

Mr. Riki Ellison:

(Silence)

Mr. Riki Ellison:

Welcome, ladies and gentlemen. I'm Riki Ellison. I'm the Founder and Chairman of the Missile Defense Advocacy Alliance. We were founded in 2003 with the mission that we believe that missile defense and its deployed format, its development and its evolution makes our nation safer. It makes the world safer. And we've seen that. We know it's happening. So we're coming to you with that mission. But I want to start off first by recognizing the challenges that our nation faces today. And they're great. With the pandemic and with the strife in our inner cities. And we feel for each of you, your families, your friends, your communities, your cities, as you go through this. And it's painful and we're with you on it, we're going to get through it. And the nation is going to be a better place once we get through it. And the world's going to be a better place once we get through it.

Mr. Riki Ellison:

So I just want to push that out first to make sure we're sensitive to everybody on that. So we're excited today. We're seeing a resurgence of American Space. And we saw that last weekend with the two astronauts, American astronauts going into space. We're seeing that with the development of our Space Force, the development of the Space Development Agency that we're going to have today discussing. And it's a great time for space and for us as an entity in the world order to make sure we are able to keep status quo within the world order.

Mr. Riki Ellison:

So today, we're going to have an opportunity to talk about a really good solution that's going to be able to help us deal with the external threats that we face as a nation and for our allies in the missile form on it. So we're going to help to educate you and give you insight on the space-based [inaudible 00:08:29] that is with our hypersonic, our ballistic missile discriminating sensors that are going to be able to help all our systems be much more efficient, much more capable, and really the first step to go forward to getting a hypersonic defense. So we have a really great illustrious panel today. And we're very fortunate have I think the best people we can, the best people that there are really on, really why are we doing this?

Mr. Riki Ellison:

What's the reasons and why we have to do this? How are we going to do it? What exactly is it? And when can it be put up and when will it be put up on it? So we're going to have a format as I just spoke... And we're going to start it off with each of the presenters to being able to present their viewpoints. And then we'll do a Q&A at the end. If you have questions, we've already got some excellent questions submitted. But if you have any questions during the program, please submit them to questions@missiledefenseadvocacy.org. So I want to start off. We have the great, great honor of having one of our, I think the best leader in Congress on space. Representative Doug Lamborn. He's been here with us for 13 years. He's a leader in the bipartisan support for both missile defense and for space.

Mr. Riki Ellison:

He's the co-chairman of the Missile Defense Caucus. He is a wonderful advocacy for it. He's been part of the STSS when it started. And I think pretty close to when he first came in. He's been part of the [SKA]. He's a big proponent and a big enabler [inaudible 00:10:33] space-based layer of HBTSS. So we're

excited to have him. He's coming from Colorado Springs. Doug, welcome. We're honored to have your remarks. No better person than you. The home of Schriever Air Force Base. The home of space. Doug.

Congressman Doug Lamborn:

Riki, thank you for those kind words. Honored to be here with you. And what a distinguished panel that we will be hearing from during this coming hour. I am speaking from Colorado Springs. We're proud to say is the home of the Provisional Space Command headquarters, which we're very excited about as a community. And you picked such an important topic, Riki, the space based sensor layer and how it will integrate with JADC2, how it will be funded. These are things that I think need to be, and I hope will be a big topic of discussion in the upcoming MDA deliberations that we're going to have, both at the subcommittee level, the week of the June 22nd, I think. The full committee level, June 30th, July 1st. Our strategic assets are so critical for keeping the peace for ourselves, and our allies and partners. And space and missile defense is such a big part of that.

Congressman Doug Lamborn:

What everyone here is doing is so critical to our national defense. Our near peer adversaries are trying to exploit the seams and gaps in our architecture, and in our missile defense and in our space assets. And then there are rogue States, like North Korea, that have the ability or want to have the ability to lob ICBMs to the Homeland. And maybe they can to some of our states like Hawaii or Alaska already. So I think that the things that we're doing with JADC2, and Riki, you mentioned HBTSS, space sensor layer, is really important. I do want to find out as we go through the next discussion period for this hour, why HBTSS is on the unfunded list. I think it's the top unfunded priority, but it's not part of the funding that's in the President's budget or DOD budget. And that's what I'm curious about and would like some clarification on. Riki, you did mention that there is bipartisan support.

Congressman Doug Lamborn:

That's something that is very true. Both sides of the aisle, for the most part, get it that our space assets are valuable. And we need to make sure that our space-based assets expand to include growing threats in the hypersonic glide vehicles are something that our near peer adversaries are not just sitting on. They're exploring, and developing, and testing and trying to make operational that very dangerous type of weapon.

Congressman Doug Lamborn:

And so we need to address that. So I will be working in a bipartisan way, trying to promote understanding, trying to promote cooperation with my colleagues on the Hill. Especially in the House, where I'm on the Arms Services. And I will be doing what I can to foster and promote that bipartisan support. So Riki, I'm going to turn it back to you. Thank you for hosting this event. I will do everything I can. You can count on me to do what I can to promote National Defense Space. It's maybe the highest priority for our national security. Back to you.

Mr. Riki Ellison:

Thank you, Doug. And I appreciate your bringing up the point on unfunded request. And hopefully this discussions going to propel information that's not really out there or it's misconstrued on what this actually is and how important it is for everything that can make our force structure more efficient, more cost effective, and certainly the first step to address the hypersonic threat has to be done. Thank you for coming in on a great time to do this. I think the best guy in the world to tell us why we need this. He is a

representative of NORTHCOM. NORTHCOM's in charge of defending our national territory against external threats.

Mr. Riki Ellison:

And Major General Guillot is the three or the Director of Operations for General O'Shaughnessy, for NORTHCOM. He comes to us with a balanced portfolio in terms of understanding this mission. He comes to us from his couple of years over at Hickam Air Force Base in the Pacific, where he was the Director of Strategic Plans and Requirements. Also was the Chief of Staff under our nominated next Chief of the Air Force CQ. Brown. He also has the opportunity to look at the CENTCOM view point, being there is the Deputy Commander in CENTCOM, for the CENTCOM Air Force. And he is now firmly in place here [inaudible 00:16:07] for NORTHCOM. And I don't think there's anybody better to explain to the American public on why this system is necessary. So without further ado, Major General Guillot. You've got it.

Major General Gregory Guillot:

Thank you, Riki. And I'm really appreciate, NORTHCOM appreciates the invitation and the opportunity to speak here today. And I've worked with him and partnered with him in three different theaters, the Pacific, the Central Command in the Middle East, and then here in the United States. Three different theaters, but all with the same mission, which is protecting our interests, and our Homeland and our forces. And we certainly appreciate your steadfast advocacy for the missile defense mission.

Major General Gregory Guillot:

And also an honor to be here with a Congressman Lamborn and this distinguished panel, as we talk about all champions in missile defense. Not just Riki, of course. And I'd like to provide the warfighter perspective on how missile [inaudible 00:17:17] from having HBTSS and how it might fit into the way we see our future architecture here for NORTHCOM and the sacred mission of defending our Homeland. I think I need to say clearly up front that the NORTHCOM mission is sacred and that is Homeland defense. We do a lot of other things. In fact, we're doing them right now with leading the DOD's COVID response. Providing medical providers all over the country to help areas in need.

Major General Gregory Guillot:

Of course, we have maritime Homeland defense issues. Getting ready for a hurricane that could come here on this weekend into the Gulf Coast states. Tracking that and the DOD response to that. But, really from the NORTHCOM side, ballistic missile defense is a cornerstone of what we're doing. And that's why I really appreciate the opportunity to talk about how HBTSS could fit into that. All aspects of Homeland defense are equally important. We can't be strong in one area, but weaken the other. And so I don't really consider ballistic missile defense, or hypersonic defense, or cruise missile defense more important than any other. However, we need to have a strong capability in all of those areas to ensure that we can defend our country. And then the best way to make sure that we have all those capabilities that are strong together is to make sure that we design systems that complement each other. And then we have support systems that can benefit all of them. And I think HBTSS fits squarely and in that mold.

Major General Gregory Guillot:

So if we break it down, I think Homeland defense is a diverse set of smaller missions. And then what we're trying to do at NORTHCOM is innovate a new way to construct and tackle this complex problem set. And then I'd like to tell you briefly about SHIELD. General O'Shaughnessy's proposal to tie all these

systems together. And SHIELD stands for the Strategic Homeland Integrated Ecosystem for Layered Defense. And when we talk about layered defense, that's layered in terms of sensors all the way from subsurface terrestrial, all the way airborne. And then all the way through into space, which we're talking about today. Layered in different types of defeat mechanisms, different types of interceptors and missiles to protect our capabilities. And then also layer geographically to ensure as the threat advances, so do our defense capabilities, to ensure that we can protect the United States, as Congressman Lamborn mentioned earlier.

