Defeating the Drone Threat

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Maj. Gen. R. Scott Jobe:

Good morning, ladies and gentlemen. Welcome to our panel today on "Defeating the Drone Threat." I'm Major General "Frag" Jobe, I'll be moderating for today, and we have an excellent panel. We have a limited amount of time, but we're going to dive straight into it.

So for our panel today, we've got Mr. Reva Reeves with Elbit Systems that is on stage right on the far side. Mr. Bart Olson to my right is from Northrop Grumman Working Future Concepts and Mr. Mike Holl from RTX is with us today. The United States remains the most formidable Air Force on the planet, but we've faced ever evolving threats and changing operational environments. All those come with challenges to include identification of threats and how to counter things en masse. Maintaining an advantage requires us to transform and continue to exploit vulnerabilities of the threat. Specifically in the drone environment we're going to talk to today.

We've seen it all over the planet, Ukraine, Yemen, Syria. It's emerged and it's prevalent throughout conflict. So for today we'll talk. The framing of this, we'll be focused on group one, two and three UAS systems. We're going to also frame it in the Indo-PACOM Theater, which brings unique challenges for distance and time, and we'll talk about those from design equipping, agile combat, employment, cost trade-offs, doctoral decisions, command and control for all the effectors that we're going to discuss today. So as we build up that framing, I'm going to open up to the panel for opening remarks and introductions. So Reva, if you want to kick us off, I appreciate that.

Col. Brad Reeves, USAF (Ret.):

Yeah, thank you sir. Thank you for choosing to invest your time to be with us here to discuss this important topic. No AFSC is immune from the drone threat. Look, the rise of the drone threat, it's culminated in this watershed moment in history that's built up as general job mentioned from the Ukraine war, the Israeli war, what's happening in Yemen, and now today, Tower 22 and Jordan, I want you to grasp this, Tower 22 is the first time in over 70 years that US ground forces have been killed by an air attack. I want you to let that set in for just a minute. This is unacceptable. As Airmen, we should feel a bit of righteous anger, but also of course do something about it. I want to share a short video with you. It's from the Israeli War. It's footage released by Hamas from a camera underneath one of their drones, and it paints a picture of a framework that I want to offer up to us today as a way to think about this new threat.

Listen, drones are the modern day IED. These low cost, readily available, inexpensive weapons can thwart multimillion dollar tech. They can wreak havoc on our forces on the ground. And like IEDs, there is not one magic solution. It will take a multi-layered approach leveraging both soft and hard kill capabilities. On the soft side, of course, we have signals intelligence to detect the threat. We have electronic warfare to jam RC and GPS signals. We have RF cyber takeover, which is a pretty interesting sophisticated technique where we actually take control of the enemy drones. And so you can imagine the fun we can have with that, put their weapons inbound back on their noggins. But of course soft kill effectors aren't in and of themselves enough. We also need hard kill effectors. And you know what these are? We have guns, high energy lasers, high power microwaves, the list goes on.

But also like IEDs, the threat continues to advance. And so today we're facing dark drones. These are drones that do not emit an RF signature. So our traditional counter UES systems cannot detect or jam them. Think autonomous drones or drones that navigate visually without the aid of GPS. We of course

have an even more complex threat in Swarms as that rises. And so for those that remember the old staff college days, when you learn the nine principles of war, the enemy is using these principles against us. They're using the principle of mass offense, surprise, simplicity. So we have to counter these. I'll tell you, I'm excited about the conversation today. I really believe that in a couple of years we'll reflect back on this and we'll see that this was a prophetic discussion. And my desire is that we do create enough righteous anger to build up some momentum to actually go do something about it because I do think we all can agree that the status quo is unacceptable.

Maj. Gen. R. Scott Jobe:

Thanks Reva. Appreciate it. Mike, you want to give us some shots?

Michael Holl:

Yes sir, thanks. Thanks for the invitation to talk about an important subject. Two big things that govern my view here is, the first is the sophistication of the enemy. We're talking about Indo-PACOM. I think we get a lot of our drone experiences from terrorists, Iran, back militias, the Ukraine, Russia war. And I'm not saying they're unsophisticated, but in China we face a threat where they have the resources and the infrastructure and the patience to develop something way more elaborate than we've seen before. As industry, we have to make sure our systems aren't brittle, that they can stay one step in front of this very sophisticated enemy. Example, I read a popular science article and they talked about Swarms like Brad just talked about. And one kind of a Swarm is the program Swarm. You got a bunch of rules in there and the Swarm attacks you and it follows rules and it's a tough nut to crack.

