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Col. Joshua Koslov:

Good afternoon, AFA. How we doing today? Yeah. Last panel on the last day. And just like me, you guys must be excited and optimistic about the future of Electromagnetic Spectrum Operations in order to be here today. I'm super stoked to be here with all of you guys and with an amazing panel. Very quickly, first thank you to Brigadier General Clark for being here today, former A26L and also thank you to General Select Marks for being here the current A26L who will turn a lot of the dreams that we talk about today into reality for all of our war fighters in the Air Force.

For those of you in the back, if you can't see me, I'm standing up. So bring it in if you need to. But seriously, thanks for being here today and I'm stoked to see the optimism for Electromagnetic Spectrum Operations. I know there's been a lot of new stories during the AFA about sprints and operational imperatives and those kind of things revolving around the Spectrum. We're not going to touch on that today.

What our focus today is going to be talking about collaboration and speed to need. It's really tough to talk about the Spectrum in an unclassified environment. So what we want to talk about are some of the competencies we're going to need as a war fighting element in order to be successful in the future. I am the commander of the 350th Spectrum Warfare Wing, AKA the Crow. And my goal for this is not only to let these gentlemen instruct all of you, but let you know that there's an organization in the United States Air Force at the operational level that's living and breathing and thinking about the Spectrum every single day.

All right, so the 350th Spectrum Warfare Wing just reached its IOC capability about three days before I took command of the organization under the great leadership of Colonel William Dollar Young, who most of you know, and in that year the Wing accomplished a series of amazing things and proved that it can deliver a lot of capability in a rapid capable way very quickly.

As we drive towards the fully operational capable of the wing, we're positioning the Wing to be a functional Wing in support directly of air component commanders and delivering them rapid combat decisive capability when they need it. What are their threats? What are their top five requirements? And we want to be the folks that target them in the spectrum.

We're also posturing the Wing to be the touchstone for the United States Air Force and get folks to ask the question, what does the 350th think when it comes to the Spectrum? And part of that is a realization that in the future, if we all are optimistic about where the Spectrum is going and the capabilities of our adversaries, we have to be able to develop a force and a capability to achieve commander's objectives in the Spectrum and with the Spectrum.

It's not just an enabling capability. The Spectrum has to grow to become a supported capability. So I think initially we'll continue to be a support team as we grow, but our aspiration and our inspiration should be to achieve commander's objectives and intent and to take the fight directly to our enemy at all times. There's a lot of members of the 350th Spectrum Warfare Wing in the room today. I hope you've had an opportunity to talk to them, but we're here to talk to you and answer your questions and we'll be up following the event to answer any questions that you have.

The last thing I just want to touch on with the Wing is that we right now today service 20 platforms across the Air Force and 74 different systems in the Air Force from a mission data programming perspective. We do that in a channelized industrial age process, but we are really good at it and we are the best at it. We have to get better. And all of that data for those 20 different platforms and 73

different systems has to reside in one place where we can then take that data and quickly develop that war fighting edge capability that I talked about that air component commanders need today.

That's our vision, that's our goal. The Crows are very happy to be here and look forward to continuing to work with our ACC counterparts, our pack half counterparts, our USAF counterparts, and of course the Department of Air Force counterparts as we move forward. The last thing I'll touch on is in order, the Spectrum is inherently joint and it's inherently coalition. So within our own service and our own department, we have to work with the Department of Space, the United States Space Force. We have to work with our Marine brothers and our Navy brothers and the Army brothers as they continue to develop their capability, because it's the only way we're actually going to be able to do it at the speed that is required.

So there's some gentlemen here that are going to help us with that today. The first to my left is Mr. Dave Harrold. He's the vice president and general manager of Countermeasure and Electronic Attack Solutions at BAE. Also joining us today is David Mueller, Spectrum Solutions Architect from AT&T, and also in his military career was a prowler pilot. Also joining us as Brent T Toland, the Vice President and General Manager Navigation Training Survivability Division Northrop Grumman.

