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Maj. Gen. John M. Olson:

All right, good afternoon ladies and gentlemen. It is my privilege and honor to host as your moderator the Creating JADC2 Architecture panel. And we have that coveted immediately post lunch time slot here, so we are going to have a dynamic and fast paced dialogue and we're going to focus on the action side of that, creating a JADC2 architecture. We've got an all-star line for you here, three great panelists. And we're going to keep it fresh and fast. And so without further ado, I'd like to introduce who our team players are here. First, from my left, or I should say... I guess working from closest to meet over, we've got Rob Epstein. And Rob is the senior solutions architect for C4ISR Solution operation in Leidos. And Rob focuses on developing strategy, vision and technical capabilities for Leidos' C4ISR command and control framework, their modeling simulation and training portfolios. And he was also an Air Force 26 year veteran, retired as a colonel just the last year in 2021. So, let's have a big welcome for Rob.

Next up, we've got Teri Williams. She's an engineering fellow with Raytheon Intelligence and space, and Teri has over 25 years of experience in systems engineering and program management, also holding a bachelor's, master's in a doctorate in engineering. And she graduated from the Air Force Academy, class in '96, so bringing it strong. Welcome. And then finally, we've got Aki Jain and he is the CTO for Palantir Technologies, as well as their president for Palantir US government. He's also deeply behind the software and the brains and the execution behind our our vision and Warp Core and other great Palantir products. So welcome, Aki.

So as we look at... Let's see. I'll make it work here. Give me a little love. There we go. Setting the context for today, as we talk about the JADC2 architecture, I think it's really important to understand where it all started. These are the direct slides from the joint staff J6 looking at the joint war fighting concept. That's really what underpins the way in which we fight across the joint services, the way we execute integrated deterrence, defense and war fighting operations. And of course along that, we have the four pillars of the joint war fighting concept. And throughout, across all those domains, is the joint all domain command and control. And as we look at that specifically, the definition for JADC2, it's really the ability to sense, make sense, and act across all domains, across the joint services in a contested environment at the speed of relevance. And I think every single one of those words matter, but as we look at the challenges that big, hair, audacious set of problems poses, it also is going to require the absolute best and most integrated solution sets.

That's a partnership across all of the services, across the whole of government, the whole of nation response. And I think as we have reflected here on our panelists, the industry side is so very important to this, because as we look at our competitors and adversaries that have civil military fusion as they have command direction, it's the richness and diversity and the intellectual curiosity and capacity, the entrepreneurial capability and the industrial base strength of our United States, as well as the partners and allies that are so vital to our success. And so as we look at this forward, this is what underpins joint all domain command and control. And I think today, the theme is going to be about the operational capability, getting beyond the rhetoric, getting beyond the lexicon, and talking about the solutions that we're driving at breakneck speed to implement. And as we do so, we look at this very same chart in terms of the data and AI being so critical.

These are strategic imperatives. They underpin everything that we do. As we look at it from the combatant commander perspective, 10 out of our 11 combatant commands, those commanders all say that data is in the top three of their integrated priority list, or their one to end top tough challenges. A third of those have it as number one. And I think the lowest is number four, and we're pretty confident that that's a mistake. So, this just lets you know how critical data and AI are to that. And it's not just data

itself. It's operationalization of data and AI/ML readiness to drive the timely decision advantage and information advantage outcomes that we absolutely need. And what underpins that is an enterprise IT infrastructure, a digital infrastructure that leverage dev sec ops, and that's for both data and AI. It leverages the DAF data fabric, a vital part of our capability set, and as well as machine to machine speed.

That's of course AI/ML and deep learning capabilities. And as we look at that, you've heard this morning from the secretary, and he outlined in the seven operational imperatives, the criticality of the sense of urgency with which we are tackling with these. So, as we look at those, certainly OI2 is the operationally focused advanced battle management system, otherwise known as battle management and command and control or command control computers and battle management. However you want to reference it, it is vitally important that we adopt a distributed and distributable command and control and battle management concept, and that's what we're doing as part of the four pillar approach going forward. You've heard the great news. We're excited to have Luke Cropsey, Brigadier General, Luke Cropsey, join Brigadier General Jeff Spaniard Valenzia and I in forging forward the Air Force and the space forces side of a joint all domain commanded control.

