activities you'd like to highlight there?

HILL: Yeah. Well, one of them, just because I'm a naval officer, I can't help myself, is Formidable Shield '19 and we're planning for Formidable Shield '21. Used to be known as the Maritime Missile Defense Forum At Sea Demonstrations that started back in '15. For years, it was bilateral just testing back and forth on interoperability. The whole focus was, can we pass data, just for situational awareness? Then it became, can we pass data for fire control? Then it became, let's go to sea. And so how we do that every other year, sponsored by EUCOM, off the coast of Hebrides. So we're on a different range, that's managed differently than any range I've ever seen in the U.S., which makes it just great fun.

And you've got a, you know, fair number of ships, typically on the order of about eight countries that are playing. And it's sort of a test bed. It allows the different navies to come in, try out new radar upgrades, for example, launch a target, see how everybody does, compare data together, bilateral or multilateral. And that is just – that just makes it better. If you can establish that sort of maritime connection and then extend that into the terrestrial-based NATO links, then now you've got something that is more than just a singular navy trying to deal with, you know, a pretty tough threat in that area. Now you've got numbers. And you've got interoperability. And that's the path we're on.

KARAKO: Well, it's not the only piece by any means, you just hit the operational side. But what about, you know, building partner missile defense capacity? FMS, things like that.

HILL: Absolutely, yeah. So one of the more visible ones that we had a couple months ago, again, up in Kodiak was with the country of Israel. So geographically constrained, in an area that testing there and doing hit to kill in that environment, not necessarily the best place to go do it. And so by moving them to Kodiak, which in itself was a feat, and then using U.S. sensors and things like that, because – as surrogates, for example, because we didn't want to remove, say, the radars that are being operationally employed today, showing that you have interoperability just at the data level, right? The fact that we can ingest that data and use it to support an Israeli system in itself was a great example of interoperability. Very good for the defensive capabilities that are required there in Israel.

So that was very successful this year, and we'll continue to do that. We have great partnerships with the United Arab Emirates. We have an FMS case. You asked about THAAD earlier and about potential upgrades for that system. You know, THAAD's been around for a long time. And THAAD ought to evolve with the threats as they come. And with the FMS case with Saudi Arabia, we have the ability to get things like the production line for radars going again, continue building out interceptors, add an additional capability as we go, which is a benefit to the United States, it's a benefit to the joint forces. All a good thing.

So, you know, you mentioned, or I mentioned, Aegis Ashore earlier. I'll talk about Japan just a little bit, kind of swinging back to the Pacific. Japan is working through their plan to put in two Aegis Ashores there to protect their country. It becomes their national missile defense. And what's fascinating about how they're going to do business there is their ground forces will operate the system, which is kind of a cool way to do it. So we had that big debate.

KARAKO: Soldiers operating Aegis?

HILL: I know. It's crazy, right?

KARAKO: Dogs and cats living together. (Laughter.)

HILL: Right. So now we'll have soldiers from another country going through our Aegis training and readiness school, which will be fascinating. But, you know, it's a great way. And we've done those trainings before in the U.S., should those sites be operated by Army, you know, because it is – you know, potentially if you decided to build Aegis Ashore in the United States, that's a conversation we'll have to open again, just because it's kind of within the Army's lane to defend the homeland.

KARAKO: Right. Right. Well, we could spend the whole hour just on FMS. But moving – I think you've got a chart on kind of the big MDA mission set, if we could maybe pull that up. You know, I think when you spoke a couple months ago you dropped the "B" from ballistic missile – talking about the missile defense mission. But this mission set is in some ways the central question for the future of the agency. A lot going on there. Do you want to speak to that?

HILL: Sure. So the earlier versions of this – I used to call it the placemat. And I still do torture my 14-year-old daughter on this every night. (Laughter.)

KARAKO: How's that coming?

HILL: It's great. She really knows it well now. (Laughter.) So the – you know, the main trajectory from left to right there is the ballistic trajectory. We talked about that being a – she now says Keplerian trajectory very well. Predictable, but becoming less predictable over time. And then we've added in the hypersonic – you know, a nominal, you know, low ballistic, coming back down, glide phase, maneuvering in the endgame, just to kind of show that we're moving in that direction. You see the boost-phase side of the house, the ascent, and the midcourse.