So gentlemen, thank you very much for being here today and I look forward to some banter and some arguments and some discussion and take the gloves off. This is the last panel at AFA, and if anything else, our goal is for you guys to leave here with some thought-provoking ideas about the Spectrum, how we should fight in the Spectrum in the future, and then to ask yourselves what do the Crows think?

So the first question I want to jump on is Secretary Kendall has been very loud in his critique of experimentation or demos that are not delivering combat capability, that are kind of intellectually interesting, but they don't deliver decisive combat effects. So in other words, what I think he's saying is that we're being too slow and we're studying problems for too long before we make decisions and deliver combat capability to our component commanders.

So in short, how is your organization addressing the need to advance EMSO operations to gain competitive advantage against our near peers, specifically China and Russia, Mr. Harrold?

Dave Harrold:

Sure, thanks Josh, and thanks everybody for being here this afternoon. Yeah BA Systems, obviously we're steeped in the electronic warfare space where we've been doing this for 60 years and over those 60 years we've really learned a lot about how to get there. Two things that BA Systems has done organizationally to really speed things up. One is we've really tried to plug into the innovation ecosystem. So places like the capital factory in Austin, Texas and Mass Challenge in Cambridge where we're learning how to operate more fluidly and more consistently with small companies.

Small companies do great things, bring a lot of innovation, but often don't have the scale or the ability to move those great things to an actual mission capability. We do. We know how to do that. The other thing we've done is we reorganized our R and D organization in a way that many R and D organizations do a lot of experimentation. Let's do low TRL kind of stuff just to prove some concepts and then all of that stuff gets left on the shelf unfortunately.

So we've reoriented such that our R and D organization sits at the center of all of our businesses and any work that's really being done in that R and D in the S and T community has a very clear tie to a business like mine and a government partner for that S and T effort. So we're really trying to help the government writ large find ways to not allow those S and T things to die on the vine or sit on the shelf because that doesn't help any of us. So we understand the need for speed and so we're really leaning into that across the board.

David A. Mueller:

Excellent. Thank you [inaudible 00:08:11], and thanks to the AFA for putting this important panel together, and thanks for all of you for staying for the last panel of the day, which I think is one of the most important ones here because we've got to win the fight in the Spectrum. We don't win the fight in the Spectrum, overall the Joint Force is going to lose and lose pretty quickly. So how do we speed up that acquisition?

Your question in a lot of ways is more of a general acquisitions question. I mean I applaud Secretary Kendall for his efforts. I think every OSD level senior executive I've heard come in over the last 20 years has said, "I want to go faster and I'm willing to accept risk to do that." And of course, generally speaking, they're all one Washington Post headline away from not wanting to take risk and not wanting to go faster.

That being said, I think we got a lot of good initiatives going on. I know at AT&T we're working a lot with OUSD R&E where they have a lot of initiatives going on trying to move 5G capabilities forward, get them in the hands of war fighters, get ready for that internet of military things that is coming. There are a lot of great capabilities that are going to be riding on Spectrum. We've done this for a long time.

But the value of Spectrum, the importance of winning the Spectrum fight is never more important than it is now. And as this technology moves forward, I mean I think you could make an argument that moving forward in wireless communication technology, the enabling things that not just 5G, Next G bring to the war fighter. This may be the most strategically important technology race since the microchip was invented.

So we've been working with OUSD R&E. They've got a lot of initiatives, but like we've seen all along, R&E doesn't go to scale with things. You need a service on the backside of those experiments. We can do and set up 5G warehouses and what not in Coronado. We can set things up at Air Force bases. We have lot experimentation going on over at Hill. But until you can bring those things to scale, until you can get them in the hands of the war fighter and have services that run those programs, it's got to be able to make the shift from R&E over into DOD CIO, A&S, and then the services to bring those programs forward. And I think that's what we're really looking forward to is to seeing how we're able to do those things.

Col. Joshua Koslov:

Outstanding. Really good comments. Mr. Toland?