But underpinning all of that is, again, huge partnerships. You see that depicted industry throughout international and our friends and allies across the board, but we're really focusing on four things. Nailing the foundation. You got to be able to talk on the same sheet of music, the same lexicon, the same concepts, but we're driving far beyond that. We're also talking about approach, a consistent model based systems engineering approach so we can show and justify and really leverage the potency of the deep functional decomposition that the team has been working on. It's about setting a context, one with an operational imperative, a set of scenarios that help focus, in a vignette form a way, that everybody can embrace. And then finally, when we had all five of the service chiefs, their operations leads and the JADC2 two leads, the common thread out of that is we need a concept of operation that underpins and stitches it all together, because after all, this is the operational way in which we go forward.

So, this is what's driving our requirements across the department of the Air Force. And so now, we're going to probe more fully with our panelists exactly what their perspectives are as we drive forward to that. So, I'll back us up and we'll just highlight... There we go. Thank you. And so first question of the day is for Rob. Rob, Secretary Kendall's seven operational imperatives to cope with our peer adversaries and competitors calls out the need to achieve operationally optimized advanced battle management systems, or ABMS, and Air Force joint all domain command and control, JADC2. So, how do you see this effort supporting the secretaries increasingly urgent roadmap?

Robert H. Epstein:

That's an easy question. Hey, first off, good afternoon everybody. Thank you General and to my fellow panelist, and thank you for surviving lunch and coming to hear us talk. 75th anniversary. So I'm just totally excited to be here to answer the question. Look, this is about decision space for leadership. And decision superiority is going to lead us to operational superiority. So, I'm probably the dumb operator on the panel here, so I'm going to stay focused on that. So as we look to create this, it's creating the pipes so that we can push data around, because data is everything. That's how we make decisions. Most of the operations I've been in, we were never the only service that was there. Matter of fact, we were never the only flag that was actually represented on the org chart of how we shared information.

For Libby operations, I saw pilots actually coming back and having to sit there, and on a whiteboard tell us what they saw, because we couldn't share information with one another and we had to do it on the fly. In a pickup war or what we did in Afghanistan, you can use superior people and probably get away with that. In a pure competition, we're going to lose because this gets into an OODA loop and a turning battle, which is we need to outturn our adversaries and the way we make decisions forcing them to

react to us and not the other way around. So, the urgency right now is, dear God, thank you that we've actually started moving out. So, I give credit and kudos to the DAF, our office. And I give credit to ABMS CFT and the space force for what they're doing, to actually stop doing the little science projects and actually start getting after the real problem, which is create the architecture and the standards that allows industry to help you solve your problems. I'll end it there, and I'm going to get into banter with everyone else.

Maj. Gen. John M. Olson:

So, that's great. So, as we pick up on the sense of urgency, as we pick up on the sense of action, Teri, what do you think the importance of experimental is in order to realize our ABMS and multi domain operations objectives?

Teri Williams:

Well, General Olson, that's a very good question. Raytheon intelligence and space is very focused on experimentation, but just went to level set everybody in the room. I'm not meaning experimentation as a science experiment in the lab and throwing something on the floor. What we are doing is exercising capability, and we are refining our TTPs and we're using AI and ML algorithms to gain confidence in operational capability. So take for example, we have Valiant Shield, Raytheon intelligence and space participating in that. Now, there is a lot of other industry partners, FFRDCs and government participating in that. And what we did is we have a very robust digital engineering environment that we take that operational scenario back. We have it in a model based system engineering approach. And we were able to test our hypotheses, we're able to test new TTPs, we're able to refine our way ahead so we can gain confidence by the next exercise to deliver that operational capability.

Maj. Gen. John M. Olson:

I agree. And so with that extraordinary model based systems engineering capability, how do you see it? And this is a little joust between you and Rob. As you look at it, how do you balance the risk there between testing the operations environment, testing in the digital environment? How do you know when you get the mixed right, or is it the sum of both parts is better than the whole?

Teri Williams:

I'll start, and then I'm going to pass it to you to tie a bow on it. How about that?

Robert H. Epstein:

Fair enough.

Teri Williams:

So, when it comes to these experiments is trained like you fight. So, you're going to have an initial 60% solution, 70% solution that you're going to try your best to model it. You're going to take what technologies you have and you're going to refine those concepts. But then you go out and you exercise that. So instead of the old antiquated tabletop exercises we're doing, we're using real software, real hardware out in the field. Som we take that and we test it. And then we refine our algorithms, and then go back and test it again. But by having that digital engineering and those models we're able to reduce the risk to the combatant commanders. We're able to reduce that cost and bring in operational capability faster.

