

The Hypersonics Weapons Fight

This transcript is made possible through the sponsorship of Schneider Electric

Dr. Mark Lewis:

Well, good afternoon everyone. I'm Mark Lewis. I'm the President and CEO of the Purdue Applied Research Institute, a former Air Force Chief Scientist, the former Director of Defense Research and Engineering and it is my absolute privilege and honor to welcome you to this afternoon's discussion about the hypersonic weapons fight.

If I can scene set. We've been hearing a lot at this symposium so far about exciting new plans modernizing our air and space forces, and I would submit to you that technology is a key element of those, and among those technologies is certainly hypersonic flight. Now, I assume most of you know what hypersonics is, but for the uninitiated, it refers to flight in excess of about five times the speed of sound. But in modern parlance it's much more than that. It's the combination of speed with maneuverability and trajectories that produce capabilities that increase survivability, but also, again, get inside an opponent's decision loop.

And joining me here today to consider the implications of hypersonics, not only from a deployment standpoint, but how we would respond and various policy issues are two incredible, incredible Air Force leaders. To my immediate right is Major General Scott Cain, who is the Commander of the Air Force Research Laboratory part of the Air Force Material Command at Wright-Patterson Air Force Base. And as an aside, he has what I believe is the second most fun job in the entire United States Air Force. You can ask me later what the first most enjoyable job is in the Air Force.

In that role, General Cain leads a three-billion-dollar enterprise in science technology innovation that accelerates discovery development of solutions for Airmen and Guardians. He's responsible for formulating a comprehensive portfolio that anticipates future warfighter needs, promotes risk-taking and problem-solving across a six-thousand-member government workforce.

Also, joining us on this panel is Brigadier General Derek Maestro O'Malley, who is the Deputy Director of Operations Headquarters North American Aerospace Defense Command at Peterson Space Force Base in Colorado, right nearby. As the Deputy Director, General O'Malley leads the future concepts Division for the Execution of Aerospace warning, Aerospace Control, and Maritime warning for North America. That includes Canadian, Alaskan and continental United States, North American Aerospace Defense Command regions within the Binational Command.

So gentlemen, first thank you both for joining us for what I know is going to be an exciting and interesting and stimulating discussion. Let me start off by asking each of our participants to say a few opening remarks and then we will go into what I expect will be a very robust but informal discussion in the realm of hypersonic weapons. So General Cain, would you like to start?

Maj. Gen. Scott A. Cain:

Yeah, thanks Dr. Lewis and good afternoon everyone. And I will be asking Dr. Lewis immediately after this what that first job is, because I don't believe it. I guarantee I have the best job in the Air Force, hands down. I am going to start by giving you a little bit of my perspective, and when I say that, not views on hypersonics immediately, but I come from an operational background both as an operational pilot and as a tester. I lay that out upfront because I'm going to talk about some things today and I'll make some comments about the operational relevance and about the pull for hypersonics from our operational community. And I'm not just saying that from the vantage point of a S&T leader, I'm saying

that from a broader perspective. Hopefully, that gives me some credibility to make those statements to start here.

I also, my experience with hypersonics, just real briefly started at DARPA in the early 2000's with some projects they were pursuing, subsequently led the Hypersonics CTF as the group commander out at the 412th Ops group at Edwards, followed on running the AEDC. Arnold Engineering Development Complex, which will lead me to some discussion about infrastructure and then as the test wing commander down at Eglin, dealing directly with the weapons directorate who's working solutions for hypersonics.

So that takes me to today at the Air Force Research Lab where I'm feeding technology solutions to all of the above. I want to make sure Dr. Lewis gave a little bit of a scene setter of what hypersonics is, but I think giving a little broader historical perspective here, we'll define some of the terms of reference we're going to use today because this is about a 80+ year journey that we've been on here.

This isn't what you're probably most familiar with is things that have happened very recently within the last few years, but these are concepts that developed in the World War Two era and continued into the sixties where we did manned hypersonics, the X-15 program, but also the space programs and ICBM development. Those are all hypersonics. So we talk about expendable hypersonics, we talk about reusable hypersonics and they have broad applications from those Mach Five vehicles that you alluded to, an ICBM or to a space shuttle. So those are all hypersonic solutions that are part of this space and part of this discussion.

