"Defining Resilient and Effective Space Order of Battle and Architectures"

Lt. Gen. DeAnna M. Burt:

Well, good afternoon. Thank you ladies and gentlemen for joining us today. I am honored to be on this panel, Lieutenant General DeAnna Burt. I am the Chief Operations Officer at the United States Space Force in the Pentagon, and I am honored to be here with our three distinguished panels members from industry. So before we start, I'd like to go through each of them and let them give a brief introduction of themselves and their background. So Kay, I'll start with you.

Kay Sears:

Thank you General Burt, and welcome everyone. Thanks for being here this afternoon. Also, thanks to the AFA, really appreciate that space is now included in this and I think there's an important dialogue. I'm Kay Sears. I am the VP GM at Boeing for Space, Intel and Weapons Systems. And just a little background, I've spent time in commercial as well as the military side. I worked for a bunch of commercial satellite operators providing services, bandwidth mostly to the military during Desert Storm, OEF, OIF. Then moved into the manufacturing side, the OEM side of the business with Lockheed Martin and worked the military space portfolio and then came over to Boeing to really expand the missions. So pretty good perspective in terms of commercial and the military side of what we can do for our war fighters today. Thank you.

Lt. Gen. DeAnna M. Burt:

Joel.

Joel Nelson:

Pleasure to be here. Joel Nelson, Senior Director of Space BMC3 Systems, overseeing the front end of our business, strategy, business development. I started out in space control back in the day and acquisitions in the Air Force, did some space operations. Been in industry for about 15 years, so bringing a perspective of the acquirer, the operator and industry. So I look forward to the panel.

Kay Sears:

Jason.

Jason Brown:

Hi everybody, I'm Jason Brown. I'm the Head of Professional Services for Defense at Google. I'm a retired intelligence officer, was a former I-CER Wing Commander and AFCENT A2.

Lt. Gen. DeAnna M. Burt:

Well, as you can see, we have an awesome panel. And so with that, we'll get started. You guys have heard a lot today about the Secretary's Seven Operational Imperatives. And so today's panel is really to talk about OI-1 which is an Effective and Resilient Space Order of Battle and Architecture. And so that's what we're going to talk about.

We've talked about today, China, China, China, and why we need that resilient architecture in order to continue to fight through that. We focus on our US and allies and broad services to make sure that we are resilient and continue to provide that capability through all stages and continuums of conflict. You heard from General Saltzman today talking about how we have to move to removing that first mover

advantage and resiliency in our architectures and the way we do that moving forward. And these three partners are critical in how we do that.

So Kay, I'll start with you. What is your perspective on the support that industry provides to the US government through commercial space-based technologies and how we use them, their availability during times of competition or conflict, and how can industry support sustained operations during a wartime surge?

Kay Sears:

Thanks, appreciate that question. I really believe there's a major shift here, mainly because we have to be threat-driven and the threat has changed so dramatically since OEF and OIF, when we actually really discovered that the space layer provides us huge advantage. Obviously the Chinese noticed that too and they have come after us big time. So the way that we use commercial during that last surge is very different than how we can use commercial going forward, I think. We had space, we owned space. We owned the space domain at that time, and commercial operators were putting up huge amounts of bandwidth, which was helping us bring back ISR across the Southeast Asia region and very good working relationships. There was a way to lease bandwidth quickly, and I think commercial operators at that time were making a big difference, along with some of our ISR partners that were also launching systems that could take photos.

And so they were doing a lot of the foundational collection and distribution of key data and it was complimenting what our defense systems were doing at the time. But if we're threat-based, then what has changed? Pretty much everything about that space domain. So now when I look at what commercial can bring, I still believe there is a huge role there, but we have to be very realistic about what's going to be effective. And so when we think about resilient systems and what commercial can bring to resilient systems, we can play the numbers game, we can play the different orbits game and commercial can be a part of that.

The question though is when we actually go to war, what happens to those systems and how do we think about our commercial partners? If they lose a system, what is the liability? Is the Space Force willing to cover that liability and that would include future revenue of what that system might have provided for a commercial operator? Are they willing to take that risk?