But then advanced above that is a Swarm. That's a learning Swarm that as the attack happens, the ones in front, the ones in back learn from it. So I'm not saying that China has that capability, but imagine that sophistication and what kind of systems you need to keep up with a threat like that to defeat that drone threat and Indo-PACOM. So our systems need to be flexible for that sophisticated enemy.

The other big theme is service specific needs. So we're here, we're the Air Force. This is about the Air Force, and we got to be careful with one size fits all kinds of solutions to counter the drone threat. I can think about the differences between the Air Force and the Navy. The Navy has a runway. It's out on the water, it can maneuver, the enemy has to find it. Pretty tough to maneuver if you got 8,500 feet of concrete somewhere, right?

Everybody knows where it is. You can't maneuver it. Passive hardening becomes very, very important. My company doesn't do that, but we depend on that. There's a difference there. Another difference is the Air Force, we have to use the medium that we're fighting in. So it's probably more important for blue versus red air, making that characterization an ID, maybe more important than some of the other services. So there's service specific needs. We can't fall for a one size fits all counter drone solution and we have a sophisticated enemy. We have to have systems that are flexible enough to account for the future threats.

Maj. Gen. R. Scott Jobe:

Thanks Mike. Bart?

Bart Olson:

Bart Olson, Northrop Grumman. I run a little shop called Future Concepts. Given 12 PhDs and a couple million dollars to go play. And what we've discovered is you need to think about this challenge holistically. We tend to think just about the effector, but I will tell you that the entire OODA loop is challenged. Sensing is a hard problem. Making sense of what you're sensing is a really hard problem.

Deciding how to deploy whatever assets you have available to you is a hard problem, especially when you have multi-services in a theater, all with their own stove-pipe command and control structure.

And then doing battle damage assessment is not a simple thing either. So drones class 1, 2, 3. It's interesting to talk about those unilaterally, but it's not a monolithic threat, it's part of a mix. And the adversary is going to throw a whole bunch of stuff at us. Drones are going to be one piece of the threat, but they're going to be part of cruise missiles, hypersonic systems coming at you, ballistic missiles coming at you. And your air defense system has to take this on from a holistic perspective. And drones are one key part of the challenge, but just one.

Maj. Gen. R. Scott Jobe:

Okay, great. Thank you panelists. So I'm going to start with the first question and I'm just going to go through the panel and let everyone comment on the question that I'm going to pose. The first one is the lifeblood of every commander in the field to coordinate their schema maneuver and to coordinate where assets are placed and to try to put your war fighting capability in the correct time and place of your choosing to get the effect you want is command and control. And in this area, command and control plays a unique role. So if you could give me some comments on our current systems, how can we make them more effective or more efficient, and see if there's any new capabilities that you guys are seeing out in industry as we look at C2 of this countering this particular threat?

Col. Brad Reeves, USAF (Ret.):

Okay, sure. Well first of all, I think as Airmen we own the market on C2. This is just our bread and butter. I think in the greater JADC2 construct and what we're doing with ABMS, we should take control of this narrative. I believe we're the right service to do that. So I'll lead with that. There's a lot of great stuff going on in industry right now on the artificial intelligence side. When it comes to command and control, especially with the drone threat, we have to be faster. So Bart mentioned the OODA loop. We've got to be able to get inside the enemy's OODA loop and most importantly, we've got to make sure that we don't allow them to get inside of ours.

And so just to give you an example, you've all heard of these little racer drones about the size of the palm of my hand. Today, they can put a weapon on there on those drones, and from about two kilometers out they can launch this thing. And you got with the time of flights of where they're at today, you got about two minutes to do something about it. Well, the current systems, the current C2 is not fast enough to detect, get a camera SLT over there, a human to look at that and now determine what that threat is and then to react to that and get an effector on there. There's just simply not enough time. So we have to rely on machines to do a lot of that for us. And so that threat detection, identification and then engagement, we have to automate that. And so the C2 has to have the capability to keep up with that and we'll do that through artificial intelligence.

