The Aerospace Advantage Podcast – Ep. 207 – Credible Deterrence: It Demands Modern NC3 – Transcript (AI-Assisted)

Heather "Lucky" Penney: [00:00:00] Welcome to the Aerospace Advantage Podcast, brought to you by PenFed. I'm your host Heather "Lucky" Penney. Here on the Aerospace Advantage, we speak with leaders in the DoD, industry, and other subject matter experts to explore the intersection of strategy, operational concepts, technology, and policy when it comes to air and space power.

The nuclear triad forms the bedrock of America's national security. The idea is simple. To hold enemy nations at risk to such a degree that they will never cross certain lines. For this to work, our nuclear enterprise needs to be highly resilient, dependable, and zero fail. It comes down to the fundamentals of effective deterrence, which demands that an enemy believes you have the will and the means to execute the mission, no matter what.

We normally focus on the weapons portion of the nuclear enterprise, intercontinental ballistic missiles based in the United States, submarine launched ballistic missiles, and air launched weapons from bombers and fighters. And while these weapons and capabilities are obviously [00:01:00] critical, the ability to use them reliably, securably, in an incredibly safe command and control system, what we call Nuclear, Command, Control, and Communications, NC3 for short.

People often take that part of the enterprise, however, for granted, because it's largely invisible. I mean, underground cables, computers, communications links, and a very few specialized aircraft and satellites are the backbone of this mission function. But it's not like we see those things at air shows or on promotional posters.

Most of us just trust that they exist and they'll function as required. But that doesn't mean we should blindly take the system for granted. Just like any other capability, it's important that we execute modernization efforts to ensure that the technology is up to date and aligned with the evolving threat environment.

This isn't just an area where, sort of good enough should be accepted. We need to be all in. And that's what we're going to explore today. America's NC3 system. The strategy, the operational concepts, and the technologies that [00:02:00] underpin it. We're also going to discuss how to modernize the system as part of a broader triad reset.

So, we're really fortunate to have Jen "Boots" Reeves as part of this conversation. As you know, she served in the ICBM world, both as an operator and a wing commander. Boots, it's great to have you back.

Jennifer "Boots" Reeves: Well, I am so happy to be here and so happy to talk about this.

Heather "Lucky" Penney: Us too, because it's a really important topic.

And we also have Chris Adams with us from Northrop Grumman, where he serves as a sector vice president and general manager of their strategic space systems division. And this is really important. Because while Boots and I can talk about the theory behind NC3 and Boots specifically how it operates, Chris and his team are part of the experts that actually build and sustain it.

So Chris, welcome. We're grateful to have you here today.

Chris Adams: Happy to be here.

Heather "Lucky" Penney: Boots, let's start with you. We were talking about this topic a few days ago, and you did an incredible job building out a mental model for me regarding how I should think about the NC3 enterprise at the macro level. Would you mind sharing that with our listeners?

I mean, it's complex, and I want to make sure that folks have a good [00:03:00] model in their minds before we dive into the technologies.

Jennifer "Boots" Reeves: Absolutely. Love to do it. Okay, so the first thing, the bottom line, what I want people to walk away with is this. NC3 is a complex web of various elements, all of which are important.

So first, what we start with is warning. Like, we have to know what's going on. What happens next is decisions get made about what do we do about what is happening. And then finally, commands are sent and the action gets taken. Okay, so let's start with warning. Okay, warning is all about missile warning, right? Pretty typically what we've seen the convention in the United States is that we're, even though this is not policy, we're not a first strike nation, right?

So, we don't believe we're going to launch a nuclear attack unless we get launched against, right? And so we have to know that that's happening and we have to be confident in that. So it starts with missile warning and we go after this concept called dual [00:04:00] phenomenology. We want to know from two

different types of systems, right? Space based and ground based that, no kidding, we are seeing, a launch against us.

Heather "Lucky" Penney: It's to validate that, no kidding, an attack is happening and that it's, no kidding, a nuclear launch.

Jennifer "Boots" Reeves: Absolutely.

Heather "Lucky" Penney: So, we want to be sure because we're not going to just play around with these weapons.