You know, ideally in a layered defense world, all types of missiles, you want to have that terminal capability, you want to hit them in descent, you want to catch them in midcourse. You want to catch them before they start ballooning countermeasures, or they start

maneuvering. And so that's really been the focus of how we're doing things. We've tied it all together with the command and control. For those of you who weren't familiar with that, what's what I meant when I said C2BMC, its really the tying together of all that. That is where the operators touch the system. And so it's really important to have the right data on the glass, right? Get the tracks on the glass, get the fusion of all the sensors together so that they can see and understand and position the forces correctly.

Along the bottom are the sensors. I grew up in that detect, control, engage world, so the slide is sort of a little bit different, detecting with the sensors, and all ranges of them. Space sensors. We have prototypes up there today that'll eventually feed the hypersonic ballistic tracking systems that will go on the Space Development Agency's, you know, overall national space layer. We have – you saw some of it in the video – the Sea-Based X-band Radar. We have ships on our radars on ships, we have radars on the ground. A number of them that are on fixed sites, many of them mobile. And that kind of rounds out the overall capability.

So it's a great architecture. And I think it's an extensible architecture. And you can move things – move things in, move things out, and have a multidomain piece as you start to take on a broader and broader threat set.

KARAKO: Of course, you know, by my count, Congress has begun to put hypersonic defense, you're the executive agent for that, you know, integration tech authority. Somebody's going to take on the cruise missile defense mission. This is a lot of new missions, and they're different, right?

HILL: Yes. Right. They're all different in a lot of ways, but they can be very similar, right? And unfortunately, the similarity tends to be in the end game, right, where you might eat something, right? And so we don't necessarily like that a whole lot. But your sensor architecture matters. And it tends to be different for these types of threats. So ballistic sensors are different from what might look like, you know, a maneuvering hypersonic or a cruise missile that's down low. So you have to account for that. And we have to make investments. We've been saying it for a while within the Missile Defense Agency. We have great support within the department. We've got to be in space to deal with the unpredictable nature of how these threats are starting to go. And they're becoming more global. And it's no longer such a regional focus. It is global. And so having space capability, the ability to diffuse that data, get it down to an engagement capability, that's really the future.

KARAKO: Why don't we move to the issue of space. I think there's a separate slide on that as well. Wonder if you might kind of give us an update on where that is for this fiscal year and perhaps the next fiscal year, for the HBTSS system. You've also got the SKA constellation up there. But you've talked eloquently many times about the importance of space for this multi-mission. How do you see that proceeding in the next year?

HILL: Yeah. I think you're going to see a very deliberate stepping out into that area. We've talked about it enough. I think we're getting the kind of support that's required within the Department and on the Hill. So if you could flip to the chart? I'm not sure who's doing that.

KARAKO: Yeah. Just go to the next slide.

HILL: And we'll kind of go past the mission. We can pop back if we – I think one more forward.

KARAKO: One more.

HILL: Yeah. There it is. Little bit hard to read. This is something we've been crafting lately to kind of tell the story on not only the importance of space but my emphasis back to the team is, not only do you find yourself reliant on space when you deploy a system, but you really do have to engineer for it and plan for it. So I mentioned detect, control, engage earlier. You have almost a similar sort of thing, you know, up in the galaxy, right? You have indications and warning. You got to get to a system that gets you to the tracking sort of quality data so that you can get to fire control. And then you always want to assess whether or not you hit. And that's – you mentioned the Space-based Kill Assessment, which we have deployed today.

We did that a couple years ago. We're on orbit now. Every test that we've had since we got them on orbit, we are testing that capability. We will continue to integrate that – that phenomenology with what we're getting from terrestrial and air-based sensors. And that'll become a more robust capability. And that one, on the end state, on the far-right of the equation is important because it does allow the combatant commanders and the warfighter to adjust their salvo policy if they know that they've had a very successful first hit. And so off to the left, indications and warning. And it's tracking throughout. And it kind of, again, depends on what your threat space is. And so something called hypersonic ballistic missile tracking sensors will feed into the national sensor layer that the Space Development Agency will deploy.

So it all kind of comes together and, you know, takes you from initial detection all the way to endgame and kill, which is important because we're just sort of out of islands for landing radars. And so there's a big lot of water out there that we just can't cover.

