

Center for Strategic and International Studies

TRANSCRIPT

Event

**“The 2022 Missile Defense Review - A Conversation with
John Plumb”**

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FEATURING

John F. Plumb

Assistant Secretary of Defense for Space Policy

CSIS EXPERTS

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Transcript By

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Tom Karako: Well, good afternoon, everyone. I'm Tom Karako. And we're very pleased to host today's event here at CSIS for the Pentagon's rollout of the Missile Defense Review, the department's high-level direction and guidance for a wide range of air and missile threats. It was released just last week as part of the National Defense Strategy.

And to do so we're very fortunate to have with us Dr. John Plumb, assistant secretary of defense for space policy. Notwithstanding the title, he's got quite a bit in his portfolio, to include the supervision of the department's policy for space warfighting, interagency coordination, and international engagement on space policy and strategy. That alone would be enough to keep anybody busy, but he's also got several other things – cyberspace operations, nuclear weapons, counter-WMD, and missile defense, which is what we're going to be talking about today. Dr. Plumb was confirmed in his role in March 2022 – this year – and in addition to everything else, he is the principal cyber adviser to the secretary of defense.

I mean, man, when do you sleep? (Laughs.) That's quite a lot there.

John F. Plumb: Thursdays. Just Thursday.

Dr. Karako: His military service in the Navy included active duty as a submarine officer on a Los Angeles-class submarine and as an instructor in the Navy's Nuclear Power School, and as a civilian you've worked in the Senate, the Pentagon, and the NSC.

So we're going to be having a discussion. We're also going to be taking questions from the audience – from the public. You can submit them online from the event page, and through the magic of integrated deterrence they'll come to my tablet and we'll direct them to our speaker.

Dr. Plumb: I thought you were going to say JADC2, but OK.

Dr. Karako: (Laughs.) I've already done that one.

Dr. Plumb: Ok.

Dr. Karako: So, John, welcome to CSIS. We're delighted you came over to do the event. Why don't I just turn it over to you to kind of situate the Missile Defense Review and highlight some of its main features?

Dr. Plumb: Well, thank you very much, Tom.

Thanks to folks who are here and online. Really appreciate it. Good to see you, and thanks to CSIS as well for hosting this.

Let me just run through some prepared points on this and we can get to our conversation.

So the Missile Defense Review informs U.S. missile defense strategy, policy, and capabilities. Just as a scene setter, I think the thing most clearly on people's minds right now is that Russia has indiscriminately used thousands of offensive missiles in Ukraine.

They've used them in a way that, in many cases, in my opinion, for broad area terror effects to inflict terrible hardships on innocent civilians and, more recently, in the last kind of week or so, also used them with precision effects against civilian infrastructure. So, once again, not really against what I would consider military targets.

But one thing is clear: Russia's use of missiles in Ukraine shows we should expect these to be part of 21st century combat.

The emerging ballistic, cruise, and hypersonic and lower tier threats, including uncrewed aircraft systems, poses an expanding and accelerating risk to the U.S. homeland, to U.S. forces abroad, and to our allies and partners.

Finding ways to effectively defend against these types of air-breathing and ballistic missile threats is an important task, really, why you've asked me to come talk today.

And for the Missile Defense Review, this is the 2022 Missile Defense Review. It's the third iteration, the previous ones in 2019 and then in 2010, which I had a pretty big hand in in 2010 in the Obama administration.

So I thought it'd be interesting to just look at a few points of continuity and then some important differences, really, between this and the previous version. But there is quite a bit of continuity across all three and I think what we see is, in any case, the security environment is evolving. Missiles are evolving. Missile defense is evolving and so, of course, the policies need to evolve to catch up and stay ahead of issues.

So, first, with respect to homeland defense, this Missile Defense Review, like both of its predecessors, says the U.S. will continue to stay ahead of the North Korean missile threat to the homeland.

To do this, we are actively improving our existing active missile defense capabilities and adding new ones. We're adding new ones like new space sensors, new land-based sensors, and, of course, we're developing 20 – at least 20 for now – new Next Generation Interceptors – NGIs – and those are scheduled to start being fielded in 2028.

Our '23 budget request alone is about \$2.8 billion just for the capabilities I've mentioned. But missile threats are advancing and changing rapidly, and so I think this Missile Defense Review is very clear eyed that we have to increasingly move beyond relying only on active defenses and continue to pursue a comprehensive missile defeat approach.

Now, comprehensive missile defeat means full spectrum – how do you prevent and defeat adversary missiles in all domains along all timelines with both kinetic and non-kinetic capabilities.

That sounds like a DOD answer. The English answer I've been giving people is any and all left of launch and any and all right of launch capabilities that could prevent an adversary missile from being effectively employed, and, roughly, the more capabilities you have, the more tools you have, the more likely your chance of success.

So, moving beyond North Korea, which I know is important to you for this Missile Defense Review so I think it's good – but moving beyond North Korea, this Missile Defense Review reaffirms that the U.S. will continue to rely on strategic deterrence underwritten by our nuclear forces to deter nuclear-capable missile threats to the U.S. homeland from China and Russia.

This is really a strategic deterrence issue. Homeland missile defenses are neither designed for nor capable of defending against the sophisticated array of offensive missile threats that China or Russia could use in a massive nuclear strike against us.

We rely on U.S. nuclear forces to deter these threats. It's long-standing U.S. policy. It's a point of continuity through this and all previous Missile Defense Reviews, a point of continuity through all Nuclear Posture Reviews, and that's – I just need to make sure that that is clear.

On regional threats – air, missile – we will continue as we always have to pursue defenses against all regional threats from any source and we'll take active and passive defenses to defeat regional hypersonic missiles as well as the other types of threats.

We're going to pursue persistent and resilient sensor networks to characterize and track all those missile threats, including hypersonic threats, to improve attribution and enable engagement and, you know, fundamentally, you got to understand the domain. You have to be able to see and track things that are coming if you're going to engage them.

And a new area of focus in this Missile Defense Review is our commitment to enhance our Pacific posture through the defense of Guam. Guam is,

obviously, a U.S. territory. It's also, obviously, part of the U.S. homeland because it is a U.S. territory, and it's U.S. homeland but it's within the range of China's missiles.

So it's a regional – it's in the regional theater and also part of the homeland, right. A big logistic hub for us, obviously, and missile defense of Guam is a big deal so it's going to require persistent, layered defenses. We have cruise missile threats. We have ballistic missile threats, general air threats.

So doing that is a big issue and we are very clearly committed to it. We've also very clearly stated that an attack on Guam is, in fact, an attack on the U.S. homeland, in case there had been any misunderstanding about that by the adversary.

Missile Defense Review also commits to examining technical solutions to address two emerging threats. One is cruise missile threats to the homeland and the second is uncrewed aircraft systems and drones, right. So these are both clearly emerging, and we can talk more in our conversation.

And then, finally, stressed in the National Defense Strategy and the Nuclear Posture Review, diplomacy is also an important element of integrated deterrence, and how that relates to missile defense is that we will work closely with the State Department as appropriate to strengthen mutual transparency and predictability with Russia and China where such efforts will strengthen deterrence or stability.

But as with any arms control transparency measure, these things only work if you have a partner acting in good faith, and that's not necessarily the case at this moment.

So that's, really, just my quick kind of overview. I think – I'm proud of the review and proud of the team, and I'm looking forward to our discussion.

Dr. Karako:

Well, congratulations for getting it out. I think you've touched a lot of the topics that we're going to be digging into.

Before we even get to the details of the litany that you ran off, obviously you've emphasized that the Missile Defense Review is closely connected to the NDS and the NSS, nested together and all that.

