Aerospace Advantage Podcast – Ep. 198 – Want to Fight and Win? Air and Space Integration is Key – Transcript

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Heather "Lucky" Penney: 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.

So, if you like learning about aerospace power, you're in the right place. To our regular listeners, welcome back. And if it's your first time here, thank you so much for joining us. As a reminder, if you like what you're hearing today, do us a favor and follow our show. Please give us a "like" and leave a comment so that we can keep charting the trajectories that matter the most to you.

If you read defense news headlines, you'll see a distinct trend. A headlong rush to sunset airborne missions and move them to space, especially for functions like intelligence surveillance and reconnaissance. What we call ISR for short. And in fact, this trend has been in place since the end of the Cold War.

Everyone loves SR 71 Blackbird, probably one of the coolest and [00:01:00] most iconic aircraft ever developed and flown. But at the end of the Cold War, a drive to cut budgets retired it in favor of alternate ISR solutions. And many of these were satellites orbiting in space. More recently, the E8 JSTARS was retired, and its replacement will be in space.

An airborne ground moving target indicator replacement solution was in the works, but it was cancelled, largely due to budget pressures. The U 2, RQ 4 Global Hawk are also on the sunset path, and their missions are also headed to space. Now, don't get me wrong, at the Mitchell Institute, we're huge fans of space based capabilities.

What our Guardians are able to deliver on orbit is incredible and sometimes superior to what an airborne solution can deliver. That said, what we're not fans of is an over concentration of capabilities in a single domain. When our adversaries have clearly indicated that they're willing to destroy or disable those assets.

As the saying goes, don't put all your eggs in one basket. [00:02:00] So, we think it's time to reassess recent trends to single domain solutions and instead

circle back to multi domain solutions that afford a more resilient set of capabilities. And there's another benefit, air and space solutions, each have their own unique strengths and weaknesses.

Combine them together and we get a better end product where the whole is greater than the sum of its parts. So, joining us here today to discuss this issue are two of the top leaders in this realm, Robert Lightfoot, President of Lockheed Martin Space, and Greg Ulmer, President of Lockheed Martin Aeronautics.

Now, you might be surprised to hear two leaders, each representing a different domain, coming together to talk about a collaborative mission execution. But the reality is that the challenges we're facing now, especially given what China and Russia are doing, demand a re look at how we architect our mission solutions.

Robert, welcome.

Robert Lightfoot: Great to be here, Heather. Thanks for having me.

Heather "Lucky" Penney: And Greg, it's great to have you with us as well.

Greg Ulmer: Thanks, Heather. I very much appreciate the opportunity to be here today with you.

Heather "Lucky" Penney: Thank you. [00:03:00] And we've also got Mitchell Institute Senior Fellow for Space Power, Charles Galbraith with us. And Charles, it's always great to have you on the podcast. Thanks so much for being back.

Charles Galbreath: Hey Heather. Great to be back. Thank you.

Heather "Lucky" Penney: So Charles, I'd like to kick this off with you to be able to get your Guardians perspective. The mission migration from air to space has to be really exciting, and it's a huge vote of confidence in modern technology and in the Guardians who operate these systems.

But I laid out a thesis in our opener. That we might be going a little bit too far given that space is now a contested domain. We might be creating single zones of failure with few backup options if our adversaries disable and attack our capabilities in orbit. What are your thoughts on this?

Charles Galbreath: Well, thanks, Heather. First, I'd like to say that space is a warfighting domain like all of the other domains. And there are threats that absolutely exists for all of them. And it's not that we're running away from one threat and trying to go to a sanctuary domain. We're trying to deliver the capabilities and effects that are most capable [00:04:00] of achieving victory and complicating the problem set for adversary.

And so when we shift to great power competition and look at the Chinese scenarios. They have this anti access area denial, um, you know, capability that they're trying to extend further and further into the Pacific. It's not a "wall of death" that you know, none can penetrate, but it does create some challenges.

And so one of the reasons we're looking at moving to space is to overcome some of those challenges. And you're right, it is a vote of confidence for the Guardians and for the capabilities. It, it happens that those systems, and personalities, and effects are coming to fruition at a time when we need the most.

That's great. But we can't just simply think that they're going to be there and everything's going to be 100 percent successful all the time. We know that there's going to be challenges. We know that there's going to be threats. And that's why I think a multi domain approach, is what's ultimately going to be the most successful [00:05:00] option set for our decision makers and our leaders in the future.

We want to make sure that those senior leaders have options and aren't pigeonholed into 1 set of capabilities that could be easily taken out. There are threats to space. There are ways to mitigate that. There are threats to air, and land, and maritime, and cyber. And there are ways to mitigate those. It's the collection of all of that we need to be looking at. And that's why I'm so excited about the opportunity to discuss this with both air and space leaders from industry.

Heather "Lucky" Penney: Charles, I love how you framed the problem set. As well as framing the solution of integrating across all of the domains in order to be able to achieve those synergistic effects that make us operationally and strategically successful.

It is about options, and I'm really excited about what space can bring to the fight, what they can do, but that it's not a sanctuary domain. That's my concern is that we're framing space as if it is a sanctuary domain and that's why we need to move up there. When in reality we need to [00:06:00] be able to create a lot

more effects through redundant and resilient operations across the different domains.

Charles Galbreath: Yeah, I don't think anybody today is thinking that space is a sanctuary domain and free from any hostilities. we're going into this and potentially transitioning mission sets with our eyes wide open that this is a a contested domain. And we have to defend it, but we also have to make sure that we have resilient options and diversified option sets. Which I think is important.

Heather "Lucky" Penney: And we've got also ensure that space has the capabilities to defend and to take the necessary actions to ensure that they are resilient and continue to operate. But Robert, I want to bring you into this conversation because you're the space expert. And you've got a tremendous amount of insight to the current state of affairs. And so I'd really like to get your perspective on what Charles and I have been talking about on integrating the air and space domain.

Robert Lightfoot: Well, first of all, I think what you both discussed is, you [00:07:00] could hit my talking points, right? I think it is an and not an or. Any time we're in a single domain strategy, we're opening ourselves up for risk. Easier challenges by our adversaries going forward.

And I think what you find is that space has capabilities, right? That we definitely have capabilities in space that allow us to do some things that maybe we weren't able to do from the air domain or won't be allowed to do in the air domain and under a, you know, the next conflict, right? But that doesn't mean you, you ignore the air domain either.