The episodic nature of that though is something else that I want to talk about because over the course of those 80 plus years, we have invested in different rates in different parts of that technology spectrum and where we find ourselves today is faced with a strategic competitor, our adversary that we're focused on for great power competition who's made a very focused deliberate sprint in this area. And so that's why we're here today, to talk about this, is that competition in this technology space. I'll hit on a couple themes as we go through here. I talked about being episodic, but I also want to encourage us to be persistent and methodical in our approach to hypersonics. And I look forward to having that discussion as we go on here today.

Dr. Mark Lewis:

Outstanding comments. Thank you so much.

Brig. Gen. Derek O'Malley:

Thank you, sir. Dr. Lewis. Well, it is very nice to be here with you. Great crowd. I see more than we expected. So as I was preparing for this, I was TDY'ed at the Pentagon a few weeks ago as my hotel room, taking a few notes about what I might present and talk about here. And the movie War Games came on TV. Yeah, I could see from the nods and smiles that some of you senior citizens in the room are familiar with the movie War Games.

Yeah. So I stopped my preparation for the conference and just sat there and watched, and I thought to myself, "This movie has it all. Matthew Broderick teenage angst, a NORAD supercomputer, artificial intelligence, a cyber attack, a crusty NORAD general. It's all right there." And of course, a global thermonuclear war, which was fortunately averted.

But it's interesting to me as I've been thinking about this topic, how many echoes of that movie are playing out in the dialogue that we hear across the department today. And I'll actually highlight some of those things as we go forward here today. It is also a shame that we can't have Dr. Stephen Falken here on the panel, Dr. Lewis. Yeah. Apparently he's not going to be here because he's not a real person. But other than that, I'm sure he would've been here.

But we do have Dr. Lewis here with us. And I will tell you it's interesting that we have this great American on the panel. He's one of the foremost experts on this topic on the planet. So I would encourage us all to take advantage of this opportunity, not just interrogate General Cain and myself under these sweat lamps we're under, but also I hope we get to hear from Dr. Lewis a bit.

But three main themes that I'll try to inject in the dialogue from a NORAD NORTHCOM perspective, I come from the NORAD side of the house, but NORAD NORTHCOM, those are two distinctly separate commands we're commonly crammed together and maybe misunderstood. NORTHCOM, a geographic combatant command, NORAD binational command with the Canadians.

I'm on the NORAD side of the house, but three themes that I'll talk about. The first is the need for all domain awareness and an integrated layered defense. The second I'll get into the need for us to be proactive and shift to left of launch deterrent strategies rather than reactive, kinetic, defeat endgame strategies, although you do need some ability to defeat things kinetically or otherwise. And then finally, the need to look beyond our conventional geographic combatant command lines and integrate globally to address these challenges. Looking forward to the conversation. Thank you.

Dr. Mark Lewis:

Great. And may I say, it's always been my aspiration to be a fictional defense scientist, so thank you. Thank you for that.

Brig. Gen. Derek O'Malley:

Dreams are coming true today.

Dr. Mark Lewis:

They are. I remember when our Chief of Staff General Jumper was on the TV show, Stargate SG-1, and I kept thinking, "They needed to write an episode where the chief scientist of the Air Force was called in to solve a problem." Sadly never happened. So thank you. So if we can jump into the question. So General Cain, if I could start with you. First, I think you very properly pointed out that AFRL has had a leading role in defining hypersonic technologies, not just in the past few years, but going back decades. And there are so many highlights. One of my personal favorites was the X-51.

I call it the Lindbergh moment in air breathing hypersonics because it established that we could build these jet-powered hypersonic vehicles that could operate in the atmosphere for long duration. But that was just one of many, many accomplishments. But the question is always, "What have you done for me lately?" So if I may, let me ask, could you tell us about some of the big revolutionary leaps that AFRL is working on now in order to realize hypersonic capability? Give us a sense of the status of some of those activities.

Maj. Gen. Scott A. Cain:

So this goes back to that lexicon that I was talking about before of expendable versus reusable and that's how we're thinking about this space right now in that there are technologies that span all of those that we're pursuing. And where we can find the most return on investment is those that apply to every one of those. But there are some aspects of reusable that I think are particularly interesting that we are pursuing, but also that are very difficult to achieve. And so I'll start out with propulsion, and it's an event that happened actually a couple of years ago, but the fact that we have demonstrated an aircraft scale scramjet engine is a really significant leap for our capability. You mentioned X-51, and in the hypersonics world, they talk in a term of 1-X, and I will talk in terms of weapon aircraft, but we have scaled that up,

the X factor, to the point where we have shown that we can execute or operate a scramjet at that aircraft scale.