Major General Gregory Guillot:

And so, SHIELD will give us an integrated network or an ecosystem, as we call it, of sensors, of shooters, of C2 systems to provide multiple layers to defense against any type of threats. And then from the NORTHCOM side, we focus primarily under the SHIELD and the ballistic missile. As I mentioned, the exciting thing is we're finding out that there are capabilities with sensors that we would have never thought would apply to a ballistic missile defense, but we're getting capabilities from them.

Major General Gregory Guillot:

And again, from under sea all the way into space. And that's why we're so excited about the prospect of HBTSS, because I think with its global multi-mission aspects completely in line with SHIELD, and bringing capability to us in a lot of different ways beyond probably the original design of the system. For BMD specifically though, I think that having that global sensor network could provide complete coverage from the threat launch all the way through the intercept. What we call here in the building, birth to death sensor coverage.

Major General Gregory Guillot:

Whereas now, and in the past, we would have periods where we might not have coverage over a threat. This system would help us detect and track all the way through the successful engagement by one of our interceptors. And so, I'll be clear, NORTHCOM certainly supports that space sensor layer. And we think that HBTSS is an important part of that space layer that we need today and will continue to need in the future as the threat advances. Another part of that layer is discrimination. And that's the ability to distinguish the lethal threats from the non-lethal threats and make sure that we're putting interceptors on the right targets. And we think that that will be a capability down the road. Certainly, we would rely on space for help in combination with terrestrial systems to make sure that we get the best discrimination possible.

Major General Gregory Guillot:

I think it will... HBTSS will give us increased sensor coverage and will certainly increase our mission effectiveness. In some areas, it may be redundant to the terrestrial sensors that we have, not many. And as we're seeing every day, there's no problem in redundancy. In fact, the more redundancy we have, the better off we are, because it will be the only capability that we have and we can't wait to get that into the system. [inaudible 00:22:38] for a lot of different capabilities. HBTSS would not only support BMD, also help with a complex problem of tracking and defending against hypersonic weapons.

Major General Gregory Guillot:

Additionally, there are plans to incorporate the HBTSS data into the missile warning architecture to give more robust, more data, more accurate network for the initial warning. Which of course, with the speeds that we're talking about is key. The sooner we have that warning, the more options, the more

decision space we have for our senior leaders to react. So as I close out with my opening comments, NORAD and NORTHCOM can not conduct this mission alone. Defense of the Homeland is a team effort. And we have some great teammates here on the screen with us here. I appreciate our teammates at MDA, in the [inaudible 00:23:33] and in OSD. And of course, the advocacy that Riki and MDAA provide us. So again, thank you for the opportunity to share some thoughts on this from NORTHCOM. And I look forward to hearing what the other panel members have to say.

Mr. Riki Ellison:

Thanks, Gooley. I'd like to ask you just a couple of questions real quick off of that, off of your remarks. The interesting thing, as you know, we're going through an NGI, a replacement of our GMD System. And we're limited by 44 of those missiles. And so, does the HBTSS mitigate maybe the best risk mitigator, because you're able to reduce the shock doctrine on the discrimination, so you don't have to use this anymore on targets. And that would seem to be an extreme value to you to have a system that can reduce the shock doctrine like that, if it's able to do that. And not only just for BMD, but for Aegis, for THAAD possibly. As you look at the under layer, what's the most efficient way you can do this, you have to wait a while for the NGI capability.

Mr. Riki Ellison:

So that's one question. And the second one is, on the SHIELD, who's driving the architect for that? Is that coming... Can we include Guam American Territory? Hawaii? Is common architect for-

PART 1 OF 4 ENDS [00:25:04]

Mr. Riki Ellison:

Why is common architect for [inaudible 00:25:05] that we can adapt to all the COCOM areas [inaudible 00:25:09], and strategically we don't have to buy a separate item for each COCOM region. Those are the two questions I'd like to see if you could help me. Don't want to put you on the spot.

Major General Gregory Guillot:

Thanks for starting off easy, Riki. I appreciate that. The first question, as, as I recall, the way you presented it is yes, HBTSS would help us in a lot of ways now by giving us that better sensor coverage and tracking and ultimately discrimination, and you hit it right on. The shock doctrine is what's going to help us. While we wait for the NGI, and by the way, this Shield is not something to hold us over until we get NGI. We're building and designing Shield and NGI to seamlessly complement and fit into that. And so, we see it as an essential into the future years when we get NGI. As you mentioned, we have some physics problems now, right? We're limited to the number of missiles that you mentioned, and so improving our shock doctrine, or decreasing the number of missile interceptors that we have to put after a missile is key. Detect, track and discriminate are the key [inaudible 00:26:28] to do that.

Major General Gregory Guillot:

And we do think that not only HBTSS space systems will allow us to do that, and the fewer interceptors we put out after any one threat, increases the number of threats that we would be able to address from these rogue nations. We want to stay on the positive side of that ratio as long as possible. Second question, Riki, you hit right at the core of what General O'Shaughnessy is so excited about. It is because there are a lot of great systems. Let's take the C2 part of this alone. There are a lot of great C2 systems, but they don't necessarily talk to each other. With the GBIs that we have now, Aegis, etc., Patriot, we're

designing and working with MDA and others to design Shield, so it takes all of those systems, almost in a plug and play way, where we can share it across. And so, no service or capability needs to redesign what we have, and we can share information of a [inaudible 00:27:35] of the architecture that they bring into the Shield.

Major General Gregory Guillot:

We've done one C2 test, ABMS in the Gulf just for the turn of the year. We had another one scheduled in April. Due to the crisis, we pushed that to September. It'll primarily be out at Nellis, but it'll be all services, all different types of capabilities feeding in, and the JADC2 format that Congressman Lamborn mentioned, to give decision making capability, engagement capability across the board, regardless of the system that's feeding it in. And so, to answer your final part of your question, Riki, is absolutely, we think that this is something that would work at PACOM, and CENTCOM, EUCOM, Guam, as you mentioned, across the board, and try to break down some of the barriers, stovepipes, that would inhibit us otherwise.

Mr. Riki Ellison:

Yep. Thank you. Thank you, Gooley. And when you talked about the ramp up exercise, we're talking about the F-35, F-22 cruise missile defense capability, is that correct? Both [inaudible 00:28:44] stand up because reading the news, you are getting intrusions on your airspace up in the Arctic. So, is this something that you're looking at? Obviously you are looking at it, but...

Major General Gregory Guillot:

Yes, that's right. So, the Homeland Defense Mission, which is shared here and by NORTHCOM and NORAD, what you described there, as part of our NORAD partners, a daily concern is intrusions into our airspace to cruise missile threat to the United States. And so, that exercise was originally going to be just some fifth generation fighters being able to seamlessly talk to one another, and then we were able to get in and partner with a lot of other services and agencies to expand that to the scenario you described, which we had a DDG out there; we had Aegis; we had the cruise missile [inaudible 00:29:40] that you described, as well as the fifth generation fighters to detect and take it, not only to detect it, but show it all the way through the kill. I think we'll actually be able to do some live fire in the upcoming exercises as well. We want to expand it out to include Sentinel radar, [High Mars 00:05:00], or other systems that we think can tie using the JADC2 that has been mentioned a few times already.

Mr. Riki Ellison:

That's great, Greg Gooley. If I could just follow on that next exercise possibly is in Guam, the ramp ups there, would that exercise duplicate the Shield? Is that what that would do, or is that just a ramp up [crosstalk 00:30:22] for the ramp?

Major General Gregory Guillot:

Yeah. I want to make sure I'm not confusing anybody. The one that's coming up will be at Nellis in September. Now I've worked very closely with General Cunningham and the J3 at Indo-Pacom. We'll certainly share everything that we have with them to apply to Hawaii, Guam and other areas of the Indo-Pacific.

Mr. Riki Ellison:

Okay. Thank you very much for the insight. Our next speaker is the Missile Defense Agency's chief architect, and he is the interface for engineering and development and technical issues directly to the Warfighter. So, Stan Stafira is in charge of the entire architect within MDA to include all the [inaudible 00:31:11] systems and the shooters and the C2BMC that's based there in Schriever. We welcome him to explain it and tell us about the HBTSS and how it fits into his architecture.