Michael Holl:

Yeah, JADC2 airbase air defense. The Air Force is doing the C2 part first for airbase air defense. I think that makes a lot of sense. Getting everything up in the cloud so you're not dragging around a 19-inch rack of electronics and an ACE environment. That makes a lot of sense. It seems like it's making progress. And I'd like to piggyback off of what Brad said. If you can make that machine do more work, that C2 machine do more work, then you need less operators. A computer doesn't show up in the chow line, doesn't need a tent, you lower your logistics footprint. If you can make that C2 do more work and take away some of your manpower constraints. What kind of work, ID, characterization, making decisions about what is the priority threat, which threat to prosecute first in a Swarm, help that

operator increase that probability of success and then take away some of that logistic footprint by putting stuff in the cloud and making the machine do more work so you don't need as many people.

Bart Olson:

And I want to introduce efficiency as a term we need to keep in the front of our head. At the end of the day, you have multiple services in any given theater, they're all looking at a threat and they all want to take the shot. Somehow, we need to make sure that we're using our six-shooter most efficiently. So the THAAD Patriot goes after the high end threat. The cannon goes after the low end threat. The non-kinetic effect goes after this threat at a certain range. It's going to be one of those games where we need to help the commanders figure out how to use his assets most efficiently. And that's going to be a C2 challenge. We need some sort of decision aid on top of each services, TAOC, AOC and or CEC, CIC.

Maj. Gen. R. Scott Jobe:

Excellent. So if we're talking about agile combat employment and having dislocated forces, so squadrons that are spread out into small fighting units to mitigate some of these threats and complicate enemy targeting, could you comment a little bit on what the things that we should think about when it comes to C2 in a distributed operation like that and how we might go about utilizing some of the advanced AI or machine learning types of decision-making tools in that environment? Reva?

Col. Brad Reeves, USAF (Ret.):

Yes. So one of the things, and I think we're getting this now, obviously as Airmen we have to get away from the four-story brick and mortar large, centralized, fixed site command and control systems that we have in place today. And there's a place for those. But certainly in an ACE construct, you will have to leverage the dispersed forces with decentralized execution and that C2 is going to have to be localized. There'll be a commander on the ground, maybe it's a captain, maybe it's a lieutenant, but someone on the ground with that very small footprint of forces in the ACE construct, these are not big, and they have to be able to make the call. So they're going to have to their own, I'll say insulated C2 that can operate in their little bubble of their space. Now with that, it has to obviously be able to connect into the greater, I'll just call it JADC2 magical network for now, whatever that equates to and we're getting after solving that.

But they do have to be able to connect so they can get the full impacts of the joint force, which is what it's going to take in an Indo-PACOM fight to be able to protect themselves. But certainly again, artificial intelligence can really help us here because the sensors we can disperse, and these can be dispersed autonomously today so we have the technology to do this. So you can have just a few Airmen and instead of having to go set up TPS radars and large logistics footprints with generators and fuel and all of these things, the tail end that goes along with this that we just can't sustain across the island chains. Instead, you have autonomous systems, they deploy out these small sensors, they're forward enough to be able to get the range that local commander needs to be able to get situational awareness to be able to detect ID and defeat threats as they come in.

Maj. Gen. R. Scott Jobe:

Mike?

Michael Holl:

And so AI presumes that you have a data set to learn from and you can collect that data during the fight or you can collect that data before the fight even happens and have a way to have that database

available. It doesn't get trapped in any industry stove-pipe. It's available, we collect it and then you get a chance to teach those AI algorithms before the fight happens. I think one element that's going on right now is Ukraine and Russia are going at it. Are we keeping that data? Are we getting it to the right spot that everybody's doing these Gucci AI algorithms that we can use it to prime the pump to get that learning upfront so then we can continue to learn as a fight goes on. But we do everything we can to be prepared in a good data set in the right place to train all those good algorithms.

Bart Olson:

And I'll just add, Brad and Mike pretty spot on, but at the end of the day when we're talking about AI, I always go to zero trust and it's got to be homegrown, it's got to be our own. In the end, this is going to be a joint fight and we need to get out of the stove-pipe service by service. You go into the theater and PACOM is arm in arm. Every service recognizes they need each other in order to be successful. So we need to build a capability machine learning AI that is ground up, something we can trust.