That is a revolutionary leap and shows the way forward for future vehicles, particularly reusables. The other area that we're continuing to make progress is many of our vehicles are boosted to that hypersonic speed. And what we would like to do is find other technologies that allow us to get to that scramjet or ramjet speed and one of the ways to do that is with turbine engines. And if you think about turbine engines, think about the engines that are in a fighter today, and those generally operate in the supersonic realm, but they operate in the low supersonic realm.

So the challenge is to push that up to a speed high supersonic where you can transition to the scramjet. And we are continuing to make progress towards that type of integrated system. So that's exciting advances, but there's some other things that we're pursuing that I think are difficult that we don't often think about, particularly with reusables, you got to think about durability, so it's not a one-way trip and if the vehicle's ablating or if things are not able to fly again, then you really don't have a very reusable system. So we're making some investments in progress in the durability of these vehicles so they can be reused.

Another area that I'm really excited about, and this is not as much actual capability that we're achieving, but the test and persistence and repeatability that we've been pursuing for years, and one of those is commercial space and particularly commercial reentry. And so we've partnered with commercial space that wants to go on orbit, do activities, say manufacture, reenter, and those are great opportunities for us to get high supersonic, high mock, excuse me, test and evaluation research opportunities. And so through F-Works and through StratFi, we've made some partnerships and those will be leveraged for our own development as well.

I think we'll see very soon one of those vehicles actually in practice reenter. So I think that's a revolutionary leap in our ability to do this research repeatedly as commercial space proliferates. And there's some other test capabilities that are going to be revolutionary leaps too, they're big investments that are happening at AEDC, and those aren't AFRL's investments, those are the TRMC investments from the Office of Secretary of Defense and the Air Force Test Center is executing those, but we're certainly partners there. And that is to have large scale, continuous clean air test facilities for hypersonics that is a game-changer in the development of these vehicles.

Dr. Mark Lewis:

So thank you, and I hope maybe we'll have time to come back and talk a little bit more about T&E because I agree with you completely. It's a really important component of what we need to have available for realizing ultimately the deployment of hypersonic systems. So General O'Malley, if I can switch to you. So you've heard General Cain talk a little bit about AFRL's capabilities, some of the enabling technologies. I'd be curious on your perspectives as well. Warfighter needs, what can an organization like AFRL do to assist you, but maybe also feel free to expand a little bit on your particular mission set?

Brig. Gen. Derek O'Malley:

Yeah, you bet. Happy to do that. And you certainly, I'll go beyond AFRL because this is bigger than any one organization of course. And frankly, I think it really demands a cultural change really across the entire department and with our allies and partners. As you look back to when NORAD first stood up, our primary threat were ICBMs and bombers flying over the pole and dropping gravity weapons here on the homeland. The threat has obviously evolved significantly since then.

Our adversaries can now arrange and threaten the homeland from any number of axes, both kinetically and non-kinetically, and they are increasing their capacity to do so at an alarming rate. So the game has changed and obviously with the introduction of hypersonics, certainly the game has changed. So with these types of threats and recognizing that our homeland is already under attack daily in the info space and the cyberspace, our theory of victory cannot hinge entirely on kinetic defeat mechanisms. That is a losing strategy both militarily and financially.

Now I agree, you certainly need to have that capability, but you also need to have other capabilities to try and get left at launch. And I'll talk about those here in a bit. So in our homeland defense design, we certainly include kinetic defeat as I mentioned, but we look at a host of other capabilities that help us get the left to launch and to illustrate this General VanHerck and now General Guillaume. For the three and a half years under General VanHerck, have arranged things under three strategic principles.

And the first is domain awareness. This is our top strategic priority. Then information dominance followed by decision superiority, all under the umbrella of global integration. And I won't get into all those right now, but let me just anchor a bit on domain awareness. This is our top strategic priority. So if I was talking to AFRL, the AFRL commander, I would say this is what NORAD wishes for you to invest in. So thank you, sir. Glad I could pass that on here on the panel. But if you think about it, you cannot deter and you certainly can't defeat something that you cannot detect.