Mr. Stan Stafira:

Riki, thanks. I'm happy that you invited me to speak today, and honored to share this with Congressmen Lamborn, Major General Guillot, Mr. Chai and Dr. Tournear. Hypersonic threats are more prevalent today. Our adversaries are out there developing those threats, and as MDA's chief architect, it's my job to develop the missile defense architectures to address these threats. We see it in the news today that hypersonic threats are operational. Our adversaries are showing them out there, but with that being said, MDA is no stranger to intercepting fast missiles. Ballistic missiles travel faster than those hypersonic [inaudible 00:07:07]. The hypersonic threats, however, are just a different flight regime and present this new challenges that we just need to address when we're looking at those kinds of threats.

Mr. Stan Stafira:

From my perspective, what we're trying to develop is a regional architecture that enables the right sensor to communicate with the right shooter at the right time. And that's [inaudible 00:32:28] where it had with all the overarching architectures and the architectures that we have being built within the agencies. We want to make sure that we're getting that right sensor and shooter combo together at the right time to have the effect that the warfighter is looking for. For us to successfully address these hypersonic threats, we need to have persistent tracking of these unpredictable threats. Hypersonic threats fly through the atmosphere. They move around. They're on an unpredictable trajectory, so we need to be watching them all the time. We need to improve our communications. We need to have changes to our fire control strategy to make sure that we can intercept those threats. And then we need to include new kinetic interceptors with high agility that can handle that harsh aerothermal environment, or [inaudible 00:33:18] solutions to be able to negate hypersonic threats as they come in.

Mr. Stan Stafira:

It's also important that we have the ability to see globally, to be able to globally see, track and engaged threats in a [inaudible 00:33:31] way with persistent global situational awareness. We want to know where they're at. We need to know where they're at, so that if we have assets in the area, we can do something about those threats, or at least warn that those threats are incoming. We need real time joint ultimate command and control, JADC2, which Major General Guillot already talked about in his opening remarks. We need that capability to be able to move the data around, move the communications around, so we can get the data to the right guys quickly because these threats are moving fast. We need to be able to engage them as soon as we can. And then we need to challenge them in all phases of flight.

Mr. Stan Stafira:

We don't want to give them sanctuary. That's what I've always been looking for. We need to challenge them everywhere and challenge them either by having sensors coverage on them, engaging them with kinetic or non-kinetic [inaudible 00:34:23] in any phases of flight, being able to communicate wherever they're at, so that they know that they can't do what they want wherever they want to. We're able to force them to show their hand per se. MDA's developed architectures for real hypersonic defense capability in cooperation with all the departments and agencies. This is a game that we need

everybody's help on to help and deliver an effective [inaudible 00:34:49] capability against regional threats, that it supports the other states. Initially we anticipate the focus on a mobile proven Aegis-type capability to be able to get capability off the field soonest, to provide that layer of defense against the hypersonic and maneuvering threats.

Mr. Stan Stafira:

So, our initial focus will be upgrading existing missile systems to get into the glide phase, that phase, before these hypersonic threats dive down and go into the target area, when it addresses them there. We want to address them in the terminal as well. From a sense perspective, the department is exploring options on how to collect and process that information. We're processing information as we speak from current capabilities. We also are looking at new capabilities, like the Hypersonic Ballistic Tracking Space Sensor, HBTSS.

Mr. Stan Stafira:

That's got the ability to see and track these threats while they're flying through this environment and watching them the whole time. That's critical in what we need to do. It's crucial in our approach to be able to make sure that we contain those threats and know where they're at. The HBTSS system will provide that far control data that we need to enable our successful engagements against those threats as they come in to protect our homeland deployed forces and partners. So, we're really interested in getting that HBTSS capability out there to help enable our hypersonic missile defense architectures, and happy to really talk about that today. Thanks, Riki.

Mr. Riki Ellison:

Hey, thanks, Stan. Could you talk a little bit about the successes of the [STSS] and the Kill Assessment Satellite Systems that you've evolved at, and how does [HBTSS] fit into that, and the learning that you've done from that, and the confidence you have in being able to do the HBTSS because of those two aspects of it?

Mr. Stan Stafira:

Yeah, sure. The STSS satellites have been up for a long time, and they've given us a lot of great data and a lot of great usage out of those two test assets. We've been able to incorporate those assets in a lot of different flight testing, and gained a lot of data from those assets that are on orbit. Great thing about it, the data they were able to provide, we're able to process that data and show that we can actually take data from a space-based sensor and get far control quality data from those sensors and provide it to an interceptor to successfully [inaudible 00:37:39]. So, that's the importance of having those assets up, show that we could actually do that.

Mr. Stan Stafira:

And so, that really leads that HBTSS type of architecture approach for space. This was a great way to be able to provide data on our data [inaudible 00:38:04] system, using a low cost acquisition approach to do that, and to be able to figure out ways to get capabilities affordably. That's kind of what we're looking at for HBTSS as well is how do we get space capability up there affordably. So [inaudible 00:38:19] and really a good pathfinders as we go forward into developing the HBTSS Constellation.

Mr. Riki Ellison:

Thanks, Stan. Moving on that other [inaudible 00:38:30], you command and control your fire control data that you've done a great job with, to the C2BMC system in Schriever, and then to the point of being able to take as much data as you [inaudible 00:38:45] both cruise missile defense and ballistic missile defense. How are you transitioning to support that role with the Shield? Is that part of where your thinking on architecture? What are you thinking with that?

Mr. Stan Stafira:

So, actually, we've been working very closely with NORTHCOM. It's been a great partnership over the last year as this concept has really come to fruition. Working with them, trying to figure out what are those requirements that we need, what does a Warfighter need, as far as the command control approach, to be able to do his job, how do we combine those datas? The great thing I think that MDA brings to the equation is we have shown that we have the proven capability to move a lot of data like this over long distances and defend wide areas like that.

Mr. Stan Stafira:

And so, using that expertise and looking at what NORTHCOM is interested in, and it's not just NORTHCOM because all the other [inaudible 00:39:44] interested in the same kind of thing, but using that, we're able to start to develop those requirements and those interfaces that we need to do to take the data from existing systems into a command control system that our Warfighters can use to better prosecute those engagements and make sure that we're better defended, and they're not having to run from one stovepipe system to another to be able to do their job.

Mr. Riki Ellison:

Okay, thank you, Stan. Our next speaker is Walter Chai, and Walter has been with MDA since 2013. He's the director of all the space sensors. He's also the acting director of the Schriever Air Base there for the [inaudible 00:40:32] that's there. He's the technical expert on the system. Walter, if you could help explain to us what actually the Constellation is and what it can do to the extent you can, it would be great. Walter?

Mr. Walter Chai:

Okay, yeah, thanks, Riki. So, it's an honor for me to be part of this forum with this distinguished group, especially with Congressman Lamborn who happens to be my representative in Congress for Colorado Springs. Thank you for your leadership, sir. Really appreciate that, and thank you, Riki, for allowing me to be part of this group. This was talked about before, but let me start by talking about why we need a system like HBTSS. Our adversaries are learning adversaries. They're working very hard at trying to defeat our current defense systems. So, they're looking for weaknesses, holes and things like that. And so, they're developing new systems that include hypersonics, maneuvering missiles, systems that display two signatures, things that are [inaudible 00:41:32] to detect.

Mr. Walter Chai:

So, they're designing systems to maneuver around our terrestrial sensors. They're trying to go under our radar [inaudible 00:16:40], so they're looking for all those different weaknesses. And so, as General Hyten stated back in August of '18, he said, "There's not enough islands in the world to build radars on them, and see all the threats to be able to [inaudible 00:41:53] the threats." And so, his conclusion was we need to go to space, and I fully concur with that. MDA is committed to getting capability to the Warfighter as soon as possible in a cost effective the manner. I believe collaboration is the key. As I

always say, space is a team sport. And so, I'm talking about collaboration with the Warfighter, organizations like NORTHCOM, STRATCOM, Space Command, other acquisition agencies, like the Space Development Agency, SMC, DARPA and industry, the traditional [inaudible 00:42:31] new space companies, the non-traditional contractors.