Robert H. Epstein:

So, my last job in the air force was commander of the Air Force agency for modeling and simulation. And one of the things we always talked about was if you create JADC2, how do you train the operator? And this becomes a problem and it gets into what you're saying, where the risk is if you don't, the likelihood of success is close to zero. So, it's about the gray matter between the ears of the operator as much as it is the system itself. So when you talk about risk, not doing it is riskier. So, we get into this, if you do the engineering properly, you can create opportunities where you can actually refine the operator. And what's more interesting now is you actually now have that digital twin of the world that you can actually train your AI, because that's something, as we talk about artificial intelligence, you have to get the reps and sets in for both the operator and now the machine so that you can take advantage of machine to machine speed, right? Because then it gets into your operational superiority.

Maj. Gen. John M. Olson:

Excellent. So, we now have a big question for you Aki. As we look at JADC2 being a longtime horizon, kind of everything utopian program. And as the secretary is first to point out, the track record hasn't been so great for everything systems. But given the longtime horizon, the complexity and the broad strategic concepts, what, in your opinion, are the most viable and quickest steps that the DOD can take to bring JADC2 capabilities to the war fighter today?

Akash Jain:

Cool, thanks, and thanks everybody for having me here today. Well, I'd kind of build on what Rob and Teri just talked about a little bit here. And actually, I thought the slides, I thought I was done, so... No laughs. So look, from my perspective, if you think about really everything that has to go into actually delivering capability today, and I think we can see this in a lot of context today, both in the experiment and training kind of aspects of it and taking MBSE and some of that work, taking the networks and the anchors and the data that's moving around, and ultimately putting software inclusive of artificial intelligence and machine learning on top of it, that is happening today.

And I think the key thing that we've really observed over the last almost two decades that we've been doing this is, it's going to take the whole commercial industrial base, all the things that the general referred to earlier, the strength of our country, the entrepreneurship of our young students and those that are coming here and have advanced technologies, the full defense industrial base, as well as academia and FFRDCs, to come together and kind of work together on these solutions in order to provide the government with some kind of speed to capability now. And I think if you look at, for example, some of the things that are happening in Europe right now, you're seeing kind of the early inklings of the last probably couple of years of JADC2 strategy actually play through. There is interop. There is data moving around. We're using MBSE and we're using those models and simulation and training that was done, whether it's through a Scarlet Dragon series, or through the global information dominance experiments, or through Valiant Shield.

And it's all coming together in a way where decision makers, to the original point that was made, the speed to decision and actually the decision space they have to make the best decision is, I would argue, a couple times better than it would've been maybe a year or two years ago.

Maj. Gen. John M. Olson:

Thank you. Teri or Rob, do you have any thoughts, or anything to add or amplify?

Teri Williams:

All I can say is he did an excellent job and completely agree. As we move forward, it is not just a single person or a single company that needs this solution space. Instead of kind of like the one chart for Dr. Grayson, it's not the government that is the integrator. It's not the industry that is the integrator. It's all of us working together in a tightly coupled fashion to make sure we're all in alignment. It's going to take the academia, FFRDC, going to even take our commercial industry and government all working together. It's a big problem. There's enough work for everybody. We just have to get after it and move forward.

Maj. Gen. John M. Olson:

I really agree with you. We have currently over 200 companies on ramped on the IDIQ contract just because we want to have the ready ability to quickly put people on contract for the digital infrastructure, which is one of the first three strong initiatives. We had 30 companies, and now we have distilled that down to seven in the industry consortium. The purpose behind that is to pull the absolute best and brightest and to have a diversity and a richness because we think when you amalgamate all those those best and breed entities, you're getting the best overall solution rather than one single winner take all. Do you have any thoughts on that from your perspective, Rob?

Robert H. Epstein:

Yeah, thank you, sir. So, the beauty of this is... I think if it's sort of in the similar vein of the way we look at the internet. It's not owned. It's something that's shared, but it's creating protocols and standards that we can all work together. It's got to be non-proprietary. It has to be. The government's demanding it and industry, everybody wants to play in it. So, it's creating those opportunities. And it's got to be perpetually modernizing, which means it's got to be plug and play. This gets to the government actually saying and demanding that there is interoperability by putting some standards forth, an industry who has opportunity to play in that building to those sets of standards to allow us to modernize and continually make it relevant, which, is an organizational problem. But I think we're actually getting after it right now with some of the things that were actually discussed by the chief earlier today. So, [inaudible 00:18:31]

Maj. Gen. John M. Olson:

Great. I appreciate. Aki, you had a follow-up?