So let me begin by invoking a phrase from the president that was in the NSS and the secretary's intro to the NDS and that is that this is a decisive decade.

Okay, so what is it in the 2020s – what are going to be the most important issues and capabilities for missile defense in the decisive decade?

Dr. Plumb:

So let me answer that kind of in two parts. Let's just talk about why it's a decisive decade first, all right.

So I cannot give enough credit to Secretary Austin for, basically, coming in on his first day and saying China is the department's pacing challenge. That has had incredible impact throughout the department to kind of pivot our focus and both focus our, you know, the mind but also our investments and our resources and look at the challenge in a way that I probably could not have predicted was capable of. Like, it's much faster than you can usually turn a ship of state and I'm really glad to be here for this part of this because it's a really important challenge.

And the reason it's an important challenge is both China and Russia may seek to undermine, really, world order and try to become, you know, the primary supplier of security, of technology, but only China, really, has the resources to come at the United States in all dimensions and so they are our pacing challenge.

That's not to put any reduction in the importance that we place on the Ukraine fight or keeping Russia at bay or trying to maintain the alliance and not have Russia feel like they can come at NATO, for example, right.

But China as a pacing challenge is a huge piece and one of the parts of the decisive decade is can we focus on China, can we focus fast enough to make sure that we continue to stay ahead of them, and the eye on that, of course, is, as was said clearly in testimony by DNI and others, which is this issue over Taiwan – will China try to take Taiwan by military force in this decade.

Our answer to that is no. But we have to make sure we're ready to make sure they understand the answer to that is no. So it's a big deal.

The other part of that decisive decade is will democracy stay together to combat this autocratic, militaristic kind of a push and I think we are seeing that in Ukraine, and that's great. I'm proud to be part of an alliance that can do this and I think we have to make sure that we are setting the stage and the conditions and, you know, the capacity to make sure we can do that throughout the decade.

So big issue. Missile defense is one part of that, hardly the only part. But as missiles become more available and more used – and, frankly, we're talking here now, really, air and missile defense so there's other threats as well – it just becomes a more and more important part of any power projection or defensive systems.

Dr. Karako:

Great. Great.

Before we kind of dig in further, let me stay real high. The department emphasized kind of the significance of the documents being released together.

So talk a little bit about the Missile Defense Review not as a product but as a process. It was a year-long process. I know it happened before you kind of got there.

Dr. Plumb: Amen.

Dr. Karako: (Laughs.) But talk a little bit about the process – who was involved, how maybe the process has differed from the previous ones that you’ve been involved in or otherwise.

Dr. Plumb: Yeah. So I think, in many ways, the processes are the same. These are big national level documents whether they come from DOD or not, right. So the National Defense Strategy, Nuclear Posture Review, and the Missile Defense Review, first of all, all being nested is actually quite useful because it makes sure that they stay integrated on message and focusing on the same thing.

I think that’s important and I think it’s the right way to do it. I hope the department continues to do that, going forward.

On the process, all three are, roughly, the same. You know, different levels of scale, obviously, but try to bring all stakeholders, not just DOD stakeholders either – of which there are many, right; we have many different pieces at DOD interested in missile defense, for example – but also the State Department, also OMB, also NSC, also other stakeholders in the interagency, is socialize it on the way up.

For the Missile Defense Review, in particular, I think there were 30 some meetings, each three hours long, which I know excites you, not everyone – but, really, to just turn over all the rocks, lift up the carpet, figure out what we need to focus on and try to scale it down to what are the most important things to look at.

So I think pretty – and, of course, consultations with allies, I should have added there. So I think a pretty robust process. Not that different from other versions, but I think in this case, because you had all three going on at the same time over multiple months, patterns emerge that just feed on themselves. So the same people in different rooms. I think a pretty solid process.

Dr. Karako: Yeah. You have – in your testimony from May you talked about missiles as a weapon of choice or weapons of choice, and I thought that was interesting.

You know, we're so far from the 1990s when it was, like, well, that's kind of a boutique capability. But there's truck bombs right?

Dr. Plumb: Exactly.

Dr. Karako: Now this is a core and, in fact, the Missile Defense Review calls them a principal means by which adversaries seek to project conventional or nuclear power, and that makes missile defense a core deterrence by denial component of integrated deterrence.

Talk us through that deterrence by denial piece – the purposes of missile defense, fundamentally.

Dr. Plumb: Sure. So I think missile defense has contributed to integrated deterrence on multiple levels, not just deterrence by denial, but specifically on that – I mean, that's pretty straightforward – which is you can't use your missile effectively or at least I've confused you or had made you have to think twice about your plans. So you either have to use a larger scale or maybe you think this isn't worth it.

So one of the pieces that has been true since the 2010 MDR – but now that there are more missiles in the world and they're more likely to be used, I think, in conflict – that's interesting is trying to raise the deterrence threshold or the threshold for adversary kinetic action, which would be you definitely cannot be assured that just using one missile in anger against, you know, adversary of your choice is assured of an effect.

So that, in theory, should give you some pause. If I make that number 10 versus one, this is a bigger level attack and do you really want to escalate this fast.

So I think, from a regional security architecture standpoint, tremendous value. So that's really the denial piece. I could – I can go on for a while if you'd like.

Dr. Karako: Well, the NDS also talks about deterrence by resilience –

Dr. Plumb: Yeah. Yes.

Dr. Karako: – and by cost imposition.

Dr. Plumb: Yes.

Dr. Karako: Thoughts there?

Dr. Plumb: So I think the resilience piece is also the natural – kind of a natural place for missile defense to fall into as well, for two reasons. The first order is simply this. I mean, NDS had built a resilient joint force, right. So one aspect of resilience is being able to defend yourself so you can continue to maneuver under adversary fire.

So I think missile defenses fundamentally provide resilience to the joint force. There is also in the Missile Defense Review – we touch on this – but the idea of distributing your shooters and sensors.

So that's, like, not quite it but that is a resilient missile defense, which, of course, then adds to the resilience of the joint force. And then we've used the word resilience a couple times in one sentence.

Dr. Karako: Well, let me go to another word from the National Defense Strategy, campaigning.

Dr. Plumb: Yeah.

Dr. Karako: It's a – I'd love to get the non-DOD English definition of campaigning from you and can we expect – what kind of campaigns can we expect with respect to missile defense?

Dr. Plumb: So, first of all, I really like the term. It's taken me a while to really wrap my head around it, I will be honest. But the more I think about it, the more I prepare for conversations like this, I think the more I like it. And I think it's supposed to, in English – my interpretation, not the formal DOD answer – would be, one, to indicate that actions that we take as a department in particular, but really as a nation should not just be a one-off stovepipe things. So an exercise is not an exercise unto itself. What is the overall message for that exercise? How are you tying into previous things? What long-term effects are you trying to present?

That's not to say this hasn't been done before but thinking about it this way, I think, is important. The second thing that it tells you just in the word is that this is not – this is an ongoing issue. So the version of persistent engagement sort of is campaigns are long. You have a plan. Where are you getting to? You may have to modify where you're trying to go. But it is not I've done this, I'm done, let's go home. It is how do you add these things together.

So I think it has good deterrence value, but – and I also think it helps DOD to think about when we do a thing now. So I would offer that missile defense itself is not necessarily a campaign but should be integrated into our campaign.

Dr. Karako: Got you. Got you.

So let's talk about the threat. The NDS really takes pains, I would say, to talk about the People's Republic of China as the pacing threat and Russia as an acute threat.

I'll just say myself one of my observations on the last Missile Defense Review was it just didn't seem like it was sufficiently aligned with that focus on China and Russia. We're still a little bit in the inertia of the rogue state ballistic problem.

