

Fighting from the Inside: Air and Missile Defense of Forward Locations

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Lt. Gen. David A. Deptula, USAF (Ret.):

Well, good morning, ladies and gentlemen. I'm Dave Deptula, Dean of the Mitchell Institute for Aerospace Studies and thanks very much for joining us today for our panel on Air and Missile Defense of Forward Operating Bases.

Now, I don't need to tell this audience that this is a crucial topic and at Mitchell Institute we're going to be releasing a report on this subject later in the year. That said, we wanted to kick off the conversation as soon as possible, and that's why I'm really glad that we have the panelists that were able to join us today. The American way of war centers on credible, sustainable power projection. Our adversaries know that and that's why they've invested heavily in an array of offensive systems to hold our forward operating bases at risk. We need to be able to defeat those systems and sustain our combat operations. That's no small challenge. It'll demand new technologies, concepts of operations and tactics. Bottom line is, the Air Force and the Space Force need to be able to operate under attack.

So without further delay, let me introduce our panelists. First, it's my pleasure to welcome Lieutenant General Dave Harris, Deputy Chief of Staff for Air Force Futures. We're also happy to have retired General Gary "Nordo" North with us. He's currently the Vice President for Customer Requirements at Lockheed Martin Aeronautics. And prior to that, he served as the Commander of Pacific Air Forces. And finally, we're pleased to be joined by Mr. Paul Ferraro, President of Air Space Defense Systems for Raytheon. He's a tremendous expert on how to get after solving this challenging problem set. So gentlemen, welcome. Let's jump right into the conversation.

Nordo, let's start with you. Could you paint the audience a picture of how the threat in the Pacific has changed since you were PACAF commander and what do you think and how do you think we can generate combat power while under attack?

Gen. Gary L. North, USAF (Ret.):

Yeah, thanks Dave, and thanks to you and Mitchell Institute and AFA for all the work. And for those in the audience, General Deptula, of course, served in the Pacific quite a bit, 13th Air Force Commander, Vice Commander of the Pacific. So anything that we can't answer, he knows. And so what's changed? I spent a tremendous amount of my later years in the Air Force in the Pacific and watching not only China but North Korea. What I think has changed over the years is they've spent the last 30-plus years watching us. Since China's last defeat in their war against Vietnam, they have decided that they are going to be both militarily strong and they're going to take advantage of technology. And as one of our very senior leaders yesterday said, they don't operate under a continuing resolution. So they put a tremendous amount of money, time, and effort with their technologies, their advances in both civilian and military industry and then the use of military power.

And so what has changed over the years? Years ago, we all believed that they would be militarily capable by about 2012 to do whatever they wanted to do in a regional conflict. I left the Pacific as the Director of Operations in 2006, went to the Middle East, came back to the Pacific three and a half years later and was astounded at the dramatic rate of both their technological improvement and then their military ability to operate in a joint and defined warfare environment. That was 2009 to 2012. Since then, they have learned dramatically, they have spread their wings, if you will, and their joint operations and exercising not only in what we would know as traditional kinetic warfare, but non-kinetic capability has been absolutely astounding. You could see that in the unclassified domain.

Those of us and those of you who work in the classified domain know it is extremely challenging. And so is it insurmountable? I like to use what former Chief of Staff David Goldfein said, "It's not a bubble, it's Swiss cheese", and we've got to be able to figure how to inter-operate inside that bubble and to ensure that we can, one, operate, two, survive, and then be preeminent if and when challenged.

Lt. Gen. David A. Deptula, USAF (Ret.):

Hey, thanks very much. No, that's a good stage-setter. General Harris, you're responsible for planning Air Force futures. And one of the questions that I think everyone out here is interested in is, how much does this issue of being able to operate inside the kind of challenges that General North has painted is on your mind? What do you think about it? And then sort of a follow-on question, what are you gaining in terms of lessons or observations from what's been happening in the Ukraine-Russia fight in the mid east?