Akash Jain:

Kind of double tap something. I think Rob said something is really, really important here. This is never going to be done. And I think that a lot of times when we think about whether it's a competitive process or procurement process... And some of the space, certainly Congress has afforded the last couple years offers a much more diverse set of ways to get at the problem, but this problem is never going to be done. I think the thing that we really believe is that strongly software and data are going to be the thing that we're constantly going to be iterating on as a nation, the west more broadly, and will be our determinative competitive advantage going forward. Certainly, there are going to be some very exquisite hardware capabilities that will hopefully provide the deterrent necessary to prevent actual war. But when it actually comes down from our perspective, the thing that in the moment we as a country, and the west more broadly, need focus on is how do you apply software? How do you apply data?

And how do you change the physics of how we do that if and when we need to fight? And so it's never going to be done. It's going to be a constant developmental. It's going to keep going and keep going and keep going. And the more we invest in that, just as we've seen in the commercial space, more the

commercial industrials have actually invested in software and data enhance their operations. That continuous cycle is the thing that we have to get really, really, really good at in order to actually solve this problem.

Maj. Gen. John M. Olson:

I couldn't agree more. I think when you look at that, we're 22 and a half years into the 21st century. The digital age is absolutely upon us. This is the way in which we execute the joint war fighting concept. This is the context. And so that underpins everything that we do. And I like what you said, JADC2 or ABMS, which is the [inaudible 00:20:20] instantiation of JADC2, it's a concept. It's part of program, part of a continual evolution. And I think the only constant is changed there, but we need to be smart because we're competing and we're potentially engaging against a pure adversary or adversaries that are economically and militarily very, very potent. And I think when we look at the amalgam of the potential for multiple actors in a global arena, this presents a fairly existential and a fairly potent level of urgency and action. And as we talked about urgency and accomplishment... And [inaudible 00:21:03] operational capabilities are kind of really the buzzword. So, let me pick up a little bit more, just more specifically, and we already kind of touched on this.

Teri, the department of the Air Force's ABMS digital infrastructure consortium is supporting the development of our JADC2 architecture. Can you talk about your work, your thoughts and perspectives as how that can be leveraged to further amplify and accelerate the timeline to getting to real, actionable, operational results?

Teri Williams:

Thank you very much. Som now I have approval to talk about that. So, it's very relevant, as you saw on the new release announcement that the digital infrastructure for ABMS has been awarded. I'm currently serving on the consortium, and I'm very excited about our pathway forward with our industry partners. What we are in doing in the digital infrastructure is we're chartered with the design, development, and deployment of the digital infrastructure and ensuring that the data there is correct. So if I'm in a disaggregated environment doing distributable C2, which is a new method of fighting, how do we break that problem apart? But how do we get the data? How do we make sure it's secure? How do we distribute it? And how do we make sure that we have connectivity? And so when I am using it, are we all operating under the same context?

Do I understand what my data is? Do I understand it from my mission set, knowing that it's going to be different for whatever type of node you are utilizing? And so this is a consortium activity, but we are working together tightly with industry, FFRDCs, academia, utilizing commercial solutions space, utilizing other IDIQs as we move forward, but we're really trying to get after the problem. And this is a consortium environment, so in less than 90 days we have a lot of best practices. Lesson learned. Instead of taking six months, 12 months to get started, we've done it in less than 90 days. We have our government customer that is ensuring that we go fast, but we're also really making sure, do we do it correctly? And so as we have forward, we've met with the government, having that tight feedback loop to make sure we've developed our initial roadmap. So, we already have a game plan on moving forward and we are all vested, industry, FFRDC, academia, government to all make sure that we deliver operational capability to the war fighter.

Maj. Gen. John M. Olson:

You're spot on. As we talk about data and AI, operationalization of data and AI/ML readiness is so fundamental to everything that we're doing. But from an AI/ML side, it's really 80 to 85% data driven.