So it just raises, in my opinion, a lot of new questions about how we leverage commercial. It's not an if. It really is a how, and I think it comes down to being realistic about that conversation. Because when you're on the commercial side and you're not in the threat discussion, you're really thinking about the capability of your system. And in many cases, commercial systems have a lot of capability. They have high bandwidth, you've got the numbers in proliferated LEO, but in a threat environment it's not just about capability. It's about resiliency and how we protect those systems.

So there's a dialogue there. It's different than what it was during the last surge. We need to be realistic about the threats and what they can do to commercial systems. And the commercial providers need to be aware of those threats as well. I do think there's things we can really invest in now that allow them to be part of the architecture and contribute to resiliency. Things like compatibility, hosted payloads. On the networking side, common ground, common protocols and waveforms. Those are some of the investments I think we could do now to bring those systems into the fold. And then we need to have the very real discussion about liability and protection.

Lt. Gen. DeAnna M. Burt:

No, agree. So we've heard from the CSO as well about his lines of effort, and the first being that we need to develop combat-ready forces that are resilient and are ready for the fight. A key part of that is

ensuring our architectures are threat-informed and capabilities are delivered at an operationally relevant pace and speed.

Joel, what is your perspective on how industry can accelerate acquisitions in the procurement of space systems and related technologies that generate affordable mass in terms of that resiliency we're looking for?

Joel Nelson:

One of the things I wanted to focus on was talent development, and it gets into the US government side as well. I've had a conversation with Dave Hamilton at the DAF RCO over the years as well as Kelly Hammet now at Space RCO. And one of the things we've been talking about are the qualities that make a really good program manager. Whether you're in the government or you're in industry, it's almost like people are moving through so quick and we don't have the depth in program managers that I've seen at the NRO or some of these old space programs. And if you want to get to the speed of the acquisition, I really think it's that relationship between the government and the industry PM, government PMs that have been through the Education With Industry Program.

On the industry side, we've got to understand the risk posture. How you set your mission assurance requirements and the risk posture will allow us to go quicker. Sometimes we forget what the risk posture was of a program when it launches and doesn't work, but that's really that partnership and I think if we develop the talent on both sides of the fence, we can manage the budgets, manage the risk, and get to capability much quicker than we have been.

Lt. Gen. DeAnna M. Burt:

Well, thanks Joel. And to that point, Jason, Joel's talking a lot about talent management and how we work to increase speed based on the folks that we have on either side of the government versus the commercial side. I would ask you, as we seek to reduce procurement timelines and advance operational capability, what are some of the key enablers and foundational technologies that could support that effort, not just the human capital element of it?

Jason Brown:

Yeah, that's a big question and I'm going to come back to talent because that's, that's really needs to be foot stomped, but software and data are the capabilities that matter most in 2023. I was saying that a few years ago in the Pentagon, I'm not sure many people believed me, this is before the pandemic. I think there's a lot more believing that now. And so the short answer, what capability matters? The short answer is commercial cloud. Every enterprise that's competing is in the commercial cloud. We should ask ourselves, should war fighting be any different?

Now, I'll probably talk later about some of the things about maintaining the proper level of classification in the commercial cloud, but commercial cloud, it extends to space. We should view space architectures as an extension of the cloud. So a lot of lessons over the last year around space, around commercial space and some good... There's some things around cybersecurity, there's some things around what are commercial companies willing to do.

Despite all that, I think there's nothing that I've seen where we should not be leaning heavily into commercial. All that said, it's not a panacea, as Kay mentioned, it's how we should approach it. We have to give the Chinese a multi-dimensional problem to solve. And so it's not just about one approach or the other. It's about how do we find that right mix and then develop the right strategy which is about de-risking the future. And it's not just about buying a thing, it's about making choices around investments.

It's around changing the rules. There's lots and lots of rules that have to change. And then finally, it's about cultivating talent.