Jennifer "Boots" Reeves: Right. We do not want to make a mistake. We, we want no mistakes in the nuclear enterprise, right? So, we want to make sure that we understand what is actually happening in the world in real time. Then all of that goes to the Missile Warning Center. And an assessment is going to take place by the various command and control agencies, including the National Military Command Center, which is in the Pentagon, right?

And what ends up happening is a decision loop gets pulled up where, no kidding, the president gets involved. He is the only person, he or she, is the only person who can execute nuclear weapons, i. e. give the order to launch. That person, the president, has to be [00:05:00] involved in this. Then what ends up happening is the decision gets made.

The decision also, part of that, is what we're actually going to execute. There are various options out there in the nuclear world. And then that command gets generated in the proper format and sent out across multiple communication systems to the actual weapons and operators of those weapons who are going to execute them.

Heather "Lucky" Penney: So Boots, I want to get this straight. There's really two halves to the system. There's a threat detection, which is more of an intelligence and warning function, and that's really zero mistake. And then there's the decision and command and control element where the president and the other top leaders respond if circumstances demand it. And this is very time sensitive, right?

So, do I have this laid out?

Jennifer "Boots" Reeves: Yeah, I think you do. I think of it in terms of we have to understand what's going on. And so that is our warning element, right? And then if we're going to take action, right? That's our nuclear element. And

then we connect them with decisions. And the [00:06:00] command and control network, the NC3 network.

And that's how we move forward. So, we have to, and all of the elements of all of that are wildly important. All of that has to be no fail.

Heather "Lucky" Penney: Yeah, and so, you've talked about the model of how it functions, and who the players are, and what we do. But the technology really is the crucial under, underpinning of all of these operations.

So, Chris, I'd like to bring you into the conversation. How did we get here from a technological perspective? I mean, this model that Boots just described how we execute the nuclear, command and control functions and all the supporting elements, they extend back to the Cold War days.

Chris Adams: The short answer here is, yes.

Early warning and NC3 played a critical role in the Cuban Missile Crisis in the early 60s. This crisis led to a significant expansion of the U. S. nuclear arsenal and a focus on many supporting elements, including the use of the space domain to ensure our nuclear readiness. From a [00:07:00] technological perspective, looking back at the crisis paints a clear picture of the realizations that were made that ultimately informed today's NC3 architecture.

Think about it. A 13 day political standoff that was only one bad decision away from nuclear Armageddon. You can look at the meeting minutes of President Kennedy and his advisors during that time and see just how hard it was for the President to maintain a clear picture of the events in the Atlantic.

Military options for the President to consider, in the worst of cases, were constantly being generated and updated as information flowed. And so, yes, this swirl of activity and the critical need for the president to maintain positive control of the nation's nuclear forces drove many of the lessons learned that underlie today's NC3.

Heather "Lucky" Penney: So, when did the current NC3 system that we rely upon now come into being? You just gave us a really good picture of where we were in the 1960s, the Cuban [00:08:00] Missile Crisis and what drove the recognition for the need to expand the NC3 architecture and enterprise. How much of this is coming from the Cold War and where are we today?

Chris Adams: Good question. It's a bit more complex. What we rely on today has really been a culmination of developments and advancements across the entire system over the past six decades. It's a little bit of a cat and mouse game with the adversary. It's also important to point out that it's not just about improvement for the sake of improvement.

It's about being in front of the adversary and really leaving no doubt in their mind on our capability to respond. The Cold War era was the time we realized the mounting requirements for a dedicated NC3 system, and the full system we rely upon today is made up of many connected and growing multi domain infrastructures.

Part of what makes NC3 so complex is that it's not a single system that was deployed at one point in time, [00:09:00] it's a system of systems. It really encompasses hundreds of individual systems that are modernized and sustained over a long period of time in response to an ever changing threat. From a space perspective, you can start by looking at missile warning and defense branch of the systems.

Starting with the Defense Support Program, or DSP, which was developed to provide uninterrupted early warning capability against ICBMs. The first DSPs were launched during the Cold War, while the last one was launched as late as 2007. During this time, DSP satellites went through numerous improvements to enhance reliability and capability, and were critical components during Operation Desert Storm, from a tactical theater perspective.