So I'm curious, what were the big choices and what are the things that you see this review doing and directing to, no kidding, focus on China and Russia in terms of missile defense?

Dr. Plumb:

OK. Well, let's do the China piece first. I just think it's more straightforward, at least in the way the Missile Defense Review is written, which is the defense of Guam is, clearly, about China. Just no beating around the bush. That's what it is, right.

So Guam is a power projection hub for us. We have military forces there. We have U.S. citizens there and we're going to protect it. And that is in the regional – as I said before, right, it's kind of in the regional or the theater for an Indo-Pacific conflict, which I hope never happens.

But so we are going to defend that and we have addressed it kind of head on and we're investing in it to a significant tune and we'll continue to do so to make sure that we can do it. So that is a big issue that is new because it's the difference between saying we should do things and actually doing them.

The cruise missile threat to the homeland is a new piece, really, to kind of address head on as well. This is a – this is capability that keeps developing. I mean, submarines can launch cruise missiles against the homeland, obviously. Air – you know, large aircraft can launch cruise missiles against the homeland as well, and so how do we defend against that?

Well, the first piece of that is can I even see a thing coming, you know, and the advantages of cruise missiles are many but one is that they can fly low to the ground so your ballistic missile radar isn't going to see a cruise missile coming in because ballistic missile radars look up and they're limited by the curvature of the Earth.

So over-the-horizon radars are a natural solution. We're investing in those. And so I think that's the – one of the big issues, and that is – Guam is located centrally in the Indo-Pacific, clearly focused on China. Over-the-horizon radars are ambivalent about who is firing a cruise missile at you.

Dr. Karako: Sure. Sure. OK. We're going to come back to both of those –

Dr. Plumb: OK.

Dr. Karako: – big issues here in a bit.

But let me just table here at the beginning, you know, how do you see the North Korean-Iranian missile arsenals proceeding? Like, just big picture how do you see the trend lines for more on the rogue state side?

Dr. Plumb: Keeps getting worse. (Laughter.) I mean, so, you know, this is throughout the NDS and the NPR as the security environment continues to deteriorate.

So I think from a purely ballistic missile standpoint – not that there's any really such thing as purely ballistic missiles hardly anymore but from a missile standpoint, can they be more available, more commoditized even and so there's more of them.

I mean, North Korea has launched, you know, a couple dozen of them in the last week. That's an indication of that is not a large piece of their arsenal. And, you know, related to missiles or at least the MDR, obviously, the threat from UAS continues to grow and that's even cheaper, in some cases, and it's – you know, these newer kind of more affordable threats, I mean, there's a scale problem.

Dr. Karako: Yeah. Now, you've – actually the – your testimony talked about missiles are a common and expected facet of modern warfare, and the MDR says that in the past three years since the last review missile-related threats have expanded in quantity, diversity, and sophistication.

Like, what's really changed in the past three or four years – the highlights?

Dr. Plumb: Just keeping at, you know, unclassified levels, but a couple things. One, obviously, the number is just – keeps going up, right, and then the second thing I would say is the capability that is available in a missile is more advanced than it has been, right.

So maneuvering. There's different levels of maneuver, but some is just for precision, right. So how do you get the missile into the place it wants to – that you're trying to target. You've got to have some positioning. You have some maneuver capability on reentry.

So these types of things where 50 years ago, 20 years ago, a much more ballistic trajectory. More maneuver keeps getting added, obviously, other more sophisticated systems like hypersonics in particular, or we could even talk about the Chinese FOBS launch. I mean, these are much more

sophisticated systems and they're, you know, harder for missile defenses by design, right. It's the – it's this competition between how do I avoid.

Dr. Karako: I liked your comment just there that there's hardly any purely ballistic things anymore, in some respects.

Dr. Plumb: Artillery.

Dr. Karako: Yeah. There you go.

Dr. Plumb: Although, frankly, maybe not entirely, so, yeah.

Dr. Karako: (Laughs.) Smart artillery, that's right. But the MDR also uses the phrase missile-related capabilities. What are you trying to capture with that to suggest about the air and missile spectrum, perhaps?

Dr. Plumb: That probably is stump the chump here, Tom. I guess I'd need to have the – do you have the full line there?

Dr. Karako: Oh, just, I think – just missile related. I think it's probably an allusion to UAVs, loitering munitions –

Dr. Plumb: Oh. Very good.

Dr. Karako: I mean, what's kind of the difference between these –

Dr. Plumb: Right. So I think once you make the break from – so, look, the 2010 Missile Defense Review – the 2010 Ballistic Missile Defense Review – I know that because we made that choice.

Dr. Karako: Right.

Dr. Plumb: We're going to do ballistic missile defense. This is not a Ballistic Missile Defense Review, right. So now you start to get into air breathers and so, now, when you do air-breathers you're going all the way down the spectrum if you want.

So we've actually, you know, focused a little bit in the Missile Defense Review on unmanned aircraft or uncrewed aircraft systems – UASs – just because that's kind of your lower tier thing, so where is that boundary.

It's really a spectrum and it's becoming a more continuous spectrum and a more available spectrum, and, of course, what's interesting is the more affordable pieces are the lower end of the spectrum but they still constitute a pretty significant threat.

Dr. Karako: Very closely related to that – and you also just alluded to it – you’re talking about long-range space and missile systems capable of crossing regions, which I’ll come back to that in a minute, but also blurring the lines between regional and homeland defense, and later you talk about threats that move in and out of the atmosphere. Is that an allusion to the FOBS? Something else?

Dr. Plumb: So the FOBS came along a little late in the system, but I guess too late to be in there. But I would say, you know, my first thought on in and out of the atmosphere is hypersonics.

So a lot of hypersonic systems are designed to initially be launched as ballistic – well, on rockets, right, up out of the atmosphere, back in, and then glide along. And so that gives them maneuverability along the trajectory, which makes them, you know, much harder to predict where they’re going to go. So they’re very fast moving. Now they have cruise missile-like properties.

Dr. Karako: Yeah. You talk about the A2/AD problem being missile centric and you also talk about how Russia uses its foreign air and missile defense as an instrument of foreign policy.

Now, to me, that sounds like Turkey, but what are you thinking about there and then how are we combating that, their foreign policy goals in our integrated approach?

Dr. Plumb: Yeah. I mean, first of all, Russia is not unique in this. I mean, all nations use foreign military sales as an instrument of foreign policy and, frankly, a lot of nations use foreign military acquisition as an instrument of foreign policy, right.

But on the Russia piece in particular, the export controls and sanctions we’re placing on Russia due to their unlawful invasion of Ukraine, this whole conflict they started for, I don’t know, personal whim, I think that’s going to have some serious impacts on their ability to supply their own missile needs and their own missile defense needs far away from providing them for those. Excuse me. (Coughs.)

Did I miss a piece of your answer there? Is that good?

Dr. Karako: No. No, that’s fine.

Dr. Plumb: OK.

Dr. Karako: That’s good. That’s good.

So let's – you also alluded in the opening to kind of the relation to nuclear deterrence and it kind of reiterates a similar statement. In fact, it goes beyond – I think the last one was talking about in terms of ICBMs.

We're not going to – that's what nuclear deterrence is for and this says ICBM or air and sea-launched ballistic missile threats. But it's only ballistics, and you've already drawn a distinction here between the ballistic threats to the homeland and the –

Dr. Plumb: I don't think –

Dr. Karako: – and the cruise missile threats to the homeland.

Dr. Plumb: I feel like that might not be the same reading that I have, and I apologize if you're giving me a detail there. But I believe what we have said is that we will rely on our strategic deterrent to prevent nuclear attacks against the homeland. That's flat out the posture.

Dr. Karako: Regardless of the – yeah.