Brent T. Toland:

Yeah, first thank you, Colonel, for the opportunity to participate on this panel. Spectrum war finding has changed its dynamic. The threats are going to be sophisticated. They're going to be changing frequently. They're going to be distributed and so the war fighter, we're going to be immersed in Spectra. So that changes a lot of the dynamic. And first of all, for us to succeed, we need to take our collaboration to a whole new level.

But first, for what Northrop Grumman is doing, first is we're leveraging our mission in system engineering. So in a joint war fighting environment, multi-ship, multi-domain, we need to make sure we understand the mission objectives that we're interoperable and that we're not interfering with ourselves. We also need to understand that our adversary is not dormant and they're not going to be stagnant. They're going to be doing everything they can to counter us. And so that all needs to be taken into the solutions that we bring forward is the mission perspective.

Second thing we're doing is we are ever enhancing the fidelity of our digital tools. So digital tools are going to be essential digital models. We're going to need to use those to model the threats, for example, and that's another area where we're leveraging our experts is first working with the Air Force, for example, understanding threats, modeling the threats. But the digital tools help us model the threats and it will help us model the solutions, and we are validating those models, again working with our industrial partners and with the services because validated models are going to be essential as we come up with solutions in a distributed multi-platform, multi-domain environment, we are not going to be able to test solutions thoroughly if at all before we field them. And so we're all going to have to get comfortable with those sort of solutions.

Third thing is developing modular open systems. I think we're all aware of the advantages those would bring in terms of speed, if you're being able to swap things out, whether it be hardware or whether it be software. Another advantage for those systems is that we're able to leverage multiple funding streams. So across the services, and we were talking about this before, across the services there is a lot of shared concerns, shared threats and shared investments.

We can leverage common investments from the services. There are unique aspects of it, of course, but we're needing more bandwidth, more processing power, techniques, AI training data, all that stuff could probably be leveraged across the services as well as across industry. So that's going to be important in these modular open systems.

Fourth thing is partnering with commercial. So Northrop Grumman, we just announced the strategic partnership with AT&T, a 5G network ecosystem that we're going to establish that will bring the best of both AT&T with their technology and their ability to scale, and with Northrop Grumman's ability to provide mission solutions and secure systems.

And then finally the last thing is the most important of all, say it the last, is hiring, retaining, attracting the skilled workforce we need. I think across the board, none of this works if we don't have the diverse, skilled workforce.

Dave Harrold:

Can I jump on that for a second, Josh? So I want to go back to Brent's comment about the leveraging across other services and things. Because we do see this that any time you try to put a J in front of a program, everybody gets nervous, right, because there's a lot that comes with that. But it doesn't have to be that way. When we work with the Army and there's a specific capability that say the Air Force is looking for, we are in the positions where we say, "Well the Army just dumped a whole bunch of money over there on something very similar and you don't have to make it a joint program, but can you use that as a starting point?"

And really where the services need to look, in my humble opinion is, where can they leverage other people's money? Both our company's internal IRAD, but also where the other services have already made some bets and really try not to ... it's never going to be a one size fits all, but we probably have way too many bespoke solutions across the services these days. I think that's another way where we could move fast. If you could build upon hundreds of millions of dollars of investment from another service and use that as your starting point, you can move a lot faster.

David A. Mueller:

I think that's a great point and I think Brent hit a bit on the interoperability piece because that goes to the heart of the interoperability piece, which is important all through acquisitions and all through what all the services do. But it has particular importance in EW and in MCO. There is no such thing as fielding a Joint Force EMSO capability unless the entire Joint Force is interoperable. I think one of the problems

is traditionally we have a standard of interoperability where we just worry, "Hey as long as my thing doesn't break the thing next to me, I'm interoperable."

But if we're going to take a real EMSO concept as we build that Joint Force, it's not just, "I can't break the thing next to me." I need to be compatible, I need to be complimentary, and ideally I need to be collaborative with that other thing. And until we can build real collaborative systems that work together, and hopefully we get on this at the end, managed by real solid tactical EMBM type systems, we're not going to have that degree of collaboration across our systems.