Maj. Gen. R. Scott Jobe:

Great, thanks Mark. So a couple of threads to pull on in this. So we talked about detection and C2, getting a data set tagged and curated so we could actually build a digital environment to train some of these algorithms to help decision makers on the ground actually react in sufficient time to counter. Can we talk about detection a little bit of some of these small systems, especially some of the concepts, Mike, you were talking about with Swarms that are behaving in different ways as we look into the future. Can you talk a little bit about detection, what sensors we might use in that space, Reva?

Col. Brad Reeves, USAF (Ret.):

Yeah, it is a wicked problem as many of our problems are in today's environment. First of all, we want to have passive detection because we want to be in these small islands and these small teams, we don't really want the enemy to know where they're located because the first thing we do in this fight is we want to deny. So we deny access, we deny them the location of where we are. But of course today the passive systems aren't sufficient enough. I mentioned earlier, dark drones, the drones that don't emit an RF signature. So the traditional counter UAS systems that rely on those RF signatures to detect the drones are completely ineffective in this instance. So it requires an active sensor today until we can come up with something new and better. So in general, that gets us to radars.

Tower 22. I don't know exactly what happened there. I've only read what's in the news, so you probably know more than I do about it, but certainly a threat got in undetected. Let's at least agree as a baseline that was the issue. So why did that happen? Don't know, but what do we need to prevent it? Well, you need something that can detect in multi-domain. You need something that can detect slow speed maneuvering targets. You need something that can detect low altitude, high altitude at the same time. So these are things that a lot of our traditional radars struggle with today. Again, there's not really a one size fits all necessarily. So we've got to rely though on both the passive and the active to be able to detect these threats.

Michael Holl:

Right. I'd echo layers help. And some of the higher frequencies we'll do better with a drone Swarm that the enemy knows, I'll come in low, I'll be in the clutter. It'll be hard for that radar to discriminate. There's only so much energy and radar resources they can have. But now we introduce the idea of cost too. Those higher performing systems that can see those small drones that perform at higher frequencies that might stare and set a spin. There's a lot of cost in that. How do we bring that cost down to make it

affordable? But the other part of cost is a cost of failure, right? You go for a cheap thing. Is it really cheap if it doesn't work, if it lets leakers through, if you can't handle a Swarm at a low level?

So I think we know the physics of seeing these small drones. The reluctance is those high performing radars that cost more, is it worth it? And I think it is, and I think we ought to invest some in bringing the cost of those higher performance radars down. But right now you can't avoid it. It's just physics and you got to go there.

Maj. Gen. R. Scott Jobe:

Bart, I'm going to jump in real quick. If one of you could comment, and I'll let you finish on this comment, but if one of you could comment on maybe perhaps other passive mechanisms like acoustic come to mind, and we've seen some of those activities, but I'll let you finish and then you guys can ruminate on that.

Bart Olson:

Yeah, we're studying acoustic methods, we're studying hyper spectral methods. We're studying different optical methods. In the end, they all have their limitations, their challenges. Physics will solve all your problems by telling you what your limits are. I'd like to think of sensing as a joint game. Again, we have very good sensors. They're spread across the services. And I think if we're thinking about ACE, we need to think about distribution of the existing sensors that we have and then net them. Fuse what we're seeing from all domains, air, from sea, from whatever ground sensors you can actually put on the island without breaking the bank on number C17s, you need to take to whatever deployment you're doing. It is a wicked hard problem. And these things are small, they're fast and they're nimble. They can confuse you and then when you put them in a mix, you got to make sense of what you're seeing. So it's not simple.

Michael Holl:

Take a second faster.

Col. Brad Reeves, USAF (Ret.):

Yeah, sure, sure. So there are many things we're working on. So ideally we would love to get to the point where we just have passive sensing. And I do believe we'll get there by the way, I think this is something we'll get there. So things we're working on today, we do have acoustic sensors today. These are very effective, especially against the propeller drones, quad copters, things along these lines. So very effective in picking those up. They are short range, so that's slightly problematic. You don't get as much of a lead time for detecting the threat, but enough to get an effector on it. Also, we've got our engineers working on it, and I don't want to promise anything, but they're working on a passive radar system. And effectively it's a radar system that uses other radars energy to detect things in the air. So it's for airborne detection.