Dr. Plumb: Right. And, look, I don't think anyone should be confused by the fact that, you know, a few dozen interceptors in Fort Greely, Alaska, does not match in any way the scale of a potential strategic attack just by ICBMs alone from either China or Russia.

Dr. Karako: Right.

Dr. Plumb: And we have no intention of building hundreds or thousands of these things to do that. One, very expensive; two, the adversary gets a vote, so they'll change trajectories; but then, three, destabilizing.

So we're not interested in having a destabilized relationship built on missile defense. We are interested in protecting our forces for conventional fights and we are interested in staying ahead of North Korea. I do not want to enter, for instance, a strategic stability relationship with North Korea.

Dr. Karako: Right. Right.

So I'm not trying to be semantic then, but when you talk about cruise missile defense for the homeland that is a different concept, right. It's not about a big nuclear attack on the homeland. It's something else. It's a different kind of problem. It's, presumably, a nonstrategic – excuse me, nonnuclear strategic attack that you're thinking about with that. Is that fair?

Dr. Plumb: If someone shoots a cruise missile or, you know, if someone shoots a missile at the United States of America we're going to try to shoot it down full stop,

right. Can I scale cruise missile defenses against cruise missile attack? Perhaps. I mean, we're a long way from that. Is that – have I answered that?

Dr. Karako: Sure. Sure.

Dr. Plumb: Yeah. I think it is different. It's different because the trajectory is different. It's different because your indication and warning is much less, right? I don't have the amount of time. And, of course, as with any missile threat, like, the number that are being launched at any one time is a huge indication of intent as well. So –

Dr. Karako: Sure. Good.

Well, closely connected to that is the arms control thing. You alluded to it there. The MDR itself didn't have the usual, I would say, assurance in terms of the United States will not accept limitations on our missile defense capability or numbers. I think the last two MDRs had that. It also talks about the interrelation between strategic offensive arms and strategic defensive systems. So having said that, since it's not there, is it fair to say that U.S. policy has not changed about that question?

Dr. Plumb: So I guess I would say, one, nothing in our acquisition plans or programs is constrained. But, two, diplomacy is part of integrated deterrence. And if we can find partners acting in good faith that are trying to seek mutual – you know, better security, mutual security, mutual stability, then we should have these discussions.

I think I have a little – I don't want to get this wrong. I think I said this maybe, but we work closely with the State Department as appropriate to strengthen mutual transparency and predictability with Russia and China where such efforts strengthen deterrence. We don't have any of those things going on right now.

Dr. Karako: Got you. Got you. OK.

So let's go to distributed operations. You also kind of alluded to that. The Missile Defense Review actually has something very explicit about air missile defense should emphasize disaggregation, dispersal, and maneuver. That's a new thing.

Let me give you a question from Byron Callan. He says – he quotes an analyst talking about Ukraine losing 75 percent of their fixed-site SAMs in the first day of the conflict. What does that imply for U.S. and allied fixed-sites?

So this is really the question of fixed versus disaggregated. I mean, that's an interesting lesson there.

Dr. Plumb: It is, and I can't speak to those statistics or numbers.

Dr. Karako: Sure.

Dr. Plumb: But I'll just say I think it is clear throughout the department that distributing forces is part of the emerging way of war. Do not put all your eggs in one basket if that basket is in one place, right.

Dr. Karako: Right.

Dr. Plumb: So I think it just – it's kind of a logical manifestation of conflict but also because missiles can reach over. It's not like there's a front line in this domain. So how do you make sure that one or two or a massed impact at a certain location doesn't have a strategic effect, and the answer is you have to have things distributed.

Dr. Karako: Yeah. So let's go to Ukraine, since we're kind of talking about that. Just for a big picture, how do you think about the lessons of that conflict so far for air and missile defense? That's what President Zelensky keeps saying is his number-one demand is some kind of air defense.

Dr. Plumb: Right.

Dr. Karako: So what are some of the lessons that you're thinking about there?

Dr. Plumb: So, for me, I mean, I said this in my opening, I think, sentence but the main lesson is adversaries have their own calculus as to what missiles are for and I would like to think that, you know, the U.S. would like to use missiles for precision military effects.

But the idea that we're facing something in Ukraine where the Ukrainians are, basically, subject to something that we haven't seen since the blitz of London in World War II, which is just a broad area terror campaign, is a little bit shocking to the senses.

But it also tells you that, you know, air and missile defense is pretty important as is, apparently, distributed critical infrastructure. I mean, there's a lot of issues to be learned from there, which is easy to say but really hard to – you know, you can't implement a solution tomorrow night, right. You have the infrastructure you have. So that's hard.

I think the need for air missile defense also clearly shines through in this conflict. I mean, Russia has used thousands of missiles. Thousands, right –

cruise missiles, ballistic missiles, drones. And so – but, again, saying that you need this and being able to field a system or a system of systems, the defense designed to protect your critical things and to protect your population, is very hard.

And, of course, the other thing that makes it harder is that the ranges are short, right. So when ranges are short your systems – the physics of your access to the missiles from your defensive systems becomes much more complicated.

Dr. Karako: And, granted, there's this massive demand signal –

Dr. Plumb: Right.

Dr. Karako: – for all of this air defense in Ukraine and in other parts of Europe right now. What's amazing, in some respects, is that the Russians haven't been more successful at suppressing those air defenses of different kinds.

Maybe it's distribution. Maybe it's mobility. Maybe it's deception of some other kind. Like, five years ago or something, I mean, the idea of fielding and talking about active defenses against these so sophisticated Russian missiles was almost unthinkable. And yet, here we are today actively supplying them with just that capability.

Is that a – I mean, in other words, they're not quite so 10 feet tall, after all.

Dr. Plumb: The Russians?

Dr. Karako: The missiles, anyway.

Dr. Plumb: The missiles. Yeah. But, obviously, a lot of them are having significant impact. So for every one that gets shot down – I mean, I don't know what the right ratio is, but clearly, enough of them are landing that 4 million people are without power right now, right. You've seen pictures of apartment buildings with holes in them.

So I think they are delivering some type of effect, which means they're getting through, right. Are some being shot down? Apparently. I think at the unclassified level, clearly, it's reported as that's happening.

Overall, I'm not sure what that connotes. Clearly, you need missile defenses to protect things. I think one of the problems Ukraine faces it can't protect everything. You can't have a shield. And so if you had 10 or 20 or 30 systems where would they go? What would you protect? This is your defense design problem that's pretty hard to do in peacetime let alone in conflict. So –

Dr. Karako: So what other initiatives does the department have in terms of supplying Ukraine with air defenses? Obviously, there's everything, Stinger to NASAMS.

Dr. Plumb: Right. Right.

Dr. Karako: There's S-300. But what else?

Dr. Plumb: So I'm going to kind of give you that list back but I'll say I think there's been 1,400 or 1,500 Stingers supplied by the United States. You know, this is kind of an older weapon. Turned out to be massively useful. And so we have to, frankly, get a more modernized version of that and start producing more of them because it turns out, even though we didn't know it, we're going to want more of those.

The NASAMS piece is interesting. I think there's, like, eight systems on their way. I don't exactly know where they are in the chain right now but they're coming, and I think that's important. You know, old Russian systems that some of our allies have had turns out to have pretty good effect against some of these systems as well.

So I think it's an interesting amalgam and it all kind of just points to the same thing, which is that having these capabilities is important and if you have them then you will find out – figure out how to use them to your best advantage.

Dr. Karako: Well, let's talk about North Korea, since you also mentioned that. You talk about GMD as the center of homeland BMD, and you alluded in your opening remarks to the Next Gen Interceptor, at least 20 I think was your words, so from a policy perspective, not an acquisition perspective but from a policy perspective, how do you think about what the document describes as the augmenting of today's GBIs and the potential replacement, like what are the factors that are going to weigh into that decision of more than 20.