We have to work those together. And I think it is an "and" not an "or." And what we're working to do today between Greg and I, are trying to figure out how do we integrate that, do that air-space integration, in a way that allows the warfighter to have the best set of solutions going in.

And, Heather, when you talked about resiliency, that's the way we talk about it. I think the air domain is resilient in its own way. The space domain is resilient in its own way, but together it is a tremendous resiliency between, if we can get the two working together [00:08:00] and for future conflict.

Heather "Lucky" Penney: Yeah, I really appreciate what you said about the air domain and the space domain being resilient in different ways, because that then further complicates adversaries problem set beyond just simply a target that happens to be in space or a target that happens to be in the air domain.

So Greg, you're the airborne mission expert here. I mean, you've got the domain underneath your entire portfolio. Here's the pushback that we get from folks in DoD when we talk about the need to continue certain missions in the air. And Charles already spoke to some of this, you know, we're hearing from DOD that the air domain is simply too contested.

Like there is a veritable "wall of death" as aircraft near the Chinese coast or Kaliningrad, and all blue forces will instantaneously vaporize once they cross the outermost maximum range of the threat. Right? We see those. Red lines on the maps, and we act as if we can't go inside that A2AD environment, or we just simply cease to exist.

And so they make this argument that why even bother fielding aircraft if they're just not going to be survivable at all. So, [00:09:00] what's your perspective on this? I mean, do they have a valid point here? Is there something that we're missing?

Greg Ulmer: You know, air superiority is central to modern warfare. And I think the current conflicts in the world ongoing as we speak in Ukraine, in the Middle East, are confirming this observation that, that air superiority is still central.

Our adversaries understand this and have been no kidding that, you know, they have invested heavily in terms of air defenses to contest our air superiority. However, airpower is still playing a very important part in the world today, in those environments. I think of the Middle East in particular, I'll say last April in particular, and I can tell you that air superiority had a large impact to influence an outcome of a very robust threat in a very strong way.

I can't get into the details, but I know that airpower informed a multi domain response to a significant threat, air, land, [00:10:00] sea, and space. Very successfully today. And, you know, we have spent decades investing in stealth survivability, integrated systems, to ensure that our air forces can operate effectively in contested airspace.

Integrating air and space assets creates a complexity, extends the advantage, and helps deter, or if we get the call, and I'd say evidenced by again, the experiences we've seen in the recent past, defeat aggression by confronting adversaries with integrated air and space defenses. And when required, offensive things. And so I am still a very much a strong believer in air superiority is required, is essential, and central, going forward.

Heather "Lucky" Penney: Amen. We here at Mitchell believe in air superiority. We take a look at what's going on over in Ukraine, and that's an example of what conflict looks like when you do not have airpower, when you do not have air [00:11:00] superiority. And the foundational element of air superiority is demonstrated by the fact that's what our adversaries look at trying to counter and deny us.

Because they know that if we're capable of establishing air superiority and now space superiority, that there's nothing that they can do to stop our operations and that we will win. So, I really appreciate that kind of baseline from everyone, Greg and Robert, again, as our experts here, I really feel like we're back at a sort of a back to the future type of moment. We juggled these challenges before in the Cold War, when the threat environment was similarly challenging. And we know that it's only gotten more complex, but Lockheed Martin has some major history to play here. And I mentioned it in the introduction and these are iconic aircraft, right?

The Blackbird. When Francis Gary Powers was shot down over the Soviet Union by an SA2, that really, however, signaled a change in the threat environment. Defense leaders in the government industry had to think about radical new ways to execute that ISR [00:12:00] mission. But they didn't double down on a single domain approach. They harnessed both pathways, in air and space. So, would you mind explaining their thinking and how we adapted to this challenge?

Greg Ulmer: The Skunk Works responded to this demand in the early 60s, when Francis Gary Powers did get shot down in 1960, you mentioned it, you know, the Blackbird. And it was designed at the time think about it, over 85, 000 feet in altitude, 3.3 times the speed of sound, higher and faster than any acknowledged cruise crewed aircraft. Before and since. And variants of this aircraft, such as the A12 in the CIA fleet as well as the Blackbird, more than I think accomplished what was required in the time. And so, as we reflect on that, and people may not know the, the SR 71 or the A12, it was the paving way for stealth with critical capabilities and applications that continue to this day.

Again, I can't get into the details, but [00:13:00] we've continually advanced the stealth technology from the SR into the 117, into the F 22, into the X, now F 35, and into the things into the future, both manned and unmanned, very successfully. To operate in that domain and in those spaces, and I think there's several different, elements associated with that, that really provides an advantage.

And part of that evolution now is multi domain, the integration of our weapon systems, in particular, space and air as one, creating flexibility and responsiveness. From I'll say from my perspective, creating bandwidth for airpower advantage going forward.

Heather "Lucky" Penney: Yeah, I mean, you know, you kind of look at air and spaces, peanut butter and jelly were better together.

Um, but you know, when Lockheed was developing the SR 71, the nation was also simultaneously developing a space approach through the Corona systems. Robert, would you mind telling our listeners a little bit about that?

Robert Lightfoot: Yeah. We the [00:14:00] whole concept , I believe at the time, obviously I wasn't there when this was going on, but at the time the concept was the things that SR 71 is doing, that we're doing with aerial assets.

If we can advance the technology, can we do that from space? Um, space, in some areas of space will give you ubiquitous coverage, right? You got the whole Globe covered. So, that's what started with the Corona program. It was a very I would call by today's standard, a very low tech activity, but for it, for the day, it was incredible. What we were able to do to provide the surveillance that we needed of the adversaries going forward.

As technology has progressed, we've been able to do more and more from space. To the ability to do surveillance, do tracking all the things that we can do. We're actually starting to see that come to fruition in a much better way. I would say the big difference is and Charles mentioned this earlier in the discussion was we now have a contested environment in space.

I would venture that, traditionally, we've thought about spaces is there to support a terrestrial challenge. Now we're [00:15:00] having to do that same terrestrial challenge. How do we, deal with the next conflict here on earth? Now we're having to factor in the fact that space is now contested as well and may not be able to. It will have its own challenges to meeting that same mission space that it has today.

So, I think the technology has improved. We've advanced it. It's like you said, it started with Corona. Now we're, I mean, the technology is pretty eye watering what we can do. Um, however, we're now contested there and how we play those together with assets like Greg puts together with the assets that we built here in space. That, that is the, to me, that is the secret sauce that's going to, that's going to make us that much more powerful as a nation.