Mr. Walter Chai:

The collaboration is key to getting capability as quickly as possible in an efficient manner. So, let me talk about those, and so Warfighters. So, we're collaborating on the requirement side. MDA is partnered with Space Command on the capability description document for the joint missile warning missile [inaudible 00:43:00]. There's a [inaudible 00:43:02] between the Space Command Mission and missile warning and mission of missile defense. And so we want to build complimentary systems as Space Command moves out on the next [inaudible 00:43:16] system, and as MDA moves out on HBTSS, we want to make sure they're complimentary and not [inaudible 00:43:21]. We want to ensure that there's resiliency and there's cost-effectiveness, no underlaps, no overlaps, okay?

Mr. Walter Chai:

Another area is in acquisition. We want to include the Warfighters in acquisition. So for instance, STRATCOM, Space Command, DARPA, they're part of our source selection team for HBTSS because we want to make sure that they're involved with how we're going to meet their requirements and selecting [inaudible 00:43:49] to meet their requirements. What are the acquisition approaches? So, they have a stake, and so they're a part of the team of acquisitions. So, they're not just throwing over the requirements and hands-off. They're part of the team and helping us select the right contractors to work. We're also providing everybody insight. We're making sure that Warfighters have a seat at the table when we're developing acquisition strategies from the beginning, and also as we execute and conducting technical review, so that they understand what our challenges, what our trade-offs might be, what risks we may meet soon, and so they're part of the solution.

Mr. Walter Chai:

[inaudible 00:44:30] with other acquisition agencies. Currently we're collaborate with SDA, SMC and others under General Raymond's leadership to develop a unified OPR enterprise solution. So, this inner agency team is trying to define what the future [inaudible 00:44:48] resilient, multilayered architecture with an optimal mix of cost effectiveness and sustainability should be. And so we're doing that today, working very closely with other agencies. We're also in sync with SDA. We're teaming with SDA to be part of their Tranche 0, have HBTSS fly along with their wide field of view sensors in a proliferated LEO constellation. And so what we're trying to do in Tranche 0 is trying to demonstrate the technical ability to be able to perform these capabilities that we need for warning and defense. We wanted to be able to do fire control and show that capability. We're also trying to demonstrate the feasibility of trying to leverage commercial technologies to acquire them affordably and quickly, and I think you'll hear more about that from Dr. Tournear.

Mr. Walter Chai:

On the ground side, we're also teaming with other agencies, specifically US Space Force and NGA on a common ground system for OPIR. And so as different agencies put new space sensors up, we want to make sure that they're considered enterprise sensors. So, they don't do very stove pipe things, but they do everything because every system has inherent capability. As a taxpayer, we don't want to pay for these things twice. We want to make sure we leverage every ounce of capability that's up in orbit. When

we launch HBTSS, not only will we be doing missile defense, we want to make sure we could do space domain awareness, battle space awareness and technical intelligence, because we'll have capabilities inherent in the system. So, we want to share that as an enterprise.

Mr. Walter Chai:

Let me talk about collaboration with industry, which is another key operation area. We're using other transactions, OTAs, and really to have unprecedented level of collaboration, not only between government and contractors, but also even among competitors to bring the best value for the Warfighter working together. And so, we at MDA, we're taking advantage of traditional defense industries, expertise and systems integration and their understanding of warfighter requirements, so we're leveraging that. We're also bringing on board commercial and non-traditional companies who bring innovation. [inaudible 00:47:11] And so as part of the team, we're mandating that they team together, and that's the price of admission. They can't just come alone. You know the defense industry alone or commercial, so we're bringing them together.

Mr. Walter Chai:

And so we're seeing companies like SpaceX, universities, commercial satellite, bus vendors, they're all part of the team now. I would say under the traditional way of doing business, we wouldn't have had them on our teams. And so, I'm very happy about how we're doing that. Let me close by talking about an example. We're working closely together with a Warfighter and also with industry, and you touched on this, Riki, space-based Kill Assessment. And so, this is a program that I'm very proud of. [inaudible 00:47:56] system determines when we launch an interceptor against a threat. We want to know if it hit it, and if it hit it, did we kill it? Did we kill the warhead, or was it a glancing blow, or was it a miss?

Mr. Walter Chai:

And so of course, that's important for Homeland defense, and [inaudible 00:48:13] because we have limited GBIs as we talked about. We in the government, we get criticized a lot for not being as fast and agile as commercial companies. We went out and partnered with a commercial space company for them to host our [inaudible 00:48:30]. It was a win-win because the companies had additional excess swap, or size, weight and power, that they were able to sell off to us. We partner with them; we partner with NORTHCOM every step of the way from requirements to execution, and even now, and we saved over \$700 million, and we developed the capability in under three years. We're currently operationalizing the SKA capability, but we're also right now providing situational awareness to NORTHCOM during periods of heightened activity.

Mr. Walter Chai:

And so, when General Guillot says, "Hey, I need this situational awareness capability," we're able to provide them, even before we operationalize it. And so I think that's an example of how we're working with industry to bring down the cost and bring capability faster, and working with Warfighter to make sure we're meeting their requirements, and getting them when they need it. And so with that, [inaudible 00:49:33], and I look forward to any follow up questions. Thanks, Riki.

Mr. Riki Ellison:

Yeah, thanks, Walt. It looks like your success is team unity. It's also your biggest challenge as well from that much more than the technical. You're pretty confident that the technology you can make happen

and get up. It's the teaming of getting everything. Is that what you would consider your biggest challenge or was it technology?

Mr. Walter Chai:

I'd say it's both. I'd be lying if I told you-

PART 2 OF 4 ENDS [00:50:04]

Mr. Walter Chai:

I'd say, its both. I'd be lying if I told you it was going to be easy technical challenge, but working with industry closely and doing [inaudible 00:50:12] with them, very methodical way, we're understanding what our [inaudible 00:50:16] are, the highest challenges. And so as we learn those things working with industry and also with the war fighter, we're methodically developing [inaudible 00:50:28] phases to address those.

Mr. Walter Chai:

So for instance, during our first phase, working with [inaudible 00:50:34] team, they determined that picking out the dim targets with the cluttered earth background was going to be the highest threat risk. And so [inaudible 00:50:45] phase we're working to make sure that we have the algorithms developed on the ground before we go to space, make sure that we [inaudible 00:00:53].

Mr. Walter Chai:

In our current phase, what we're trying to do is demonstrate that these algorithms work. And so we're going to be providing scenes to the industry teams and they're going to have to pick out the dim targets and be able to track.

Mr. Walter Chai:

And so we're methodically buying down the risk and that's working [inaudible 00:51:11] industry, working with the war fighters to make sure that we're on the right track.

Mr. Riki Ellison:

Thank you. Thank you, Walt, thank you. Our next speaker, Dr. Derek Tournear. He is the new, or the only, or the first director of the new Space Development Agency that got formed last March, last year. It is DOD space development response, rapid deployment of military applications in space. We're excited to see how he fits in with MDA and MDA fits in with him and the whole architecture from his perspective, the sensor capabilities from space as an objective, the whole following that from General Hyten's position on this as well. So you're up.

Dr. Derek Tournear:

Thank you, Riki. I was surprised that you didn't give me a Stanford slam there. I was waiting for it.

Mr. Riki Ellison:

Okay. Yeah. I'm still recovering from that loss, you guys beat us back when my son was playing. So you go ahead.

Dr. Derek Tournear:

It's a pleasure to be here, and especially Congressman Lamborn, I really appreciate the time, because this is, you have been a strong advocate. And speaking of advocacy, I just want to [inaudible 00:52:28] how important this mission is to not only myself, but the whole undersecretary of research and engineering, Dr. Mike Griffin. He came back into the government with this as his primary focus. He said, "This is the reason I came, was so that I could make sure that we got this whole mission of space tracking of advanced missiles done correctly." And I came back into the government from industry where I was involved in some of those programs that Walt was talking about, came back in precisely because we're at a time where it's crucial, where it is so exciting because the commercialization and the commoditization of space hardware is so affordable that we can really revolutionize the way we do architectures for not only the missile tracking mission, but also just beyond line of sight targeting, because we can go to a proliferated architecture and do this rapid spiral development. And that's what we want to focus on.

Dr. Derek Tournear:

So if you look at the advanced missile targeting and tracking, this is an exciting time. And I'll talk briefly at the high level about how I view the whole architecture fitting together. And Walt and I have had a lot of discussions over this, and I think we have a good hybrid approach that I'll discuss. But the backbone we've talked about, JADC2. How do you get there right data to the shooter at the right time?