KARAKO: So the "H" and the "B," the hypersonic and the ballistic letters in that HBTSS acronym point to its multi-mission character. And of course, also the blending of these missions.

HILL: That's right.

KARAKO: Are there big impediments on the science and technology side to getting that space sensor up? What's kind of standing between us and the space sensor layer?

HILL: Yeah. I think the space sensors are – I wouldn't call them a new science. It's an engineering effort. And so we know that there are lots of different commercial options for getting those capabilities up. I would say the big technical one, and if you just think about it for a second, is just dealing with the passing of track data between different space vehicles, and maintaining track, and dealing with clutter, right? So when you're up high and you're looking down, there is clutter mitigation.

Now, we know how to go do that. And I don't consider that science either. So it's really about bringing that all together, knowing what your mission space is. And if it is hypersonics, and you want to take it a step further and say, well, in some cases I can see cruise missiles, well then, you know, you can leverage the sensors to go do that. So I think it's going to be a great capability. We just need to get it up there as soon as we can and rapidly proliferate.

KARAKO: Great. You said something right there along the way. It's not just the sensor seeing all this stuff, but in a way it's the bandwidth and the ability to move that data around in a prompt and reliable way as quickly as possible that's going to feed into the architecture.

HILL: That's right. Yeah. And I get to see it in slow motion with my – you know, with my Navy background, right? So when we talk about engage on remote, a forward-based sensor, moving that threat data back to a shooting platform, for example. That's an example of, you know, moving data at a very fast rate to make sure that you're closing in on a target that's coming in quickly. When you put yourself on a moving body that's not at 30 knots but at a much higher speed, you know, maintaining the stability of that track, being able to pull the clutter out of it, determining how much you want to process upon orbit versus how much you want to feed down and process on the ground, and then how you distribute. Do you distribute directly from the sensor? Do you control the weapon from space? Or do you take it to the ground station and do it there? There's different trades. And we'll probably do it differently in a lot of different ways, because that adds to the overall resilience of the system.

KARAKO: Yeah. OK. Well, I've got 1,000 other things, but I want to open it up to questions for the next 20 minutes or so. And we've got a mic, couple mics that are going around. So if you wouldn't mind, get my attention, we'll bring you the mic. Please identify yourself and keep it in the form of a question. Let's go to this gentleman right here in the middle.

Q: Thank you for my question. My name is Sangmin Lee. I'm working for the Radio Free Asia for Korea Service.

I have a question about the North Korean missile threat. North Korea claimed that they successfully launched a submarine ballistic missile last week. But do you think that – do you assess that they really successfully launched a submarine ballistic missile? Or do you assess that they launched a missile from sea-based platform? And if they are really successfully at the SLBM, how do you assess their capability of SLBM by North Korea?

KARAKO: All right. So the question is, you know, what's your take on the reported SLBM test from last week, what it means for us?

HILL: Yeah. So I would say that it's really kind of more of a question for the intelligence community. It's not something – you know, I'm really an acquisition guy, right? I go build systems. But I will tell you that what you saw in the press, let's just assume that it is a submarine launch. I also read that it may have been some underwater barge. You know, I don't know what it is. But I also have high faith in the U.S. and the allied submarine forces that if something like that were to emerge over time, that we'd be able to hold it back. So I'm less concerned about the platform. But the message to take from that is they are trying lots of different ways to not only launch, but to deliver that kind of capability. And so we need to keep an eye on it and continuing to assess that to make sure the architecture's in place to deal with it.

KARAKO: All right. I think we got this gentleman right here.

Q: My name's Kevin Smith. Thank you for today.

And I wanted to ask you the role of automation in this process. When something's launched, we got to shoot it out of the sky, that all happens very quickly. And so what's kind of the role of – which processes can be automated, what's the role of artificial intelligence, to the extent you can speak about it?

HILL: Yeah. It's – you almost can't swing a dead cat without hitting someone with AI printed on their forehead. It's an important part of the future and it's an important part of now. And I would say that if you look back 15-20 years in a lot of our weapons systems you see artificial intelligence there, you know, where it was in that time in its evolution. It doesn't relieve you of the responsibility of properly engineering the fire control loop, right? So your ability to speed it up and take human error out of the loop is good and it's important. And I think you're right, with the kind of speeds that we're dealing with today, the kind of reaction time that we have to have today, there's no other answer other than to leverage artificial intelligence. But, again, it doesn't relieve you from the responsibility of doing the full fire control engineering. You've just got to figure out where is the right place for artificial intelligence.