So in the case of hypersonics, we need the ability to track them persistently from launch all the way to impact. And I know that is a difficult challenge, but one that I know that we're working through, we in NORAD and NORTHCOM are also platform-agnostic. I'm not going to advocate for a very specific capability. I'm going to describe the effect I want, but I'm going to trust the smart people like General Cain and his team to figure out how best to deliver that capability. From our perspective, a particular platform is not as important as its ability to be integrated across all classification levels, across all domains with our allies and partners.

And frankly, if we get to that point, I think we're finally getting into the concept of that. I know that we're all moving forward on. We're also encouraged by the forward thinking that we've seen in the department. Certainly, enjoy what I heard from the chief, from the secretary yesterday and from you now, sir, here today. I think that's important because we at NORTHCOM, if I advocate for a radar, I'm probably going to get a radar when in reality there are a host of other potential capabilities out there, biostatics, acoustics, space-based, the list goes on that could deliver the capabilities and the effects that we need. So I'm encouraged, sir, General Cain to hear that we've got organizations led by you that are doing just that. Thanks.

Dr. Mark Lewis:

If I may, I am really encouraged by the fact that you're thinking not only about implications of offensive systems, but also the defensive capabilities that might address those offensive systems. I always like to remind people that hypersonic weapons are hard to stop. They're not impossible to stop if you do it right. So thank you for those comments.

So with that in mind, General Cain, can I come back to you and ask, can you talk to us about some of the challenges that could hinder rapid or progressive solutions that hypersonic researchers are trying to deliver? And if I may, back when I was on the air staff, which was shortly after Hap Arnold started the Air Force, thank you. I had a colleague in the air staff who used to say hypersonics is the future and it always will be. And I think we can now say, "No, hypersonics is here." We have demonstrated capability, we have competitors who've deployed capability. We have systems just waiting to go, and yet we're still always looking to advance that state-of-the-art obviously through programs at AFRL, tell me about some of the challenges that we face.

Maj. Gen. Scott A. Cain:

So what I'm going to talk about aren't S&T challenges as much as they are, like you alluded to, institutional challenges. These are investment challenges, having been there firsthand, particularly with that ground test infrastructure, with the wind tunnels, with the ARC heaters that provide those thermal environments. Those are large national level investments.

And over the last few years we have made big investments there in Dragonfire, a new arc heater capability. I talked about the clean air hypersonics facility, but there's a lot of associated aging infrastructure that drives those systems that we need to continue to recapitalize. What we've seen is that methodical approach of building the technology through the lab to the testing results in success in the air. And so if we don't continue to make those investments, if we don't have the best infrastructure in our labs and in our ground test, then we risk having less success.

So I say that's probably one of the number one challenges we have because those are just large national level investments. They simply cost a lot. I did allude to the persistence piece earlier, and that's persistence and ability to repeatably test, but it's persistence in the poll, and this is how I started the whole session by talking about being an operator, but we need the operational use case. We need the operational analysis that shows where this fits in to our force design and what happens if that exists.

Then these problems are very complex and they don't happen on the scale of a year or a couple of years. They happen on the scale of decades. And I know we want to go fast, but this is something that falls into the bucket of what I call 20 years to an overnight success, or maybe as the chief said this morning, times of consequence, this time spent in development is very consequential to get to the capability that you need. So we need to create that persistent demand signal, it needs to fit into our force design, but then that gives you the multi-year investment that allows you to really solve these complex problems.

Dr. Mark Lewis:

Yeah, I really appreciate you saying that. I sometimes like to make the point that the supersonic combustion ramjet, the scramjet was conceived of forty-six years before its first successful flight, and then it was another seven years or so before we had a scramjet that AFRL flew, that essentially flew for as long as it was being fueled and kind of established that technology worked.

And there's this one example, so I absolutely resonate with your point as well about the need for the long-term investment. And if I can, I also like to give a shout-out, you mentioned TRMC and the good folks at AEDC. I mean, they're doing a phenomenal job. I would argue investing in the facilities that we need ground testing, even flight tests as well to make sure that we can get to the deployed systems eventually that we need.

Maj. Gen. Scott A. Cain:

Yeah, there's one other thing that I'd like to add to that too, is that persistence also affects our workforce and we can't build up and then lose our workforce and do that episodically either. So we need a consistent demand signal for those scientists and those technologists that are going to develop these systems. So that's a not insignificant benefit of persistence as well.