Dr. Derek Tournear:

That's what SDA is putting up as our transport layer. So that's the mesh network that will allow us to tie directly into our weapons system, tie directly into C2BMC, and tie directly into these sensing systems. So what are those sensing systems?

Dr. Derek Tournear:

For the missile tracking mission, we have two concepts on how to field out this hybrid architecture. The first one is, you look at HBTSS. [inaudible 00:54:30] give you as part of the whole kill chain. HBTSS will give you very exquisite fire control data. I say we need to be able to detect, track and send those data all from space directly to a weapons system. HBTSS will be able to tell you exactly what that fire control system is. So you should be able to fire on remote. That's the goal. We call that our medium field of view system, because it's part of an architecture that has a wide field of view system and a medium field of view system.

Dr. Derek Tournear:

Why do you need both? The wide field of view system is what actually gives you your global coverage. By the nature of HBTSS, in order for it to give you that explicit fire control track, it has to be cued. So it will take a cue from some other sensor. And it will say, "Once I take that cue, I will tell you exactly where to fire the weapon to take it out." As Stan says, we work on this to take out objects that move faster than HGVs. We can do that.

Dr. Derek Tournear:

So the wide field of view system will give you the global coverage that will be able to do that detection and tracking of those hypersonic glide vehicles. Just like you said, Congressman, we need to be able to detect them and track them the entire time through flight.

Dr. Derek Tournear:

The wide field of view system will be able to do that. It will be able to detect targets that are fairly dim, not as dim as HBTSS. So then that's the goal. The wide field of view system detects it, tracks it, passes that information off to HBTSS, HBTSS then tracks it. Even if it gets dimmer than the wide field of view system can do, and then it gives you a fire control solution directly to the war fighter.

Dr. Derek Tournear:

Okay. So, that's the goal. Now, what's the timing on all of this? So the timing, when we looked at this, we said, "Okay. What do we want to do? We want to get," I'm going to quote you, Stan. "We want to get capabilities fielded soonest." That's what General Raymond is pushing as well. And we're for that. And so what we've looked at is we said, "What is the fastest way that we can get a system up there that can do hypersonic glide vehicle tracking?"

Dr. Derek Tournear:

Then we said, "We're going to dovetail immediately off of what DARPA's been doing on Blackjack. We're going to try to proliferate that kind of technology in a wide field of view system, as soon as possible in Tranche 0, FY22." We're going to launch about eight of those to be able to demonstrate that mission.

Dr. Derek Tournear:

The medium field of you, HBTSS, will follow shortly thereafter, and this, Congressman, to your point, this is where it followed shortly thereafter, because if we had just a little bit more money in FY21 we could probably [inaudible 00:57:21] to where it would be a little closer, but behind the wide field of view systems. But as it stands, the plan holds and it's still a solid plan. Wide field of view system goes up in FY22, trailing it in FY23 is the medium field of view system, and now we have a kernel of architecture that demonstrates this entire detection, tracking, fire control, SDA transport layer to the weapons system.

Dr. Derek Tournear:

Into the SDA transport layer, into C2BMC, for then further dissemination. Into the SDA transport layer, down to the Army Titan system for further command and control. That's how they would, in essence, be able to task that. The Link 16 and C2BMC would be how you would task Aegis. The overall system closes starting with a JADC2 client transport layer, a wide field of view system that allows you to do the global tracking mission, and then the medium field of view, HBTSS, that says, "Okay, now this is the actual track that I can fire [inaudible 00:58:28] on." That's how it all fits together. And as Walt pointed out, we're working very closely with General Raymond and folks at SMC and US Space Force to look at what the next generation beyond, after next gen OPIR block zero would look like. And let me tell you, it's going to have all of these aspects in it. And there are details about, is it going to rely all on LEO? Is it going to have some in LEO and MEO? I answer it this way. I say, "I am not wed to LEO over MEO or MEO over LEO. I am wed to proliferation and spiral development."

Dr. Derek Tournear:

So I want to get these wide field of view and medium field of view constellations proliferated as soon as possible so we can fight the war. [inaudible 00:09:12]. And then we'll spiral up. And each spiral, every two years spiral, we'll get additional capability based on new technology and new lessons learned. And then we'll eventually get better and better capability, but we definitely don't want to wait, and have better be the enemy of good enough. We need build something and we need to field it immediately.

Mr. Riki Ellison:

You're awesome. Derek. That was great articulation on the issue. What's the biggest challenge you face, for the team, for everybody in this group discussion here, what is the challenge for this entity? That's preventing you from getting to where you need to go?

Dr. Derek Tournear:

So there's a couple different things. The technical one won't hit it on the head. The technical one is, we need to make sure that we can do that signal to clutter extraction. That's a, that's a big technical problem. We're working on that. We're working very closely together. There's a lot of technology development.

Dr. Derek Tournear:

I will say, outside of that there is an optics issue that I'm really grateful that you put this together, because Walt and I have been working hand in glove to put this hybrid architecture together. And we think we have a very good solution on how we can actually get capability as rapidly as possible that closes the kill chain. But it, for some reason within the community, I think it's probably because of the rapidity on which SDA was kind of stood up, and there's been some turmoil, but regardless of that, there's been this impression that there's a contention. Well, I'm really glad that you pulled this together. Because Walt and I looked at each other, and we work very closely together. We have a hybrid architecture. We're just trying to evangelize that, "Hey, look, we have a way to solve this problem. Just let us go do it."

Mr. Riki Ellison:

That's good. So finally, I'm going to allow Congressman Doug Lamborn to ask the first question, and ask many questions if he needs to, to kind of address what you do.

Congressman Doug Lamborn:

[inaudible 01:01:15] Tricky. And boy, this has been a great educational experience with the wealth of expertise that is on this panel today. Mr. Tournear, let me direct a question to you. How best can SDA and MBA collaborate? And if there are those out there who are thinking there's redundancy or some unnecessary missions for SDA, how would you respond to that?

Dr. Derek Tournear:

Excellent question. So the way I would respond is the technical description. So I would say that SDA has the overall tracking layer, tracking meaning advanced missile tracking mission, able to show that we can close that and get those data to the transport layer, and then down to what MDA has developed with C2BMC and all of the fire control solutions.

Dr. Derek Tournear:

So HBTSS, as I've went through, is a key opponent that is necessary to make that tracking layer whole and work. And the wide field of view. [inaudible 01:02:29] to make sure that that overall missile tracking layer works and closes. So when people talk about that, I think what they do is we just need to walk through the technical details about why we need a hybrid approach, why one is not better than the other. They're both symbiotic and need to fit together and work together.

Dr. Derek Tournear:

As far as making sure that that SDA and MDA are tied closely together. Well, for one thing, we've got the same boss. That's a start that helps a lot. Number two, we're working very closely with MDA, and one of the things we're doing is we're actually going to put SDA personnel with the MDA personnel at [inaudible 00:13:18], at Schriever, to make sure that there's no daylight between us. Everything we're working on is tied together to really close that loop on communication. Because what we don't want is we don't want someone to work on something for two weeks and someone else to work on something for two weeks and then come back together and bounce it off and say, "Oh wait, wait, wait, we should have changed this four days ago." We want to close that so we have complete communication.

Congressman Doug Lamborn:

Okay. Now my last question, and then it'll be back to you, Riki, is on the funding side. Sometimes those of us on HASC who are very keenly aware of the need to elevate an unfunded priority into a funded priority, might look at HBTSS as the number one unfunded priority and say, hey, [inaudible 01:04:07] struggle, and it's a challenge, but if we can get some dollars to elevate that from unfunded to funded, would it be too early to do it in this upcoming fiscal year, given what you've already told us today?

Dr. Derek Tournear:

So what I would contend is that right now we have a plan that closes, but it closes with that gap that is not ideal. The gap between when the wide field of view and the medium field of view system come online. I would contend that the primary reason that gap exists is because of FY21 funding constraints. So I don't think it's too early. I think that if we wanted to try to close that gap to where the wide field of view and the medium field of view operate a little closer together, I think FY 21 is the right place to say, "Okay, we want MDA to be able to go as fast as they can on development of HBTSS. Let's let's close that gap."

Congressman Doug Lamborn:

Thank you. Back to you, Riki.

Mr. Riki Ellison:

Thanks, Doug. I appreciate it. We're going to pass this over to my board member, former undersecretary for policy, John Rood. So John, you want to ask a couple of questions to start off and then go into the Q&A that's been put it on you on the web?