Lt. Gen. David A. Harris, Jr.:

Yeah, great questions. Thank you. So first thanks to AFA and thanks to the Mitchell Institute for having me here to be able to talk about this. I think this question, both parts of it, by the way, really relate back to what General North just said, and it's really the pace of the threat changing. And the Swiss cheese analogy, I think, is really good. Just the cheese is getting thicker and the holes might be getting a little bit smaller over time. So it's a growing threat of the ballistic missiles space. We heard General Saltzman talk about the growing threat in space being contested there. But I would tell you that as time continues to move, and we even see it today, that cyber becomes a more important factor in what we're doing. So I go back to this idea of is there really sanctuary? How are we operating from it?

And the first part is the base defense piece and why that's so important and why that's critical, at least in my thinking moving forward, that as we look to the Great Power Competition piece and we look at our homeland and no area having sanctuary, that cyber threat is real. And having a component commander or a commander right there that can actually focus on that threat is going to be critically important. As we move just even to current day operations, in my previous role as a DCFAC, we lost three soldiers at Tower 22 and multiple injured, and you could see the growing importance of base defense and how that's being pivotal in our ability to project power.

I think in the future it's only going to become more contested and more challenging. So this idea of having a high-low mix I think is going to be really important. The threats that are out there with one-way UAV attacks, small UAS, it doesn't take the Patriot or a THAAD to be able to take those out. There has to be a blend, but I tell you even more so than the base defense piece, it's really the ability to find it and track that to be successful in the base defense game.

Lt. Gen. David A. Deptula, USAF (Ret.):

I was smiling because you're so right. Folks, and I know many of you won't remember all the way back to what some people called WW Desert Storm, but afterwards there was a lot of consternation that, hey, you Air Force folks didn't take out any of the SCUDs before they were launched. To wit my retort was, well, I don't recall anyone from the naval component, the Army, the Marine Corps taking them out either. It's not an issue of the domain in which you do the response, it's you got to know where they are and what's going on. That's fundamental to this whole process. But I digress, but thanks for bringing that up. This one's for Paul and Nordo. I think one of the clear challenges when it comes to base defense is the size of the threat. We need solutions that are available in high volume, sustainable and affordable. So what's industry thinking about this kind of approach and can these objectives be accomplished at a reasonable cost?

Paul Ferraro:

I can start that. So thank you again for the opportunity to be here, sir. I think there's a couple of themes that we've already touched on. One is the pace of the threat, the pace at which it's emerging and the complexity of that. I would also say the breadth of the threat, it's no longer just high-end exquisite threats that we have to deal with. You already mentioned drones, cyber, other effects that we need to combat against. And really from an industry perspective and in particular, the industry primes, part of our role is to develop a thorough understanding of the complexity of that threat, decompose the primary mission objectives that encompass that breadth both from a cost-to-exchange ratio, a complexity of the threat itself. So we can propose architectures that are encompassing across this variety of threat space and keep pace with the evolution of it.

The exchange ratio becomes very important very quickly. We can't be shooting million-dollar effectors at \$100,000 drones. And really what that speaks to from an architecture standpoint is how do our command and control systems work? How do we develop layered defenses that allow us to do proper weapons pairing so we can maintain and manage that exchange ratio? We're providing effective solution sets with depth of resources to combat a swarm of drones, swarm of low-end effectors, and still have the ability to combat the higher-end threats that we're invariably going to have to face. So again, it's a combination of maintaining pace with the threat, furthering our understanding of what it is that our warfighters are dealing with and developing that breadth of ability to engage so we can engage across the low-end effects that we need to defend against as well as the high-end. But it comes down to a thorough architecture and architecture that's scalable and extensible that really, I think, is going to allow us to be cost-effective and meet the threat with pace that we're going to have to respond to.

Gen. Gary L. North, USAF (Ret.):

Yeah, I had a couple things from the perspective of an operational Airman, particularly when you think about hub and spoke and the agility of moving. And the number one rule of any operations, of course, is maneuver. So if you are going to maneuver between the first and the second island chain or therein, you're going to be operating in an environment where there's upwards of 250 million people. Some of the places that our military may operate from are adjacent to either civilian structures or at other nations military bases. I think the most important part of this is we talk about all of the traditional domains, but as Paul said, the one piece of this is the speed of which warfare has warped, if you will, to where there's a domain that we need to think about and that's the domain of time. How fast can we determine where a threat is coming from, what the threat is, and then how do we work it?

