Col. Joshua Koslov:

Good afternoon. Who, just show hands very quickly, was in the last Spectrum panel last just an hour ago? All right. Pretty much the best one seen today, right? All right, so I made this joke at last year's AFA. I'm just going to make it again and hopefully someone will listen to me this time. But hey, we talk about the spectrum a lot. We care about it a lot. We care about it enough that it's the last panel on the last day of AFA. You're supposed to laugh. You're supposed to laugh, right? Oh, that's the negative attitude about it. I prefer to have a positive mindset. And so really we're the anchor leg and not in the Frank the Tank kind of way. We're going to drive this thing home. We've got General Cropsey with us today, so thank you for being here. And so he's going to solve all the spectrum challenges for us as we go through this day for us.

And Rogers is right next to him. So that's the two most powerful dudes in EW right there. I'm highlighting them, talk to them. They're really important to our future. Hey, for those that don't know me, even though half the room was in or more than half of the room was in the last panel, I'm Josh Koslov, go by Mule. I'm the 350th Spectrum Warfare Wing Commander. It's my great privilege to serve with that organization. Just for context, we get told where the Air Force is leading MSO organization all of the time. We reprogram every single asset in the Air Force inventory for the most part over 70 systems. We are supposed to be developing the capability to do target and waveform development, and we also do assessment, which means like EW readiness, so that as we as a force, go to war, we can look at General Brown and say these forces are ready to fight.

So for those that didn't get that message in the last briefing or we're curious about the Spectrum Warfare Wing, that's who we are. And there's about 30 of those dudes running around the room right now. And so if you have questions about The Wing, please reach out and talk to our folks. But we're really lucky today because we have three key industry members from three different sectors of industry to talk with us today to build on the discussion we just had in the last panel. What I really want to do is give them a couple of minutes to introduce themselves and where they're coming from and then we'll try to jump right back into the same discussions we were having over in the other room, but maybe with a little bit of different flavor.

So Mr. Joshua Niedzwiecki, Vice President, General Manager of ECS, Electronic Combat Systems for BAE. Oh, you guys are in different seats. Crap. See anchor leg. Maybe I started the Frank the tank thing early. You guys mixed it up on me, man. Bad. Where's my mission data? Mr. Mark Visco is the Director of Mission Success for Ansys Government Initiatives, sir. Please come.

Mark Visco:

Thank you, sir.

Col. Joshua Koslov:

Yeah.

Mark Visco:

So for folks that are unaware, Ansys is a non-traditional software simulation company. We focus on high fidelity simulation, mission level simulation. And it was interesting, I was going to use the analogy, we're really here chartered to bring speed and to raise all boats, but probably not the right analogy for this audience, right? So we're really trying to look to help the Air Force, help the industrial base here go faster, go further, fly higher, and really get after the speed you need, not only from a development perspective, but from turning the operational mission and evolving that mission with the complexity of the... with the complexity of the threat systems out there.

Col. Joshua Koslov:

Thank you, sir. We'll come back to that. All right, now Mr. Niedzwiecki, please go ahead. Yeah.

Joshua Niedzwiecki:

Thanks, Mule. Josh Niedzwiecki, BAE systems. I run our electronic warfare portfolio in BAE systems and that includes a wide range of platforms including things like the F-22, F-35, F-15, EPAWSS, in our broader electronics portfolio Compass Call EC 37 Bravo. And so our perspective is really looking at how do we help the Air Force with a technology that allows them to fight in the future fight, address the agile and adaptive threat, and really keep pace with the environment that we're facing.

Col. Joshua Koslov:

Outstanding, thank you. We're also privileged to have Captain Brian Hinkley, US Navy retired and he's the Vice President at Amentum and also the National President for the Association of Old Crows. So looking forward to his presence today, sir.

Brian Hinkley:

Thanks, Mule. I am the unicorn here. So being a little bit of a navy, EW guy, for those of you that have checked, yes, Air Force is picked by at least 14 points this year for the game coming up next month. So I will acknowledge that. The other part is a little unique is that Amentum is a pure services provider. So while Ansys and BAE provide high level technical manufactured parts and pieces and components and technology, we provide people. So it's very important to me to train those people correctly and to hire folks directly out of uniform. It's what Amentum did to me so that we bring that subject matter expertise back to the customers. EW is a joint fight, and so I think even though I'm a Navy guy, I think the Navy and the Air Force have shown over the years that we worked very well together jointly.