Dr. Plumb: Sure. I mean, just straight up – and, again, I am not an acquisition authority. I do not have the decision to – I don't have the power to make these decisions. But I would say the United States should prove to ourselves that we can shoot something down before we buy more of a thing, right.

So fly before you buy, if fly includes shooting a missile down to prove that it works, and I think, you know, fundamentally, we have – as a department, as a country, we have not tested things enough or we don't build enough tests into our programs and we have made this weirdly risk-averse system that somehow is averse to missile tests or testing of equipment because if the

thing fails – and I don't know if the concern is Congress will take the – it's ridiculous.

You test things because they might not work and you learn from every test. Then you fly another one. Yes, it costs money. But that's how you get a capability that actually works and you can rely on in a conflict.

So, to me, I am hopeful that we will apply those lessons to NGI and at least while I'm there that is going to be my line. Not that I'm the decision on it but, like, my input will be let's prove this thing works. Let's not do the GBI thing again.

Dr. Karako: Rigorous acquisition, lots of tests and competition.

Dr. Plumb: Yeah, and I think all of those things are, from what I can see, helping.

Dr. Karako: Great. The document says, and you alluded to it, that we will outpace the North Korean missile threats.

Dr. Plumb: Yeah.

Dr. Karako: But there was an interesting and a subtle change.

Dr. Plumb: Yes.

Dr. Karako: You said that we will outpace it with our missile defeat capabilities –

Dr. Plumb: Yeah.

Dr. Karako: – as opposed to merely the active defense.

Dr. Plumb: Yes.

Dr. Karako: So subtle change. What's it mean?

Dr. Plumb: I don't know if it's as subtle as you're suggesting. But it means that there will – there is a point where, you know, we only tend to go one for one or two for one or whatever North Command – NORTHCOM commander says his shot doctrine is at the time, right.

So this is this capacity issue and this cost issue and being on the wrong side of the cost curve. So I think when we – as I said, you know, comprehensive missile defeat is all of the capabilities.

I'll give you an easy one at the unclassified level, which is if I blow up your missile before it leaves the rail I have defeated that missile and you can't use

it against me, right. So that's missile defeat. That is not missile defense under the classic definition. And there are other things too.

So making sure that the department understands, the Missile Defense Agency understands, the services understand we need to go at this kind of as a whole approach and not just rely on whoever the shooter is at whatever point to take care of that problem and I'll go invest in something else. I think it's a pretty big deal.

Dr. Karako: Yeah. And is it fair to say that that – what the document talked about is comprehensive missile defeat? You later call it full spectrum missile defeat. Is that an organizing principle?

Dr. Plumb: Those are – those probably have more specific meaning to others. To me, it's this – it's much of a muchness.

Dr. Karako: OK. So would you draw distinctions between missile defeat and left of launch and IAMD?

Dr. Plumb: No. So missile defeat is left and right of launch. So – right, so for full spectrum one reading of that, of course, and it depends, I think, on the context and where we're using it, is, as we've said, the spectrum of air-breathing and ballistic missile threat is kind of across the continuum.

On missile defeat, though, left of launch, right of launch, it's, really, we're trying to define this as anything that stops the missile from having its successful intended effect.

Dr. Karako: Now, you just used a few minutes ago that old saw fly before you buy in terms of –

Dr. Plumb: Older than you know. There's a conference room that I go to many, many meetings in, somewhere in the Pentagon and it's, like, from 1972 from some previous acquisition possible general or something. It's not – I mean, it's old.

Dr. Karako: And it's a good one.

Dr. Plumb: Oldie but a goody.

Dr. Karako: It reflects the kind of prudence about acquisition and it's often been applied to missile defense.

So how do you think about applying that principle to the missile defeat stuff? What I'm thinking about here is that a lot of the things that are regarded as in this box of exotic, novel, perhaps fleeting, cyber EW there are going to be challenges with demonstrating and testing and evaluating those capabilities.

And so, therefore, what does that tell us about how much confidence we can safely put in these left of launch things relative to missile defeat – missile defense?

Dr. Plumb: It's a great question and I guess I'll just say, at the unclassified level, that you have to be sure of your effects, right, and you may have – you know, you may have to be sure of them upon using them but you, certainly, have to be able to prove to yourself that that thing that you've just tried worked.

But I do think – well, we can go back to the kinetic example, which is if you intend to blow something up on a launch pad seeing a bang doesn't let you know you've done it. You need to do battle damage assessment to know that it happened.

Dr. Karako: Right. So there's a caution there. OK.

So let's talk about some of the capabilities. Counter-UAS – this is a new thing in the document relative to the past –

Dr. Plumb: Yes.

Dr. Karako: – and, in some ways, it seems obvious that this should be part of the active defense capability spectrum as well.

So I guess the question is why'd you add it. Seems kind of self-evident. But let me read something to you because we see so much on this in Ukraine, Armenia-Azerbaijan, et cetera, over the years, and the Middle East.

You say that UASs have a similar lethality to cruise missiles and they're very flexible and, yet, they're generally not perceived by adversaries as having the same destabilizing geostrategic implications as larger missile forces.

And, yet, whether it's the September 2019 attack on the Saudi oil fields or what have you, they sure look like cruise missiles. Is that perception rational? Is that kind of a – something that, basically, this is an uninterrupted spectrum and do these different categories really make sense?

Dr. Plumb: Is it rational? I don't know if it's rational but I think that's, clearly, how even you and I are thinking about it right now. Like, that just seems – it feels different. Maybe it's because it's a lower speed. Maybe it's because people tinker with these things in their backyard at a smaller scale, right. And so – and this is actually one of the things that's – I'll use the word interesting; I don't know if that's the correct word – about these pieces, is that the technology for them is becoming quite available.

There are, of course, your high-end things, right. So your higher-end things get closer to cruise missiles. Your lower-end things, you know, are kind of terrorist or jerry-rigged events.

But these are – also can have lethality and they're also things that you can kind of – the pieces are so cheap and there's so many in the world that you can – you know, with a sponsored fund you can tinker away and come up with some interesting solutions and I think we need to be aware of them.

Hoping they won't be there is not going to make them go away and so how do you protect deployed forces from these types of attacks? How do you protect your runways from these types of attacks? It's kind of a big deal and so we have to start looking at it. And I don't want to pretend like we've got it solved but we will be investing more and more in this.

Dr. Karako: Yeah. Great. And lots of that going on in Ukraine, obviously, right now as well.

Dr. Plumb: Yes.

Dr. Karako: So let's move to that adjacent topic, which is CMD and, specifically, CMD-H. In end of July this year the department designated the Air Force as the lead acquisition agent for CMD-H –

Dr. Plumb: Yes, we did.

Dr. Karako: – and you alluded in your opening statements to the OTHRs both the United States and Canada is doing there. So you mentioned NORTHCOM and TRANSCOM kind of been, you know, banging the table about this threat.

Big picture, why is this a threat that we need to worry about for the homeland? It's not that big nuclear thing. We rely on strategic deterrence for that. What is the concept of attack here that we're concerned about?

Dr. Plumb: Like, the capabilities becoming available to adversaries and proliferated. By proliferated I just mean – I don't mean proliferated as, you know, horizontally. What I mean is there's more and more of them available. And so it's becoming clear that this is one more vector of attack and I think if you're the Department of Defense you think about, well, are there – let's just – let's narrow it to this conventional issue, which isn't the whole issue, but are there a few conventional – would a handful of conventional missiles do significant damage to the U.S. ability to project power.