Dr. Mark Lewis:

And wearing a university hat, I would argue workforce also begins with the universities, and I'm going to give a shout-out to AFRL, especially through AFOSR. AFOSR has kept universities working in the hybrid,

even through some of the lean times, AFOSR always made sure that there was a workforce that was being prepared and ready to-

Maj. Gen. Scott A. Cain:

And if I didn't make that point earlier, you've made it a couple times now, but our investment has been over the course of all those decades, both in the technology, in the workforce, and that's what our strategy is to continue to do so. We certainly respond to the needs of the department, but we also know that the department needs the technology for the strategic competition. So we're going to stay the course and continue that investment.

Dr. Mark Lewis:

So General O'Malley, if we can come back to you, you talked a little bit about your role and it involves multinational. Can we talk about a whole of country approach and the importance of partnerships not only in the country, but also working with our friends, partners and allies to accomplish what we need in this field?

Brig. Gen. Derek O'Malley:

Yeah, absolutely. Happy to get into that. And obviously NORAD's a very unique command, binational command working side by side by our Canadian allies. It's been a unique experience for the past three years. For me to have that opportunity to get to the heart of this, I'll go back to the strategy I'm talking about before, which is this desire to get left of launch to deter before we have to get into a kinetic shooting fight. And all too often, I think through the years we as operators have tended to focus on kinetic defeat mechanisms.

You look at our leadership General VanHerck, General Guillaume, myself and others, we were operators. So we grew up and kinetic defeat was something that we were comfortable with and we sort of gravitate towards that. But that puts you in a situation where you're now almost by definition reactive because you're waiting for the inbound missile vice being proactive. And so we're working very closely with our Canadian partners to try and devise strategies that allows to be more proactive. So if you think about the case of a hypersonic glide vehicle. To be specific, this is a weapon where we may not know where it was launched if we don't have the requisite domain awareness that I'm describing. So that's why it's an important investment from a NORAD perspective.

We may not know the intended target since they can maneuver end game, and we may not know until either we engage that missile or that missile impacts target, whether it was conventional or nuclear. So those are significant challenges for our senior decision makers. So we've got to have the domain awareness, but we've also got to find a way to become proactive and get left of launch. And this is where I get to the principles that General VanHerck now General Guillaume, have really been uniting the United States and Canada on together, and that is decision superiority first, information dominance and decision superiority and information dominance is aggregating all the information that we can harness from our domain awareness sensors and then translating them back to decision makers in a meaningful way that is useful.

We often hear discussions about sensor to shooter, and I believe we absolutely need sensor to shooter, but I would also like to have sensor to decision maker because if we can give that maybe I don't ever need a sensor to shooter. So we want to aggregate that information, process it in real time and generate effects back using artificial intelligence and machine learning so that we can make better decisions. And this is precisely the concept of decision superiority that General VanHerck has talked about quite a bit, General Guillaume as well. And that is simply the ability to make better and smarter decisions than our

adversaries getting inside the adversary's loop so that we can, rather than react to their actions, we can proactively influence or drive their actions. That's the kind of left to launch that we're trying to get to as we collaborate with our Canadian partners.

Dr. Mark Lewis:

And may I day, I'm delighted to hear that we know we have pure competitors who are trying to build ambiguity into their hypersonic systems to make us wonder, is it conventional, is it strategic? So wonderful to hear that you're going through that thought process in addressing these challenges. So thank you for that. I want to make sure we leave some time open for audience questions, but let me also ask my two colleagues if they have any closing remarks before we get to the question part of our...

Maj. Gen. Scott A. Cain:

I have just a follow-up, I guess, to the partnerships piece too. You mentioned the academic partnerships, but international partnerships are incredibly important to the research lab and to the research community as well. So our project arrangement with the Australians in particular has been extremely beneficial. So working with our allies and partners is something that I wanted to make sure that I highlighted to everyone in here that you understand that we're not going this alone, we're going this with some very technologically sophisticated partners.

I guess the way that I'm thinking about the whole proposition is, and kind of the message that I wanted to get to everybody in here is this is a technology problem, but it's not only a technology problem, it's also an operational acceptance, a operational integration connection with the warfighter that we need to make from this S&T community to understand what it brings to the fight. It's also not only just for conflict, and Maestro I think made me think about that because of his left of launch, but so far left of launch that this is a factor in this technology matters for competition, and I think there's value in the investment not only for conflict that we need to be considering.