Col. Joshua Koslov:

Yeah, I'll just jump in there just for a second. I don't want to stop this discussion because collaboration and interoperability are definitely a topic I'd like us to hit. But I think I heard you guys in summary to the first question identify is that for the DOD, what we owe you is people, process, tools and resources that can drive good requirements for you to support what we're trying to do. So I'm going to be a little facetious because I have the microphone, but leveraging other people's money sounds like an amazing idea.

I sat through a bunch of Space Force briefings and sounds like they're doing some amazing things. What is your recommendations from a business perspective on how we can do that as an Air Force, specifically in the Spectrum? So as an example, the Spectrum, like every other capability in the Air Force, touches each of the operational imperatives, a massive role in each of those. None of those are successful without the Spectrum. So how do we build a culture and a capability to leverage other people's money, and deliver capability faster?

Brent T. Toland:

You already are. So I think first though is just increasing the communication and the awareness. So we have systems where we have been funded by the Army for radar warning receivers and there's parts of the systems that we are incorporating into the F16 IVEWs. So they're building blocks and there's an awareness of across the services of, "Well this piece is already being developed. I, Air Force, don't need to fund this, and we can take it to another level." I think it's really just awareness and continuing the kind of consortium in communication.

Col. Joshua Koslov:

I just want to build on that. So rather than just leveraging your money, leveraging your expertise as well. And so you talked about digital engineering and speeding up the acquisition process by being able to test and model and those kind of things. Those are all really super valuable in the Spectrum. However, our business practices in the Air Force, when it comes to Spectrum capability, still rely on hardware in the loop labs, and in my opinion archaic business practices to develop and field capability. Can the three of you talk a little bit more about digital engineering and some of the ways that your company uses it and it's effectiveness and where you see it growing to?

Dave Harrold:

Yeah, I mean when you talk digital engineering, model-based systems engineering, I mean these are all emerging things. We've got excellence in pockets across the industry, but it is about getting to a level of risk tolerance that says, "I can retire some of that stuff that I've always gotten used to doing." We still want have strong modeling and simulation. We're still going to have to have some level of test. But where is that threshold of, "I'm going to do more in the digital environment than I am in the physical environment, and I'm going to believe in it, and it's going to help me make risk-based decisions."

Let me take an aside on this and make a more general acquisition comment. One of the things that we always ask for is clarity of requirement. Sometimes you don't have the clarity because we don't fully understand what needs there are. But one thing is let's make sure we're separating between needs and wants. If you ask us to gold plate something, we'll do it, and then it'll be unaffordable and we won't be able to buy enough copies and all that stuff happens.

Just a little sort of anecdote, I was with a customer and we were talking about a future requirement and this customer said to me, "Wait until you see the requirement. It's going to blow your mind." Please don't blow my mind, because that means we haven't been having conversations about what's in the art of the possible and what the trade space looks like. So what I advocate for is a really open dialogue to the extent possible because collectively we can really get clarity and get to the right requirements that'll allow us to move fast and deliver.

David A. Mueller:

And the key to these things are in the requirements, right? When we look at all of our systems, I mean let's be honest, we've got EW communities out there, but the overwhelming majority of the EW the Joint Force brings to the battlefield, especially the EA capabilities, are self-protect systems. They're dispersed throughout all of the different platforms and they're run by all the different program offices.

The requirements get set by each of those different programs. But to get a collaborative capability out of that, you've got to have a degree of common requirements across. You've got to have common standards and you've got to demand that out of the requirements and make it in a way so that as budgets start getting tight, survivability isn't the thing that falls out because it's viewed as survivability, not as an important EA system that is going to enable the Joint Force Commander to have the effects on the battlefield he's trying to get.

I think that's the big key is are we able to set those standards in the requirements process? Can the JROC start doing some of those things? That's an open question.