In a very practical program, Education With Industry, I would love to see the department of the Air Force double down on that program. And there's an actual program that does the opposite, where it takes industry and puts them in the DOD for a period of time. I think we need to double down. That's where we get that program management trade craft and other capability that enables us to get more capability to the force much more quickly.

Lt. Gen. DeAnna M. Burt:

Oh, thanks Jason. A resilient architecture is defined as one that can withstand fight through and recover from attacks. However, I'm interested in your thoughts on how do cost, schedule and performance parameters factor into industry's ability to support the realization of a resilient and effective architecture?

Kay Sears:

So I think we've defined what we want to get out of a resilient architecture. What we haven't really defined yet is how we're going to measure that resiliency, and I think it can be measured. We know with every orbit, every new asset, we have more resiliency. So we need a way to measure that. We need that to be across industry and Space Force and then of course, requirements drive cost and schedule. The complexity of those requirements, how much new development is included in those requirements. Of course today, our supply chain drives cost and schedule as well. But if you just look at requirements and the level of development, so if we can find a way how to measure resiliency, we can set those requirements at what that next thing that you're buying has to add to the architecture versus very complex requirements where we're not thinking about what is the piece of resiliency that this one asset or this constellation or this capability is going to bring.

So I think we have to look at a way to break that down. If we have a resilient architecture, then we're buying a piece of that every time and we're not overstating the complexity of those requirements, which is going to help us with affordability and it's going to help us to deliver faster. The architecture is what has to fight through, not every single asset. In fact, we would be designing things that might be taken on day one or day three or day seven, but it's according to our plan and our definition of resiliency. Right now, I think there's a great effort to add mission capability to existing programs of record and we're doing that through evolution.

If you think about the WGS system as an example, we're adding resilient capability with each new spacecraft that we build. That is one good path. We're also through Space RCO adding brand new capabilities, whether that's offensive or defensive capabilities. So each one of those adds a component to the architecture. So let's figure out how to measure it and then let's ensure that we're setting those requirements correctly and we don't get overly complex because that's really what's going to drive us into five year timelines and something that's not affordable.

Lt. Gen. DeAnna M. Burt:

Well, thank you. So we heard this morning, General Saltzman is our Chief Space Operations talk about competitive endurance, and we talked about responsible counter space. If you were here for the panel before lunch, we talked about how do we up our counter intelligence game to keep our adversaries from stealing our intellectual property and our technical capabilities and moving faster than we are.

So Joel, this question is for you. As we look at what it takes to protect our capabilities, what can be done now to protect our space systems and how can industry ensure the appropriate security of sensitive material in the development of new technologies and architectures?

Joel Nelson:

Thanks for the question. Two thoughts, one's more an operations-focused, in the terms of speed of defending against the threat. In my operations background, we worked a lot with a GOCO model, government owned, contractor operated, and I know with a lot of the new systems coming on board as Delta has figured out how to staff and operate these systems, maybe the color of money's off and you didn't get the money you needed to operate things quick enough. I've seen it, if the contractor's embedded with you, the operator, in a bigger way, the speed of which you can react, come up with a new TTP or procedure, you can really shorten that loop and protect a system quickly. So I think there is an operations aspect you need to think through in that GOCO model that it isn't as prevalent on the Space Force side of things.

As far as security, I would encourage the government to think about moving to an SCI model where you have an umbrella that you can get people read into. A lot of times in this world, I've seen physics get classified. Certainly in the air realm, anything you do to protect a platform in the air, you can probably do similar things in space. CONOPS, TTPs, war fighting isn't new. Yeah, it's might be new to the domain, but the over-classification and the inability to collaborate and talk about how these systems fit together and work together has been prohibitive. So those are my thoughts.

Lt. Gen. DeAnna M. Burt:

No, don't disagree. And we've had those conversations in other forums today and we'll continue about the over-classification and how we get after that data sharing.

Jason, you've served in the military as you mentioned in your intro, and you've worked now in industry supporting the Department of Defense. What are some specific areas of readily available technology that are mature innovation products or services in industry today that you see that we are not tapping into or utilizing as the Space Force that could have an high impact and low cost in improving our space resiliency?