Well, perhaps, but we should at least make that hard to do, right. We don't want to have a Pearl Harbor situation, which didn't work out great for the adversary. But, still, that's not a place you want to be, right.

So I think we need to get after it. I think we're doing this at the appropriate time. I mean, 10 years ago would I say should we get after this? Who would you get to want to put resources in it?

But we're putting some real money in it. Air Force – you know, Air Force operates these OTHRs so at the moment they're the natural lead acquisition authority for this because this is the stage we're at and I expect this to develop over time.

Dr. Karako: Now, so you said it makes sense to make it harder for the adversary to raise up the obstacles for this kind of an attack and, yet, I was struck by how the MDR talked about the OTHRs for surveillance for this mission – detection, track, but not engagement support, and the distinction was made for different capabilities. So the question I'm getting at is, OK, we've got the OTHRs for seeing this stuff coming. What's the plan for active defense?

Dr. Plumb: Crawl, walk, run. Crawl, walk, run. Crawl, walk, run. You can't shoot anything if you don't know it's coming. So start with A, get to B.

Dr. Karako: All right. All right.

Do we think that's coming soon in terms of the next steps of moving beyond just the OTHRs?

Dr. Plumb: Well, the OTHRs aren't here yet, so relatively soon. I mean, look, these are capabilities we have to develop. We have to figure out how we're going to do this. There's a lot of things to be answered.

If you're asking is this just a throwaway solution, no. It's not just, OK, we've got some OTHRs. We have to think about cruise missile defense of the homeland. That's incorrect. Part of my job is to make sure that it is not correct. But, you know, we do these missile defense executive boards. This is part of the system, though.

Dr. Karako: Yeah. We've talked earlier about the non-DOD entities that are – it's a part of integrated deterrence, whole of government kind of efforts here. In terms of this particular field there's discussion about integrating FAA radars within CONUS, for instance. Is that a conversation that's going on right now to better pull together the stuff that we've already got right now, but non-DOD?

Dr. Plumb: Yeah. I think we should work to use any sensors that we can use that don't put civilian traffic at risk. But look, any sensors you can use that add to your overall picture are things we should do. We're funding them as the U.S. government. Why would we say, oh, only this one? So looking at it.

Dr. Karako: Good. Good.

All right. Defense of Guam – this was the big ticket item in terms of, really, this Missile Defense Review. I mean, it's the biggest dollar and, in some ways, if China is the central pacing threat, this is the central air and missile defense piece.

So how much of this is about putting stuff on the island? How much of this is going to be working with things off island be it other sensors, ships, all this kind of stuff? How are you thinking about the architecture regionally?

Dr. Plumb: Yeah. Obviously, any defense design keeps getting reevaluated and we're kind of at the early end of this.

But, at the moment, I would say I look for the focus to be on island because ships are multipurpose, right. And so there's really few situations where the department would want to tether a ship to a location if it didn't have to – well, if you have to. But it's better to not, and so I think our goal is to figure out how much we can do from the island.

Obviously, Guam doesn't want to become a military fortress. Tourism is a big piece for Guam. People have to live there and enjoy. So how can we do that at a minimal footprint that still provides this kind of defense. And it's an ongoing discussion but significant resources are being put at it.

Dr. Karako: So Air Force was designated as lead for CMD-H. When might we expect a lead for the defense of Guam? Who's going to be in charge of that?

Dr. Plumb: I'll let you know.

Dr. Karako: That may be a little more – a little –

Dr. Plumb: I'll let you know when we make a decision.

Dr. Karako: Sure. (Laughs.) Okay. Fair enough.

Dr. Plumb: But, you know, this lead piece is not necessarily – it doesn't – we are proceeding with the architecture for the defense of Guam based on DOD consensus about which issues we need, where we need to invest, what the threat would be. This is not – I'm not waiting for someone to be written down on paper. It's not an essential part of that kill chain.

Dr. Karako: So given that, given the centrality of this to what we're doing at INDOPACOM – this has been INDOPACOM's number-one, I think UFR item for some numbers of years – is this something that the urgency requires it to be done in this – the decisive decade or is this something that we're pushing off?

Dr. Plumb: Oh, it's this year. Not this year, this decade. Yeah, this is happening.

Dr. Karako: Good. Good. Good. All right.

So a piece of the threat that you'll have to defend Guam against but also other places as well is the hypersonic threat, be they gliders or other types.

Dr. Plumb: Yeah. Yeah.

Dr. Karako: How do you think about that threat? What makes them qualitatively different, not just the technics but what makes them qualitatively different and how might an adversary use that as part of a mixed attack?

Dr. Plumb: Yeah. I mean, the qualitative difference is, obviously, the speed, right – coming in fast – and the maneuverability. So the ability to kind of maneuver from any angle, right, so you, basically, need 360-degree defense for a point defense. You can't just say we got shot from over there so there it comes. And so the ability to track it as well, hard.

So we're moving to a missile warning/missile track architecture in low earth orbit through the Space Development Agency that, I think, is going to – well, we have to see it work. But I have all faith that we will get there.

But one of the things is to make sure that we can, you know, see hypersonic threats as they come and this is absolutely important, how are you going to – how are you going to engage something if you don't know it's there.

Dr. Karako: Yeah. I'm not going to put acquisition stuff on you, but how do you think about the way to come after the challenging maneuverable hypersonic problem in kinetic versus non-kinetic? Where do you – where are you seeing the emphasis put? Where is the – where are we going with that?

Dr. Plumb: All right, first of all, there is no version of missile defense that doesn't have kinetic at the end of it, OK, and that's kind of where we're starting from on terminal defense, right. And so then building out – glide phase interceptor is a thing coming. That's also, obviously, a kinetic interceptor.

If you're asking me about directed energy, I mean, I think there's a lot to learn there.

Dr. Karako: OK.

You mentioned starting with terminal. I'm thinking sea-based terminal today. You also mentioned glide phase, which is out further. Given how fast these things are coming, given the maneuverability in the end game, and

given, frankly, just the fundamentals of defense in depth, doesn't it make sense to make sure that we're doing that layered defense and we're reaching out beyond the terminal as opposed to just putting all our eggs in the terminal basket?

Dr. Plumb: Oh, I'm not saying we're putting all our eggs there. I'm just saying what's the natural evolution of how to do this.

You know, one thing that we add, which is – you know, for our hypersonic defense piece is we've got to have a sensor network to know that it's coming. We're going to start with terminal and build out kind of in capability for defenses but also working on aggressively pursuing hypersonic offensive missiles ourselves, some of which could do some left of launch there.

Dr. Karako: Yeah. But relying on terminal alone would be, you know, risky?

Dr. Plumb: No one's suggesting that that's the answer.

Dr. Karako: Good. OK. Good. Good.

Acquisition authorities. Actually, before I go to that, I just noticed a question has come in from Steve Trimble, and I should have brought this up just a little bit ago, but he asked about the PB '23 and the North Warning System, so back to CMD-H for a minute. Talks about the over-the-horizon radars.

Is there any plan to invest in interceptors to shoot down weapons if they're tracked by the Northern Warning System? I guess that's a version of what I said earlier.

Dr. Plumb: Yes.

Dr. Karako: Yes. OK. There you go, Steve.

Acquisition authorities. This is also something that just had the slightest little reference in the Missile Defense Review in terms of – I think it says adaptive acquisition approaches. In a way, why, perhaps, wasn't it more there relative to the last ones? And from a policy perspective, how do you think about the need to empower the acquisition world with flexible acquisition authorities?

Dr. Plumb: Yeah. So, obviously, just to state very clearly, I'm not the acquisition expert. Acquisition policy is the realm of A&S and, in some cases, Missile Defense Agency, who works for R&E, not for policy.