So this is another technique at least we're working on, and I'm sure there's many companies working on all sorts of Gucci techniques out there. But passive is certainly, I believe it's the holy grail. It's where we want to go. As Bart mentioned, the technology is just not mature enough yet to rely on it fully and also to be able to get, most importantly for it to be a targetable solution. So to be a fire control radar, if you will, fire control solution to give us the accuracy we need for the weapon systems. It's just not there today, but do believe it will be soon.

Michael Holl:

And the passive systems are hard for the enemy to target. They don't know they're there. EOYR, a little susceptible to weather, maybe better for Indo-PACOM than for something like UCOM. But again, layers. Layers work, layers are effective, they confuse the enemy. The enemy doesn't know if you turned your active radar off or it's broke. You have a passive system, it's a passive system organ, great. But those layers, they cause logistics footprint and they cost money. And that works against us to protect every base.

Maj. Gen. R. Scott Jobe:

Okay, great. Thank you for that. Since we're talking about detection and the threat and having multi-layer sensors and then infusing a C2 picture so we can get the right effectors at the right time and the right place. Can we talk a little bit about some of the trends in the counter UAS space? We've seen a lot of different capabilities fielded. There seem to be literally thousands of these out on the market. They change and evolve. Reva, you brought up the IED threat, how that evolved over time in the Iraq campaign and others. Can you give me some comments on what you guys are seeing as far as the threat evolution and how we're going to have to react to that in a fairly timely fashion to integrate new capabilities?

Col. Brad Reeves, USAF (Ret.):

Yes sir. Absolutely. So there's a lot here, we could spend all day on this. Let me start with a high level thought though, because this is something that I'm somewhat passionate about, is I don't believe we actually have a counter UAS crisis. We have a counter UXS crisis and certainly it's trending there. And here's what I mean. So there's an exponential growth today of all of these different domains and those robotics, so the UAS, USV, they're growing somewhere around 18 to 20% compounded annually each year, I.E exponential growth in the numbers. I think we all understand that. The USVs, so the uncrewed surface vessels, we've seen how effective Ukraine has been against Russia in using these. So again, this is something you think Indo-PACOM were surrounded by water, this could be a factor for our Airmen there. And then on the UGV side, the ground vehicles, China is investing heavily in ground robotics.

And so there's also this projected exponential increase in the number of UGVs that are going to be out there. So all of this means that it's a UXS threat. I believe we have to be able to defend in all three of these domains. It's not enough just to take care of the air. So that's high level. Since I mentioned dark drones earlier, this is one that certainly is a trend that we're seeing. These are certainly much more sophisticated, but still you're not talking millions of dollars by any stretch of imagination. So you can still have folks building these things in their garage and as they do that, of course a lot of the databases where we keep some of the commercial drones and some of the traditional systems rely on those to detect drones by loading them in a database, a pre-owned database.

Some of these are built in mom and pop garage shop, they're not in the database, and so they become what we call an unknown. And so it's critical that our systems are able to detect unknown threats as well. So many more trends, but I'll leave some for Michael and Bart to talk about.

Michael Holl:

I'll grab the mass production trend. We talked about that sophisticated enemy and that sophisticated enemy is very good at mass-producing high quality stuff now. So you just got this massive of threats that can be pre-positioned all over the place. What are you going to do that the cost exchange for a very cheap drone for almost any kinetic effector is high. Now you can start to put some of that cost in that better radar. You can get a missile that performs not as well if the radar does more of the work. So you

can try to do things, pull levers to make the cost exchange a little better, but you're dealing with that cost exchange of a sophisticated enemy that can mass produce these threats.

Bart Olson:

And I'll talk to the multi-domain nature of the threat. So we think of drones as just coming at you in the air, and if you can see them, great, you can do something about them. What about the ones that are in the air for a while and then they dive underneath the water, come to the beach and then pop up. You can go online and you can buy those drones. They're specialty is for oil platform inspections. It's like, okay, that's a scary trend. They're coming at us from all directions and we need to be playing a better game.