We've done it with exchange programs way back from the EF-111 and the EA-6B through today. We continue to do it. We did it very well out in Iraq and Afghanistan when it came time to put on, in many cases Army uniforms and fight radio-controlled IEDs, and I had the privilege to bring 292 sailors out to Iraq to help with that. But the bottom line is joint, EW, when done well, saves lives. So thank you for letting me be part of the panel.

Col. Joshua Koslov:

Outstanding, really awesome intros. Hey, what I would like to do is just to frame it a little bit for Mark and for Hinks is, in the last panel, as you listened to the discussion and you're sitting in your seat, what was a topic that you wanted to jump on in that discussion that you really had a viewpoint on and wanted to share with this audience? Mark, we'll start with you.

Mark Visco:

Well, you mentioned modeling and simulation and the need for tools. So what we've seen in both this industry and in other industries, we work in the automotive industry, we work in the telecommunications industry, advances in high fidelity representation of the RF environment. For the automotive industry, we took some processing activities that took, maybe, 14 hours in the past, down the milliseconds now for millimeter wave radar systems. We just did an interesting effort with the telecommunications industry where we're basically modeling a dense urban cityscape with all the materials, properties of all the buildings and over a thousand nodes of RF communication devices and necking that down into minutes of processing to predict the antenna coupling of those kinds of systems.

So there's just a tremendous amount of innovation that's going on in and around the industry that can be brought to bear to solve the problem.

Col. Joshua Koslov:

It's outstanding. I'll pull a follow-up question on that in a few minutes. So Hinks, what about you, as you sat in your seat in the last panel?

Brian Hinkley:

Yeah, I heard a couple really good things. One was need for speed. I think you talked about it. I think that was Maverick from Top Gun, but you also talked about it, and then so, I think-

Col. Joshua Koslov:

I've been child of the '80s Hinks. Look at my haircut.

Brian Hinkley:

And then you've mentioned the way to look at electronic warfare and electromagnetic spectrum operations in being from the offensive side and that the best defense is a good offense. And that was not Bill Belichick, I think it was George Washington that kind of probably said that first, but I think your focus on it and what the Air Force is doing with the Electronic warfare wing and some other organizations, I think it's good that we focus on that.

Col. Joshua Koslov:

Thank you, sir. I appreciate that. Josh, any comments back to your new panelists' trader?

Joshua Niedzwiecki:

Yeah, so from one of the things that we didn't hit on a lot in the last panel that, I think, is also important is electromagnetic battle management. I think that's a huge topic and one that we need to figure out. When I think of looking at how we do battle management and how we've done that in the past and the evolution, I think we need to take the same evolution with EMBM where in the past you'd have an electronic order of battle and you'd build your war plans and battle plans perfectly ahead of time. It's all pre mission planned to that next leap where you've got a forward operating base and you've got connectivity to your platforms and you're doing real time mission management and changing to the dynamic threats in the environment to where we need to go in the future where that decision-making has to be at the tactical edge where possible because the threat is so adaptive.

And so when I think about electromagnetic battle management, I think we have to take that same kind of evolution where we're really looking at what can you do pre-planned to define those electronic attacks as we go offensive in the Spectrum? Where are the places in the platforms in theater, in mission that can be those electromagnetic battle managers. Platforms like Compass Call are a great example. Is that a good place to be able to orchestrate effects across multiple platforms in the environment and then to go even further orchestrate those effects automatically in the pointy edge jets at the pointy end of the spear? I think those are things we have to continue to discuss and mature.

Col. Joshua Koslov:

Outstanding. Those are really good points and I'll come back to the EMBM for sure, but based on that answer and Mr. Visco building on Mr. Niedzwiecki's answer just now, can you discuss how your team is

working to enable scalable prediction and developmental validation and exercise of realistic EW effects across a dynamic multi-domain kill web at the speed of need, which ties directly to EMBM, right?

Joshua Niedzwiecki:

That was a mouthful.

Col. Joshua Koslov:

Yeah. Should I do it one more time? I should have had a beer before this.

Joshua Niedzwiecki:

So what we've seen, and we have the luxury of working across all services within the DOD and then also obviously the commercial world. So we're seeing a trend that had arise where if you look at the development life cycle first, there's a lot of redevelopment of models and physics and tools at every phase of the lifecycle. So what we have the luxury as a provider to all is to create an environment that's really data-driven. So it's not every time you want to make a change or want to evolve fidelity, we call it dial fidelity.