Jason Brown:

There's not an easy button, that's for sure, but I would say, and it's not easy. So many of the problems that the department has are not technically difficult. I would even say that JADC2 is not technically challenging. It comes down to policy. So it's really focusing on the networking layer, which is at the base of any enterprise architecture, and that's the layer in of itself. If we think we're going to fight on SuperNet as is or some of our other classified networks as is, the latency is just... It's horrible to be able to do the kinds of things that we say we're going to have to do in a fight, in a high end fight. So the short answer to what can we do, software-based encryption. So literally running SuperNet on the commercial cloud is very possible to do it very secure, to make it very resilient, to move away from hardware-based encryption to really capture that capability that the cloud offers.

I'll just give an example from the private sector, day traders, or not day traders, I should say those power traders. They're the ones working at the big financial firms, doing a lot of trading. Four milliseconds or a five millisecond delay will cost them $4 million. If they have a five millisecond delay in their ability to sell or buy, it could cost them large amounts of money. So we say, "Well, we're not in that business." Well, we are in the business of defending against hypersonic missiles and so now we're talking about

milliseconds that matter. So we really need to focus on the networking layer and remove the policies around software-based encryption and really, really lean in on that.

Lt. Gen. DeAnna M. Burt:

Thank you. Jason.

As a follow up, Joel, I think one of the things we all are interested in is from an industry's perspective, what do you think that's out there that's not at a lower TRL level today that, but would mature in the next three years to a TRL level that the military would or Space Force would be willing to bring on as a relevant operational capability for the war fight in 2028?

Joel Nelson:

A few thoughts, some of these are more mature technology wise, but multi-mission payloads and reprogramability of payloads, the threat's not static. The enemy's evolving, learning, the ability to have on-orbit payloads that are reprogrammable to shift with a threat is important. Similarly, autonomous threat detection and what to do about things. You're not going to be in touch with some of these birds all the time either. So detecting a threat, reacting to a threat, as AI comes into play more, you're not always going to have that operator in the loop. And I think we're in this paradigm where the operator has to be in the loop. There needs to be a little bit of a shift to some autonomous operations, especially at the speed of protecting and defending occurs. And I'm not seeing that in the requirements. I think the technology's there. So it's a shift in what can be done and how can we do it in CONOPS, in operations as well.

Kay Sears:

That's another example where the airborne layer and the space layer could move in tandem, right? Because we're doing a lot of that autonomy, autonomous systems and AI in that to really create a force multiplier. We should think about what's the equivalent of that in the space domain? What's that force multiplier that relates to the software piece as well?

Lt. Gen. DeAnna M. Burt:

I'm going to throw a question because you guys have answered the next question we talked about, because you're all going towards the technologies. I think all of us in the Space Force are very much recognizing we are born in the information age as a service. We are not born in the industrial age. Much of the industrial base, the people we work with every day, how people have their value propositions in making money in a particular company, have typically been very hardware focused. I just heard all of you sort of talk about software, reprogrammable software, payloads, artificial intelligence.

How do we change the value proposition for companies in a way that would make them want to shift, particularly the bigs who've been very much involved in hardware, getting them more software focused rather than hardware focused? Do you guys have any thoughts on how we incentivize that? It's a free-for-all because that was a question I did not... I threw that on the table, so I apologize, but I'm trying to make it interesting based on what you guys gave us.

Jason Brown:

We talked about modeling in SIM, so the space domain has gotten incredible. This is an understatement, incredibly complex. Who knows what it's going to be a year from now, two years from now? We have to model that. Right now, there's not the incentive for companies to truly share models. There's not really

even an environment to really do that. So focusing on building that environment, by the way, this gets back into the cloud and some other conversations to really make this viable. Being able to model all of that will require a community. So a couple different examples, so NOOA has the Unified Forecasting System, which is a community-based modeling approach. They have various different vendors producing various different models and then contributing to it as a community.