If you look at a lot of systems today that run in automatic, or in semi-automatic, or in manual, that's sort of the early – that's the early view of artificial intelligence. And so if the problem we're trying to solve really is pretty much always reaction time. So what can you do to speed up reaction time? But the balance there is how often do you, and must you, have an operator in the loop, just given the rules of engagement? So we can't forget that.

KARAKO: OK. All right. I think we've got this gentleman in up the front waiting here.

Q: Thank you. I'm Dong-hyun Kim from Voice of America Korea Service.

I have a question regarding the GSOMIA [General Security of Military Information Agreement] piece, with South Korea deciding not to extend the GSOMIA with Japan. How does that affect the missile defense operation and the overall perspective? And the second is, you said about the integration of data, how – but, like, unlike Japan, South Korea is not integrated with U.S. missile defenses. What is your concern on that aspect? Thank you.

HILL: I didn't quite catch the first part.

KARAKO: Well, we've got our bilateral relation with both Korea and Japan, the question is whether the GSOMIA, you know, suspension will affect that, or if we are actually still in a good place with our information sharing with all our allies.

HILL: Yeah. So it's obviously – you want as much free exchange. You know, if you get down to the data perspective, let's just say you're sharing sensor data. You want to have as much unfettered, you know, sharing as possible so that you can leverage the whole force. Can you operate in a world where there's a bilateral between the U.S. and Japan and the U.S. and the ROK? You could do that. It's not optimal. So, yes, I would love to live in a world where both Japan and South Korea can come through their differences and we can, you know, open up the data to openly share with them. But there are obviously ways to work around it.

The capabilities in the Japanese Navy, for example, for ballistic missile defense and what's in the Republic of Korea's arsenal, from a naval perspective, they're different anyway. So given those differences, there's probably a minor effect today. But once they get on parity, then it becomes a larger issue in terms of data sharing.

KARAKO: Good. All right. I think we've got a gentleman right here, and then we'll go back.

Q: Drake Avila, Asia Policy Point.

In the layered missile defense system, how do later layers react if an earlier layer is compromised? Specifically, if satellite capabilities are neutralized, how do land and sea sensors adjust? And how is their efficiency impaired? Thank you.

HILL: Yeah. So we wargame that a lot. And I would say that the systems are built to always assume that they have the direct attack coming on them, right? So if you're a Patriot battery in the layered architecture, you're going to always assume that there's either a leaker or everything's coming at you, and that you have to try it all. So we really build it from the opposite direction from the way you described it. So if you have Patriot, well, then we're going to have THAAD. We're going to have Aegis. We're going to have GMD, depending on what that sense of layering looks like.

The best place, though, to get a look at that is to wargame those sorts of scenarios, which we do on a regular basis. NORTHCOM does that. STRATCOM does it. You see our regional combatant commanders doing that based on the assets that they have available to them. And I think it just varies depending on what the scenario is. But we do have the ability to leverage different parts of the layer depending on where you might lose something. And we drill on that all the time. It's all a part of the war fighters being prepared to operate the system.

KARAKO: You know, on that point, one of the sort of favorite criticisms of MDA is the question of operational realism. And you've spent a lot of time on this. You're very focused on war fighter integration, war fighter involvement, and all this kind of stuff. How do you see the agency maturing on the operational realism side?

HILL: Yeah. I think that, you know, one of the things we talk about is when you say operational realism, everyone right away goes to a test like the FTG-11, and they think about a live-fire test. There is a whole host of ground tests that we do, and associated warfighter integration tests that tie to those. And so you can't really get to a flight test without a full ground test campaign, you know, full high-fidelity modeling all the way through, with a close-in tie with the warfighters on how they're going to go off and engage these.