So the most important part, I think, that have always had in a military environment, in either peacetime or wartime operations, is our ability to manage our data. The old adage from an AVMer is, good data is good, no data is bad, bad data is treason. And so in our environment, we've got to ensure across the joint domain that the data that we have is both secure, accurate, and is presented, particularly when we have agile Airmen, Marines, Navy, and Army personnel moving throughout this environment. Connectivity and mobility are the success points that will enable us to, one, be able to first survive and once we can survive, then we can operate. And I think that's the critical piece of this.

And the cost imposition of this is really important because I agree that as we have seen in the Red Sea and we've seen with the Houthis that shooting a million dollar missile at a \$100,000 drone is not cost effective. However, the most important piece of this is the survivability of the force. So the most precious asset that we have are our men and women in uniform. And if it takes a million dollar missile to save an Airman and the tools that the Airman's going to use to commit combat operations, we have to do that until we can leverage and find a multi-level layered capability to defend wherever we are.

Are there any Airmen here that have served in Kunsan? Okay, the first rule of Kunsan is defend the base. And so in that environment, what we've got to do is be able to defend our forces wherever they are. And something we don't talk about very much is how you interweave the joint force into this, whether it's putting a Navy cruiser out somewhere where they can be part of the defense chain and then part of the kill chain to support our units wherever we are. So that joint interoperability and the protection of data across the spectrum as our forces move in multiple areas in time will be the difference between success or failure.

Lt. Gen. David A. Deptula, USAF (Ret.):

There's some great points in there in order that you all rolled into, excuse me, into your answer. General Harris, if we could segue from some of those remarks into a little more detail in thinking about their both active and passive means to accomplish base defense, what kind of thinking are you doing about the allocation of maybe not just resources but just thought into these two lanes of action?

Lt. Gen. David A. Harris, Jr.:

So both active and passive. First, there's a OSD and a RAND study that talks a little bit about the right mix of active and passive, and it's the same mix, I would say, the same discussion points about a high-low mix, the expensive and exquisite versus the inexact. So for active and passive, there's still some things in the passive side that are tried and true today that do provide a little bit of time and space, and that's the cover and concealment aspect of this. You could still look at hardening, but some of these things, depending on where you do it and what AOR, the expense can be cost imposition to us. How much do you harden? How much do we need to protect fuel, C-II runways and the likes? So there has to be a balance there within the active piece of this.

And what I really think back to when I'm trying to figure out what is the right mix of active and passive would be just go back to World War II in the Pacific and you think about the three lenses in which they looked at base defense and ACE and the defense posture that they had. They would fly aircraft off of an island to look for contrails in the sky and wakes in the sea to see what threats are coming at them. They would've to communicate that back as the enemy was advancing. They would have AAA pieces that were there so they could flush the forest to get back out. Really, things haven't changed much since then except for the technology and our ability to rapidly relay and to be able to sit there and buy time and space for us with some point defense to be able to flush the force to then conduct our pulses the way we need to.

But again, I go back to the scalability piece that Paul spoke about, that the defenses that we put in place have to be scalable, they have to move quickly, but there's lessons to learn from our joint partners as well as our allies and partners that are out there as well. And I'm going to harken back to the great philosopher and leader, General Hecker, who brought up the comment yesterday that said, hey, there's some things that when your back's up against the wall that you could really start getting resourceful with. And that was the fact that the Ukrainians today, looking at how they got after the problem of the one-way UAS problem and putting cell phones up on sticks and listening to the acoustics to be able to figure out speed, range, direction, tying that back into an iPad to a AAA operator. 84 missiles shot, 80 of them taken down. So that's pretty impressive.

But it does go back to the same thing that I just talked about for the island defenses here, and that's what they did is they sent something out by way of a sensor, they were able to track something coming in, relay that back. It's about the data that General North just talked about. My job is to protect the data and corrupt their data at the same time.