That was really the first time they were used in war. Shortly after, the DSP replacement system, SBIRS, began its development with the first satellite launching in 2011. SIBRS, or Space Based Infrared System, [00:10:00] currently makes up the primary constellation for detecting missile launches. But yes, some DSPs are still operational today and provide useful residual capability.

Jennifer "Boots" Reeves: Wow.

Chris Adams: It's the same story for space based assured communication branch of systems, starting with the MilSTAR program, a top priority during the Reagan administration that wasn't even launched until after the Cold War ended. And while the MilSTAR system is still in operation today, a more advanced system replacement was deployed starting in 2010 to serve as the next generation systems, backward compatible, so it was able to work with MilSTAR.

Heather "Lucky" Penney: So, this is incredible because a lot of what we're living with today, the systems, the architecture, was built in the Cold War before we really had an internet or any of the cyber threats that we have to face today.

So, not only is the challenge how you integrate and create interoperability across all of these systems, especially when they're in space. Um, you can't do that kind of on the ground depo modernization. That's a really [00:11:00] big problem. So, can you help us understand the mission requirements that were back then, and the nature of the threat, and how that then shaped the NC3 system, many of which those legacy elements we're living with today.

Chris Adams: Yeah, it's a great question. Space is a longer cycle because you can't get it back like you can on the ground or in the air. I think it'd be helpful to tackle the question from a then versus now position.

Heather "Lucky" Penney: Okay. Yeah.

Chris Adams: Really getting at the requirement drivers. So, back then pre Cold War, early Cold War, we had a single nuclear peer problem, the Soviets at that point. so, this limited the geography of the threat, it made the attribution problem fairly unique and a lot easier.

Heather "Lucky" Penney: Simpler, yeah.

Chris Adams: Today we face an arena where several nations either openly possess or are believed to have nuclear weapons, but we face a very real two nuclear peer problem with China's rapid nuclear modernization efforts.

The shift from one to multi raises the [00:12:00] requirements for survivability and NC3 in many ways. Today, the space domain is also a warfighting domain. U. S. space superiority was largely uncontested in the Cold War times. Today, it is heavily contested, and that uniquely changes the NC3 position. Think about the American West, which went from quiet prairies to fiercely contested territory in a matter of decades due to land opportunity, resource exploitation, industrialization, etc.

This rapid transition Introduced new requirements for ensuring stability on the prairies. It's a little bit unclear where we are in the space domain on that analogy, but back in the Cold War, there were fewer factors to consider to ensure space superiority. The now congested and contested domain is not only driving new NC3 requirements, but also a mindset shift, architecturally.

Back [00:13:00] then, space was a wholly supporting domain, with space systems that supported military operations in land, sea, and air domains. Today, space systems require their own support, as they themselves operate in an increasingly contested domain. This is true for all U. S. space assets, especially the NC3 space based systems.

I could go on and on about what drove NC3 requirements back then versus now, but I'll give a few examples. Back in the early Cold War days, the fact of and the technology to simply deliver a nuclear weapon was the technology. Contrast that with today, and you have an ever increasing complexity and sophistication of the delivery systems.

They're dimmer, they're faster. That drives a lot of advancements required for the sensors to be able to unambiguously see them, detect them, track them. On the comm side, in the early Cold War days, most of [00:14:00] the systems were point to point and somewhat uncontested, at least relative to today's standards.

Today, everything is hyper connected and cyber is a real threat. So, there's a lot more attack surfaces relative to the security and assurity of the comm systems themselves. Some will say if everything is connected, nothing is secure. I think this is somewhat true and really important when you talk about NC3 systems.

What needs to be connected to what and what do you want to make sure doesn't get connected. Again, all tying back to that, that communication assurity. So, these new requirements are a clear signal that now is not the time to pull our foot off the gas in investing and modernizing in our NC3 systems, particularly our space based NC3 systems. And it's certainly not the time to consider a pivot to unproven systems for a no compromise mission.