So you can start with a low fidelity model and you can dial it right up to a high fidelity model. As a provider of that, the enterprise needs to be adopting tool sets or capabilities or building those capabilities that can be not only interoperable but can be data-driven, and not, I don't have to change code every time I have to add a new model or every time I want to take it up in a level of fidelity. And so we do that... we start from a mission environment with a multi-domain mission environment set, but we also, we will do that at each layer of the physics tool chain all the way down to IC chips. So it's important obviously within the electromagnetic spectrum world, not only to model the performance of RF coming off of antenna, but what's the RF vulnerability of my chips and can I get at those, and how do I model those, and how do I want to incorporate all of that tool chain within not only the development lifecycle, but then the operational lifecycle.

On the flip side, we just talked about EMBM. So we have the luxury, we work a lot with the space force in weapons and tactics. So they use high fidelity's physics tools, commercial tools, to develop these COAs offline. Well, that's the same tool set that runs in the cloud that can be also leveraged operationally. So the common theme there is, tool sets don't have to be different at every phase. And in fact, if you've got tool sets and really underlying physics capabilities that are used across the lifecycle, they're much more robust and much more resilient.

Col. Joshua Koslov:

Outstanding. That's awesome. So just to pull that thread a little bit, and I'll make this a round-robin. When I think about EMBM, I think about it in two ways. There's tactics and then there's the technology behind the tactics. And the technology is making sure all the platforms are talking to each other and that they're actually being able to pass the information and that the right people are on the sensors. And I think part of the technology piece also is the ability to, if you're going to be predictive and make decisions based off that data that the model has to be accurate. So how do we actually get to that place where the service is capable of programming their systems in order to do that? I'll just open that up as a round table if anyone wants to jump on it.

Joshua Niedzwiecki:

Yeah, so I think from an EMBM standpoint, you talked about technology and tactics. I think from the technology standpoint, there's a lot of software capability out there in other spaces in the mission planning world around leveraging data, building models and then using them to real-time optimize effects. And we have to map those things to the EW spectrum. I think getting that in place, that's the brain that's deciding which lights to flick on when, and then like you said, there's a whole set of mechanics around how do you actually interface with all the platforms in the environment to drive who's going to do that work.

Col. Joshua Koslov:

Yeah, outstanding. Hinks, on the Navy side, what are you seeing? Is there similarities in the Navy's approach to electromagnetic battle management or on the joint forces?

Brian Hinkley:

Well, I think as a carrier aviation knuckle dragon guy, I can't talk to the specifics that these gentlemen can that are working on these systems, but we've been working at this problem for 15 years now. There are friends in the audience from the spectrum management specialty area. There are friends in the audience from the electronic warfare area. And unfortunately the way we're organized, we're in stovepipes and we've been working for years to try to bring those two together. So I would just add on the Navy side, we are very, very concerned about it. We are making some headway. I mean obviously leveraging the technology, I'm not worried about the technology. I think industry is going to get us there, but what I'm worried about is how we're organized and actually putting money where our mouth is. We've done a great job of advertising how important it is. We haven't done a good job of funding that.

Mark Visco:

Hey, just to add onto that, another piece of the EMBM challenge space is the complexity of the threat and how networked it is. And so it's not just about resource loading and sharing, I'm going to jam this over here and you're going to jam that over there. It's having enough of an understanding of that air defense network that whatever false picture I'm going to put over here at a fusion node somewhere, how do I make sure that that's not easily removed and kept as a example of a deception technique. So as we build these, same thing with data links, right? There's multiple paths from sensor to shooter. We have to make sure we're not just killing one of those paths, but we have to kill all of them. And so as we do the EMBM, understanding the complexity of the threat environment and how network those air defense systems are is a big piece of the technology side of that solution space.

Col. Joshua Koslov:

Outstanding.