Heather "Lucky" Penney: And for our listeners, if you don't know the Corona story, I highly encourage you to do a little bit of research because it's really incredible how our nation developed a series of spy satellites that were able to take pictures, high resolution pictures of the ground, and then deploy those canisters that were then picked up by aircraft for processing later on. Really an [00:16:00] innovative approach to being able to develop an alternate ISR capability. So, you can see how together the Corona program and the SR 71 provided that kind of responsive resilience through both of those domains because, the Corona series, they could, they covered the entire earth.

They could go places where no aircraft could go, whether or not that was because of the threat or because of the range and so forth, but it comes down to kind of survivability in both of these domains. Survivability of the assets, which is whether or not that's an airplane or a satellite. They will require capabilities and attributes that not only help them execute their missions, but survive so that they can execute those missions and provide us the intelligence or the outcomes and effects that we need. But it's also about survivability of the mission rich, large, how those assets, the aircraft and the spacecraft collaborate together to ensure that the mission or the kill chain survives, even if you lose all some of the aircraft or some of the satellites.

And I think that's how we bring [00:17:00] together both of these domains in an integrated fashion. To exploit the relative strengths and mitigate the weaknesses that each domain might have. So Charles, I'd really like to get your thoughts on this. Um, you know, we sort of pioneered this approach, but I would say that Corona and SR 71 were really kind of parallel. They weren't integrated. How should we relook at this?

Charles Galbreath: Yeah, thanks, Heather. I think your comment about them not being fully integrated, even though they were both coming from Lockheed Martin, is an interesting one and maybe worth exploring a little bit further. But I also want to dive back to the similarities and differences between what we faced in the Cold War and what we face today.

Um, I think in many ways, the challenges we're facing today are even more problematic than they were during the Cold War.

Certainly, we have a very capable potential adversary in China. We can't forget, though, that Russia is still there and is very capable and pressing forward in Europe in their illegal invasion of Ukraine.

[00:18:00] And so if we were to get into a conflict, it could be a multipole sort of situation. Add on top of that, the fact that in the 1960s, space was pretty much the domain exclusively to the Soviet Union and the United States. Now, there are dozens and dozens of countries that have capabilities, not to mention private organizations and universities, et cetera, that all utilize the space domain together.

And so this really complicates the problem set that we have. When we address space as a war fighting domain. Preserving our capabilities, pressing forward with our advantages, and exploiting the unique benefits from each domain. Air and space and cyber. And air and maritime all of them effectively to achieve our objectives.

And that's one of the reasons why I think we need to be looking at space as a supported domain or supported space command, as a supported command as we go forward. It's not just, you know, as Mr. Lightfoot described, how [00:19:00] space can support terrestrial operations, but how those other domains can support and help us secure the space capabilities and effects that we're all relying on. So, I mean, there's a lot of dynamics going on that make this problem set very complicated.

Heather "Lucky" Penney: Charles, I'm really glad you brought that up because I firmly believe that we need to look at all of the other domains. Air, sea, and land on how can we support the space mission? How do we support the space domain? Because for too long, we've taken space for granted and we all know that we cannot do our jobs, we cannot be successful, if we do not have space superiority. And that means that as we're looking to space and relying on space to become more of an active war fighter, that's integrated into all of our operations and not just, you know, Satcom. That we really have to ensure that we are providing the necessary support to space and that's something I don't think that we've really thought enough about and dedicated enough resources to. I'm really glad you brought that up. But I'd like to pivot this [00:20:00] conversation to kind of get back to the survivability piece. Survivability of the platform survivability of the mission, and that gets to how do we exploit the relative strengths and mitigate the weaknesses of both of these domains.

And Robert, I'd like to begin with you. When we begin talking about the relative strengths and limitations of space, where do solutions on orbit really excel these days? And what are those limitations? I'm trying to, build out a broader picture here of how the two domains, air and space, can really integrate together.

Robert Lightfoot: I think for us, Heather the, the way we're addressing that in space and the capabilities we're putting on orbit they're incredible in their capability, the resiliency, and the resolution we can provide the warfighter. The challenge and the limiting piece of that is how do we make sure that is a sustained capability? You think about our challenge of reaching China, right? talked about the beyond line of sight communications, the beyond line of sight targeting and recognition.

That's where space can come through and help you. But [00:21:00] the way we have to think about this is we've got to think about this as, we like to say "unleash the power of connectivity." You know, historically, we have bought these platforms in a stovepipe manner. I think what's really important to us is if we can connect the space assets to all the other assets, we talked about air, but you talked about others as well.

You all of a sudden have a huge advantage. We think tactically because and our teams are actually working now to create that resilient kill web, as you described it earlier. By ensuring this seamless flow of information. And the way we think about it is I'm, my satellites are simply, part of a larger think neural network. Each satellite is a node in that network.

Well, so are Greg's airborne assets. And as long as we're a node in each other's networks, it just makes it that integration does to two real key things for us as we look at this. First, it creates this better sum of the whole, you know, the whole is a lot better than some of the parts. We've talked about that already. I can fill gaps [00:22:00] for Greg's or for the arrows. The air domain can fill gaps for the space domain.

And then second, it just makes it really complex when we present ourselves to our adversaries. So, that unleashing that connectivity is critical. And I think just because if you think about the historical way, we have acquired these systems, you know, that was not part of the discussion.

And now we're through joint all the main operations and the things that Greg and I are working on together, we get an opportunity here to prove that we can unleash that power of connectivity. And that's what's going to make the difference.

Heather "Lucky" Penney: I think that's huge. I mean, that connectivity of sharing information, across all the different domains into the different platforms is crucial to how we will be able to create those resilient kill webs and execute a successful operations.

But we also know that China's planning on targeting how we operate in this way through their theory of victory, which is systems destruction. So, Greg, I'd like your thoughts. How can we leverage the air domain to do the same? How can we exploit the [00:23:00] strengths of the air domain as well as mitigate its weaknesses through this integration of air and space?

Greg Ulmer: Yeah, I think if you use the F 35 as the example. So, we all, we know already through Red Flag, through naval carrier operations, that the F 35 as an integrated system within a carrier air wing or within an air wing raises all boats on the tide. So, it increases the capability of 4th Gen. The way it does that, it has a sensor suite and those sensors can gather information and it informs not only F 35 to F 35, but it informs the 4th Gen aircraft as well within the air wing.