The driverless car industry, community-based models, people are offering up new models based off of whatever research they're doing, whatever product that... It's a number of different players in that space. So being able to have a marketplace where people are offering models, that all starts with the requirements, by the way. We have to have a requirement to do all of these things and it's not currently there. They're just people are offering a model, they're saying it's open. It's not really open, it's open maybe to the vendor who produced it, but it's not open to the community. And I think the problem we have to solve,

Kay Sears:

I don't know, I disagree a little bit in terms of the open systems approach coupled with the digital engineering thread that we're trying to create. I think the big defense contractors realize that the value they can bring with open systems is what our customers want. And so being able to exchange those digital models, having early conversations about what kinds of digital tools are you using and when can we exchange? Where could we meet? Maybe in the cloud to collaborate digitally. I think we're going to try to put our arms around this and carve everything out for ourselves. I think that those days are over. We see the value of open systems, of bringing payloads, apps, on top of that and capabilities and building that system. That is what our customers are really asking for. So I see that happening now. I see it happening more in the airborne layer than it is in the space layer right now. I always think about NextGen, but I think there's no reason it can't happen in the space domain as well.

Joel Nelson:

I think, you bring up hardware and software. I've run both types of programs. Software is involved with a lot. I think sometimes we try to fit a hardware acquisition model to a software system. I think the government struggles with how do we buy software? We could go into examples of that, but we've also... I bring it back to the PMs. I feel like we've lost a generation of program managers that went to Silicon Valley. They haven't been in aerospace, maybe in the late 90s, early 2000s. So again, part of it's training our PMs to understand how to convert commercial development models to the government. And likewise, how does a government really go about buying software? I think there's more we could do there to figure that out.

Lt. Gen. DeAnna M. Burt:

No, I absolutely agree. I'll throw one more before we go to our closing question. My question to you is, what are we doing today as a government or the Space Force that you would say is obsolete and we have absolutely got to stop doing in your opinion, based on how industry is going, in the way we do business today?

I didn't mean to stump them, but I didn't.

Jason Brown:

It might be a long list.

Lt. Gen. DeAnna M. Burt:

I know it's probably a list.

What are we doing today?

Jason Brown:

Stop doing?

Lt. Gen. DeAnna M. Burt:

What should we stop doing that's absolutely obsolete and it's hurting us to continue to do because we're not moving forward with where industry is going.

Jason Brown:

I'll go back to talent. Managing talent very differently than the way that the traditional military model has managed. By the way, I'm very aware that the Space Force is focused on that and trying to do that. And I would just really like whatever barrier the Space Force is facing to be the force that they want from that talent management perspective.

I just encourage you all to keep driving because quite honestly, I think it has the potential to change a lot of things across the services. There's a lot of different aspects of talent management that everyone in this room who's certainly wearing a uniform or wore a uniform knows exactly what I'm talking about. Some of it, quite honestly, is just fundamentally getting some of the IT fixed in the A1 world. 118 systems and databases, many of which written in COBOL, that's what I saw just a few years ago. I doubt it's changed that much. So there's a lot to be focused on around talent and figuring out how to do that, how to retain the expertise, how to bring in new expertise. So that's where I would focus.

Joel Nelson:

I guess two thoughts. One, acquisition wise, again, I've used firm-fixed price when I was in the government, I've been on the recipient side. I think we, in industry, we get into trouble when there's NRE on fixed price. It's hard to quantify that cost and risk. And I think we need to think long and hard of, "Hey, let's get through CDR, define what we're doing, be a little quicker before we go to fixed price."

And then the second is I think the government should think long and hard about being a system integrator and what that means. It's hard. That's what you know used to pay us to do. Sometimes you take it on, but it can be challenging as we've seen on a number of things.

Kay Sears:

You took mine, so I'll add one. I think your incentive structure, your incentive structure for your PCOs doesn't match what you want them to do. So we're all set. We're all being told go faster, think out of the box. We got to bring the contracting office along with that.

Lt. Gen. DeAnna M. Burt:

No, all good puts. And I appreciate you flexing with me asking something different, but because the way we've been going, you're crushing all my questions. So I'll close with this, our conversation with this last discussion.