The data wrangling, it's very time intensive, complex, messy, dirty, non-sexy. The formatting, metadata, tagging, cleansing, data integrity validation, all that is required. So, I got a focal question for you, Rob, and that is, how can the air force and industry accelerate getting our trusted data into the war fighters so that it can prime the pump for AI/ML readiness, since we know, much like the JADC2 definition is, to do that at the speed of relevancy? To make sense [inaudible 00:24:29], we need machine to machine speed, because simply put the OODA loop or the kill chains must... The timelines have to be radically reduced in the modern peer competitive environment. What are your thoughts on that? How can we accelerate that?

Robert H. Epstein:

How do we accelerate it? It's getting humans out of loop and on the loop. It's getting machines to do most of the work for you, which means you have to trust your AI. How many used Waze to get here today? Nobody used Waze to get over here? All right, there's a couple hands. Thanks. You know, Waze isn't any good unless you trust what it's telling you. And so you got to have open algorithms. You got to have it in such a way that you can actually take advantage of those things. And then it's getting you relevant data the way you need to ingest it. And to Teri's point, this is all about flexibility. One of the things when I look at this, because we too, Leidos, are on the digital consortium. I can say that now. Flexibility is key to air power, always has been. So, this gets back into the, if I need to get data out, it can't be a single stove pipe solution anymore because our adversaries know about it.

So, how do you get it to the point where you can get it out opportunistically to where it needs to be to make sure that we can actually be relevant? AI's going to have to take a huge part of that because it's going to have to make a lot of decisions based on networks being up or down, radio frequencies, what adversary or what asset is out there that can receive it to get the right information to the right user at the right time resiliently. It's a complex problem, but that's sort of where we're at, and we're making significant headway. And I'm going to lob that ball over to my partners here on the panel.

Akash Jain:

I want to follow up on the Waze analogy for a second, because I think it's... So, how many people in the audience have actually ever used Waze? All right, for the people on camera, it's maybe like 90% of the people. All right, how many people in the audience do Waze tells you to do when you hit traffic? Only about 40% of you. And I guess I'll throw two whys maybe. First why, is the reason for those of you who don't do what Waze tells you to do, is it because you don't understand why it's telling you what to do? Is that the reason For those that don't follow the Waze directions? Why don't you do what ways tells you to do? Somebody just yell it out.

Audience Member:

I know better.

Akash Jain:

Oh, right there. I know better. Yeah. Yeah. This is like the first problem that we worked on with the DOD in the AI/ML space. And for clarity, Palantir does, I think what General Olson talked about, which is really about the data munging, the T&E, the ModSim environment, some of those things, and then the CICD of AI/ML models. We don't actually build AI/ML models. There are folks that are much better at that, that have been studying systems for years and know exactly what this is going to look like, and they have the experts. We try to create the environment that gets them the data to do that. And the first thing we did when we sat down with operators is we put them in kind of a zip cop environment. They'd have a FMV

[inaudible 00:27:33] up. They'd have a computer vision algorithm. It'd be highlighting a truck on the screen. And we'd say, "Oh, it's so cool, isn't it? Hey, AI." And they'd be like...

I don't know if I can say this on the video, but they'd be like, "No shit, Sherlock. There's a truck on the screen. I'm a human. I can tell you there's a truck on the screen. Who cares? Why is that important? Why do I need the AI to tell me that?" And then when I think about the concept of Waze, "I know better," this is the number one thing that we really run into when we're thinking about how to adopt AI and how to enable the department to drive it in to effectively become the Jarvis for humans in some of these decision spaces. It's how do you make it explainable? How do you get the humans really trust it? How do you do the training and the ModSim kind of work, such that when Waze tells you to do something... Admittedly, I don't...

I'll admit, I don't follow Waze most of the time as well, because I do know better. But how do you get to the point at which you're working through an ATO cycle or something and the human says, "Hey, you, the machine, helped me come up with a better decision, or a more timely decision, or a more cost effective solution to a problem." And we see this, I think... Again, I'm not a pilot, and many of you in the audience are, but in the ways that we trust autopilot systems today and how they ultimately help with task and saturation and overload, how do we get to the point where AI is really doing that? And I think that's why these activities and the continuity kind of across industry, across the government and really doing these exercises and training components to the point where, hey, when Waze tells us, "Hey, no, really, you'll save five minutes if you do this," we do it, and it actually is helpful and augmentative and we're not kind of pulling an office and driving into a lake because Waze told us to do so.