Let's add the fifth domain, space. And so as Robert alluded to, think of F 35 as an elevated sensor or a satellite as an elevated sensor that now informs an F 35 that then informs the fourth gen. Gee, it's starting to sound a lot like a family of systems, something we call sixth gen. [00:24:00] And so I think we're well on our way actually.

Um, and how do we do that? In the aircraft, we do it through open mission systems architecture. We do it through machine learning. We do it through AI. And these are capabilities that exist today, and that really allows us to, you know, we may take off with a certain knowledge base of what the threat is, what the threat environment is, and on the way, get informed through space assets. Perhaps other air assets. Robert mentioned beyond line of sight.

And we replan the plan on the way in using AI, using machine learning. And all of a sudden, we have a multiple factor advantage relative to situational awareness and how to deal with the threat. And we've seen it in spades, I'd say, in the F 35 world. And now that we just expand that to include air and space integration.

And then there's the physics of aircraft. And many times we, you know, the world knows where the satellites are and [00:25:00] what the advantage of aircraft is. We can move them quickly, strategically, tactically, and there's also physics in terms of azimuth, attitude, altitude that we can get and hang on to a specific threat.

And as they move their threats, as they adjust their battle space, we can do so very rapidly with aircraft informed by the elevated sensors, I'll say, of satellites. And so I think that really provides a significant advantage going forward. And then there's the limiting factors associated with aircraft.

And we know what those factors are. We know how to take those considerations are in terms of RF frequency and the threats associated with those. But with the situational awareness, along with integrated air defense systems, we can resolve those problems or mitigate them or, you know, tailor the approach to the engagement to account for them much to the benefit of the outcome.

So I think again, I'm really back to it's a family of systems, a multi domain [00:26:00] approach. Air dominance is still a very strong element of that multi domain providing resilience and robustness relative to capacity and throughput.

Heather "Lucky" Penney: And I'm going to get back on the train of air dominance because I think having that air dominance, that air superiority, really is a foundation that enables space superiority as well as all of the other missions and operations that need to occur. And in that family of systems, and I'm saying this for our listeners, one of the keys is you have to buy the entire family. If we're creating these interdependencies, especially if we're disaggregating capabilities, you need to have the entire family to be as fully effective as you, plan to be. So, we need to remain committed to those family systems as we go forward.

But Greg, one of the things I really appreciate was how you talked about the physics of aircraft and the physics of spacecraft. And how this actually allows us to think about tactics. Think about maneuvering both in space and in air, because we can maneuver in space. [00:27:00] It costs fuel, but I think that's something a lot of folks don't really consider is how would we create tactics. It's not just about sharing information. It's also about the new maneuver space as well. But part of this is, you know, not just creating again dilemmas for the adversary because we're multi domain, but it's also about the command and control. How do we orchestrate whether or not it's the information, the targeting or the tactics and the maneuver of these aircraft?

How do we orchestrate and coordinate, these capabilities across the domains so that they have that kind of synergistic effect? Who's the boss here? How do we make this happen?

Greg Ulmer: Yeah, I think, our teams are collaborating to create a resilient kill web by ensuring seamless flow of information across the domains. And so first, I think it creates, you know, a whole that is more than the sum of its parts. For example, space can provide a persistent coverage and air assets can be called on when and where needed. They can be flexible to meet our end user needs. Space

has a [00:28:00] wide area, persistent coverage, that can allow airborne targeting assets to focus on what they and where they need to go.

Which is flexible tracking and targeting high value targets. So, not only does it provide them the site picture, but it also racks and stacks in terms of, I'll say, the order of battle. Here's the highest threat environment, or perhaps here's a threat environment you can't survive in. Don't go there. And then we can apply an effect or a kinetic or non kinetic effect to change that.

And then I think, again, it really, secondly, it increases the complexity that we present to our adversaries. A multi domain solution that gives them some difficulty relative to how they go solve that problem. And so I think that complexity just provides another advantage to us that significantly reduces the probability of our adversary being successful in what they desire to do.

Heather "Lucky" Penney: Okay, but not every [00:29:00] mission involves going over Beijing. We're not always going to be going downtown, in the super MEZ. So, how would this shape, us pursuing a collaborative air and space approach? Charles, what are your thoughts on this?

Charles Galbreath: So, let me just circle back real quick and highlights one of the areas that Greg talked about. The nodes of a network that are all interconnected that puts a huge requirement on assuring that connectivity via RF communication, via laser comms, or whatever else.

Those nodes have got to be connected. You can't fuse data in the cockpit unless the data can get to the cockpit. And so that places a whole nother set of requirements and importance on assuring that compies. I just wanted to highlight that before we go any further, because as we talk about air and space, they're all connected by call it the cyber domain if you want, but they're connected by that, that those com links.

Heather "Lucky" Penney: Yeah, [00:30:00] it's about the interoperability as well. I mean, you've got to have the little black boxes that can catch those, whether or not it's a laser comms or RF data link. Um, we've got to have that kind of interoperability and then assure that connectivity.

Charles Galbreath: Right. Absolutely. And so, as we look at collaborating for air and space approaches in a variety of scenarios, as you put it, not everything's going over Beijing. We're going to have to have a flexible set of capabilities with multiple options. Again to suit the threat environment. Sometimes we're going to need those incredibly stealthy aircraft to penetrate. Sometimes we're

going to need things with the incredibly long legs to cover great distances with a large capacity.

So, it's about having a full and robust as you put, it family of systems. And we have to make sure that as you said, we buy the whole family because it's like fielding a football team. If you don't have your front line and you've got an incredible quarterback and incredible wide receiver, they're going to get [00:31:00] sacked and never get to pass the ball.

Right? So we need the whole team to show up and that's why it's so important.

Heather "Lucky" Penney: Yeah. And you need them in the numbers, necessary for the family to be effective because we're planning to operate through attrition. That's part of the reason why we're integrating these domains. That's part of the reason why we think this operational concept will have resilience.

That's part of the reason why we're looking to take this approach. And if you don't buy enough of them, you lose an absolute number. That's a disproportionate element of the family of systems. And it doesn't necessarily take a whole lot of percentage points. I mean, it could be 20 percent. It could be 30 percent that then makes you ineffective.

I mean, imagine if you only had one linebacker, right?