Paul Ferraro:

If I might add to that for one second, we talk about interoperability and integration and with the breadth of threat that we're facing, I think that's going to become even more paramount, how we integrate these systems into one integrated war-fighting capability. The amount of data that we generate with these systems, it can be overwhelming. What we provide to our Airmen needs to be meaningful and actionable. And to that end, many of the investments we're making and the emphasis on our systems now is finding ways to provide the Airmen and the users with information that's truly valuable to the war-fighting decisions that they're going to have to make. Airgap systems are not helpful. It would just require too many systems, independent systems to satisfy all of the threat space that we're going to face. Integrating them in a seamless way, providing useful war-fighting information on a single pane of glass, invoking AI-based decision aids, and really providing the warfighter the information that they truly need to manage this incredibly complex threat space is going to become more and more important as we move forward.

Lt. Gen. David A. Deptula, USAF (Ret.):

I appreciate that. Nordo, one back for you on the subject of lessons. It appears that some folks might be putting what they see happening in Ukraine out of context or they're making these observations without context. For example, commercial off-the-shelf quadcopters are probably not going to be the leading threat to Anderson or Kadena. The ranges involved in the Pacific drive different operating assumptions. So could you walk us through that a bit and how do we gain insight from the fight in Ukraine but not confuse these observations with what might be more applicable in the Pacific?

Gen. Gary L. North, USAF (Ret.):

Yeah, thanks. As we've watched not only the fight in Ukraine now approaching the third year, we've watched what is going on in the Middle East with Israel, and we've looked at warfare that we have been participating in literally over the last thirty-plus years at high end. We've learned a tremendous amount, and frankly, the more that it looks different, the more it looks the same. There is obviously in the Pacific what we call the tyranny of distance, and that distance is both geographical distance, it's the supply chain, it's how fast an airplane can fly, at what speed a ship travels and the challenges therein. But there are a tremendous amount of similarities as both the United States, Taiwan, and adversaries, both China and North Korea, look at the challenges of, if you will, Great Power Competition and warfare. If you look at the Ukraine, which General Hecker spends a tremendous amount of his time and his staff in the environment, from the eastern portion of the NATO countries to the Donbas is about 700 miles. From Guam to Taiwan is 1700 miles. From Australia to Taiwan is 2,700 miles, so the tyranny of distance is there.

The challenge is for all of us is to think about the horrific impact across what we all know and have studied called the DIMEFIL of the impact of warfare, not only against nation states and bad actors, but across the entire globe. And we have seen that in our lifetime many times. We've studied it from the history books. What I think is the same is a conflict in Asia against great powers would be under the umbrella of the assumption that the ultimate weapon would be nuclear. And then the assumption that as we have seen with the lack of air superiority that the fight in the Ukraine has gone for quite some time. So air superiority, even if it is localized, is going to be absolutely critical. And then when you think about the tremendous amount of both hypersonic and ballistic missiles that can be thrown from either China or North Korea is something that we think about.

How do you defeat that and how do you work that with high-end weapons against it, and how do you integrate it? No different from what we are seeing in Ukraine. The challenge from a Western perspective

is how low our magazines are right now and how industry, based on government demand, can generate. We cannot generate from our nation, our industrial base at the rate we were able to do in World War II because our nation is not on a wartime footing. And even if we were to go on a wartime footing, it would take years to be able to start to have a capability to replenish stocks at the rate that exercise and modeling tell us will happen.

The other piece, and I'll close it with this is, those of us who studied the Pacific primarily from a North Korean conflict and the devastation that would happen at Seoul is equivalent to what we are seeing in Ukraine, which is equivalent to what we would see in Taiwan. How do you recover from that? And I believe that thoughtful minds have studied quite well. What is your objective if you were China thinking about why do I want to take Taiwan? There's the political historical, there's also the industrial piece of it. And if it becomes an invasion of Taiwan, think of the devastation that that would be, not only to the population, but to the industrial base, not only there, but around the world. And so similarities, differences, thoughtful minds, of course, from across that DIMEFIL is critical before you make a decision if it's worth it to jump.