Heather "Lucky" Penney: Chris, thank you for that summary. I mean, what I'm taking away from this is that no longer are we in a [00:15:00] dual world where it's just the Soviet Union versus the United States. We have a very complex nuclear environment from smaller states that may not necessarily acknowledge that they have nuclear weapons to clearly China's breakout and Russia's threat as well.

Then you talk about space. Space is now a contested domain. It is a warfighting domain, which puts our systems, those that detect and provide that kind of missile warning, that's clearly a threat as well. And then you look at the whole comm infrastructure. So, this is a really complex problem. Thank you for that summary.

Boots, you were a young operator, and then later a wing commander within the NC3 construct. So, I'd really like to hear your perspective.

Jennifer "Boots" Reeves: Absolutely. So when I think about, first, when I think about nuclear weapons, we used to use this phrase and we still do. It's still used there. Of course, I'm just not there.

And it's called safe, secure, and reliable, right? We always look at them through the lens of safety, security, and reliability, right? [00:16:00] All those three things need to be optimized. When I think about NC3, my number one thing is reliability. We have to make sure that those messages get through. And so what does it take for those messages to get through?

What does it take in terms of the system, the technology, what's actually being, what's put together today? What are we looking for tomorrow to ensure the reliability of those messages? So, I think about redundancy. You have to have various options in case something falls out for whatever reason in real time.

You have to have redundant options that can help pick up the slack, as it were because, right, without the NC3, there's no way to get that order to the dispersed force. And remember, we've got the nuclear triad that we already talked about. And the reason that the triad is so relevant is because each of them offers something different terms of being quick, being alert right now and can launch within moments, but [00:17:00] only if that communications order gets to them, telling them to do the right thing.

So, would say that the redundancy is most important to underpin reliability. And if we're going to modernize. And we need to modernize. We have to make sure that it is being done holistically because everything is interconnected.

Right? So, we have to make sure as we bring something new on board that it can still be backwards compatible with what is not new and what already exists.

Heather "Lucky" Penney: Yeah, interoperable. And at the same time, like you said, not just reliable, but secure as well, because not only do we need to ensure that those communications get out to those forces, whether or not it's the survivable forces in the field, the ICBM fields, the sneaky forces and the submarines, and the maneuverable forces within the bombers, that all needs to be reliable and secure.

And it's not just about getting the message out. It's ensuring that it doesn't get hacked. So, there's no spurious messages as well.

Jennifer "Boots" Reeves: Absolutely.

Heather "Lucky" Penney: So, Chris, [00:18:00] clearly we're, this is a very classified subject because it is so crucial to our security. But can you best describe in an open environment what the construct of the vision is for the next generation NC3?

Chris Adams: Sure. Fundamentally, the construct for the future NC3 really hasn't changed through the decades. The fundamental idea is to ensure that the use of nuclear weapons is associated with unique attribution, is always deliberate and controlled, and functions under the direst conditions. With zero gap or vulnerability is, as both of you have, have said. Examples of this are during or after a nuclear attack, unfortunately. Next gen NC3 is performing for the same macro level mission.

From a structural construct point of view, the mission is best satisfied from a bird's eye view, our perspective is that's a space [00:19:00] bird, not an air bird, in order to see the entire joint domain.

Heather "Lucky" Penney: Yeah. Yeah.

Chris Adams: But even at just the space layer, the next gen NC3 mission requires shaping across distributed architectures for a system of systems solution.

And we talked a little bit about the individual systems, but let's go a little bit deeper into that as we look at what needs to happen in the future. First of all, we talked about the advancing threats, right? Primarily the delivery systems. This will likely require advancements to the sensor technology to improve their effectiveness as well as their resiliency, adaptability to other emerging threats.

We also need to maintain the integrity and functionality of critical communications by increasing their survivability. And then lastly, we need to continue to enhance the functional capacity, the speed and the efficiency of the data processing. A lot of this also has to do with the economics really [00:20:00] getting the most out of the systems that we're procuring as opposed to necessarily making them better. It helps with speed and efficiency.

And that's just to name a few. The underlying piece here is really crucial. It's ensuring that we are modernizing, advancing, and sustaining every facet of the system without leaving any gaps along the way. Again, this is about staying

ahead, not just being better for the sake of being better, and leaving no doubt in our adversary on our ability to respond at any point in a potential transition.