Mr. John Rood:

Yes. I want to thank those of you that have been sending in questions. We've gotten quite a few. Really appreciate that. And I'll try to capture some of those into a couple of categories. One relates to organization dynamics. One of the challenges, whenever you have a new organization, and in this case there's several of them, is roles and responsibilities, and how do you work that out?

Mr. John Rood:

And so there've been a few questions that came in along those lines. You have, in addition to the Missile Defense Agency, which obviously takes a lead on missile defense and the needs for the overall architecture, Space Development Agency, having been stood up to look at development of the space architecture to support a variety of missions. And then you get into the services, the COCOMs. so a

number of the questions were along those lines, but I guess just starting off, how do you resolve those issues?

Mr. John Rood:

It's heartening to hear that the two of you are working well together at SDA and MDA, but ultimately MDA'll put forward a vision for missile defense. How does SDA regard those things? Do you see it as sort of requirements that the mission lead is providing to you, that you then go service in the context of a broader architecture? Or besides the customary collaboration between the two organizations, how are we going to keep the two aligned? And then the other questions we got were things around how does this fit into the Space Force, and what role will the Army and Navy and others have in levying their requirements to have it all fit together as a whole? Perhaps, Derek, you could begin. MDA, maybe Stan address that next.

Dr. Derek Tournear:

Sure. Certainly. So that's a very appropriate question. And I'll start with what I think is one of the biggest misconceptions in missile defense within the department. And so it's good to air to make sure everyone in the community hears it. But one of the things you mentioned there is MDA puts together this overall vision. So Stan talked to this about how this overall vision will work to get you the right data. Make sure they get it basically to the right weapon at the right time. The right sensor, right shooter, right time.

Dr. Derek Tournear:

And that's perfect because what we look at at SDA is we are trying to come up with minimum viable product in each of our Tranches. Our Tranche 0 is FY22. Every two years another Tranche. What we want is at the end of FY24, which is Tranche 1, we want to have IOC, which will give regional persistence so we could focus on different areas. And then Tranche 2 in FY26, we would have global coverage.

Dr. Derek Tournear:

So what we do is we look at weapons systems, and we look at war fighter needs. So we would look at the weapons systems that we know that Stan's developing, and what is needed to close that. And we would treat that as a capability need that we would put into our minimum viable product delivery timetable.

Dr. Derek Tournear:

So the reason why I say there's a big disconnect within the department over that is you start to get into this chicken and the egg issue that we want to head off at the pass. So for example, when we were pushing for getting funding for the tracking layer mission last year, one of the questions is, wait a minute. Why fund it until we have a solution to shoot it when we're [inaudible 01:09:05].

Dr. Derek Tournear:

Okay. Then obviously I'm sure that my colleagues then that were asking for money for the interceptors got the same question. Why would we fund the interceptor until we have the tracking?

Dr. Derek Tournear:

So you don't want to get caught into that. So the idea is we want to move both of them at the same time. And I would contend that one of them is not more difficult than the other, both are necessary, and you need to push forward.

Dr. Derek Tournear:

So what we do is we make sure that we understand what the capabilities are in the future. And we design our delivered sensing capabilities to plug into that. That's how we integrated and work together.

Mr. John Rood:

And then-

Mr. Stan Stafira:

As I understand it-

Mr. John Rood:

Go ahead, Stan.

Mr. Stan Stafira:

Sure, sure. Thanks. It is a good question. And I think we're really working hard on trying to make sure that we collaborate better amongst the department. I know the agency, for a fact, has reached out very, very deliberately to the Army and the Navy and the Air Force, making sure that we try to understand the capabilities that they have out there, and make sure that we're bringing those capabilities into the architecture, looking for ways to incorporate that in the architecture. We're making sure that we're talking to the war-fighting combatant commands, seeing what their needs are. We're [inaudible 01:10:28] with the combatant commands to make sure that we understand their requirements, make sure we work with them to kind of document those requirements so that we understand and they understand how they can flow into a architecture, which we could then develop and procure should the department decide to fund that.

Mr. Stan Stafira:

So, so we're doing a lot more of that than we have done in the past. I think we got that point where we've developed a ballistic missile defense architecture, I call it a 1.0 architecture that does very well at defending against a rogue ballistic missile threat.

Mr. Stan Stafira:

But we're now seeing hypersonic threats, cruise missile threats. We're looking at those architectures as well and laying them up against each other and saying, "Where are the synergies amongst those architectures? Where's the best bang for the buck that I can spend or develop amongst those architectures so that I can move them all forward and be able to give the war fighter greater capability?"

Mr. Stan Stafira:

And so I think we're doing a lot more of that, that leg work out there with the services and the COCOMs to make sure that we're all together, as well as the agencies like SDA and DARPA.

Mr. Riki Ellison:

Thanks, Stan.

Mr. John Rood:

Thanks. Another question that arises is the support of the space-based layer, not only for the defensive mission, but integration of all offense and defense. So you mentioned something, some of the new threats like hypersonics that are difficult to defend against, or cruise missiles. They're difficult in different ways than ballistic missiles, which pose their own series of difficulties. But as part of the defensive operations that will be missile defense, then how do you see this through different command and control systems for the offense? Things like the department has a large effort for hypersonic weapons for offensive strike. Other things in the intermediate range missile area are being pursued. Can you talk about the linkage between offense and defense and how a more so broad based architecture can support them both? Derek, would you mind going first?

Dr. Derek Tournear:

Sure. I can certainly answer that. So we have the tracking layer to do the missile tracking. That's our priority. Our second priority is specifically the beyond line of sight targeting for time sensitive ground and maritime targets. Exactly for the missions that you're talking about.

Dr. Derek Tournear:

And so in order to do that, we call that our custody layer. Custody meaning it is able to maintain target custody. For that, we are relying on other mission partners to build out the sensing aspect. So we're really tied very closely with what Army's is doing, not only with space programs, but also what they're doing on the ground with Titan to be able to be able to do the actual targeting. And then the Air Force has some programs, as well as others within the community.

Dr. Derek Tournear:

The whole idea is that will form a proliferated network of detection capabilities that will then feed into our transport layer. And transport will be able to give that those fire control solutions directly via tactical data links over Link 16 to a weapons platform or to Titan so that Titan could distribute it out to other weapons platforms. So that is what we see as the beyond line of site targeting mission. That's our custody layer mission, and that's how we do the offensive mission.

Mr. John Rood:

Thank you. General, do you want to comment on this at all?

Major General Gregory Guillot:

I think that we're covering all the points that are important to us at NORTHCOM on bringing in sensors and looking at today and in tomorrow. And I particularly liked how Derek described the custody all the way across, from sensing and tracking all the way to the fire solution.

Major General Gregory Guillot:

One thing that did come up in my fellow panel members' discussion that I would like to hit on very quickly, a little bit off the subject is the topic of collaboration and teamwork.

Major General Gregory Guillot:

You've heard a lot, and I'd like to emphasize from our point of view, the work with Stan and his team is basically daily, from here at NORTHCOM, layer defense, NGI, you name the topic. We are extremely close, from Derek's standpoint, although we don't do too much day to day on the space. He has a team...

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Major General Gregory Guillot:

... Derek's standpoint, although we don't do too much day to day on the space. He has teammates in R&E that we're working with all the time as well. Then, Walt brought up a great point about our close collaboration with him and his team, where he took a capability that will be fully operational in several years and figured out a way to give us a partial capability now, without derailing his developmental progress, still giving us interim capability in the meantime, which is far and away better than what we would have otherwise.

Major General Gregory Guillot:

There's no reason to do that other than people that are really focused on getting the most out of every program and really striving to meet the needs of the war fighter, which are ultimately the needs of the American people is to protect the homeland.

Major General Gregory Guillot:

I do appreciate the opportunity to comment on the teamwork and collaboration that we have across the board here with the panel members. It is really appreciated from the NORTHCOM standpoint, highly valued. I think that the American people are going to see the results of that great collaboration and teamwork, and better capabilities sooner and probably cheaper because of it.

Mr. John Rood:

Thank you, General Guillot. Got some other questions here. Derek, you began by discussing some of the timing. Some of the follow on questions that we received pertained to things like, well, when will the first launch be expected? You talked a little about IOC, but just if you could refresh, what does IOC constitute, and then the full operational capability? The two or three questions were along the lines of: When does the first observable happen? What's the first major milestones and then the objective system?