Lt. Gen. David A. Deptula, USAF (Ret.):

Great points. Go ahead, Paul, you want to jump in.

Paul Ferraro:

If I might add a couple of points that you touched on, which I think are incredibly important. A couple of things that we've learned from the ongoing conflicts is, I'll start with the good news first. The good news is I think many of our weapons programs have proven themselves incredibly effective, perhaps more so than, certainly, I would've anticipated and the resourcefulness of the individuals using them is remarkable as well. So that's great. Weapons work very well, and we're not talking our latest, most exquisite weapons. We're talking about weapons that have been in inventory for some time have proven themselves to perform as intended.

The part that I found staggering is how quickly we've depleted the weapons inventory and the weapons stores that we have. And we can talk about what's an appropriate inventory during peacetime and how do we replenish those stores once in use. But we have gone through multiple years of production capacity in literally weeks, and our ability to respond to that is, I won't say nil, but it's hampered at best. And when we talk about the industrial base and industrial base ability to turn on a dime and ramp up, quite honestly, I'm not typically talking about the industry primes and our ability to build product. The fact is that over 70% of our product is outsourced either at a material level or subsystem level that we then integrate, test, and sell off. We rely on over 14,000 suppliers to develop our products. It's the third, fourth, and fifth tier suppliers ability to respond. That depth of capacity, the ability for these small businesses to ramp up and produce the product that we need to produce the weapon systems that we ultimately deliver is oftentimes really where that difficulty lies.

We really need to take a good hard look at our industrial base at all levels, understand where the single points of failure are within the second, third, and fourth tier suppliers, and ensure that we do have the ability to respond, we have the elasticity in the supply base to respond. And that includes oftentimes redesign of weapons that perhaps have been out of production for years. We can't simply just turn on production of a weapons program that has been either in minimal sustaining rate or less than that for times, years, if not decades. That requires NRE, that requires redesign, re-qualification and the development of a new supply base to support the production of those weapons programs. So something I think we need to absolutely collectively think about and respond to.

Lt. Gen. David A. Deptula, USAF (Ret.):

General Harris.

Lt. Gen. David A. Harris, Jr.:

So great question. I wanted to add on just a little bit from my point of view and some insights. First is foot stomping the need for air superiority. I think that we can't overestimate what we're seeing and what's happening in the Ukraine right now and the need for air superiority. The other part of this is for resilient kill chains, to be able to continue targeting the enemy, making sure that we protect that data. And finally, I'd tell you that it's the affordable munitions and that's the part that Paul just hit on right here. I believe there's a trinity between ops, acquisition, and industry, and we need to keep that trinity alive and keep it in balance to make sure that once we have those three things in place, the next piece that I'll talk about probably is the logistics piece of this and being able to get those munitions and get those supplied to the point of need in a timely fashion to continue the fight and continue the tempo.

It's the tempo that I think with these stops and starts that we're seeing, that's allowing the adversary to take advantage of some of the gaps in our time and logistics. And then the other part of this is being able to bring things to the point of need and challenging our lines of communication, our lines of logistics. All of that is predicated upon a foundation that I'll say is just our Airmen. The creativity of the Airmen and what they're bringing to the fight, being able to operate in a multi-domain fashion. But more than that, understanding it's a joint fight. So I think this piece that we're going through with Great Power Competition and look into the talent management piece of it, this force development and what this future fight looks like, I think there's some good lessons that we can pull back to be able to infuse into the Airmen of tomorrow and being able to harness that creativity and innovation for them to come up with the things of an iPhone on a stick, to be able to come with these low-cost solutions that are going to get us where we need to be at the end.

Lt. Gen. David A. Deptula, USAF (Ret.):

Very good. Now you've heard a theme here of, look, some of the challenges over the years have remained the same, but one of the things that do or offer promise, what comes out of technological advancements and changes. And Paul, directed energy is one of those key tool that we might be able to use for modern-based defense. So could you help us understand what it'll look like to employ this technology from an operational perspective and how we're getting through this crawl, walk, run approach to capitalizing on directed energy?