So, we have to consider when, where, and how we want to deploy the next generation systems incrementally and carefully so we don't leave any vulnerabilities. A good analogy is grabbing the next ring on the playground before letting go of the last one.

Heather "Lucky" Penney: I'm really glad you said that because something that you mentioned earlier about we cannot afford to have the vulnerabilities of unproven [00:21:00] systems.

So, I really like that analogy of making sure you grab that next ring. They need to be mature, they need to be reliable, and they need to, we need to know that they will execute the function and the missions and the communications necessary to have that safety, security, and reliability. So, what does it mean to develop this technology in the modern era?

You know, everything's hyper connected, we've just alluded to that before. And there's some interesting opportunities that this affords, but given the need to have absolute mission assurance and security, I'm thinking this approach to modern NC3 is different than what we might see on the conventional side of the equation.

Chris Adams: It's a great question, Heather, and like other topics, there's a lot of complexities to that particular answer. If we step back and look at, as you asked, that conventional military system problem or the tactical theater level problem, tied to missile warning and command and control. We have a collection of next gen assets and [00:22:00] capability in development today.

And as you said, in this hyper connected modern era in space, you're right, there are some very interesting and promising opportunities that are being pursued. Including bolstering our conventional missile warning and tracking systems, a critical warfighter capability that we're all in on. One example is through the Space Development Agency's proliferated LEO tracking layer. Where a large constellation of missile tracking satellites are being deployed in LEO, putting more sensors closer to those targets for uninterrupted tracking to ensure successful interception.

This is an economical approach relative to the mission value. And it's actually quite resilient against a subset of the threats. These new approaches hold a great deal of potential for the future. And it's encouraging to see the industry,

including us, embracing experimentation in these areas for conventional military systems.

But experimentation is a key word here. And it's [00:23:00] important to remember that in the grand scheme of things, it's very, very new. So, it's vital that we do not confuse what is good enough for conventional military systems with what is required to ensure the U. S. nuclear deterrence mission, which cannot afford failure at any point in time.

Potential future benefits of this modern era and these opportunities and architectures does not alleviate the risks we face today. Which is why we must carefully consider all It's all ongoing modernization of the nation's NC3 architecture. How do we modernize this system without compromising its integrity and operation with the proven systems we have?

Heather "Lucky" Penney: And that's crucial. It's not just zero fail. The mission is zero mistake as well. And so I wanna pull on this thread some more because people often talk about how much the triad reset costs, but it's also really important to highlight that this is something we can't afford to not do. The stakes don't get any higher than nuclear [00:24:00] weapons and nuclear warfare.

And so, if we think that doing it right costs a lot, we ought to think about what the costs and risks associated with what a plan B might be. And I think that perspective puts everything within context.

Chris Adams: Absolutely, it does. I would argue the world is not a safer place today relative to the Cold War time.

Heather "Lucky" Penney: I think we would agree with you.

Chris Adams: And just to be clear, nuclear deterrence is the plan A. It underpins national security in the United States and will continue to do so for the foreseeable future. And that means investments and focus on both the triad and NC3. Why? Because there's no room for error when the Commander in Chief, as Jen said earlier, is making decisions, and in some cases, potentially the ultimate decision, that would alter the course of civilization.

That really needs to sink in. Alter the course of civilization.

Heather "Lucky" Penney: Yeah.

Chris Adams: Launch is literally the last resort. Anything that disrupts our immediate [00:25:00] access to accurate information that is reliable beyond a shadow of a doubt is a grave threat to humanity. How do you really put a dollar figure on that?

Heather "Lucky" Penney: I think it's priceless.

Chris Adams: I, I would agree, but obviously at some point we have to...

Heather "Lucky" Penney: We have to pay the bills for the, for the reset.

Chris Adams: The reality is, the NC3 systems have zero margin for error. Every second is critical with nuclear command and control, and no fail requires the absolute best. A really good analogy is perhaps the Olympics.

Every athlete that goes to the Olympics is the best of their sport. But then there are those athletes that are the best of the best of all time. Katie Ledecky, Michael Jordan, to name a few. They're in a class all of their own. They deliver flawless athletic performances every time, under all conditions.