Joshua Niedzwiecki:

Yeah. Mule, you mentioned how do you get trust and validate some of those models so that you can actually use them ongoing? And I would suppose there's two ways that we see that happening. One is I talked about reusable models throughout the life cycle. So if you test early, fail fast with a software model or with a model, you are going to evolve that model and you're going to build that persistent trust and respect for that model as it progresses through the life cycle such that when it comes out the back end, I'm ready to go, I'm ready to use that operationally. You're never going to get, I think, around some live hardware testing, you're always going to have some of that, but what we have seen play out,

and actually in a recent case with the telecommunications industry, you can play out, you can create that complex model and validate that against a number of use cases, but validate the fact that that model can be data-driven and used for a plethora of use cases. So it's all very doable. There's a bit of a culture change that needs to happen.

Col. Joshua Koslov:

I appreciate that. So kind of pulling on that culture change, and I think we'll drive towards it this way, people have heard me talk, hear me say this all the time, but the spectrum is inherently coalition and it's inherently joint. And so a big part of your frustration when you're developing systems like models or EMBM or waveform, has to be the lack of integration between the services about what they need for spectrum operations, right? The Army talks about EMOE characterization. The Air Force doesn't talk about that at all. So you talk for, in my view, as the Spectrum Warfare Wing Commanders, I view industry as a stakeholder and that's the ultimate success of our wing and we have to find the right people to partner with to build solutions. Can you talk a little bit about frustrations with dealing with the different requirements from the services and pairing those to something that's whole, like the spectrum as a common? Does that make sense?

Joshua Niedzwiecki:

Sure, I'll hit that. So a big challenge is in a joint fight you've got platforms, air, maritime, and now space platforms all operating in the same theater. And from a spectrum perspective, the EM spectrum doesn't care if that's a Navy platform or an Air Force platform. And we talked in the last panel about this transition of going from a one V, many fight where each platform is responsible for protecting itself against all possible threats to a many V, many fight and really disrupting those kill webs in a collaborative way. Why would you just limit yourself to the Air Force air platforms, for example. How do we create the EMBM management infrastructure and those dynamics that really ride across the top so that it could be a Super Hornet, it could be an F-35, it could be a Paleo, SmallSat that are all being coordinated as equal members of that network and utilized based on where they are in the AOR and the threat environment that they're seeing.

Mark Visco:

So Josh, I appreciate you framing it that way because as you asked the question, in my mind I'm thinking, well, RF is RF, and if I have a multi-domain environment where I can model space, I can model terrestrial, we don't model undersea, but if you can model the environmental effects, then what do I got left? I got RF. I've got what we've seen to be very important to model is the actual body of a platform and it's near field characteristics, whether if it's got propellers or if it's got appendages or however that is, look at the scattering on each of the bodies, but those are ubiquitous. That's everywhere. I have to worry about modeling that. So from the requirements perspective, we don't deliver direct, so we don't have to-

Col. Joshua Koslov:

Yeah.

Mark Visco:

Or get confused by the requirements. We just know that, hey, you got to model RF as fast and as accurate as you can. That's what we're focused on.

Joshua Niedzwiecki:

Just to pull on that thread, as an EW technique developer and capability provider, one of the biggest challenges is validating those models. And so there's still a huge need for hardware in the loop testing and range testing and field-testing. It is very easy for me to build a model that says every one of our air platforms disappears on every radar screen.

Col. Joshua Koslov:

That's right.

Joshua Niedzwiecki:

But it's very hard to actually prove that that worked and prove to the war fighter that when they press that button or when they're inside the west, that their system is going to keep them from being visible. And so I think as we look forward, having the ability to do much more robust modeling in sim, with hardware in the loop validation and with range testing is super important. On the F-15 EPAWSS Program, that's what we did. We did a tremendous amount of testing at Point Mugu and then at the Nellis range and used all of that data to go back and revalidate our software models in simulation environments so that then we could do excursions and look at different scenarios to assess effectiveness. That's very powerful, but if you don't validate the models, then you've got a lot of skepticism out there. So that's something we're working closely with the Air Force on now.

Col. Joshua Koslov:

Awesome.

Brian Hinkley:

And just to pick up a little bit on that, so there's a concept out there called uncertainty quantification. So if I create a software model of a hardware system and I run some hardware tests on it, I can now quantify how uncertain am I in that software model to perform the way I expect it to perform, and I can shrink that uncertainty down through various hardware and loop efforts, actually even through other software simulation efforts where I can mathematically quantify how uncertain am I in that model so that I can use that and I know that when I go make decisions against it.