I also, listening to Maestro, think that our investment in offense is also valuable for our understanding of defense. And then I'll take this up another level to think about this nationally, and it's really a decision of our investment in aerospace. We're an aerospace nation, and you probably co-wrote this with Dr. Halyan, but there's this idea of 6, 60, 600 and mobility, and we started moving things at about six miles an hour, and then the automobile got us up to about 60 and the aircraft got us up to about 600. And so the question with hypersonics from a mobility perspective, not only defense mobility, I'm talking about just global mobility for our nation is do we make the step to 6,000 or do we lead to 6,000 to keep that geometric rise going?

Dr. Mark Lewis:

Yeah, no, absolutely. And by the way, I'm going to reveal myself to the audience as an AFRL fanboy, but you talked about international relations and that's another role that AFRL has filled so magnificently, the Highfire program that AFRL led with Australia led to now Syfire, which was a major piece of AUKUS. It's just one of many, many examples. So thanks to AFRL for what you've done in that realm as well. So General O'Malley?

Brig. Gen. Derek O'Malley:

Sure, I'll end where I began. So journey back with me to 1983 we're watching War Games. You may recall at the end of the movie, Joshua or WOPR is running a simulation of a nuclear strike, what will happen? And he quickly realizes that eventually both sides will be completely annihilated and he wisely reaches the conclusion that the only winning move is not to play. I think that's exactly the message that

we want our adversaries to see and feel as they look at us. I hope that somewhere right now, maybe the PRC is watching this right now. Hello, PRC!

I want our adversaries to realize that we are so resilient, so well integrated and so capable that they can never defeat us, that any attack in our homeland would be futile, that the only winning move for them is not to play. And frankly, from my perspective, I wake up every day and I get to execute the most noble mission on the planet that is to protect, defend our homeland. But I would argue that whether you're an Indo-Paycom on offense, or a NORAD NORTHCOM on defense, all of us ultimately are in the business of homeland defense and preserving our freedoms, preserving our way of life. So it's an honor to serve side by side with you in that important mission. Bring on the questions.

Dr. Mark Lewis:

Yes. All right, so audience questions. And I'm going to tell you ahead of time, we are blinded by these spotlights, so please, if you have a question, raise your hand and I see one already in the back and you're going to have to shout it out.

Audience Member:

I was just wondering if ... aspects of... Thank you. If the reusability aspects of hypersonics suggests recallability and what the potential of recallability on things like ICBMs would have for our deterrent decision-making calculus.

Dr. Mark Lewis:

Cool. Which one of you wants to take that?

Brig. Gen. Derek O'Malley:

That sounds like an AFRL question to me.

Maj. Gen. Scott A. Cain:

So I certainly think the answer to that is yes. I mean, it enables you to make those decisions and then they get into his lane and then I'll ask him to answer that question. But no, it's a really good question and I mean, I think that's a capability that's natural in our way of war fighting right now is making operational or tactical decisions. That's how we train and we reserve the right, make the decision sometimes to not attack, whether it's for the safety of the crew or the success level or risk level of the mission. So it definitely gives you some sort of flexibility at a tactical level. I do think at a strategic level that probably is a deterrence, something goes into your deterrence calculus, but I don't think I'm ready to throw down with that. I'd probably defer to someone who's in the strategic deterrence business to answer that. So Maestro, over to you.

Brig. Gen. Derek O'Malley:

I felt like your answer was fully complete and we were ready to move to the next question.

Dr. Mark Lewis:

All right, next question. Do we have any more questions? Let's see a question over here on the side. Wait, can you wait for the microphone?

Howard Albin:

Thank you very much. Howard Albin from the Warzone. I got sort of a two-part question. One is can you give us an update on the Mayhem program and then is there anything underway, like the SR-32 in any kind of phase that you can talk about?

Maj. Gen. Scott A. Cain:

Yeah, I don't think I can give you any specifics in this forum on either of those. We can follow up to see if there's information I could give you, but not in this forum.

Howard Albin:

Okay, thanks.

Dr. Mark Lewis:

Thanks a lot. Other questions? Question over in the back or on the side?

Eric Lazo:

Good afternoon, gentlemen. Cadet first class here, Eric Lazo from USAFA. Do you see a tension between developing hypersonic weapons and modernizing the nuclear deterrent and does one undermine the other?