Charles Galbreath: Absolutely. And Heather, to that point, I think in many ways leadership in the military and our political leadership and even across the country, we've been conditioned over the past 30 years of combat operations where we have enjoyed space superiority and air superiority. To an extent that thankfully we were able to keep our [00:32:00] casualties very low.

If we think about a true conflict with a great power like China. Those equations of gain and loss are going to be much different than what we've experienced and we have to, you know, intellectually and emotionally prepare ourselves as a military and as a nation for those realities and adjust accordingly.

Heather "Lucky" Penney: Absolutely. I mean, we're seeing what Ukraine looks like without air superiority. I can't even begin to imagine what a pure conflict with China would look like if we didn't have space superiority. So, this is absolutely necessary that we assure both of those domains. And so in the air domain, we're seeing aggressive development in pursuit of a new class of uninhabited aerial vehicles.

And for our listeners, you know that these are CCAs, collaborative combat aircraft that have a level of autonomy and don't require, man in the loop type operations. And in the space domain, we're seeing the rise of small satellites. So, proliferated low earth orbit. There are a lot of [00:33:00] similarities in these two trends, especially when it comes to disaggregating mission capabilities across this family of systems that Charles, you and I were just talking about. And this is to enhance resilience and boost capacity and capability.

So, gentlemen, I'd really like your perspective on what this means from a collaboration perspective?

Robert Lightfoot: When we look at the small satellite trend just kind of pulling on that one to start with, it really is part of the resilient structure for space. You know, we talked about space as resilience, air domain has this resilience. The way this, the small satellite proliferated, LEO leveraging those, it gives us an opportunity to have capability in multiple orbits.

Okay. So, think low earth orbit, medium earth orbit, and geosynchronous orbit. We have capabilities and all those locations. The goal ultimately is you don't have one target to hit. You have multiple targets to hit from that standpoint. And if you can get to the point where you're sharing data, you increase the resiliency of the space domain. Okay?

And so [00:34:00] when we think about that it's an exciting opportunity and the technology has gotten to the point where we can package these things in much smaller capabilities. There's still some things that physics requires, right? You simply have to have certain power for certain types of missions that we do.

You have to have persistence over certain locations that you don't want, you know, you want to be able to maintain that with certain assets at different orbitologies, I would say. So, think the whole proliferated LEO that concept is really about providing more resilience.

Now you might say, okay what's resilient about that? Well, the big thing that our customers are pushing us on is speed. Get these assets on orbit as fast as possible. They want resilience that we're talking about here, and then they want technical maturity. If you think about some of the historical assets we build takes five to six years to build them.

They're that complex of a spacecraft. We get them on orbit. If you think about when the acquisition cycle starts, that means that particular bird has [00:35:00] technology it could be 10 years, 15 years old. The advantage to the proliferated architecture is you can replenish in a way that you're bringing the most updated tech you have, to the fight, right? So, you're getting the resilience of having not just one or two specific assets that can be targeted by the adversary.

You're also bringing in the tech maturity that we're doing here, you know, as technology evolves. Now, the goal here, and I'll turn it over to Greg is that particular, architecture then, if it can also communicate with the air layer, you've just increased your resiliency even more kind of what we've been talking about through this whole conversation. So, I think, from a Lockheed Martin perspective we're, participating in all those domains. That's what we do from a space perspective.

We're in, We're in all those orbitologies that we need as a nation. But it it helps from resilience and getting the best tech on orbit as quick as we can. And I know it feeds into what Greg's talking about with the work they're doing there. So, Greg, over to you.

Greg Ulmer: Yeah, you know, I think a critical element in [00:36:00] delivering combat power in contested environments will be autonomy in both crewed and uncrewed teaming.

And if you think about the speed of technology or the speed of information, is a better way of saying it, you know, self governing systems with reduced or limited human intervention provide our warfighter with orders of magnitude of multiplication, of response time. In terms of force, in terms of range, in terms of speed.

And I think this offers the promise of enhanced mission effectiveness, survivability, and range in contested multi domain environments. I think about in particular, you know, we have for us, I'll use JADC2 in the DoD's idea to create an Internet of things in terms of a network, that connect numerous sensors.

So, from a CA perspective, we can have weapons trucks. We can have sensor trucks. We can have air to air refueling. We can have things that provide non kinetic effects using artificial [00:37:00] intelligent algorithms to really help improve rapid decision making. And we can kind of dial in, you know, what kind of authority, what kind of autonomy they want and on a given day the dial may be way up. On another day you may not have to be so dialed up. And I

think that allows, a very empowered war fighting capability. And I think that also creates a level of deterrence. And the whole intent really is to provide that deterrence to let our adversaries know on any given day.

We have an ability to reach out create an effect that they probably want to think twice about.

Robert Lightfoot: And Heather, if I could add just to kind of pile on here, of the strategies we have is, we have a technology demonstration and prototypes organization. And we recently launched a mission we call Pony Express II.

And our entire goal of that demo is demonstrating and will continue to demonstrate enhanced connectivity, some autonomous capability, mission flexibility, [00:38:00] some agile operations, and really enabled troubleshooting. So, what's happening is these, satellites, there's 2 satellites, they are actually auctioning off with each other and what's part of the mission they're going to do based on their capability. They're troubleshooting themselves. You know, if something's we've put the kind of AI into the system to let them do that without having to go to the ground. Historically, a space asset goes in safe mode, sends a message to the ground. I'm in safe mode and the ground starts working it.

This is the advantage of these small satellites is we can actually have them heal themselves and even have the entire network heal itself. So, if you lose one satellite out of a constellation of 30, the 29 come together and take that over. That open mesh network that we're putting in space now and actually demonstrating it is exactly what you're talking about the leveraging the autonomy, leveraging the AI, leveraging things in space.

Again, to provide more resiliency without, or not without, with less human in the loop required [00:39:00] and save the critical human in the loop bandwidth I'll call it. For what we need the decision makers to do. And so that's just an example that feeds into the whole bringing that tech faster to the customer as we look at what we can do in space going forward.

Greg Ulmer: Yeah, I was going to pile on a little bit and I, we, I don't think we really talked about from a capacity or throughput in a very strong way, so to speak. But if you think about the autonomy, the integration of things, the layer joint all domain aspect, there is an increase in capacity in terms of overall response to a given situation.

And so not just an order of magnitude of force multiplier in terms of weapon effectiveness, weapon employment, situational awareness, but the ability for our warfighter to increase their ability to increase the capacity of their engagement across the war [00:40:00] space. If that makes sense to you, Heather.