Brent T. Toland:

I would agree with all that. I think there's also an aspect just at the very beginning in terms of modeling the scenarios. So when we're talking about joint war fighting environment, multi-domain, multi-platforms, that we have models that can model those platforms, the capability of those platforms, model those domains in realistic scenarios. The moving OV1, and many of us participated in those. I can't really get into details but modeling those first in that we believe that the models represent reality. I think from that will come requirements that will flow into how you ... you'll see in the model how you successfully prosecute a mission and then what capabilities were needed to actually succeed in that mission.

Col. Joshua Koslov:

Fantastic. I want to thank you for letting me challenge you a little bit. I did it on purpose because you brought out the points that for the blue, the uniform crowd in the audience. There's a lot of apathy about we can't fix it, these things don't get fixed. We've done a bunch of strategies and studies and it's time to take action. But what you're really outlining for us is people, process, resources and tools drive requirements, which if we do that well, we can get to where we want to be.

So let's pull on the people thread a little bit. We talked about some of the organizations that helped develop your requirements. From looking at DOD, how often are we talking out both sides of our mouths, and do you know where to go to get the most solid EMSO requirements for the Force?

Dave Harrold:

Well, I'll just use the secretary as an example. We've had lots of conversations over the course of this week asking senior leaders in the Air Force about what's going on in the EMSO environment, but we really didn't have to because the secretary's pretty clear about what the Air Force's imperatives are, what the mission focus areas are, and how important EMSO is to support all of that priority.

So I think one good thing that's happening is there is very clear, in my mind, clarity from the top, and alignment as we spoke to senior leaders this week, very good alignment across the board on what has to happen. I think one of the things that we all should consider is we've all seen where it can work, where we can move fast.

And often for me, so first of all we should find some of those shining examples and really say what went well here and how can we more broadly use that? But in my experience, the majority of that comes down to communication and alignment. So when we can get alignment of focus, and again the operational imperatives and the mission focus areas, those are giving us the opportunity to have alignment of purpose.

And then if we can have iterative conversations that allow us to stay aligned, that's how we move fast. We've all seen plenty of examples that we can pick from and say, "Yep, that was a core piece of why we were able to be successful there."

Col. Joshua Koslov:

Alignment of purpose, 350th Spectrum Warfare Wing, advertisement. Thank you, sir. I kid, I kid. Is there anything that you'd like to add onto that, Mr. Mueller or Mr. Toland, before we transition? So I'd like to pull the thread now, we've touched on it a couple different times, but collaboration and standards and interoperability. Massive challenge in every single one of our mission portfolios.

But as Mr. Mueller quite astutely said, it's even more important in the Spectrum because of the Spectrum's reach. So if you were charting a course, first off do you believe that full interoperability is a real thing or will we always be in a collaborative state? Are standards real for EMSO? Let's start there and then we'll have a broader discussion.

David A. Mueller:

So I think absolutely they are. They're a real thing. We just have a system that is in that is designed to disincentivize the creation of those real standards. Because we have five services now that get to make all their own acquisition decisions and we don't have a very clear senior leader that owns all of this, although there's a lot of work done and CIO certainly feels that at the OSD level they own it now because they own the EMS superiority strategy. Are we able to create a system that will permeate those standards in a way that makes them enforceable across the Joint Force?

I know that General Hyten had a very clear understanding that he wanted to see the JROC set those standards, and use the JROC to, in his words, instead of validating other requirements for deliverables, could the JROC be used to create a requirement for things that are not deliverables, ie standards?

I can tell you if you go into Title X, the JROC clearly has that authority, but how would that actually take place? The JROC gets fed by the Joint Staff by the FCBs that permeate requirements up for validation. Can you put enough expertise into the FCBs or can they adopt a process that brings enough expertise? Because I think that that would be a role for DOD and industry collaboration.

The research laboratories would have to be involved in this. If you can get them enough influence into the FCBs so that you can get the right standards set, the JROC has the authority to set them. The question is, are we going to do that and are we going to make them enforceable across the services?