And the investments they made along the way, to master their craft and guarantee immaculate performance, were tremendous, life [00:26:00] consuming. That's exactly what these space based NC3 systems must be. They surpass even the highest bars constantly, refining what being the best means, and that requires mastery.

And again, it's really about being ahead of the next athlete, in this case that being our adversaries.

Heather "Lucky" Penney: And I think I'd like to really just emphasize something you had mentioned earlier, is that nuclear deterrence underpins are conventional capabilities. The only reason why we're able to wage conventional conflict is because we have nuclear deterrence.

If we didn't have the assurance of that capability to deter potential adversaries, we could be deterred from executing conventional military operations, which is necessary to be able to protect our interests and our security alliances across the globe.

Chris Adams: That's absolutely right.

Heather "Lucky" Penney: So, Boots, it's no secret that when defense leaders talk about "juicy fat targets" in space, part of what they're highlighting is the NC3 architecture. I mean, that's a very [00:27:00] desirable target, right, for adversaries. So, it seems like everything being proliferated these days in a disaggregated model, why aren't we pursuing this with NC3 right now?

Jennifer "Boots" Reeves: Well, I'm with Chris on this one. The key thing is that it's, we're just figuring out how things are going to look with PLEO, right? With our proliferated LEO constellations. And we can't afford to take the risk with our NC3 assets. We simply can't. Also, let's think about it in these terms. There are plenty of other ways to protect our assets besides disaggregating them, right? One of my co-workers uses this great analogy that a carrier battle group is a big, fat, juicy target.

But that doesn't mean we don't have them. We enable, we add things to protect them when it's time to protect them. And we can do the same thing in space. We just have to look at [00:28:00] these larger exquisite systems that are proven, that we need more of, that we need to recapitalize. We need to look at them from a different lens and not experiment on them in PLEO.

We're doing that with plenty of other systems. We will learn what the unintended consequences are, what the downstream effects are that we're not quite thinking about yet, that we just can't, you don't know what you...

Heather "Lucky" Penney: You don't know what you don't know until, when you move to a new architecture.

You know, I think this is also really interesting too, because not only we're figuring out disaggregated architectures within the PLEO orbit, but also the reason why it's LEO is because it's low earth orbit, and that could potentially create greater vulnerabilities because it's easier to reach in terms of a counter space capability, right?

Jennifer "Boots" Reeves: Yeah, I mean, I think there are trade offs in all the orbital regimes, right? But there's a reason we put nuclear command and control satellites in GEO. There are very useful and unique things about the GEO orbital regime. They're there for a reason. And so [00:29:00] instead of just setting that aside and saying, we'll figure it out and rejigger it all and put it into a PLEO constellation. Instead of doing that experimentation on an NC3 asset, constellation of assets.

Heather "Lucky" Penney: Figure it out with conventional capabilities first.

Jennifer "Boots" Reeves: Right. And then let's protect our assets in GEO in ways that they need to be protected, right? They can be hardened. We can ensure that encryption on the signals is happening appropriately such that the signals are more resilient. All of those things are multiple things that we can be doing to protect those assets in GEO and still use that orbital regime, which is to this point we've decided is the best one for this mission.

Heather "Lucky" Penney: Yeah, well, it's the unblinking eye. So, is the notion of time part of this too? That we need to keep moving and we would take on extra risk by restudying the issue and re architecting something entirely new? We've talked about risk of unproven technologies with PLEO, but what else could be at stake here?

Jennifer "Boots" Reeves: [00:30:00] So, the answer to your question is yes. Time is a factor, right? So as, as these assets age out, they need to be replaced, right? We're seeing that right now in the entire nuclear enterprise that we have studied and push the recapitalization off to the right over and over again.

That sounds

Heather "Lucky" Penney: familiar.

Jennifer "Boots" Reeves: I know. And now here we are, where everything needs to be recapitalized. Like we've done so many studies, and we keep coming back to the same answer that it needs to be recapitalized. So, here we are, if want to study it, I mean, sure, let's have another study, but don't sacrifice recapitalizing right now when we need to ensure the continuity of these assets and the capabilities.