Col. Joshua Koslov:

Well, that's super important to the concept of speed and scale that we were talking about in the last panel, and then we've started to talk about here. So in order to go fast, we are going to probably have to accept some level of risk based on how quickly we need to turn data back out as we develop combat capability. So you guys have heard me talk about pulling data back from the edge, reprogramming it and shooting it back out there. What is your real thought about that? When you go back to your companies and you talk to them about it, how far away from that are we? Do you think it's realistic and how do we make it happen?

Brian Hinkley:

Historically in the Navy, we've been using the JADO organization, which is optimizing jammer techniques, and we've had some incredibly responsive production from that organization. Now, why that organization isn't more robust and more of a joint organization, I don't know. I think we'll be able to get there because they've done a terrific job and it's obviously got to be faster. Again, I think technology

is going to get there. I'm encouraged with the newly formed JEC, the Joint Electromagnetic Spectrum Operations Center with Brigadier General Anthony. That is a good step in the right direction. It gives her a bully pulpit to highlight some of these issues that are plaguing industry and our warriors. But it gets back to... every military operator knows you have to train like you fight. And in the electromagnetic spectrum, that's impossible because physics is physics and we're running out of spectrum. So we're going to have to come up with what you gentlemen were talking about in the modeling and sim, in the augmented reality, in virtual training that we can continue to fight that.

Joshua Niedzwiecki:

Yeah, I mean, as an industry player, I'm super excited about the whole concept of rapid reprogramming and what you and your team are doing at the 350th. That is extremely, from a technology perspective, it's an extremely low hanging fruit. I mean, the technology is there to let us rapidly reprogram. We got to be willing to take the risk that the technique that we just built and we're going to reprogram into that MDF, we're going to be willing to take the risk that that's better than what we had before. But the threat is changing at such a fast pace that I think your risk of not doing anything is even higher. And so to me, it's about how do we effectively build the tools that can, we go do rapid reprogramming all the time as a company when we're testing our systems, we were out at Northern Edge, we talked about it in the last panel.

That's easy for a bunch of EW engineers and SMEs using EW mission data file tools. One of the things we've got to do a better job at is how do I abstract away all of the tech jargon that allows me to do that rapidly and allow someone on the flight line in a blue suit to do that work with EW experience, but doesn't need to be the PhD who's been doing EW technique development all their life to make it work. So to me, that's a big area of focus we're looking at is how do we create the tools that make that proliferated and be able to be done at scale.

Col. Joshua Koslov:

Outstanding.

Brian Hinkley:

So not that specific reprogramming challenge, not withstanding because I'm not involved in that, but the good news is we're seeing across industries, our automated CICD pipelines for not only processing large amounts of data, but then generating AI ML techniques and then from there auto generating code that actually gets programmed into chips. So we're seeing those, that kind of a technology exists. Now, how does it get applied to this problem set? That's a challenge there, but the fact that tools and solutions are out there that can enable that.

Col. Joshua Koslov:

Yes, sir. I really appreciate all those comments. So the challenge then becomes, are we describing our problem set well enough to industry, in your opinion, in your specific area, whether it's modeling and sim or electronic combat solutions, are you getting a sense that the Air Force is saying we need more offensive capability and we're making that capability known to you? Are you getting a sense that the Air Force is saying, we need a virtual way to train and develop Air Force EW readiness in a virtual model and sim environment? Are those clear and are we writing the right things down so you guys can execute violently for us? I'll leave it open.

Joshua Niedzwiecki:

Sure. So I'll come on that. So everything could be better always. But what I really like about what we've been doing over the past two years, broadly, especially within the Air Force, Secretary Kendall said it when he first took office, is this idea of reinvigorating the defense industrial base and getting the defense industrial base involved in the solution hearing so that we're not just waiting for, "Hey, here's the new program and here's the requirements." It's, "Here's the problem we have, here's the challenge we're facing, and we need industry to help us innovate ways to solve that problem."

So I see General Rogers here, we met regularly on the [inaudible 00:27:39] COE. That engagement is fantastic as it allows industry to really understand the problem better and then share what we believe is in our goodie bag of technologies or kit that might be applied and iterate on that to help evolve a solution together. I think we need to do the same thing when we talk about data and reprogramming, but I really appreciate how that whole Air Force model from the top down is much more focused on collaborating on understanding the problem and with the threat environment where it is and the timelines that we're worried about China, I think that's paramount.