Paul Ferraro:

Sure. I think the technology is there. We've demonstrated a number of systems. We'll put them in the prototype category to prove out the concepts, how effective they are and what their utility is. We talked about the magazine depth and need to do weapons pairing and I couldn't agree more. Our first objective is we need to maintain the safety of our Airmen and our bases and our assets and we will use the effectors that we have available to us to do that. But directed energy really offers yet another layer in this layered defense of a very cost-effective method of downing, be it drones or other less expensive and perhaps less sophisticated threats that are very, very real threats, threats to our infrastructure, threats to our Airmen. But I think the key to success here is not only developing and maturing that capability and that technology, but doing it in a way that allows it to be included in the overall architecture and layered defense.

That would then also include kinetic effects. It can't be one without the other. We still need the kinetic effects. We'll always need the kinetic effects. We're going to have that array of threats that we're going

to have to face, but it absolutely plays a role and a very vital role in properly managing the weapons pairing and pairing up an effective weapon, be it laser or high-powered microwave that has proven itself very effective in a series of experimentations that we've done most recently, and I see it being an integral part of our overall base defense architecture.

Gen. Gary L. North, USAF (Ret.):

Can I just add on to that, both to General Harris's comment about our Airmen. I personally love the patch on the shoulder that says what your career field is. I know under the ACE construct, I'm looking forward to the one that goes all up around AUR, because in our environment, our Airmen in an ACE construct are going to have to do a lot of things that they are not skill-trained to do. And so that environment of all of our different career fields, being able to force, inter-operate and train, particularly when you're out exercising, is going to be critical for success. If you go back and look at how our Army Air Corps worked in World War II across the environment, it was fantastic that everybody was all in and figuring out how to do business. So that's one part.

The other part, I would say that we tend to think that because of the way the Pacific is aligned, I'll take a bit of umbrage, that we may not end up facing small UAVs at short range. Both China and North Korea have infused people over the decades into other environments. We know at Guam that there are a lot of industries that may have a diplomatic in a civilian commercial industry rationale, but we know throughout the Pacific that there are people who, think about this, you can call them sleepers if you like, that may infuse into the environment, particularly in larger cities where we may operate out of, at least temporarily, who can open a suitcase and launch hundreds of drones at a moment's notice. As I watch these multi-hundreds of drones doing shows at events, you just have to think that this is mission rehearsal. And so in our environment, we need to think about the entire spectrum of how we will operate and then how industry can support that.

My closing piece about this is also about policy in the United States. Our partners, allies, and other nations have got some amazing technology. The UK just demonstrated on a ship, laser capability, which is pretty impressive. So somewhere in here, in a policy regime, particularly with our partners and allies, I know both in the State Department and the Department of Defense, we are trying to open the appetite to be able to ensure that we can use best of breed technology even if it does not come from the United States. And that is absolutely critical because a lot of our partners and allies have got very, very capable systems and we need to work with them. And if we have to or we need to, we use their equipment side by side with ours, particularly where we are engaged in joint operations or joint basing at different facilities.

And that interoperability ties into, just like we have done in Iraq and Afghanistan and other places, how do we operate in a common operating system where you've got different partners and equipment melded into share that same data across what we all know we need to drive to, which is an open system architecture, multi-security domain environment for success.

Lt. Gen. David A. Deptula, USAF (Ret.):

I'll just amplify on that last point, Nordo, in the context that if you go back 30 years, operating with partners and allies was nice, but the number of, the capacity that the United States alone had could accomplish a lot. Today it's not an option, it's an absolute necessity. So great points. Thank you. And nice segue on bringing up ACE because I one on wanted to ask General Harris, who is, obviously, we still have some large bases in the Pacific. We're going to have to deal with protecting those, but at the same time, if we're going to really actualize ACE, we've got to figure out how to defend those different locations. Could you expand a little bit on your thoughts on the topic?