That's my thought. We don't have the time for it. It's been studied multiple times. We need to recapitalize not just the three legs of the triad, but NC3 as well.

Heather "Lucky" Penney: Yeah, well, and then these GEO satellites, I mean, they are mature, they're proven. We understand the architecture, we understand the approach we just [00:31:00] simply need to modernize that equipment because we can't keep these older satellites and rely on them for extended periods of time. We're already beyond the life cycle.

Jennifer "Boots" Reeves: Well, and what's happening is as you modernize one leg of the triad, NC3 connects to all legs of the triad, right? And so, it needs to be brought up to speed with the other legs as well, right? Because they're all interconnected.

Heather "Lucky" Penney: Yeah!

Jennifer "Boots" Reeves: And so, you can't have the super, super old stuff with the brand new stuff.

Heather "Lucky" Penney: That's a really great point. Chris, I'd like to bring you in on this because Northrop has feet in both camps. You do these larger exquisite satellites, but you're also working on the smaller PLEO satellites too.

Chris Adams: Yeah, if you look at our company's space legacy, we've been developing and deploying technology and capabilities for space missions since really the dawn of the space age.

So, yeah, we've got a history of proven, highly sophisticated satellites that we're [00:32:00] incredibly proud of. Just recently, we launched the ASBM satellite that hosted a MilSATCOM payload. That was a first, a military system on a commercial bus, not only commercial, but an international satellite. Figuring out how to do that economically and meeting all of those complex requirements associated with that mission.

We're also a leader in the new architectures with a very firm foot in the government PLEO market. We actually have over a hundred systems, a hundred vehicles on contract for the Space Development Agency alone, which is a combination of comms data transport satellites and missile warning missile tracking satellites.

Simply put, we believe we should be using any and all tools to solve critical national security and defense challenges. Inclusive of PLEO systems and sophisticated high altitude systems. Also commercial integration and cross [00:33:00] domain connectivity, just to name a few. With an ultimate goal of an assured national security space architecture.

One that is balanced in resiliency, mission, and economics. It needs to be connected across all domains. And as we've talked about, it needs to be increasingly supported and protected. I, too, love the battle carrier group analogy that's one of my favorites, is we have this debate around PLEO versus HVA and our firm position is the balanced approach is the right approach.

There's all kinds of arguments that diversity is the most economic and resilient solution.

Jennifer "Boots" Reeves: 100%.

Chris Adams: The national space architecture can and should be transitioned to a resilient posture in a balanced, low risk, and transformative way. There are many threats, but also many proven and emerging approaches to negate all of the threats.

The diverse threats that we're facing today require, as I said, a balanced approach to resiliency [00:34:00] that is multi layer and blends national security space architectures across all the orbits.

Heather "Lucky" Penney: So, Boots, we've talked about a balanced and reliable approach across the satellite constellations, and I think this is a reason why we need to get real about space offense and defensive capabilities.

I mean, we need to have the ability to deter attacks against our key satellites and respond if necessary.

Jennifer "Boots" Reeves: Well, Chris said it. Space has been declared by the United States a warfighting domain, right? We've got a brand new geographic combatant command that has stood up. We have a new military service because of this. And it's very interesting because aggressors in space, like the layperson who's not all involved in this, you don't know that it's actually happening, right? We do have systems, hopefully, that are redundant enough that you still get your effects from space, your GPS still works, et cetera. But it's happening up there.

And we, the United States, and the United States Space Force, [00:35:00] Space Command, has been given a new license to be bolder up in space and certainly in defense, right? I don't think anyone's having questions about defense, right? It starts to get a little edgy about what people want to do and what, from a policy perspective, we're going to do in terms of offense, but I imagine as the aggressors out there get more bold in their actions, we will have to respond in kind.

Otherwise, the utility of the space domain will be taken from us and we simply can't live without space anymore. That's not how modern life actually goes. So, I do think in the future, and maybe closer in the future, we're gonna see some offensive action that, that is going to happen, and it's going to be necessary to

ensure that we're maintaining, our primacy and our ability to use the domain, for our own purposes in the United States, and our friends and allies.