Mark Visco:

So back to that, at least from a training LVC readiness perspective, both in the Air Force and in the Navy, and then to some extent now with the Space Force, those requirements are clear. The gaps are clear that exist today. Just, maybe, simple as injecting realistic electromagnetic spectrum effects into a training environment. That's a need. I would suggest that the real challenge is openness to just buying it as our first move is to build. So if we want to get to speed of need, I think that a cultural shift on looking at, "Hey, let me just buy what I can" and then really "Just build what I need to."

Col. Joshua Koslov:

That's outstanding. So kind of going back to the one of our missions in the 350th Spectrum Warfare Wing and a really important piece in EW that's always been missing. We've talked about somebody presses a button, I believe, we've talked about that. A way that you get to pass from, I believe, is TTP development, Tactics Training Procedures. And the way we do that is through often lifeline or can be on the range, but as we move into the spectrum, we also have to be able to assess those TTPs and give someone a readiness grade. And so talk a little bit about the lack of assessment across the spectrum capabilities that are being developed and what we're asking for, and then particularly this idea of software, software in the loop or just software in general, being able to answer some of our harder problems for us right off the bat.

Brian Hinkley:

Let me start. I can say, let's see, for about 30 years now, you can go back to Cope India in '94, and you witnessed firsthand that a single bit, DRFM jammer can completely wipe out our air assets if used correctly by an adversary. And you move into any large scale exercise. You mentioned Northern Edge, right? We see it every time we employ it. The Navy has fleet exercises every year. The devil is in the details and you have to exercise that. It's very simple in a large scale exercise. GPS jamming, you can only do it for about 20 seconds before it cripples the fleet and therefore you have to stop training in it goes back to train like you fight. But we can't do it because it's so effective. And we see Russia, we see China, they have taken some strategic steps to organize around an Electromagnetic Spectrum capability. We haven't done that yet. So I think the more we can do with large scale exercises every time we have one, it makes a very valid point that we need more focus on EW.

Joshua Niedzwiecki:

Yeah. I'll pull the assessment thread a little further from an EW. As an EW system provider and one that's developing a wide range of very advanced techniques, assessment is a huge challenge because in the past it was how much noise, power am I putting out of my sensor? And that's going to define a JADO-S and its signal to noise ratio on the enemy's radar or comms link is what I'm trying to defeat. And that means very simple to assess. Did your transmitter transmit that level noise out the system. When you've got that next level of techniques are more intricate radar countermeasure techniques where if I have access to a high fidelity version of that radar and it's pretty static, then I can build that technique and validate it.

And now my testing is also, "Okay, did I spit out the cocktail that I said I was going to spit out?" But when you look at the threat now and how agile it is and how advanced it is, and the level of techniques that we're developing that take advantage of much more nuanced knowledge of the actual intricacies of what's going on inside that radar or radio, your ability to assess effectiveness becomes much harder. You have to have not just a high fidelity model, but in some cases an actual representation of that system to know, is my desired effect actually having an effect? I think that's a big challenge that we still have to face.

Mark Visco:

And just to layer on the top of some of that, talk about training and readiness and TTP development, one point is the effectiveness of the TTP. The other one is what's the adversary's perception of that effect and are they picking up on what we are trying to do or are we doing it in a way that really does obscure their perception? And so playing that war game of red versus blue, where really you're also managing the perception of both sides on what they think is really going on is probably another critical piece of how do we ensure our TTPs are rock solid.

Col. Joshua Koslov:

Hundred percent, there's no doing this in a vacuum. So we've all said that the platform stovepipe model is a dead model and we've got to be able to integrate all these things. And the only way we're going to be able to do that is through software and through models, and then through a really careful understanding of what the technique is that has been developed and how does that technique work. And so as someone who's building an organization that's devoted to assessment and EW assessment specifically towards readiness, what I would offer the audience and I would offer industry is we can't continue to build capabilities that are unaccessible. And so just as an example, the F-35 is an amazing piece of machinery, but there is no way for the Air Force's Combat Shield, which is its EW Readiness Assessment Organization to assess that platform's EW readiness as a writ large program.

So as guys in OCPs in flight suits make a demand signal, and that's not a slam on B because they delivered exactly what we asked them to do, but the focus of being EW ready wasn't built into that set of requirements. And that is hurting us because we're actually unable to say how ready are we at any given time in space. I'll just pause there and allow any feedback on any of that or any thoughts? No. Good. Okay. Hey, Mr. Niedzwiecki, talk to me a little bit about C5ISRT and how BAE, your team is working to combine rapid reprogramming Cog EW and EMBM.