You know, we talked earlier about Space-based Kill Assessment. So SKA is not fully operational today, but they're up there operating. Which means we can capture that data. And where we are now is working very closely with the warfighters to determine what they need to see. You know, what is that user interface that is desired as we have this system now deployed? And so we're working our way through that. I mentioned the touchpoints at C2BMC, where the operators are on the console. So they're not just doing it during a flight test or during a ground test, but every day. And so when you have launches out there, you know, we have our operators on duty right now that when there's another launch like that we'll determine whether or not we're violating a defended area, and we're going to either go on alert or not, right? Sometimes we manually go, just to test the system, and then we bring it back down.

And so that's happening on ships today. It's happening in the various batteries. It happens in the GMD fire control. So when it comes to realism, the fact that we've got sailors deployed on those ships today, we've got the – you know, our soldiers up at Fort Greely. We have the airmen and all the different radars deployed around the world. They're ready to go. And we'll pull in those operational teams. In one of our last Aegis tests, on an Aegis ashore, we actually brought in the Romania team to sit on the console and operate there in Hawaii.

KARAKO: Cool.

HILL: Kind of cool, right? Freaks everybody out when you bring Romanians into Hawaii, but it was great.

KARAKO: Great. (Laughs.) All right, we got a question right here.

Q: Thanks. Good morning, sir. John Vaughn from Raytheon company. We're in town.

Sir, can you speak at all to the MDR response for THAAD fire units number required, and then also progress you're making on the program transfer with the Army?

KARAKO: Oh boy. I got to hold him back, talk about transfer.

HILL: Yeah. OK. So I think he asked about the Missile Defense Review's task for the Army to determine numbers of batteries and then I think he asked about transfer. So it's all – I'll tell a THAAD story. First, I'm not going to tell you the number in this environment today, but the Army did do its analysis against a very valid threat set, and they have a number, and that number's been briefed out. And in fact, we closed out that action recently. The Army will continue to assess as the threat changes or increases. And then we'll know what that number is.

When it comes to transfer – it remains kind of a debate, both within the building and on the Hill. And I think that's OK. As a new director, you know, four months sitting the chair, having stared at this a lot and had lots of debates with prior directors about whether or not we need to transfer or not, I kind of just drew my own conclusion, which irritated a few people on the Hill recently. How can you say this? The last two directors have said that. I'm like: well, because I've taken a harder look at it.

And for me, it fundamentally comes down to: What does it mean to transfer, right? So when we say transfer, everyone's got a different definition. It's either at production of, say, the missile system – we'll just stick with THAAD, right? It's either the interceptors or it's to take on, well, the battery level. The Army should just own the batteries. Or the Army should own the associated radars. Those the TPY-2s that are not only part of terminal mode, but a part of the homeland defense architecture.

So when we start having those kind of conversations, I immediately go back and say: Let's define transfer the way it should be defined, which is operations and sustainment, with a cost share with the agency to provide sustainment support. And why does that make sense? It's because it applies to every system we've ever built. So I mentioned GMD for a reason, running into the Army guys up there, right, both on console and providing security forces, and running the BOQ [Bachelor Officer Quarters], right? Go to Clear. Airmen up there operating the radar. I mean, that's an operations and sustainment role that the services do very well to include getting the manning in place. The Army, for THAAD, they manned up the batteries. They have the eighth battery manned, for example, right? We're just equipment poor right now.

So I think we have a very successful story if you define transfer correctly. If you muck around with the definition for whatever the agenda is, then the story goes haywire and it doesn't apply to all the systems. But all systems when you define lead service as operating and sustaining and the agency providing the right sustainment support it is the right answer. The debate I'd like to have is, are we doing the right things as an agency to provide

the right logistics, the right training. And I'll just use my Aegis story. Am I doing enough to ensure A-sub-O [Ao, operational availability] on an Aegis ship is at the highest level it can be for the ballistic missile defense mission? Am I being held accountable to that?

That's the conversation I want to have, not the conversation of an organizational experiment in this strategic environment. That's the wrong answer. Am I providing the right training to the Aegis Training and Readiness Center? Are there deficits there that we should be addressing and fixing? That's the conversation I want to have. You know, what does my cost share look like? I can show you that. But should I do an organizational experiment and carve out production of a missile of a major system like THAAD, that we need to continue to keep steady? And I mentioned dynamic force employment with the Army. Why would we do an organizational experiment in this environment today? I'd rather talk about sparing, do the soldiers have what they need to operate the system. Does that answer it?