Heather "Lucky" Penney: Yeah, and just to be clear, we can't go back in time. I mean, space is a [00:36:00] contested domain, and that means offensive and defensive capabilities are necessary to be able to assure what we rely on in space. If you don't have space, I mean, you kind of don't have much of anything. So, if you don't mind, I'd like for both of you to pull out your crystal ball.

What does program success look like for NC3 in the future? Where should we be in a few years, and how should folks grade that homework? So, Chris, let's start with you and then Boots.

Chris Adams: Sure. I really like this question. Um, I didn't bring my crystal ball though, so I'll do my best.

Heather "Lucky" Penney: Magic 8 ball works too.

Chris Adams: Yeah, perfect. So, obviously a lot of this conversation has started with the needs to continue around the word affordable, right? That fundamentally is driving a lot of the conversation today with flat budgets and increasing threats. There's just headwinds. So, the architecture has to be affordable. Jen also added a really important word, right?

I think in addition to affordable architecture, [00:37:00] we have to have a policy that aligns to that particular architecture. How do we respond? How will we respond to certain actions and things like that? So, once you've established an affordable architecture and a balanced policy, then you got to absolutely grade yourself against unambiguously continuing through a potential transition our ability to, as we've said, uniquely and unambiguously observe and respond under any and all conditions, right?

And I changed my words a little bit saying any condition because there's a lot of other actions and a lot of other threats out there other than the classic kind of dire NC3 situation. So, affordable architecture and policy that unambiguously continues through transition our ability to observe and respond under any condition.

I think, and it sounds like Jen agrees, the right economic mission resiliency balance will [00:38:00] have LEO for a lot of capability through certain phases of the conflict. Backstopped with no fail protected high altitude system.

Heather "Lucky" Penney: Yeah, and that's, that's interesting. I had not thought about the policy of, you know, normally when we think about NCE3 and nuclear assurance and deterrence, we normally just think about a missile being, going from point A to point B, but attacking the architecture itself could also be a real problem set.

Boots, what's your crystal ball say?

Jennifer "Boots" Reeves: So, my crystal ball says reliability. Reliability is the measure by which we are successful. And how do we get to reliability? Well, it's with recapitalization. And, I remember being a captain sitting in the, command center, right in my little LCC there at F. E. Warren Air Force Base. And we would get exercise messages coming to us across the [00:39:00] NC3 network. As a colonel, working in the National Military Command Center, in the basement of the Pentagon, I would be there when those messages, those exercise messages got sent out. And that happens multiple times every day to test that system to make sure it's working.

And it needs to continue working like that seamlessly for the operators who are actually doing the job, for the decision makers who are actually making the decisions, for those warning folks who are actually getting the warning to the decision makers. All of that needs to be seamless with high, high, high reliability.

And how do we get there? We've got to recapitalize.

Heather "Lucky" Penney: That's the bumper sticker. I love that. Reliability. Because if we have something that's reliable, that's balanced, that's resilient, that's secure, that's modernized, then, you know, that provides us the opportunity to withstand attack, not just the nuclear attack, but any attacks on the NC3 infrastructure.

And that, to me, is going to be what provides us that kind of assurance and deterrence across the [00:40:00] entire spectrum. So, I'd like to thank both of you so much for being here today. What an interesting conversation and really important conversation too.

Thank you, Chris, for joining us.

Chris Adams: Thank you for having me.

Heather "Lucky" Penney: And Boots, as always, fabulous to have you here.

Jennifer "Boots" Reeves: So much fun. Thanks.

Heather "Lucky" Penney: With that, I'd like to extend a big thank you to our guests for joining in today's discussion. I'd also like to extend a big thank you to you, our listeners, for your continued support and for tuning into today's show. If you like what you heard today, don't forget to hit that "like" button and follow or subscribe to the Aerospace Advantage.

You can also leave a comment to let us know what you think about our show or areas you would like us to explore further. As always, you can join in on the conversation by following the Mitchell Institute on Twitter, Instagram, Facebook, or LinkedIn. And you can always find us at Mitchell aerospace power. org.

Thanks again for joining us and have a great aerospace power kind of day.

See you next time.