Joshua Niedzwiecki:

Yeah, sure. So what we're doing at BAE systems is a couple of things. We have the good fortune of having existing EW kit on a large number of platforms, EC-37B being kind of the most prevalent electronic attack platform out there with a tremendous amount of new capability now that's actually DTOT starting now, right? So very excited about that. For us, it's about every one of those platforms,

how do I make sure that each one that's already software defined? We start opening up those architectures. Each program was built from the platforms above, and we always leveraged, every new program was leveraging the information from the last program. What we got to get better at, and what we're doing internally is not just leveraging but driving commonality. And so, one of the things we can do, in short order, is on the software side, build the open architecture framework inside each of those systems that lets us be more agile at adapting advanced techniques as they're developed.

And so some of those techniques require a Compass Call to employ. They need high power standoff based on the mission. Some of those techniques are advanced low power techniques that could be employed from a number of these boxes. Today our focus is on how do I maximize commonality so that when the Air Force or company X builds one of those new techniques, we can press a button and employ it across multiple things. I've got examples now where we've got very advanced techniques that are running on three different EW boxes in five different platforms, and we want to do more of that because it just provides options to the Air force.

Col. Joshua Koslov:

Options are the number one piece. So there's so much that goes to Mr. Visco's point earlier of we reinvent models over a lifecycle because we're not thinking about how do I integrate this model across the force or the program or programs, I should say. We do the same thing with waveforms. Waveforms that are sitting in a Compass Call would be ideal for a growler, and we've got to kind of figure that piece of things out as we go forward from here. So for the audience, we have three distinct members of our panel in our final time here. So we have a more people enterprise wide EW focused leader and Mr. Hinkley, we have developing hardware software solutions that are attacking and offensive and much more than that in BAE. And then we have the modeling and sim, TTP development software in the loop lab testing mindset coming from Ansys and Mr. Visco.

So in the remaining two minutes, my thesis would be, and I think it's amazing that the three of you're on this panel, is we need to resource and invest in each of those lines of effort in order to get to where we need to be as an air force in the spectrum. And so just stealing from the last panel, like a, do you agree? Are you getting the resources you need in the stuff you need from us? And b, what's the first thing we have to do in your bailiwick, if you will? We'll start here.

Mark Visco:

So I say first thing we do is probably deepen the engagement because the EW community, it's obviously a very highly classified, we have few of us in our company that have clearances and probably few non-traditionals, and not just us, but other non-traditionals that have innovations to apply. Just getting access to then help educate what the art of the possible is given today's technology to bring to bear on your fight.

Col. Joshua Koslov:

Yeah, great.

Joshua Niedzwiecki:

Yeah. So from a resourcing standpoint, of course, I mean, this is a huge problem. The future fight is going to be dependent on the spectrum and electronic warfare. So I think we need to continue to resource that. And that comes in multiple ways. It's not just resourcing a new EW box on a new platform, but it's also where I think we need more energy is resourcing that advanced technique development and threat understanding. We need to build an industrial base that really understands that

the threat environment, that dynamics of the threat can analyze it and rapidly develop techniques. Our most advanced smartest EW folks are the ones that are out on the range every week, testing and iterating and really understanding what they're seeing and responding. I think as an industrial base, we have to build that up because we don't have time to wait.

Col. Joshua Koslov:

I would argue as an Air force, we should be putting our green suit kids next to that engineer on the range and have them learning together. Mr. Hinkley, please,

Brian Hinkley:

Just a final comment. For me, as the president of the AOC, I would say that the Air Force is doing an exceptional job of highlighting what they need, like them and the other services not doing nearly as good of a job at resourcing the ability to go after that. And when you talk about technology that needs to be accessible, I would say you also need to be building that technology that's employable, that's executable. So again, our greatest asset in any service is our people. So we have to be able to enable those war fighters to be able to fight in the electromagnetic spectrum battle space.

Col. Joshua Koslov:

Outstanding. Gentlemen, it's been awesome and an honor to learn from you today. Ladies and gentlemen, that concludes AFA, but can we have a round of applause for our panelists, please? I invite you to come forward and talk to our panelists or ask any other questions that you might have for them. Thank you. Have a great afternoon.