So let me just talk more broadly without actually answering your question, which I think is a good D.C. answer.

I would say that the ability to get our defense industrial base more able to flex and surge on demand, I think, is important. I think this is the lesson that we are all learning from the Ukraine situation. You know, how do I get more Javelins? How do I get more Stingers? How do I replenish these things more quickly? And I think that also applies to missile defense.

U.S. missile defense is included, right. How do we build additional lines or additional capacity? That is not where we have been for many years. Many years it's been, like, how do I scale this thing down to build just exactly what's on contract, right.

That turns out to not be where we need our defense industrial base or ours plus allies to be, to face, really, conflicts for the century and I think the Ukraine conflict is a big wake-up call for that, and I'm cautiously optimistic that we will take these lessons and drive them home.

I do know that, you know, folks who aren't – that don't work for me – (mic feedback) – not policy issue so much but the A&S people – I guess that was me; sorry – the A&S folks are working really hard on this.

Dr. Karako: All right. OK.

Future technologies. The discussion of this was – seemed primarily sensor based and also C2, so I don't think it had a discussion of directed energy. I think you said there was lots to learn there. Directed energy was kind of taken out of the Missile Defense Agency a couple years ago.

Dr. Plumb: Yeah.

Dr. Karako: And so I guess I'm curious: What's the most interesting things going on here to enable us to do different things on the sensor side, on the C2 side, and, yes, directed energy?

Dr. Plumb: Sure. So let me take that in reverse.

So on directed energy, so Under Secretary of Defense Heidi Shyu, R&E, they have directed energy and they are aggressively pursuing directed energy solutions, which will also have missile defense applications at fruition, right.

So I don't want you to think that just because we've taken it – we – just because the country removed that from the Missile Defense Agency's portfolio that we aren't looking at missile defense capabilities through directed energy.

That is, in theory, a way of the future, but we have to make sure those things work.

On C2 and sensors for future technology, look, we have to get sensors that can track these kind of maneuverable threats that may not burn as hot as a reentering ballistic missile, for example, right. So now from an OPIR standpoint I have this challenge as well.

And then on C2, like, look, C2 is absolutely fundamental to doing any of this. I have to be able to integrate sensor data. I have to be able to get it to shooters. I have to be able to get shooters. Whatever form directed energy, kinetic, whatever this is, how do I close this loop to get it back.

So it's actually – you know, if you don't have those first two there's really no point in having the third.

Dr. Karako: Got you.

Well, let's go to something that is, I expect, very comfortable for you and that's space, space sensors. I wonder if you could just sort of give us an overview of how the department is approaching space-based not just missile warning but especially track, broadly speaking?

Dr. Plumb: Sure. So I've already spoken to the kind of pivot to a resilient architecture, which we're looking at through Space Development Agency for missile warning, missile tracking, low earth orbit, kind of proliferated architecture that can sustain, you know, adversary attacks against individual satellites.

So I think that's really important. I think, you know, the ideal version of that in some future state would be not just being able to see missiles but also be able to do kind of fire control quality engagement. You know about HBTSS. I don't know if you call it HBTSS, but we call it HBTSS, or at least I do and maybe two other people in the world.

But so the Missile Defense Agency has some ideas on how that might work, and at the moment the plan is to get a few of those. We'll integrate them and we'll see how it goes.

Well, I don't – you know, as with fly before you buy for missiles, we should fly before you buy before – you know, for more expensive satellites. One of the advantages that's supposed to happen with proliferated low earth orbit is that the cost per satellite is supposed to go down. So if you're just putting exquisite capabilities in low earth orbit that is not a good solution, in my opinion.

Dr. Karako: So let's jump off of that. The last administration really started some of this pLEO but it was all pLEO all the time, which was a change from the past, which was, I guess, basically, MEO preferred, thinking PTSS and some other programs in the past that never saw the light of day.

But LEO is a relatively more benign environment than others. Could you talk to us about some of the tradeoffs –

Dr. Plumb: Sure.

Dr. Karako: – of LEO, MEO, HEO – polar orbits, elliptical polar orbits – and then also GEO? Like, what's the tradeoffs between these things?

Dr. Plumb: So for those who aren't tracking at home, right, low earth orbit is, basically –

Dr. Karako: We'll have a glossary we'll post.

Dr. Plumb: OK. That's good.

So LEO is low earth orbit. It's kind of the closest thing, sort of where the Space Station exists, and these satellites and different things in space at low earth orbit kind of whip around the Earth every 90 minutes. So your viewpoint for one of these satellites, if you were going to track it, it might be across the sky in four to five minutes.

A GEO, you're so far out from the planet that you, basically, rotate around the Earth at the same speed that the Earth rotates, and so just like, you know, DirecTV you point your antenna dish at this one point in the sky that, basically, stays there. It kind of wobbles a bit as you go around the sun but – and it just stays there and it kind of tracks with you and so you can always see that.

Very expensive to get things to GEO. Very expensive. It's a long way. It's a lot more fuel. It's much more complicated. Getting increasingly cheaper to get things to LEO. LEO has some disadvantages in a conflict including, you know, Russia has shown, China has shown, they've got direct-ascent ASATs that can hit you in LEO. So now I have a problem there how to get around that.

MEO offers some advantages just by being farther out. MEO, medium, right. We had low. We have to have medium and then we have geosynchronous for GEO. And then HEO orbits are kind of, you know, specific. I have a system that's probably a higher level of value, but anyway, to loiter around one part, so the orbit is designed to kind of see one part of the Earth for longer periods of time.

I think what we're finding is that resilience, A, has no end state. So the president told the United States Department of Defense to go get resilient. Go get resilient in space architectures and stop saying you're going to do it. Actually do it. So this is what we're doing, and resilience, though, you can't just buy resilience today and be done. Buy resilience today, the adversary adapts. Now what do I need to do to be resilient?

So I think what we're finding is diversifying across orbits probably provides the best resilience. Obviously, there's resource constraints. You can't buy everything for everybody. But you don't just put all your eggs in LEO. You don't put all your eggs in GEO, which is what we've been doing for years, turns out. That time has passed.

And so I think what you'll see is architectures that kind of spread across.

Dr. Karako: That's great. In terms of the areas covered and prioritized in the short versus long term, you mentioned polar orbits is focusing on one particular part of the globe.

But how do you think about the relative priority of let's just stick with pLEO for regional versus global coverage? In other words, the relative priority of getting some stuff out there that favors certain latitudes of interest in INDOPACOM, say, as opposed to trying to do the perfect global DirecTV constellation?

Dr. Plumb: I guess I would say every mission set has its own requirements. I don't think everything needs to be global but also some things do, and I think the resilience piece is going to drive architecture changes way – at a much higher clip than any other particular consideration. And I think that's all I have to say about that.

Dr. Karako: OK. You mentioned along the way there the importance of fire control quality track.

Dr. Plumb: In the ideal. To be clear, in the ideal.

So I don't – I'm just going to cut you off for a second. It is important, but I don't want to say, my gosh, we have to get this right now. What we have to do is prove we can do these things. Now, please continue.

Dr. Karako: No, that was where I was going –

Dr. Plumb: OK.

Dr. Karako: – is what is the relative importance and timeline for that in terms of that objective as opposed to the threshold. It's just a high-res video of these things –

Dr. Plumb: Sure. So, I mean, look, right now we have some pretty great radars on the ground, right. We have satellites that can detect missile launch. It allows us to say, hey, look over here. We have these great, really fantastic radars that say, OK, here this thing comes, can I engage this. OK. So this remains true.