Maj. Gen. R. Scott Jobe:

Excellent, thank you for that. In all the endeavors that we do in the service and across the services, logistics and sustainment is the most difficult thing that we do. And so we'll talk about effectors in a moment if we get time to it. But what I really would like to talk about is potentially fielding some of these counter UAS systems. So we know we have the chief scientist, a global strike command in the audience today. And defending a missile field or a convoy to go inspect a field is much different than doing something at a garrison base, say a training base who's just doing day-to-day activities, which is challenging enough. And then in the ACE environment we've talked about, which is where we're framing things. So can we talk a little bit about effectors, how we might deploy them and sustain them in the field?

Col. Brad Reeves, USAF (Ret.):

Yeah, let me just tell you real quick what the Marine Corps is doing just because we're Airmen. We're learning organization so we can always learn from others. They have a concept, they call it expeditiary, advanced base operations. It equals ACE. It's the same exact thing as what we're doing with our ACE concept. It's distributed ops all across Indo-PACOM. They're working on a program that's called MA DOSS, Mobile All-Domain Observation and Sensing System. And so what they're doing with this because they realize they're going to have these small teams, again, all ACE is for the logistics side. They're trying to do push things as much as they can on the autonomy side and then also as much as they can, I'm going to call it hybrid power, but effectively where you have some solar, you have some small diesel generators that can power electric robotics, things along these lines.

And so this is how they're attacking the, I'll say the logistics footprint, everything that also has to be a small footprint. So in their instance, it's a sling loaded under an osprey. That's what their standard is. For us it may be a 130, something along those lines. And so they're trying to keep things small. They're focusing on the maintainability, so they want to make sure that the things are very low maintenance in the field, so you can just swap out a black box or whatever and keep going. You don't have to do a lot of heavy duty repair out in the field. So that's kind of that part. On the effector side, this gets much more complicated because now again, you're dealing with mass. And so when you're dealing with mass, then you generally speaking need quantity. It's mass V mass generally speaking, until we get the laser rifle perfected that's got the nuclear power generator in it or whatever, and it can just perpetual power and we're not quite there yet on that.

If you've seen some of the high energy lasers, these things are ginormous and take a lot of power. So we haven't solved that problem and it is a very difficult problem. But it does come down though to what Bart was alluding to earlier when he was talking about you don't use a Thad missile against a racer drone, for example. So you may want to use 762 rounds against a razor drone and that's sufficient,

something very short range. And so you do have to look at this and try to pair the right weapon. This is back in the old Jaws JM days, which I used to geek out on when I was a young guy, loves sitting in the weapon shop doing this, but you have to pair the right weapon to the right target. And so for some of the drones, it may be just bullets which are relatively inexpensive, they're relatively easy to move around, and it's something that's realistic for operators on these small teams to do without having a whole lot of specialized training.

Michael Holl:

So logistics in an ACE environment, we have these sensors. If you bring in a sensor for counter drone and one for counter cruise missile and one for counter ballistic missile and one for air traffic control. And so that's a pretty big logistics footprint. I think you got to start to make some of these sensors do double duty. Now, you might have to make some compromises. The air traffic control guys aren't going to like the frequencies and scans and stuff that you get if that radar is doing a counter drone mission. But again, finding a compromise. So one or two radars can do the work of a whole ACE environment, will save you a logistics footprint, will save you operators, spares, energy, fuel, all that kind of stuff. We got to look for a little bit of compromise to make, especially sensors do double duty. And then logistics of effectors, of course directed energy. Holy cow, it's just going to be a game changer.

You don't have any of the logistics of moving munitions, you just need that energy. I know Bart is going to talk about directed energy, so I'll leave some of it up to him. But we are starting to develop tactically relevant ranges for things like high-powered microwaves. So even if they can't do the whole job, if they can do part of the job, you save a lot. If you had a laser or a high-powered microwave doing some of the affecting, then that comes back to you in terms of magazine depth for your kinetic effectors.