Col. Joshua Koslov:

Mr. Toland, anything to add?

Brent T. Toland:

No, I just would say that standards are going to be essential, back to my opening comments. In an interoperable environment, there has to be standards that we adhere to or we're just not going to be able to function. So those need to be enforced. Those need to be developed early on in the process. And again, it starts with the mission system engineering.

Dave Harrold:

I think maybe this wades into a different question, but I think complete interoperability, that's tough, especially when we've built some systems intentionally not for other reasons, for security reasons and things like that. But that gets us, in the EMSO environment, it gets us to the EMBM conversation around maybe you can't have everybody talking directly to everybody, but you can have everybody talking to one place, and that place helping to manage the entire battle space. So I think we can get to interoperability if we're smart about how and where we do the EMBM part of the mission.

Brent T. Toland:

That's an excellent point. We have the OI, so it's really using the use cases and defining what actually needs to be interoperable. Not everything needs to be interoperable, but as we go through the OIs and actually have real world scenarios that we try to have joint solutions to, that will define which assets need to be interoperable and how. And again, I think starting there will help define what the interoperability requirements need to be, and then we would need the services to align to those.

Col. Joshua Koslov:

Mr. Mueller, anything to add?

David A. Mueller:

No, I think those are all great points, and I couldn't agree more. It comes down to how you define those EMBM systems. Are we going to have real tactical, real time EMBM that eventually will be AI-enabled, that can really do EMS maneuver on the battle space? If the Joint Force isn't capable of EMS maneuver on the battle space in the future war fighting environment, the notion that it can be survivable is probably going to be very problematic.

Col. Joshua Koslov:

Right on. So two topics in our remaining time that I'd like to drive into, the EMBM discussion being the first one of those. So not only from an industry perspective but from a DOD perspective, if we're going to realize a vision of EMBM, what is, in your mind, the starting point for that discussion? Not from a process procedure or office perspective, but what is the starting point for a discussion of what EMBM actually is?

So there's lots of discussion of EMBM is the management of collection, EMBM is management of electronic attack, EMBM is the integration, the convergence of aerospace and EW perspectives. So it can't be all things because an EMBM will fall under the weight of its own drum. So let's have a discussion about your perspectives of the starting point for a realistic EMBM capability for the DOD.

David A. Mueller:

So if I can just weigh in real quick, I think the starting point is clearly articulating the EMS superiority strategy. There are two paragraphs that clearly define EMBM in the near term and in the long term solution about what real tactical, real time EMBM looks like, and eventually in the future becomes AI enabled. And in short, it's the command and control of your Spectrum-dependent systems that will give you the ability to maneuver in Spectrum, that will be able to sense and avoid problems on the battlefield with agile EMS-dependent systems.

The key to that is one, getting service EMBM systems that are all interoperable with each other, also interoperable with, because DISSA has a program and they're building an operational level EMBM tool that'll work in operational headquarters and that's fantastic. So got to be interoperable with that. And then you've got to have the agile EMS-dependent systems that give you something to EMBM. Because if you don't have agile systems, it doesn't matter that you can sense and avoid on the battlefield. Nothing's going to move. So I think we start there. Other thoughts?

Dave Harrold:

Yeah, if I can. So I have loved the conversations that we've had this week, not about this platform or this capability, but about the enterprise and about how do we create enterprise solutions. And I think that's empowered by the fact that this EMSO is feeding into all these imperatives. But I think the conversation that we have to have is around we're really good at doing the operational analysis on this platform versus this threat.

And I know even at our company where we've got EW systems on 80% of the DODs fixed wing aircraft, we still do a lot of 1V1, if you will, or platform versus threat, where we really need to do collectively is get to the place where we are doing that operational analysis at the campaign or enterprise or more operational level and less in the niche environment. So I think for me the conversation starts with good definition of what we think it is. Then what's the analysis overall that has to be done to allow us to see where the gaps are and point us in the right direction.