This morning, you heard General Saltzman outline his theory of success and for building a space superiority mission set that is effective. He stated the first tenant is to ensure that we avoid operational surprise. In your thoughts, what could we do better to avoid operational surprises? Is there something

on the horizon that you don't think we're addressing enough that we need to, moving forward, or we're going to fail?

Kay Sears:

I would say we underestimate the agility of our competitor and our threat, and we're looking for sanctuary again. OMIO, that's going to be sanctuary, it's not. P-LEO, that's going to be our sanctuary, it's not. So it is this agility that I think we're underestimating that has to drive us in the architecture to be sure that we are covering every one of those bases. I think the operational surprise, it is space domain awareness, but it's comprised of so many sub-elements of that that we have to be really, really good at identifying and tracking space objects.

Obviously the UDA loop that we talk about, the networked sensors and capabilities, that foundational network. So we can not just collect data, we can process it with decision systems at the speed of how we have to make those decisions. So there's this consistent evolution that we have to have as a part of our nature of what we're doing in space. And that has to translate into everything, has to translate into how we're buying, how we're evolving, the requirements, on top of that space domain core capability, and know that it has to be incredibly agile because the threat is incredibly agile. And I think if we can get there and we don't underestimate that agility of our competitor, we won't be surprised.

Joel Nelson:

I key in on the speed of decision making and the speed of the fight. It's going to happen quickly, I think. As I look at the architecture, we talk capabilities, effects, but when you get into what does the transport layer need to look like to talk to all these things and what does the battle management command and control? We're still a little stove pipe and it gets hard when you're acquiring pieces through different acquisition agencies. How does that all come together?

We've touched on AIML and the data, but again, it's getting you the information to make the decisions you need to make quickly and then what level of capability am I comfortable to put on board and let a system make its own decisions to protect and defend. Those are things I see in pockets, but as a community, I think we still need to wrestle through.

As I said before, I think the technologies are there to enable those things now, but it tends to be CONOPS and TTPs for you, the operator and the government to think about what are we willing to do. We have first lieutenants, captains flying around in F-22s, making fire control decisions and in doing things, space is moving to that. So how can we use technology to enable that decision making?

Jason Brown:

I'm thinking about Chinese spy balloons right now, and it isn't really about the balloon. It's about China's ability to offer a multi-dimensional problem to us. And we have to respect that. We have to acknowledge it. There's other things I'm confident are happening that we may or may not know about, that will generate a surprise. And so we have to acknowledge that. I think we talked about the UTA loop comes from John Boyd. John Boyd focused on people, ideas and technology in that order. I think we've got some great ideas, some great concepts. I think they're sound, the technology to actually achieve them is there. It's just a matter of the policy as we've talked about.

So then we can get to the really hard problems, technologically speaking, which is putting in machine learning agents into a model and SIM environment that can give me what-if scenarios. If something gets taken out, and we could do that from a programmatic, what do we buy? What do we build? Or we can do that from an operational, I need to shift some things around right now, but to reach that panacea, there's some foundational things that need to take place. And then I'll just end on people, ideas and

technology in that order. It comes back to really doubling down on your people, doubling down on the talent that exists and how we attract more.

Lt. Gen. DeAnna M. Burt:

Thank you all. I appreciate you. I hope the audience, we've talked about what it means to be a Space Force and General Saltzman went through the history today of the Air Force and how the Air Force evolved and then how we've seen the Space Force evolve. We don't do that without our industry partners. And it has been amazing to see the growth in industry and what we've seen from all of you, particularly in about the last 10 years. We've just seen it just come like gangbusters. And that's been huge to us because as a Department of Defense, we cannot execute without an industrial base that is supporting us and providing those capabilities that we would then use to defend the nation.

So thank you, all three of you, for being here today. We talk about the theme of this conference is about... We can see that this panel is an example of what I think the conference and I heard in the in the Intelligence Threat Brief earlier that the monikers should be on all of our programs and that every Airman, Guardian and industry is in the fight. So thank you very much for your time today, and thank you for being here after lunch and staying awake.

Jason Brown:

Thank you.