Bart Olson:

So I have a colleague who says logistics is sexy. Logistics wins wars, and you have to sustain a fight. It's not one and done. It's wave after wave after wave. Your challenge is going to be resupply. It's going to be having enough gas, having enough power to be able to provide support for the multiple effectors that are going to be needed to defeat this threat. You need gas for all of the aircraft. That's the primary mission. And defense is a secondary mission. It's just one of those things where it's going to take C17s on any ACE construct in order to get this mission done. How many C17s are needed to do just a four ship on any island in the Pacific, roughly two to one, two C17s for every one F35 that you're deploying. And then you've got all the support equipment for defense that goes on top of that. Oh my gosh, this is a hard problem. So you got to think about that ahead of time before you even get to what do you think the right answer is.

Maj. Gen. R. Scott Jobe:

Okay, great. Well, we're closing in on about five minutes remaining. It's been a good panel so far. I'm going to go across the panel for closing remarks and then I'll tie up at the very end if we have a couple minutes remaining. So Reva, if you want to have some closing comments for us.

Col. Brad Reeves, USAF (Ret.):

So first of all, it really is encouraging for me to see the room packed here. It's going to take military and industry partnering together to solve this crisis. But the one thing I'll tell you is it is completely solvable. And if there's one thing that we as Americans are fantastic at, it's rallying together at times of crisis and coming up with creative solutions that will actually go and solve these problems and allow us and allow you now to go win our nation's wars as our army brethren would say. So counter UAS, again, a couple of

things I'd ask you to leave with. One is, I do believe we need to really think about this through the lens of counter UXS. I think that's very critical because while it's not in our face today, I'm telling you it's coming. So we need to be prepared and thinking ahead for that.

I do think thinking about this from a lens of how did we react and the react, counter, counteract all of this with the ID threat. It's not a perfect framework by any means, but it does give us some method to start learning from the lessons of the past because there's a lot of lessons we learned from IDs and if you think back through how we deployed early on in that war with soft skin humvees and light infantry, not a lot of force protection measures out there to where we ended with these huge up armored MATVs and MRAPs and all of the technology that went along with this, it was drastically different. And so what I want us to do now is learn from that and start thinking now during peace time, if you will, before we get into conflict stage of warfare, let's start thinking about what we can do to solve these problems.

And please, please, please engage with us in industry. I assure you we do not know nearly as much as you think we do as far as what you're dealing with every day. The only way we keep a pulse of what you the war fighter needs is when you engage with us. And so the Air Force is pretty good about talking to industry, but I just encourage you, it is time to open up, open kimono. Let's have the honest conversations. All the acquisition stuff that we have dealt with in the past, we don't have time for that anymore. We really have to move together as a team. We've got to be agile In the new initiatives that we're just announced yesterday at the Air Force undergoing, I applaud that.

We need to be able to do things differently because the status quo is just not working for us and this threat, while it's not, I'll say as sexy as maybe hypersonics or mirrors and a lot of these other things, which believe me, I love these exquisite weapons and all that. I'm a big fan of these, they are a lot of fun. But this threat can really derail us if we don't do something about it. So let's partner together and go solve it.

Maj. Gen. R. Scott Jobe:

Thanks, Reva. Mike?

Michael Holl:

Sophisticated enemy, we got to stay in front of them. Systems that meet minimum standards might not be our best play that we have to make sure they flex and meet future needs too. The other thing is one size fits all solutions aren't going to work. The Navy and the Army need their special requirements. The Air Force needs its special requirements. We've got to keep the eye on the ball and say, what do we need for the Air Force to make sure the Air Force can defeat the drone threat?

Maj. Gen. R. Scott Jobe:

Thanks, Mike. Mark?

Bart Olson:

I have a book recommendation for you, 12 Seconds of Silence. We sit here 80 years after World War II and we're talking about the same problem that we took on with Kamikazes and with V1s. This book is about the innovators who took on that challenge chartered by President Roosevelt to go take on the science and technology aspect of this whole problem set. And at the beginning of the war, they measured the effectiveness of our air defense by rounds per hit, and it was about 20,000 rounds per hit. By the end of the war this team had introduced a prox fuse that changed that dynamic so that the rounds per hit for our kinetic solution was eight to one. We can do that again. We just have to put our minds to it. Over to you general.

Maj. Gen. R. Scott Jobe:

All right. Well, thank you so much. I appreciate it. Thanks to the crowd who packed into Adams B today because it is actually a very full house in here. We appreciate all that. Thanks to AFA. But really Reva, Mike, and Bart, thank you so much. A round of applause for our panel if you would please.