Col. Joshua Koslov:

So if I may just kind of peel that onion back a little bit, what I think I heard from Mr. Mueller is a really good description of what EMBM brings to us, and then what you're bringing to us, sir, to the uniformed audience, is the operationalization of that capability, right? And so DOD investing in the people and the human capital that could sit in those operational commands, it's very similar to our requirements discussion, but know enough about war fighting and are very capable at integrating the Spectrum into the scheme of maneuver that then can define how EMBM goes forward. Is that kind of what you're talking about, sir?

Dave Harrold:

Yeah, that's right. Yep.

Col. Joshua Koslov:

Mr. Toland, anything to add on that line of logic?

Brent T. Toland:

No, I think I've been clear throughout this is I agree it starts again with modeling the scenarios from the top levels, the mission modeling, and then having the confidence in the models that you are modeling

reality, so you can quickly deploy solutions. There's also an aspect of this where we need to do better is to get threats into the hands of experts within the DOD and within industry. And there's another opportunity for us to collaborate together and start to learn more about the threat, to learn more about the solutions, and that will help us deploy solutions much faster as well.

Col. Joshua Koslov:

Sir, I just want to pull on something that you've brought up a couple times, and I'm sorry it's the second time you brought it up but I didn't jump on it, but something that's really astute and really important is the future of modeling and software-based testing allows us to do multiple iterations and go faster and potentially cut costs for you, but for us there's a lot of use to that as well. So can you drive into what is your framework or a potential framework or some frameworks for risk-based decision making as it comes to models?

Brent T. Toland:

So as we're developing the models, there are specific tests we can do, boundary cases that we can test as we go along, and for certain situations that will build our confidence in the model. We have built many some systems and we could start comparing how the model predicts they behave with how we've actually measured them. If you do that enough, then you'll start to have confidence that when we need to get something out within a day to the field, that we're going to go with the model, because the model has not let us down before. We trust the model.

And when we get to AI, we're certainly going to need that sort of trust. And it isn't just blind trust. So it's going to take years of us working together to have confidence in these models, that they are actually modeling how these systems really perform in real world environments. And that is all doable. It just takes time and it takes collaboration.

Col. Joshua Koslov:

And then I'm a bit of neophyte on this particular topic, but when we talk about models and the data it requires to operate those models, would it be fair to say that not only data management but interoperability between data sets becomes potentially something that from a Spectrum perspective that we have to invest in and we have to do some technical debt investment in order to get to where we need to be?

Brent T. Toland:

Yeah. And there's an aspect of configuration control as well, but we have to, once we validate the model of the system that performs, then we need to be able to control that. But we also need to be able to validate how the threats are. Is the environment itself actually realistic, and then be able to control that as well.

David A. Mueller:

And I think there are bureaucratic barriers there as well. You two gentlemen deal with this a lot more than I do, if you wanted to comment on it. Some of this is getting DOD acceptance that they're willing to accept the models for fielding on those things and operational test requirements and whatnot not withstanding. Will those stand up and will DOD accept those results?

Dave Harrold:

Yeah, I think that's right. Confidence comes from volume, repetition and validation. That sometimes takes time. You could have the models that say this is how it's going to happen, but you don't get validation of that for a number of years. But we got to keep on doing that because the fear is, we all talk about AI being part of this in the future, but if we don't get the trust piece first, the technology will be there and we won't be able to leverage it because we won't trust the outcome of it.

So I know we're all working now to figure out how to do that with the tools that we have, the data that we have. Inherently there are some structural challenges as well around this data sits in this compartment or in this network and it's hard to get access to. So when we can't get the volume and the right data to do those thousands and thousands of repetitions on a simulation, it's hard to then build the confidence.

Brent T. Toland:

All the services have their modeling capability. We know this, as do the contractors. And it's kind of this nascent emerging collaboration that we're having with various services, one at a time with the Army here, with Air Force there. And we need to get to where it's ... and when we share and work with the services, they will actually provide us models of some of their platforms and we'll provide them with models of like a radar warning receiver or something.