Mr. John Rood:

Perhaps after, Derek, you address that, Stan, another question we received was: As the space layer takes shape, there's also all of the terrestrial MDA capabilities, whether it's a next generation intercept or other legacy systems. How are you going to further optimize the rest of that architecture to take advantage of that space layer that's being developed? So Derek, would you mind sort of stepping through the schedule and what people in the community should expect to see as the observable, such as a launch and IOC and FO capabilities, please?

Dr. Derek Tournear:

Absolutely. I'll just start with the [inaudible 01:17:31] I'll march through in time and tell you what capabilities you'd expect. In about the March of 2021 time frame, there'll there'll be one demonstration flown. This will be a Leo demonstration to take a bunch of OPIR data at various bandwidth bands. So

that's the first near term observable that people will see. That's a joint SDA, MDA [inaudible 00:02:59]. We're working with a vendor to take those data.

Dr. Derek Tournear:

Then what we'll see is later in 2021, there'll be at least three Leo OPIR satellites flown. And so those will be wide field of use systems that will [inaudible 01:18:18] and two of those will be flown by DARPA. One of those will be flown by SDA. We call that our tracking phenomenology experiment. The idea there is to collect the data with a wide field of view system in [inaudible 01:18:30] so that we can really justify that we've chosen the correct bands, that we understand some of the phenomenology. And with that we'll be able to work directly into a lot of the algorithms that HPTS is currently developing. We'll be able to play those off of each other.

Dr. Derek Tournear:

As a matter of fact, that payload is already selected and on contract, all of those payloads, but the bus that SDA plans putting out, the spacecraft bus, the RFP for that bus actually should go on the street today. And so we should be able to see that, people will be able to propose to that.

Dr. Derek Tournear:

The next thing that people will be able to see is by June 15th we plan on having our RFP on the street for our traunch zero wide field of view satellites. So this is eight satellites wide field of view to be able to do the mission. That RFP draft has already been out and closed. The real RFP will go on the street before June 15th. Those eight satellites [inaudible 01:19:32] show that we can have something that's traceable [inaudible 01:19:34] coverage, and we'll be able to get the data on how [inaudible 01:19:37] and how good tracks are. All right.

Dr. Derek Tournear:

Then again, shortly thereafter, then HBTSS will fly with one [inaudible 01:19:46] satellites. We're still working through that on how many we can fly. Obviously we'd like to fly more than [inaudible 01:19:52]. And then that will give us the medium field of view data that we'll be able to feed from the wide field of use system, then go to transport to show the whole kill chain can be closed. That's traunch zero.

Dr. Derek Tournear:

What I call IOC is traunch one. So after traunch zero then we go and we launch... Now we're talking about multiple dozen. So on the order of say 70 mixture of wide field of view and medium field of view satellites will make up traunch one. And that will give us enough coverage in Leo so that we can have essentially regional persistence. That seems odd, but essentially we'll have enough satellites up there where we won't be orbitology limited, but the satellites are small. They still will have to duty cycle so we'll be power limited. So we'll have to determine which areas of the globe we want to focus on. I call that IOC because that's the first time we'll have enough satellites up there to where we could actually fight a war with those satellites because we'll be able to have capability over a given AOR.

Dr. Derek Tournear:

Then in traunch two, so now we're at the end of FY24, we'll have more satellites up to where it we'll be able to have full global coverage. I don't want to use the term FOC, which would be final operating capability, because in this spiral development model you never get to final. Every two years you get better and better abilities. But at the end of traunch two, at the end of FY26, that's when you would

have enough to have full global coverage to be able to meet the capabilities that are required. And then you would continue to move up as you learn from that point on.

Mr. John Rood:

Thank you. Thank you very much. Stan, do you want to address the question on optimizing the architecture?

Mr. Stan Stafira:

Certainly. Glad to do that. As we see more of these systems proliferate, we're already looking at ways to be able to better utilize the assets that are out there. And MDA's looking at fusing the sensor data that we're getting from all these different assets. When we fuse that sensor data we're looking to get better tracks, better understanding of what the threat is. With that better understanding we can give the war fighter a more accurate picture, be able to influence shot doctrine or strategy that he has.

Mr. Stan Stafira:

We're also, as part of the layered Homeland defense effort, looking at how do we better manage the battle, be able to make sure that we can optimize between different layers, be able to communicate better between the different systems of those layers and truly have an integrated layered defense as we go forward in the future. As these capabilities come in what they do is they provide the data that we need to be able to better utilize the assets that we have. And so that's what we're really looking forward to with those assets as they come forward.

Mr. John Rood:

Thanks, Stan.

Mr. Riki Ellison:

I'd like to ask both Derek, Stan, and Walt: How do you mitigate the risk that we're going to take? We may use funds from our terrestrial radars and stop modernizing them. Where are we moving in funding for this? And as we know in the history, what satellites that usually been over cost [inaudible 01:23:16] and they're not deployed on time. So what lessons have you... How can you give us affirmation that you can do this faster, quicker, that what you're saying to make this real than what we've seen in the past? And then the second question is resiliency. There's a lot of argument of having space-based up there because they're not resilient. So if you could address those two, I appreciate it.

Dr. Derek Tournear:

Is that to me, Riki?

Mr. Riki Ellison:

I think yeah, to you and then to MDA after you.

Dr. Derek Tournear:

Certainly. All right, so those are great questions and I have some data to be able to substantiate on why I believe that we can do it on cost and schedule for what we're proposing and what we've shown. Our transport satellites are a little bit ahead of our tracking satellites. We have just closed our RFP for our traunch zero tracking or transport satellites. And on those we requested firm fixed price bids from

industry. And we received a lot of good proposals in. To the dollar amounts that we expected based on our estimate, and a lot of it was based on my experience coming from the space industry, coming from one of these aerospace and defense companies that were doing a lot of these fast type of projects. I knew how much it would cost.

Dr. Derek Tournear:

We now have proposals in that match that in their firm fixed price bids from industry. And the way that we're able to do that is we're not trying to develop completely new technology. We're taking technology that exists or is pretty darn mature right now and we're just saying, give us that in a commercial model and let's fly it and collect the data. As we develop new technology that will be spiraled in later. That's the key thing is we're not going after trying to get exquisite requirements from the get go. We have a minimum viable product that we're going [inaudible 01:25:15]. We're going to deliver it on time and on budget. And then we're going to spiral every two years as we develop better and better technology capability. That's how we're going to be able to do this affordably because we're riding on the coattails of all of the technology and maturations being done in the commercial industry.

Dr. Derek Tournear:

Now, this other one is resiliency. That's a good question that we're debating in the community now. And it's one that a lot of us think that the vulnerabilities in Leo have been overblown. So if you look at this, we are getting our resiliency on a couple different things. We're getting our resiliency on numbers. First, primarily we have a lot of different targets, if you will, up there and you'll have to shoot down multiple of those [inaudible 01:26:04] before you start to degrade our capabilities. So that gives you time. That gives you time from when they first started shooting to when you lose capability. That gap in time is the time when you can respond. Whereas if you just have your high valued asset up there, it's vulnerable. If it gets shot down and you lose a large gap in capability, well then you have no time. So that's number one.

Dr. Derek Tournear:

A lot of other things [inaudible 01:26:28] that in terms of resiliency we're ensuring that there are multiple performers building [inaudible 01:26:35] resiliency in the supply chain. We have resiliency if there's any common mode failures amongst different components, we're watching that. Those are the kinds of things that we're watching very closely, obviously cyber. But as far as any specific... If you look at specific threats to Leo satellites, proliferated Leo satellites, versus threats to satellites in any other orbital regime, they're terrible. And what Leo buys you, it buys you the multitude of the number of satellites you have up there and the ability to actually [inaudible 01:27:07] than a lot of other constellations that are being [inaudible 01:27:12] and proliferated in LEO.

Mr. Riki Ellison:

Thank you.

Mr. Walter Chai:

If you don't mind, let me add. I think collaboration is key, like I mentioned earlier. The reason I say that is because we're coming at it as an informed consumer, MDA. We've done a lot of studies with industry, with the war fighters and other acquisition agencies. We know what we're talking about as we develop some of these. For instance, we looked at 15,000 orbit architectures to see what is the optimal system.

We looked at, what are the pros and cons at different orbitals. We leveraged all those lessons learned and all the information as we work with the future HBTSS as contractors.

Mr. Walter Chai:

We understand what the challenges are so we're developing phases [inaudible 01:28:10] go to space and find out whoops, we can't detect these. We're going to put on the ground. We're taking steps on the ground methodical to find out [inaudible 01:28:23] and I believe that's the right approach. We're going to make sure that's cost effective. We're working within the architecture that SDA is developing, right? We're not building these one offs. It's going to be part of system of systems. I'll leave it at that. I'll turn it over to Stan.