Heather "Lucky" Penney: Yeah. Because what you're essentially doing is you're, using those autonomous assets, whether in space or in air to be able to span the entire region, span the scope of geography that we're faced with. And still do so with the density of attacks, density of sensing, and density of connectivity necessary to be successful.

Is that correct?

Greg Ulmer: Yeah, density is definitely going to be, you know, you think about, our history in air warfare in particular, and, the war of attrition, if you will, it was a dense fight, right? I mean, it was a war of numbers. And I think modern technology through autonomy, through machine learning, through net enabled multi domain operations, we now have increased the ability to operate in a very dense environment. In terms of, I'll say IT world.

Again, it's just a force multiplier and an advantage.

Robert Lightfoot: And I was going to add that if you use your Corona example that we talked about earlier, that was a [00:41:00] film that came down. People developed the film. They looked at it. Think about the time that takes. Now, we are sending down flops of data to the commanders, the decision makers. We got to enable some AI ML to help there as a decision support system because we, because the technology has improved so much, at least from space, to bring that much data down to them.

So, we want to make sure we're not wasting, you know, their bandwidth on what I like to call transactional things, right? That are, how's the spacecraft health? I'd rather than be worrying about what the spacecraft's telling them, not how the spacecraft's operating. So that's kind of the autonomy piece that we're bringing forward because you will overwhelm a human, if you don't, if you don't do something with all this data that we're bringing to the battle now.

Heather "Lucky" Penney: Yeah, we can't drown in the data. We want to be able to leverage human cognition for what it's unique and special at doing. So, what are the strengths of human cognition and just kind of doing those mundane tasks is not where we want people to be.

[00:42:00] And also that's what we're doing. These mundane tasks, we're going to miss things because we know that our brains switch off during those kinds of tasks. And we're going to be too slow to be effective. One of the things I really like what I've heard from both of you, Robert and Greg, is the ability to do real time tech insertion to the constellation and how that has a revolutionary impact on the effects of the constellation of family of systems. As opposed to having to focus on fielding a new system writ large.

Greg Ulmer: Yeah.

Heather "Lucky" Penney: So, we've talked about CONOPS so far uh, in a big picture kind of way, but I, we, let's get down into the nuts and bolts of how we actually build these things. Clearly the Air Force and the Space Force focus on their two separate domains. But the Air Force Research Lab continues to focus on both through a model that they call one lab for two services. And Lockheed Martin is very similar in that you have a similar approach.

Would you mind walking us through how you balance these zones of dedicated depth and efforts and still integrate this multi domain [00:43:00] focus through your space company and aeronautics company?

Greg Ulmer: Yeah, you know, I would tell you, Heather, five years ago, ten years ago, even within just the aeronautics portfolio, we were very siloed.

And so today, when you come into aeronautics, we are looking across multiple platforms, and we call them counsel. So, for example, I can have the F 16, the F 22, the F 35, ADP things sitting in a room with the Skunks, I'll say. And we're doing, you know, we're doing, um, advanced development across all those spectrums.

Now, in today's environment, I'm doing that with Robert's team. So, in the past it was very solid with an arrow and it was very siloed between the two companies. Today we're as one. So, Robert has come down to Palmdale and we have done a lot of uh, Brain trust and sharing of approaches to how we solve joint problems across multi domain.

How do we leverage? How do we build in by [00:44:00] design the ability with open systems architectures with different RF connections, et cetera. Really, to the benefit of each other. And then I've been up to his spaces with my team to look at what's going on from a space perspective, and that's kind of internal how we're going about that body of work. But we really try to really kind of step to

the problem solving, across multi domain rather than siloed within a given program.

Robert Lightfoot: Yeah, and I would add probably the real key that has happened here. It's Greg's operational analysis team and space operational analysis team, in my opinion, together, second to none. And they're providing a very agnostic view that the customers are asking for from us. All the missions are asking for us to bring that data forward and share what does it look like to you? And we've got the modeling. We've got all the things that we need to do.

And in the past space was to say, I could have that could have been space Greg was talking about right? [00:45:00] Very siloed internally to space. But now, we're seeing the ability to leverage each other's capabilities in a way to bring a better mission solution to our customers.

And it was very striking. Just as a simple example, we had a meeting with the Space Force recently, and I had Greg and his team in that meeting. And even the comment from that customer was, oh, this is interesting. You know, you guys are you guys must be communicating must be talking and we were able to share some very specific examples.

Of things that we were doing together that Greg said, about 10 years ago, we probably wouldn't even known each other we're doing. And so that's a it's just a, it's refreshing. It's very exciting actually, because it gets, I know for the space team, it gets exciting because we get to dabble in the aeronautics world a little bit and act like we know what we're talking about when we do that.

But Greg straightens me out every chance he gets, but it does give us a chance to have those conversations.

Greg Ulmer: A running joke, Heather, we have is an F 35 is really a satellite in very low Earth orbit.

Heather "Lucky" Penney: Well, I think the [00:46:00] integration that you all are talking about it is common sense to a lot of listeners. But I have to ask about the classification because in both the air and the space side, there have been tremendous barriers to sharing information about what your capabilities are. Robert, one of the things I was thinking, your guys must be excited because people finally know what you y'all do, right? How is the government supporting your ability to have this kind of cross talk despite classification barriers? Are they allowing you to break some of that down because they see how important this is?

Robert Lightfoot: I think, well, absolutely. I think what we've been able to do is show where it's been most effective and that effective answer they're going. Wow. We didn't understand this and it even gets deeper than what you're talking about, heather. It's even a Title 10, Title 50 kind of discussion, right? You think about the intelligence community. Versus the defense, the Department of Defense. We've been able to get the aeronautics folks engaged in some of the things we're doing for the intelligence community.

And again, it's an opportunity for us to share what we're doing is driven [00:47:00] by different classifications, but we can still we've figured out a piece of it. Pretty good way. And the customers, by the way, have been incredibly supportive of this. A way for us to be able to share that information without necessarily sharing what it's for. If that makes sense.

Heather "Lucky" Penney: It totally makes sense.

Robert Lightfoot: I'm trying to dance here very carefully.

Heather "Lucky" Penney: You're talking about effects, not means and methods.

Robert Lightfoot: I'm talking about all of it.