How much of this can I do from space, which would make, in theory, me more resilient than having to rely on a few big radars? That is where we are going. That's the vision. How fast will we get there? Let's prove that we can do these things on the way there.

It's very expensive. It's very expensive, right. So the – we put \$4.7 billion in the '23 FYDP just to get towards this kind of first iteration of missile warning and missile track, and if these satellites only last three, four, or five years, then the refresh rate becomes expensive, too. We have to do it right.

Dr. Karako: All right. All right. Good answer.

Let's talk about the international components of missile defense. What are some of the most important to missile defense international cooperation efforts that we're doing right now? The document highlights several.

Dr. Plumb: Right. So I think, you know, the first one that comes to mind would be Japan. So we've had a pretty successful run with SM-3 IIAs in Japan, and Japan has now, I mean, publicly expressed some interest in working with us on countering hypersonics and I think that's the next natural evolution.

I have to say, you know, props to the Missile Defense Agency for really working through some of the early hiccups there. I was on the kind of kicking team for kicking off that SM-3 IIA cooperation in the Obama administration and I'm really pleased to see that a lot of the initial difficulties have been overcome to really hammer some things out and get better mechanisms to more rapidly work together.

So I hope that's a thing we can continue and I think both nations have expressed interest in doing that.

Dr. Karako: Can I pull the thread on Japan?

Dr. Plumb: Yeah. Yeah.

Dr. Karako: There is – you mentioned the interest in hypersonic defense cooperation. But what's probably the thing that's most useful or doable in terms of this

international cooperation? Is it another missile? Is it the sensors? Is it something else? Like, how do we think about – where do we go there?

Dr. Plumb: So, first of all, let's just recognize that we're not talking about cooperation on acquisition and production, which is different than cooperation on warfighting, right. So the most useful thing is cooperation in warfighting, right, and so the most useful thing is making sure that their sensors and our sensors have a combined picture so that we can collectively shoot down adversary missile threats or air threats, right. So that is way more important than these other pieces. The other pieces are kind of a way to just develop that and leverage each country's expertise.

I will say that to the best of my knowledge the cooperation pieces that we are discussing with Japan on that are mostly focused on interceptor. That doesn't mean that there aren't sensor issues out there. It's just that I, personally, have not yet come across them in my conversations.

Dr. Karako: Sure. All right. So that was Japan.

Other cooperation in the Pacific, for instance Australia?

Dr. Plumb: Sure, and I don't want to get too far ahead of my knowledge base here. But, obviously, Australia is a huge military partner and anything we can do to increase that cooperation. I would say, you know, from a U.S. standpoint, the message to Australia is you are increasingly under missile threat now, too, right, because the range of China's weapons, in particular, continues to grow and so cruise missile threats and ballistic missile threats now are a thing that you should be thinking about.

Yeah. You know, we can do a little tour of the world but I am not the State Department and I'm not the Missile Defense Agency. Obviously, in the Middle East this is a big deal. We have individual partners and we also have the GCC and working – you know, working there as well these kind of ongoing continuing problems.

Dr. Karako: Right. Right.

Well, something that's, perhaps, a little bit more in the forefront of everybody's mind is NATO. The European Sky Shield Initiative – it's closely connected to, obviously, what's going on with Russia and Ukraine but it's about kind of replenishing the efforts in Europe and making it better.

Is that something that's come across your desk in –

Dr. Plumb: So the Sky Shield piece does not cross my desk but the concept of this problem set of as we expend these munitions allies are going to want to

replenish their munitions just like we are going to want to replenish our munitions. And so that gets to the industrial base question problem set.

Dr. Karako: Great.

Well, look, we've covered a lot of ground. I think we've got maybe time for one more – one or two more.

We've got a question here from – actually, Mark Bitterman wants to know if we're pursuing testing of our own hypersonic capabilities in a manner consistent with meeting the emerging threat. You talked about the speed and things like that.

Dr. Plumb: This is kind of a(n) offensive capability question? Is that – is that –

Dr. Karako: I think it's testing in general. Testing in general, as I read it.

Dr. Plumb: Again, not my bailiwick. But I think the need to successfully field hypersonic weapons is a clear priority for the department. Tests are ongoing. I think you can read about them here and there after they happen and I would expect you to keep reading about those.

Dr. Karako: Great.

Well, here's another one. This is fun. This comes from Walt Slocombe. He wants to know does DOD have a role in preparing for dealing with the long-term but significant issue of collision with asteroids.

Dr. Plumb: Hi, Walt. (Laughter.)

So that's really a NASA mission. Obviously, DOD has a supporting role there. But I think the fact that we have a Space Force and we include – you know, space domain awareness is starting to become kind of a driving issue for us – maybe that's starting – with the ability to see more, understand the domain more, will only help with this. But kind of the deep space stuff, that's really a NASA problem.

Dr. Karako: Great. Well, let me, just since you mentioned the Space Force, just stay there with, you know, how do you – again, you're the ASD for space policy. You spend a lot of your time dealing with that stuff.

How do you see the Space Force and Space Command interacting with, maybe bumping up against the missile defense mission?

Dr. Plumb: It's a pretty significant overlap for the sensor standpoint, right. So every X months, maybe six months, we have a great big meeting between Space

Command and the Missile Defense Agency. Basically, as far as I can tell, everyone that works for each department is on that line, which is a lot of man hours.

But look, the sensor network that the Department of Defense operates, whether it's for missile defense or for space – I mean, sensors can look up, so you can use those – the ones that you can use for space domain awareness when they're not actively involved in doing missile defense you should be using those for that and if you can figure out how to get them to do both all the time that's great.

But then how do you integrate all that information? And, you know, tracking a fractional orbital bombardment weapon is very much like tracking a satellite in low earth orbit and so how do you get a responsive architecture that can track these things as they go.

So, actually, a tremendous opportunity to unlock value there that already exists, and folks are working really hard on it and I'm actually really impressed where they're headed.

Dr. Karako: Great. The final question comes from another reporter, Theresa Hitchens.

One of the key capabilities for missile defeat is the ability to track mobile launchers. There's been a review of the role of space-based GMTIs versus air-based. Can you talk about the factors involved in creating that new architecture? And what are the cost benefits of space sensors versus high-altitude stratospheric basing?

Dr. Plumb: So, first, Theresa, I'm not going to get into answers on kind of this, you know, potential architecture.

But I will say getting after the mobile threat is hard. It's a hard problem. It's been a hard problem for a long time. Space may afford us some opportunities to do that in a way that it hasn't before if we can figure out how to do that, you know, at cost because you can get a more persistent look.

But like I just said, if you're going over every 90 minutes it's not over the same spot on Earth every 90 minutes, and so a persistent look takes quite a few satellites in low earth orbit.

As far as high altitude pieces, I mean, those have loitering capabilities. I don't know anything about that. But there is a very big difference between a thing that just stays there versus a thing that keeps looping around.

Dr. Karako: Got you.

Well, look, we've covered a lot of ground. Thanks for being so generous with your time.

Any kind of closeout, big picture, next steps, comments and observations?

Dr. Plumb:

I guess I'd say, first of all, thank you. This was very enjoyable. I hope I've acquitted myself well.

And then the second thing I'd say – so, for us and my offices, and I've got – you know, I've got my – I've got Neil here from my office – we have to make sure that we implement the things that we say we're going to do and so that's part of – you know, one of Policy's lead roles is to make sure we're going to go and do these things now.

And so we've set up a system to make sure that we are holding ourselves accountable, do those things we said we were going to do, and so I think you'll see more of that coming.

Dr. Karako:

Great. Well, thank you very much, John. Appreciate it. And thanks, everybody, for tuning in and for showing up in person.

Please join me in thanking Dr. Plumb. (Applause.)

(END)