Mr. Stan Stafira:

No, and I echo all the comments that have gone before. I think that these guys are exactly right. And we continue to have terrestrial capabilities, as well as the space-based capabilities. We will have our [inaudible 01:29:02] radars, we'll have our long range discriminating radars, and those things out there as well to provide a sense of diversity, and also to provide increased accuracy based on that, as well as the satellite architecture that's up there. Because we [inaudible 01:29:19] systems to be easily maintained, we're continuing to maintain them, and we'll continue to do that into the future as [inaudible 01:29:24].

Mr. Riki Ellison:

So Stan, we're able to do both modernize and create new terrestrial radars and space with the limited budget we have? Or are there going to be hard choices here?

Mr. Stan Stafira:

Well, certainly there'll be hard choices as far as which way you want to go, but that being said, we're not going to just divest the current assets that we have. We'll make sure we maintain those as we go and have that pathway to get to the capability I think that we all think we need to have. We need to have a space-based capability to do this mission right. Especially with the threats that we're looking at, right? When you look at a hypersonic threat, as Walt said, there's not enough land on the earth to be able to put enough terrestrial radars to do this, so we definitely need to get up there to be able to handle this mission.

Mr. John Rood:

Another question that had come in that I think is probably best addressed by Walter Chai. Walter, you talk about the presentation about the critical technology efforts, things like the algorithm development for spreading out signal from the background clutter. But the question was what other critical new technology areas need to be addressed to fill the space layer vision for missile defense? And which of these are small enough to be addressed by smaller businesses, new commercial entities, universities that you spoke about? Can you address that, please?

Mr. Walter Chai:

I guess another critical technology is focal plane arrays. We've partnered with other agencies, intel community, as well as the Air Force to invest in those. We're actually reaping the benefits now. We're turning those over. We get those contractors that we're working with to help with their risk mitigation. I

can't tell you exactly what areas, I guess, new innovative companies could work, so I'm going to leave that up to the teams to figure out where those niches are.

Mr. Walter Chai:

We've seen proposals where small universities, for example, have a subject matter expertise in an area that would be helpful that we're leveraging. In commercial, I guess, processes and developing large quantities of spacecraft buses. In the past, in the defense industry we'd be buying ones and twosies of course raising the cost. Now we're trying to leverage the processes of that correct vendors bring to the people. I can't give you an exact example where they could help, but I think there's gems everywhere, right? There's areas where small businesses with expertise could really help, and that's going to help deliver capabilities faster and cheaper.

Mr. Riki Ellison:

Okay. Well, I think we're coming to a end of our session. I'd like to ask each one of you to do a closing remarks and what you thought we got accomplished today. And we'll start with representative Doug Lamborn. Doug, if you could wrap this up, would appreciate it.

Congressman Doug Lamborn:

Thank you all for being here. I've learned a lot and I'm going to take this with me into our upcoming deliberations on the NDAA where possible. I'll team work with every single one of you. You're doing great work. I'll really be trying to educate and to convince and persuade all of my colleagues on both sides of the aisle how critical these technologies are ,and how critical it is to fund them and defend them as soon as possible. That's going to be my mission. This has been helpful to me to help accomplish that mission. Riki, thank you.

Mr. Riki Ellison:

Thank you. Hey, thank you< Doug, for taking the time to be here with us, to listen to the discussion today, and to be active in action on getting some of these things that we talked about today addressed. So we appreciate that. Thank you very much. Gooy could we have you give us a couple of closing remarks?

Major General Gregory Guillot:

Of course, of course. It's been a pleasure to be a part of this team. And as Congressman Lamborn said, learned a lot from some really, really smart people. I've got a page full of notes on the great things that were said. I think my takeaway from this will be just need the team work to keep the pressure on what NORTHCOM considers to be a sacred mission of defending our homeland. And keeping the pressure on partially is for us at NORTHCOM to get the most out of the systems that we have. And you heard them mentioned, improve our shot doctrine. How can we get the most out of the systems that we have today? What tactics, techniques, and procedures can we put in play to get the most out of the capabilities we have?

Major General Gregory Guillot:

At the same time, we want to make sure that we're staying on timeline with the system of record that's been developed to bring us more capability to fill these gaps in the future. And some of those [inaudible 01:34:36] mentioned and we focus a lot on the space part, space-based kill assessment, HBTSS, those programs that will really bring more capability to us in the future.

Major General Gregory Guillot:

And then the final area is just developing and implementing that layered defense approach. The threats we're faced with are [inaudible 01:34:55] right now for simple defense systems so we need the layers in the sensors and in the defeat mechanisms and in the ability [inaudible 01:35:03] across all of that. And as you heard, the team on the screen here is doing great on that.

Major General Gregory Guillot:

And then of course, we'd like to thank Congressman Lamborn for his advocacy and support across the board on all these initiatives. And Riki, back to you with thanks for keeping us involved in this discussion.

Mr. Riki Ellison:

Thank you, Goey. And we're looking forward to that common architecture of the shield and moving that out across the globe. That's important. Stan, would you like to have some remarks at the end?

Mr. Stan Stafira:

Sure. Riki, Secretary Ruth, thanks for inviting me again to speak at this event. Again, I find it great. The questions are great. The discussion is great. Again, I learned a lot. Congressman Lamborn, General Guillot, glad to be on a panel with you, Walt Chai and Dr. Tournear. Again, it was a great discussion that we had to be able to look at this capability we have out there. I mean, in my mind, from an architecture perspective, the threat's there and the time's now, right? We know the threat's out there. We know we need to address this threat. It's challenging our forces in the theater. The technology and the capability are maturing now. This is the right time to be looking at this.

Mr. Stan Stafira:

I think maybe in the past a space might have been too far a reach. I don't think it is now. I think we're at the right point in time that we do need to make that transition, to be able to have that pervasive birth that that sensor coverage. That's what we're looking for. That's the way that we get that reduced shot strategy, be able to better manage our forces, better manage our engagements, and be able to better defend forces and homeland from threats from our adversaries. Again, thanks again, Riki, for allowing me to speak at this event. It was really good. Thanks.

Mr. Riki Ellison:

Thank you, Stan. Walt?

Mr. Walter Chai:

I'm just going to reemphasize what I said. I truly believe that space is a team sport and it's really gratifying and it's great to have my teammates here also share stage with them. I really appreciate that. The only thing I want to mention besides that is that I lead the space sensors group within the agency, but I don't see ourselves as space people. We're all about bringing capability to the war fighter. And we just happen to understand how we could bring space applications that do that. I really think the focus is, from my perspective even being space sensors, it's not about space, it's bringing capability to war fighter. We're going to try to do that as efficiently as possible. Teaming with others to get that done I think that's the way. So again, thanks for allowing want me to be here. It was a great honor.

Mr. Riki Ellison:

Thanks, Walt. Derek?

Dr. Derek Tournear:

Thank you for setting this up. I just echo. I completely agree. Defending the homeland is a key mission. The threat is real, the threat is now, and it's a team sport. I really appreciate it. I think everyone on this panel, especially Congressman, I know you're fighting the fight and knows how important it is. We're out there to help. Let us know. We need to get these capabilities fielded.

Mr. Riki Ellison:

Thanks, Derek. John, do you want to say anything?

Mr. John Rood:

Just to express gratitude to the panelists. I thought you did a terrific job of really shedding a lot of light on this. It's a real honor to have Congressman Lamborn with us and to have these experts in the field. I thought you did a terrific job. Thank you very much, everyone.

Mr. Riki Ellison:

Thanks, John. Hey, thank you all. It's about team play and a more talented team, a team that has more capacity, more capability [than] with a team that trusts each other and a team that has diversity of thought across the board. And it's mostly trying to get that trust within the team is more important than the external factors. Because once you have that, you become invincible, and you're able to beat. And it's not about going to war. It's about to [deter] war. And we have to be able to have a capacity and capability that is not going to be as much as what the other opponents can do, but enough that's so invincible by trust, and it's going to reach out to our allies as well that we become [invincible]. And this is part of the process of being able to communicate within our own team to work that trust issues out between each one of us. So as a one team, one fight, and we'll take the world on this. So thank you very much, everyone, for joining us today. Thank you.

PART 4 OF 4 ENDS [01:39:52]