Greg Ulmer: I'll raise it up a little bit, Heather. In very simple terms, we always kind of talk about a need to know. And in a multi domain aspect, there's a need to know across the multi domains of how you integrate, how you connect. And so our customer, through the same rules and processes relative to security. All that's in place, and we're expanding the who needs to know. And that's how we go about this body of work, I'd say, in really simple terms. And it, just makes sense, but, you know, by all means, all the proper security aspects and things are in place.

It's just in a multi domain operation, we, you know, the need to know has expanded a little bit. And that's not necessarily, we know [00:48:00] all of each other, but we know how to do that integration.

Robert Lightfoot: I also think Heather, that the customer has started, you know, the government has begun to realize that challenge as well. Or this classification challenge and even John Plumb before he left the the Pentagon had really changed the, kind of set the new policy on how we're going to do classification and everybody's going to be able to leverage that. And again, in a very good way without giving away, you know, all the details behind it.

Heather "Lucky" Penney: And that's really important to be able to share that kind of information and enhance that interoperability and integration. So, we're already seeing some of this happen, for example, in the Space Force where we're we have a Royal Air Force space officer serving with the Space Force. So, this sort of brings up the questions of allies and partners. Greg, as you're aware, the F 35 is a super powerful sensor-shooter.

They'll be behind them at enemy lines. And we're using F 35 to create interoperability and enhance our effectiveness across our allies and partners. [00:49:00] So it's going to need though to collaborate with space systems and how do we ensure that this is this is possible with our allies and partners being part of that equation? So I know part of this is a government policy issue, but there's areas where y'all are engaged here as well.

Greg Ulmer: Yeah, you know, we focus very much on maintaining a robust set of allied customers and we worked very hard to integrate their needs and their capabilities on our platforms or our system of systems. And so we continue to have those discussions. Again as appropriate and our policy allows. And it really helps define the scale and scope of our international community in terms of what they can bring and there is elements that they can bring. That's an additional layer of capability, creating agility in terms of response to challenges, for them as well as our domestic customers that I think there is significant value for everybody in the multi domain aspect. And so we're very focused on, I would say, allied [00:50:00] by design, where we are looking at many nations ramping up.

You know, their investments to accelerate the growth of their space sector. To make sure it's connected in the air domain.

Heather "Lucky" Penney: So Robert, F 35 was designed around partners. What are your perspectives on this?

Robert Lightfoot: Yeah, what we're doing is, you're seeing more emphasis on space internationally. If you just look at budgets in different countries they're trying to increase their presence in space. They're realizing that space is an enabler, in a conflict. Not the only thing, but definitely an enabler for that piece. And so what we're doing is spending time with, the same concept as Greg said, allied by design. How can we bring the same systems we're building for the US for them? And then those are interoperable. That's a big deal for us is making sure they're interoperable.

If I'm interoperable from a domestic perspective with Greg's assets, they get that by default, if that makes sense. And that's that to us is one of the areas we're looking at the UK very involved with them and Australia as well [00:51:00] today in terms of how can we bring some of the space assets. To their fight that they see coming in and we're getting tremendous support from the US government on this one in terms of how do we do that? Space hasn't really been talked about that way.

You know, if you think about Foreign Military Sales, there's not really an FMS for space and these are the kind, these are kind of, I mean, that's just been a challenge. And we're seeing huge demand signals, as some of the allied partners come in and ask us, we know you build this can you do it for us as well? And I got to look at their budgets. They're putting their money where their mouth is from a, national perspective. Now, part of that brings they want indigenous capability as Greg's dealt with. And so we continue to work. There's another great, it's one of those, I'm going to call it tertiary examples of collaboration.

Greg's teams plowed that ground. Other parts of Lockheed Martin have plowed that ground already. There's no sense in us trying to plow how do we work with the international partners. And their teams are helping us to, you know, understand how their acquisition systems work. How do those things work?

That [00:52:00] sounds mundane and bureaucratic, but that actually becomes sometimes a barrier. If you're not, you know, I got a high tech system getting it is the hard part, right? Somehow acquiring it can actually be tougher than actually building it, it feels like at times.

Heather "Lucky" Penney: Yeah, I believe that. Charles, I'd like to bring you into this conversation because you've got a tremendous amount of experience from your history and how you've served as well. And we know that space can't do it alone. And Space Force leadership has made that very clear. That they're going to depend on allied and commercial capabilities.

So, how is this impacting the revamping of the classification guidance? We sort of began talking about it previously, but I'd really like to bring your perspective in.

Charles Galbreath: Yeah, absolutely, Heather. So, it's really fundamental that if we want a coalition of partners on our team, which we absolutely do. We all have to be able to talk with one another and we all have to be able to bring capabilities that can interoperate with one another. And that starts with having

the lexicon and the security classification system, you [00:53:00] know, that Dr. Plum b really championed while he was still working in the Pentagon.

That is absolutely foundational. and you're right, Heather it's international and it's commercial. The Space Force budget simply isn't enough to do all of the things we need to do in space and so we're going to be relying on our partners and coalition partners, that is, to bring some key capabilities to bear. I use the football analogy earlier and so maybe, our center might be a coalition partner. It's not just the second string stuff. These people are integrated into our daily operations. That's going to have to be a given going forward.

The thought that Greg brought up about "need to know." To me, it's almost like we are finally operationalizing space, because we're recognizing that there's a broader community of people that need to know what those capabilities are and what their limitations are. Back in the Cold War it was held the highest levels of [00:54:00] national leadership.

What capabilities we had in Corona and the SR 71 and, you know, that those stove pipes existed because we were protecting him. And the people that needed to know we're at the very highest level. Well, now we're operationalizing it. That means more people need to know. We still protect it, but we've got to make sure we've got the right people talking.

And that is just absolutely critical as we move forward, not just in development of capabilities, but as we develop our operational plans that will ultimately lead us to a victory should we have to go to conflict. And fundamentally being able to assure a victory in conflict is the best way to deter that conflict from ever happening in the first place, which is what we're really all about.

Heather "Lucky" Penney: I utterly agree, absolutely, without any question. And part of that is going to be resourcing the Space Force and the Air Force so they can develop the capabilities they need and buy them in the quantities that they need to fully field this family of systems that is integrated and able to leverage and exploit [00:55:00] the advantages across the air and the space domain.

So, let's look 10 years in the future. Let's say we've got the dollars, let's say we were developing the capabilities in the CONOPS. Gentlemen, what does a better multi domain approach look like that balances mission effectiveness, resilience, and agility? I'm really trying to give us a vector and a vision for the future so that people can grade the homework on our progress.