Maj. Gen. John M. Olson:

And I think if we amplify that a little bit further, when we talk about edge node and edge capability and edge AI, to operate at the speed of need, at speed of relevance, one of the challenges in a contested environment, in a multi domain environment is everything is perfect. And we know the criticality, and certainly we see it with the airborne edge known capability release one that's going to be on the KC46. We see extensibility to that, to the fighter side too, but the space node two. As we start looking at the criticality of space sensing, space networking, space command and control, and the space transport, of course, enabling so much of that, these are both great opportunities, and I think the technology and the operational capabilities are evolving where we can have some excellent solutions, but we also need to be very mindful of this degraded, very challenging environment. Primary alternate contingency, emergency operation space, operations are key.

How do you see that? In particular for air and space operations, how do you see solutions from either your teams, your companies, or your perspectives coming forward in this domain to provide those solutions, not just fight tonight, but fight right now and as we evolve and continually evolve towards a more rigorous and challenging future?

Akash Jain:

Yeah, no, that is a great question. I think that... So, if I look at the last four years of what this has looked like, and again, I can't emphasize enough the importance of the collaboration with our DIB partners, with the government, with academia. A lot of what we really try to do and the way that we try to enable that is by going to the field, by participating in the Scarlet Dragons, going forward, seeing what's actually going on in Germany and Poland right now, working a lot. As a multinational, we work globally.

About half our business is global government, most of it defense. We work with the Five Eyes really closely. We spend a lot of time in the UK and with our partners in Canada and Australia. And if you really think about it, across all those experiences, our greatest approach to this is, "Hey, bring commercial

software, make it open to non-pro proprietary, make it so anybody come and play, and then really work with users to iterate on building things like trust," enabling them to understand why the software is suggesting something to them. And then getting a few layers down and doing a fair amount of IRAD to say, "Hey, it's not good enough." As a commercial software company, we kind of stop at the point at which we've built something and try to throw it over the wall and say, "Hey, just use it." You have to invest in things like IL5, IL6 and beyond. You actually have to build that infrastructure. You have to have the 24/7 knock and sock that can ultimately garner trust with the cyber folks.

And you have to have really resilient software and capability, alongside amazing partners, in order to actually then deliver that to the war fighter. And that's kind of how we're seeing our software actually make its way into the fight. But I will say that has taken us... I've been a Palantir for 17 years now. Company's been around for 18 years, so I like to joke, there're allowed to buy cigarettes finally, couple years to be able to drink. But at the end of the day, that's taken us 18 years and a lot of investment to get to. I think the way we see this now is that we have to pay that forward, and you have to get a lot of smaller companies involved and we have to help them do that.

Maj. Gen. John M. Olson:

Amen. It's definitely team sport. Teri, how would you amplify that? Or can you take it further and one up?

Teri Williams:

So, I'm currently doing the ABMS, but have spent some time in the space domain, and as we move forward, realizing how do we integrate and how do we interoperate, because you have multiple pathways to get to the end state. And so understanding the data, bringing it back down to that, getting the good backbone, making sure we have the right context, making sure we have open standards, realizing that our solution isn't the only solution. So, how do we make sure that we are all working together? Because we're all mission focused, we're all trying to get to that end game, but instead of it your spot, your spot, mine, how do we work together to move forward? So, if you have a particular piece, how does it interoperate, integrate with mine? How do we keep it moving forward? How do we make it plug and play? How do we embrace digital technology to keep it moving forward? How do we get the feedback from the operators, from the government to make sure that we're continually evolving as well?

Maj. Gen. John M. Olson:

Great. Rob, any follow ups?

Robert H. Epstein:

Yeah, the evolution is key in this process. In a perfect world, you'd want to, okay, scrap everything. I'm going to start over. I'm going to ability to exactly right that everything works together, and that's [inaudible 00:33:54]. I mean, we don't have the money or the ability to stop doing what we're doing and start over. So, it becomes a challenge where collectively we've got to work together to make sure that if you create that architecture, the digital infrastructure that's open and it can start taking things in, eventually it sort of absorbs all the old software and it evolves in the right direction. And that's where our fifth and sixth gen airplanes and the new systems coming board are where we snap the chalk line and try and move forward, but it's taking legacy today to making sure we can operate together. And that's a team sport. There's no other way to do it.