I was getting a little too excited there, sorry about that. Chris Shank is smiling over there. (Laughter.)

KARAKO: Well, it's funny. It's really only talked about for TPY-2, THAAD, and SM, not GMD, as you emphasized. But this really suggests, again, back to the mission set, you could have unintended consequences by carving things off, rather than having everything more fully integrated.

HILL: You sure could, yeah. And I think about the USFK JEON [Joint Emergent Operational Need] work that's happening out in the ROK and its extensibility to other theaters. I think about the Saudi case, major FMS case. You know, it took a decade to pull that together. Why would you muck with that? You know, that's going to allow us to get the production lines back up, lower the cost of interceptors going to the U.S. forces? Why would we mess with that? And it's really – it's just playing around with a definition that is well-understood.

KARAKO: Great. Great. All right. Who else? Right here in the front.

Q: Admiral, Dave McFarland. How are you?

HILL: Hey, stranger, how are you?

Q: Good.

HILL: Good.

Q: A quick question. So I'm looking at the slide up here. And I see a lot of lightning bolts. And I see a bunch of sensors and information transport. And I see attack operations. But I don't see cybersecurity. Can you talk to us about that?

HILL: Sure. Yeah, and in fact I don't have the slide in this package. If you were to ask me about the changes that need to be made within the Missile Defense Agency for the future, I will mention the evolved ballistic threat. I will talk about hypersonic. I will talk about cruise missile. And I talk about cybersecurity. They go together. And so how do you organize for that, right, something that cuts across everything? And so I've had some great discussions with Dr. [Mitch] Crosswait from DOT&E about, do I need a functional code for cybersecurity? It's embedded in all the programs today. You go look at our budget system

and you can see it across all the programs. But it is coordinated at the level that it needs to be coordinated for war fighting, right?

Can you get by with a Napoleon's corporal, is what Dr. Crosswait calls it, where you have someone that's on direct report from me that kind of keeps his hands and eyes on what the different parts of the agency are doing? And it's a big, big problem, as you know, whether it's your administrative networks, or it's the operational networks, or if it's, you know, within the fire control loop on a ship someplace. It's a big issue. And so we do need to get our arms around it and organize for it. I would say that we're not task-based organized on it today – not task organized to execute that as a war fighting capability. And that's where I want to take the agency over the next few months.

KARAKO: So it's not the same as cyber, but sometimes they're put together, but electronic attack and the whole electromagnetic spectrum. I don't think we've kind of brought up directed energy much. Perhaps you could kind of speak to the EMS, but also the different kinds of directed energy in your portfolio.

HILL: Sure. Yeah. In some ways when I show the prior chart, I do that on purpose, just to irritate people, because it's clearly a kinetic chart, right? And it's clearly missile on missile. And there is – because that's what we can talk about in this environment. A lot of the thing that you just mentioned, you know, reside elsewhere, and so we can't have a robust discussion there. I would say that what we're doing for directed energy is taking a holistic department look within MDA. The work that we do on laser scaling, for example, is tapped into Dr. Tom Carr, who's the head for directed energy up on the RNE staff, and to an overall DOD roadmap.

And I think it's important to pool resources and work together on that because it is a very enabling technology that we need not only for war fighting. You can use it for sensing. You can use it for a lot of different things. And so we're clutched in on the DOD roadmap, and that's where investment is. I think two years ago I would have come in here and talked to you about very high-power levels operating at very high altitude. We've kind of just stepped away from that and said: Let's pool the resources across the department to get to higher power levels and get to smaller space and weight, because everyone needs it. It's not just the Missile Defense Agency. If something we're working on today within the agency goes to a service and not used in a missile defense mission, I'm OK with that.

KARAKO: OK, good. We got another – OK, let's do in the back.

Q: Good morning, sir. Thank you for the talk. This is Harry Chen from Radio Free Asia Mandarin Service.

During the latest military parade that China CPC's founding 70th anniversary, the PLA actually displayed a few new models of missiles. And I wonder, what's your assessment on their capability right now, and how is the U.S. trying to respond to that? Thank you.

HILL: Yeah. So I always think parades are fun, but I do leave it to the intelligence agency to kind of assess what we have there. I really don't have a lot of commentary other than, you know, hey, happy 70th anniversary. And it's the 15th anniversary of GMD. (Laughter.)