Greg Ulmer: Yeah, Heather, it really touches everything we've talked about it. We're talking about. mesh network that's informed by autonomy and machine learning. And there's the aspect I will say of the weapon system or the integrated weapon system, the family of systems, perhaps a better way of saying it, but it's also informing how we go about our work.

So, a lot of the discussion that Robert and I have had with you and Charles today is about how we're integrating ourselves as a business. And [00:56:00] within Lockheed Martin, we have a couple of initiatives. One is we call it One LM and that we don't approach our problem solving in support of our customer mission needs in those silos.

That is truly One LM, not just from an air and space perspective, but all things. Across all domains. And then we're very focused on updating. I'll say our digital tool suite that we're doing that both from a product perspective and the digital tools that they have. And again, how we do our work. And I think it really comes down to model based simulation engineering, and that will produce a capacity and a throughput.

It'll reduce costs. It'll allow us to increase cycle times and development. And so rather than taking, you know, in today's world from an air framer point of view in the 40s, 50s, and 60s, we could produce multiple products within years and fly them from initial concept. If you look at the SR 71 and how quickly it was designed, developed, and built and flown [00:57:00] compared to what we're doing today.

Well, my belief is in the future, especially with model based systems engineering, we're going to have the ability to get back to those kinds of timelines we've seen in the past. I'm talking decades ago where we could design, build, manufacture, fly very rapidly. And so we're very keen and excited about doing it. And it's not just airframe point of view. It's an integrated domain point of view.

Robert Lightfoot: I think I would add to those digital tools if you are really making a difference today. It's not 10 years from now, but in 10 years, the digital tools will have produced digital twins, not just of the platforms and the, deliverable we're bringing, but the entire network at the mesh that Greg mentioned, and allow us to actually exercise those missions in a digital framework.

So much faster than we can do today. It's really impressive. And if you did the challenge for someone like Lockheed Martin is we were born analog. If you think about it that way, [00:58:00] we were born analog decades ago.

Greg Ulmer: You and I were, Robert.

Robert Lightfoot: No, okay. That's fair. Yeah, I'm definitely born analog but even the workforce is coming into this industry is expecting those digital tools, right?

The digital kind. Things they're learning when they're in school, what they're seeing in other businesses, other industries even. So, I think when you talk about 10 years, I think you're going to see, if I had my crystal ball, you're going to see a completely integrated basically space to undersea ability for us to run a mission or perform our missions in that integrated fashion. And I think you, you're going to see that happen. Whether it's a requirement in an RFP or not, we're going to have to do it. It's going to be table stakes for us as we move forward as a nation.

Heather "Lucky" Penney: Well, and I think that digital engineering environment is absolutely going to be the future. It's going to reduce the cycle times and improve outcomes reduce rework and integrate capabilities across all of the domains.

But Charles, now that we've looked at the future, [00:59:00] let's bring this back to where we began. What does all of this mean from a warfighting perspective? And can you let us tell us again why this combined multi domain approach is so important from the warfighter's advantage?

Charles Galbreath: Yeah, Heather, I'm just sitting here smiling because our conversation in the span of about an hour covered 75 years. From 1960 all the way up to 2035.

And I think we did it fairly seamlessly in talking about how throughout that period, air and space have been pursuing similar objectives and are now integrating on a level that we haven't seen before, and that's just incredibly exciting. It's driven by a necessity because of the threat that we're seeing posed by China. And the types of capabilities we need to win in a peer conflict.

So, this is absolutely essential to the future planning of the DoD's capabilities that they acquire and the operational concepts that they put forward. I mean, we've talked about things today [01:00:00] about the importance of artificial

intelligence machine learning. How autonomy is going to be a key to ensuring that the information reaches the right users and is synthesized rapidly in a way that humans can't.

Which then enables humans to do the things that only they can do. We've talked about the importance of breaking down the security barriers that will prohibit us from integrating our effects and keep us from breaking down our silos of expertise if we don't do it. And so these fundamental steps will really lay the groundwork for us to deliver a cross domain set of capabilities in an integrated fashion that no adversary can match.

And so this has just been a really enjoyable conversation. Thank you both for taking the time to chat with us today.

So rich. Absolutely so rich. Thank you so much. So gentlemen, thank you for being here today. I know there's so much more that we could talk about. I mean, Charles just barely uh, scratched the top of everything that we cover today, we look forward to having you [01:01:00] back on the Aerospace Advantage again in the future.

Greg Ulmer: Thanks, Heather. Thanks, Charles.

Robert Lightfoot: Thanks, Heather. Thanks, Charles. Enjoyed it.

Charles Galbreath: Thank you all.

Greg Ulmer: Have a good day.

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.

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And you can always find us at Mitchell aerospace power. org. Thanks again for joining us and have a great airspace power kind of day. See you next time. All right, gentlemen, that's a wrap. Thank you so much for uh, for making the time. Um, what a great conversation. Thank you. It was good. Yeah. Thanks Heather.

Appreciate it. Really enjoyed [01:02:00] that. Uh, And I wish we could have spent a little more time kind of, breaking down the discussion on title 10 versus title 50, because I know when it comes to AMTI and GMTI, that's going to be one of those Hot button issues we have to resolve. It really is. I'm sorry. Go ahead.

Policies. Policies. Another big thing. Heather we have got to figure out how to work with our closest allies in a bigger way than we are. Oh, my gosh. No, I believe it. Um, and, you know, and Charles, what you said about having us. An episode simply on the Title 10, Title 50 conversation, that's going to be a huge piece for getting the trust of the warfighter uh, to be able to go, yep, I'm going to hit that, that I believe button.

And I think it's essential because if we don't build the policies, we don't build the architecture, we are going to be depriving the warfighter of a key element of that entire targeting system. I mean, I, I'm still a believer that we'll need air domain uh, in the, you know, inside the threat ring, inside the first island chain as part of AMTI and GMTI, but I don't think it's an either or situation.

I think it's a both. [01:03:00] And, you know, by having the silos broken down earlier, it will help us develop trust among all of the different communities. And that trust is what's going to be essential when the chips are down. Right. And it really matters. You've got to know that you can rely on your cross domain partner to help you out.

All right. All I got to run. I got a phone call. I got to jump on. I appreciate the opportunity. Thank you. Thanks everyone. We'll see you later. Thanks. Thanks. Bye. Bye.