So we will share those models, but where we need to get to is where there is a common standard model, I think, across the services and industry. And there is also, it's done at the right levels. The clearances can also be a challenge for us.

Col. Joshua Koslov:

I think when I'm summing up this discussion very quickly, what I think you gentlemen have kind of taught this audience is technologically we're there. So if we go back to people, process, resources and then tools, the tools are there, the processes and the people aren't there to make the risk-informed decision on the uniform side. And this is where until we make that leap, this is where we're going to continue to struggle with the valley of death in terms of acquisition. Is that a fair assessment?

David A. Mueller:

Yeah, and I think that that's where that type of calculated risk acceptance is probably right in the wheelhouse of Secretary Kendall's guidance.

Brent T. Toland:

We've kind of walked down the aisle over many decades. We are a very risk averse industry and so we need to walk back from that and be able to accept more risk or we're just not going to be as fast as deploying as commercial. I mean iPhones, we've gone iPhone seven to 14 here in 10 years maybe, and some EW systems we've gone from one to one and a half. So we need to move a lot faster.

Dave Harrold:

Yeah, I would just quantify or qualify the risk comment because sometimes we say, "Hey DOD, you need to take more risk and you need to be more comfortable with it." All of you in the audience do very serious things for this nation. And so there are what I would say is appropriate risk, because there's some places where we just can't add risk because the potential outcome of that is devastating. So we need to have the conversations around where it's appropriate to lean in, take more risk and move

faster. But where are those keep out zones where we really together have to make sure we've got the right risk profile?

Brent T. Toland:

And as I said earlier, a large component of that is building the trust early. It's working early and developing the trust over years. That's where we're going to get to the tolerance for risk.

Col. Joshua Koslov:

Outstanding. With just a minute left, we'll do a quick speed round. A topic that I didn't talk about but this audience might want to know about or I should have brought up that I'm not thinking about that I need to as a leader in the Spectrum for the United States Air Force.

Dave Harrold:

I can't think of anything off the bat. I think the operational analysis conversation for me is the big point that we ought to pull more on.

Col. Joshua Koslov:

Yes sir.

David A. Mueller:

Yeah, I'll go back to we need to be focused on that good tactical EMBM and doing the prep work because the internet of military things is coming, and we need to be ready for it to get here. If we start preparing once it's here, we're going to be two years behind.

Brent T. Toland:

I guess again, back to the workforce and what we need for the services, the highly skilled is perhaps collaboration, more collaboration on attracting folks into the military, into this defense industry. We are a high tech industry. Sometimes over the last few decades that's kind of gotten submerged, but we are the high tech industry and we are the ones with the mission and I think the fulfilling purpose. So I think us messaging and doing that and promoting STEM in high schools and elementary schools would be one area.

Col. Joshua Koslov:

Phenomenal points. Thank you. So I'll end with what we started with. There's optimism in the air for EMSO. The 350th existing with those personnel and beginning to onboard more personnel is the Air Force's first starting point towards developing the organizations needed to be successful and go forward in the future.

I just want to say as we wrap up and to the audience, we'll hang out in the front of the stage if you have any personal questions for any of the panelists. To you and your companies and the people that work at your companies, thank you. Not only thank you for being at the panel letting me challenge you and drive some tough conversation, but thank you for the capability that you do deliver, because to your point, sir, we do do serious business and that capability has proven both to be very effective and lethal over time.

We just got to get a little bit better and faster and a little bit more mojo. But thank you very much to you and your people that developed that capability for us. And to the audience, thank you for being here at the last panel of AFA. Please ask us any questions that you have. If you have any questions about the

EMSO in the Air Force, ask the Crows at the 350th Spectrum Warfare Wing. Thank you very much for being here.

David A. Mueller:
Thank you.

Dave Harrold:
Thanks a lot.

Brent T. Toland:
Thank you.