Lt. Gen. David A. Harris, Jr.:

Absolutely. So first I would say that from an Air Force A-5 perspective, there's, I think about ACE in three different circles or three VED diagrams. First one is the communications. There's another circle that overlaps with that and it's base defense. And there's another one that's contested logistics or logistics under attack. That framework, I think, works well for just about every AOR that's out there, although that they optimize in different areas of those three circles. So USAFE has a CONOP for how they do ACE and the work that they've been doing on base defense and logistics. INDOPACOM has also been doing work with their concept and they're focused a little bit more on the command and control aspects of this and where they're going and how they span the vast distances to be able to start thinking about mission command, mission type orders, what's my PACE plan for the different communication sequence. In CENTCOM, they're looking at it from a little bit of a different perspective, and that's the logistics under attack. How do I harden fuel and ammo storage facilities, things like that.

So all three of them have value. You just have to tailor that to the different AOR that you're in. So we don't want to be overly prescriptive on how things need to be, but at the same point, I think those three elements are key no matter where you fight and how you fight from ... The part about the defense, I think just opens it up a little bit more because it's not just your Patriots and your THAADs and the things that we think that are going to defend these higher-end threats, but it's also the cyber piece of this, and I can't foot stomp that enough that there's going to be things being done to disrupt our kill chains. There's going to be things to disrupt our bases back in CONUS here that we need to protect against because our ability to get out the door, our ability to project power, all of that contributes to how survivable we're going to be in a forward location.

So with that, we had talked a little bit about it, I forget who brought it up, but the allies and partners piece. I'm going to flip that around a bit, and it's what can we learn from them? And I'll go back again to the UCOM scenario and some of the things that we're doing with ACE right now. I look at Finland and see what they do and how they survive and when every one of their runways is targeted. But you make your entire highway and your infrastructure and roads a landing strip for you, and you can pull off and you can rearm, refuel, refit and take back off again, they use speed. And for some of these things, it's not a defense system. It's speed.

So it's the principles of war and maneuver on how they're getting after the problem. So that's how I think about the ACE concept. And then the last part here on the allies and partners is in the INDOPACOM theater, it's things that we can learn from them. They know where the commercial fishing traffic is, they know where commercial shipping traffic is, they know the routes that go overhead. All those things that we need to take into consideration when we characterize the battlefield to understand what's different and what are these indications and warnings coming in that have to put me in a defensive posture to be able to start protecting my base.

Lt. Gen. David A. Deptula, USAF (Ret.):

All awesome observations. We've got about two and a half minutes left, so let me give you each one minute to offer your insights with respect to that question from industry.

Paul Ferraro:

Yeah, so I think, once again, we're touching on interoperability, integration, and command and control. Not being overly prescriptive with any one solution, but designing an architecture that's extensible and scalable to fit most any need. They're all going to be unique. To the degree that we can perform the right ops analysis, we can understand what threat space is unique to a given installation and really invoke a solution that is leveraging a common architecture, a common command and control that has a

resiliency necessary to survive, I think is going to be critical to be able to deploy at the speed at which we're going to have to move.

Gen. Gary L. North, USAF (Ret.):

Yeah, I agree. Everything that you said, I'll take a slightly different tact and it gets to the relationship. Industry's performance today depends on your success in the future. And so the relationship between industry and the military to bring best of breed and the capability and the relationships and the understanding of how to solve difficult problems is really important. So lean into industry. Industry, lean back into each of you so that we can understand each other better and drive to get a common solution. And then, I'll close with the part of this is really important that either long lead items to be able to allow stability, as Paul said in his company, in Lockheed Martin, we've got 13,000 tier one suppliers across 55 nations.

If there's a problem in funding in long lead for a major prime, it's a headache. For a second, third, or fourth tier supplier, it's a heart attack. And so driving acquisition, streamlining, and funding to ensure that the product is available in that domain of time when a warfighter needs it, is absolutely critical. So we need to be in formation together. We need to lock arms and we need to drive forward and we need to present strength such that an adversary has to pause to decide if they want to jump. Thanks.

Lt. Gen. David A. Deptula, USAF (Ret.):

Well, thank you all for a great set of remarks and a nice transition to Secretary Kendall's wrap-up here shortly. From those of us at Mitchell Institute, we wish you having a wonderful air and space power kind of day, and please join me in thanking our panelists.

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