Maj. Gen. John M. Olson:

I think that's the common thread. We're hearing a lot of interoperability, a lot of collaboration, and a lot of sense of urgency when we do that. I think this is a very daunting challenge we have before us, and certainly there's been a fair amount of criticisms about the rate and pace and the sense of urgency, but I would like us to focus on, for each one of you, what one opportunity would you say is most fertile, most important in the minds of either you or your team or your company as we go forward to drive timely and responsive solutions to JADC2 at the speed of need? Anybody want to go first on that one? The word of the day or the opportunity most fervent, where you think you can bring a solution to the myriad of challenges ahead?

Robert H. Epstein:

I'll go from a Leidos perspective. We look at it as being a partner with the government to help take the OEM platforms that we currently have today and be an integrator, an honest broker. And I think that's part of the process that the government needs, that honest broker to help tie things together. And so collaboratively, I see that being what's going to probably get us across the finish line.

Teri Williams:

My put for the one thing is delivering, understanding, working collaboratively, and taking it and producing that product, say "We are going to do this," and go out and go do you can. And then we iterate to refine and make it better.

Akash Jain:

I'm going to use software. Sorry, it's kind of generic, but as a software company. I think the number one opportunity for us is how do we take our kind of software capabilities and apply it to the space in a way that, again, it's open, it's interoperable, it is enabling those outcomes in real time. And that ultimately, whether it's the fight tonight kind of solutions or the longer term helping change the physics of agility, kind of making it so that our Airmen and everybody kind of across the different forces as well as with our mission partners can move at the pace of the mission or at the pace of relevance, together as one through software, that's really, I think, the thing that we most contribute, which is that software expertise and track record of almost 20 years of delivery.

Maj. Gen. John M. Olson:

I think we heard some ethereal interoperability and collaboration and technology based solutions as well. I think it goes without saying that at the core of all this is also people. It takes a rich team, not only in and across the government, a diverse team, one that includes data and AI/ML folks, operational personnel, technologists, and as well as driving across the spectrum. But indeed, as we look at the commercial and the academia relationships, as well as the international relationships, we've seen a lot of those. We're starting to accelerate those. We've certainly seen that the Ukraine war, how critically important. And it's really now showing that as much as it's a kinetic war of attrition, in some ways, it's the first true war of cognition for the 21st century. And I think as we drive forward, what is absolutely going to be true is data and AI and the ability to sense, make sense, and act at the speed of need is fundamentally tied to that.

So, from a personnel development and from a growth perspective, what do you see as important next steps that you think we ought to be taking to cultivate our people, both locally and systemically?

Teri Williams:

I would like to take that one to start off with. We need risk takers. We need people who are able to meet a multifaceted environment. You do need the STEM background, but we also need this people who think strategically. And we also need to have people who are willing to make mistakes, willing to fail and learn from them. And so that's the critical things, as we are growing our new team, is saying that, "Hey, we want you to go out there, try new things, learn from them, get those best practices and showcase the new skill sets."

Akash Jain:

Yeah, I would double tap that. I think the only thing I would maybe add... So, our CO is a little bit famous for saying we're a colony of artists, which many of us software engineers enjoy. But the way that we think about this is also know thy self. I think just within the government workforce, within the commercial workforce, defense social base, et cetera, everybody has a spike. They have something they're world class in. And I think that the ability to take people with spikes in world class areas and bring them together to form a much stronger team, I think it's what America is best at in the world, is really critical.

So, I think one of the things I think about when you bring on risk takers and entrepreneurs to grow these programs is, how do you equip them with a set of people who can really help them understand software? They don't have to do kind of the crash course in understanding software and kind of be a minus minus version of it, but instead they have a world class software engineer next to them that can really help them understand that and push things forward. And so I think it's really about helping take folks with very different spikes and creating that circumstance under which they can do really great work together as a team.

Maj. Gen. John M. Olson:

Any final words, Rob?

Robert H. Epstein:

Yeah, to piggyback on my co-panelists, it's piggybacking on that scrum mentality of the operator and the software developer so that we can scale this at speed. The time is now to act, and we need people of action.

Maj. Gen. John M. Olson:

Well, with that, ladies and gentlemen, we've had a fantastic panel discussion, a lot of back and forth. Thank you for engaging. Creating JADC2 is the imperative of today and we'll be so for the future. At the core of it is people, interoperability, and collaboration. So, until next time, thank you very much.