KARAKO: All right. So let me just sort of take a look forward here as we – as we conclude. And that's – you know, as we begin to put together the '21 budget you've got a lot of new missions coming down the pipe. What are some top priorities that can especially cut across the

missions? You spoke very nicely about kind of the specific role of the Missile Defense Agency in this larger ecosystem, and kind of some ways to think about the enterprise, and transfer, and all that. But what are some big priorities, your priorities, for moving forward to tackle all these things?

HILL: Yeah. So I think the way to address that the best – and this is kind of how we're coming at it from an organizational perspective, and how we even deal with 70th anniversary parades, is you got to look at where the threat is, where it is today, where it's going in the future. So it kind of starts on that left-hand side. And then you have to take a look at the pointy end as what do the warfighters need?

And when I think about the numbers of threats, and where they're going, and I look at what the warfighters need, to me it's about the multidomain act, right? It's unusual for most programs to kind of work beyond their scope, but I think we're nuts if we don't, right? So if we don't open up the spigot for C2BMC or command and control battle management to bring in air breathing threats, for example, that could help the Navy do its mission. If we don't leverage a radar that is on an island that can also look up and do space situational awareness and get that data to who could use it, or have the radar look down for surface tracks on the ocean and pass that to the Navy, we are missing an opportunity.

And in general, you don't have to do a lot of new requirements onto those assets. You can just leverage the inherent capability that they've got. And so for me, it's about exploring the capability of the systems that are out there to kind of push them to the edge. We talked about SM-3. It was not designed to go against an ICBM. But there is some inherent capability there that we see in our modeling. So why not go explore that, and go do a flight test? Someone earlier mentioned THAAD's capacity to maybe do that. Also not designed against that threat but may have a capability there in some unique circumstances.

And so if you understand where all those capabilities and limitations are across the system – whether it's a sensor or a fire control, how it can tie in and support all the services and even non-DOD partners in terms of sensing the kind of data that you have – I think we're moving in the direction that we need to move into. So that's probably my broad answer, Tom. And I can go down to another level.

KARAKO: Well, let me just take it another level, which are, you know, the relative tradeoffs between procurement, sustainment and R&D – true R&D within the –within the agency. As these new missions come online, is there going to have to be a little bit of a shift there?

HILL: Could be. So the way we normally characterize our budget is along the priorities of the agency. And I didn't really get into those earlier, but the first one is really a readiness and sustainment priority. And that nominally was about 60 percent. And then 30 percent went into capability and capacity, which was buying more things. And then we said we had this 10 percent down there focused on the advanced threat. And so that's kind of how we bucketize our budget.

Now, when I go in and I listen to the Navy give its POM brief, or the Air Force, or the Army, it's kind of interesting, right? Sixty percent going towards readiness and sustainment, because that's a hard, hard problem, right? And then 30 percent towards buying new things and 10 towards the threat. We took a look at, as we were walking into this next budget phase, and said maybe that's not – maybe those numbers aren't – maybe we're not bucketizing things in the right place, right? So if I'm really going to focus on our readiness

and sustainment and take some of the things that were previously put into that part of the bucket that are really addressing the advanced threat, that sort of changes the ratio.

And so we're going to take a different look at how we look at the advanced threat, for example, because when we first had our alignment under the undersecretary for R&E, we sort of had science and technology on our minds, which meant anything that was at the component and element level of technology maturation was put into that 10 percent bucket, which is why it's 10 percent. But if you actually say it's about the threat, and I'm doing, say, an Aegis upgrade to deal with the threat, or a THAAD upgrade, or I'm doing a Next-Generation Interceptor, that's actually down in that other bucket.

So I still think they're – it's a valid way to break up the program, as opposed to homeland and regional, look at it from what am I sustaining today, what am I actually producing and delivering right now, and what am I working on for the future, you get sort of a different view of the program. And it does force you to kind of think about warfighter more often.

KARAKO: All right. Well Admiral, thank you for your time.

HILL: Happy to come.

KARAKO: The agency's in good hands. And I appreciate your coming out.

HILL: Well, I appreciate the time. Thanks, everybody. (Applause.)

(END)