Brig. Gen. Derek O'Malley:

That sounds like a NORAD question and a STRATCOM question, but I'll cover for them as well. Yes. First I'll say this, I think our strategic nuclear deterrent is the foundation of the bedrock of our defense, and that doesn't change, but I think we have to be very clear-eyed about the erosion potentially of our new strategic nuclear deterrents with the introduction hypersonic weapons, particularly hypersonic glide vehicles.

So let's go back to War Games, shall we? You may remember in the simulations that Josh was running, and I know you're a cadet at the academy, so if you haven't seen the movie, you have homework after this, but I feel like you've seen it. But remember those simulations are running and the ICVMs are flying and we actually have some time to make some decisions there. But in the case of a hypersonic glide vehicle, we may not know what kind of warhead is on it.

We have difficulty tracking, potentially. These things fly at incredibly high speeds, Mach five plus. So coupling ambiguity with lack of decision space, that's a dangerous combination. So I think also we have to recognize that with a hypersonic glide vehicle, an adversary, may the calculus changes. An adversary may now think that they have a viable first strike opportunity. In other words that they could strike our homeland without guaranteeing that they're also going to be annihilated. That changes the calculus significantly. So I do think we've got to pay close attention to how this could erode our strategic clear deterrence. Be clear-eyed about it, have clear policy moving forward. But a very insightful question. Thank you.

Dr. Mark Lewis:

We're good. Let's see. I'm not seeing any additional hands, which means I get to ask a question.

Brig. Gen. Derek O'Malley:

Three minutes.

Dr. Mark Lewis:

Three minutes left. So actually I want to come back to test and evaluation if I could, and how we War Game, if you will, how we think about how we analyze the role of hypersonics, both offensive and our defensive response. How should we think about that as an air force and a space force? What's the whole of services approach to solving that problem? I know it's an easy one.

Brig. Gen. Derek O'Malley:

Yeah, I'm in the joint command. You're in the air force.

Maj. Gen. Scott A. Cain:

Well, I think it's a matter of looking at the operational problems that we're trying to solve and what the technology brings to it is really all it is. And that's how we approach all of our technology development. And as we work with futures and force designers, they are calling it a cycle of learning. And that is because not just what's in the mind of the war fighter, but it's what's in the mind of the technologist that we need to show the art of the possible and what trades does it make. I was just given the undersecretary a tour of the AFRL booth, and I was telling her about how my scientists and engineer understand war fighter needs.

So they enter these problems with that in mind, understanding what this brings to the fight. So I think it's a conversation with the war fighter. We've talked about that as a theme of this whole conference as well, that not just with an exquisite high-end technology like hypersonics with all of our technology development, we have to have a conversation with the warfighter throughout so they understand it and so that they perhaps trust it and they understand what capability it brings to the missions that they're trying to close on.

Brig. Gen. Derek O'Malley:

I'll just add a quick thought on policy that I think relates to your question. It's very important from a NORA perspective that we have clear policy on what we need to defend. I don't think we're in a position where we're going to put force field over the entire continent of North America that would be cost prohibitive. So we need to have clear policy on what we need to defend, and we've made great progress on that here in the United States. We have some work to do in Canada, still. We're working through that.

But additionally, we also need clear policy on who needs to defend. In the case of an ICBM right now, it's very clear who owns what. There's no ambiguity In the case of cruise missiles, it's very clear in the UCP who owns those responsibilities. But we introduce a weapon, like a hypersonic glider vehicle, which has kind of elements of cruise missiles and ICBMs. You can find yourself where it quickly becomes ambiguous. So it's very important that we resolve those ambiguities before we're in a fight. So there's no question who has a responsibility to be trained and equipped to actually defend against those threats.

Dr. Mark Lewis:

I've even heard it suggested that some of our peer competitors understand that there's an ambiguity there and they've deliberately engineered systems such that it would cause us to ponder who's actually in charge of defending against it. So they're using that against this. So I am delighted to hear you say that that unfortunately is the last word for our panel. We have now officially run out of time.

I want to first thank the audience. You've been an incredibly responsive audience, standing in room only on an important topic. I thank you for your participation. I want to express a very sincere thanks to my two panel members, General O'Malley, General Cain, thank you first for your insights for joining us in this panel, but also thank you for what you do in leading our air force, leading our Airmen, leading our Guardians, helping to map out the future of our services. Thank you so much everyone, and have a good rest of the day.

This transcript is made possible through the sponsorship of Schneider Electric

