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Lt. Gen. David Deptula (Ret.):

Well that's good. That's good. The audience is kind of silenced and we'll wait for the last few stragglers to come in, and I'll go ahead and introduce myself. I'm Dave Deptula, Dean of the Mitchell Institute for Aerospace Studies and we start this next panel with a very special presentation.

So first let me ask the representatives of the 178th Attack squadron to please come to the stage and surround this magnificent trophy here. Now the Mitchell Institute for Aerospace Study is very pleased to announce that the recipient of the General Atomics Remotely Piloted Aircraft trophy of the year for 2021 is the Happy Hooligans of the 178th Attack Squadron. And you can clap again. The Hooligans are based at Fargo National Guard Base North Dakota. And to join me in presenting the award, I'd like to introduce Lt. Gen. Russ Mack, the Vice Commander of Air Combat Command, Maj. Gen. Vinny Mac McDonald, Commander Air National Guard Readiness Center, and Mr. Dave Alexander, President of General Atomics Aeronautic Systems. So Gen. Mack over to you.

Gen. Russ Mack:

Thank you Gen. Deptula. And sir, thank you for your leadership at the Mitchell Institute. This award is presented annually for outstanding performance by RPA squadrons in achieving intelligence, surveillance, and persistent attack and reconnaissance over the preceding calendar year. While I can tell you firsthand what it takes to organize, train, and equip this incredible enterprise, I know that our RPA community is in high demand, and our combatant commanders just can't get enough of what they provide. So I wanted to say thank you to the Happy Hooligans of the 178th. They have exhibited exemplary performance this past year, and I'd like to offer a hardy well done by the Air Combat Command Commander Gen. Mark Kelly. Thank you.

Maj. Gen. Vinny Mack MacDonald:

In 2021, the 178th Attack Squadron continually stayed on the leading edge of MQ-9 war fighting excellence in innovation. The Happy Hooligans many accomplishments while protecting the American people, our homeland, and the American way of life distinctly identify them as US Air Force most outstanding RPA Squadron. Importantly the 178th is the first National Guard unit to be presented with this prestigious title, and I'm honored to be part of awarding them this trophy today. Air National Guard RPA units contribute to the total force the combat power needed to safeguard our nation's interests worldwide. And in 2020, the 178th sent the benchmark for this performance. Thank you.

Dave Alexander:

So General Atomics proudly sponsors the Squadron of the Year Award. We honor all the RPA Airmen. But during 2021, Air Force selected the Happy Hooligans as the top rank unit. The Hooligans completed their 14th straight year of 24/7, 365 combat operations. So I'll say that again. 14th straight year 24/7, 365, every second, every day supporting two combatant commands, an incredible achievement. So congratulations to the 178th, thank you for your service, you've made a difference, and most of all, thank you for our freedom.

Lt. Gen. David Deptula (Ret.):

Well thanks Gen. Mack and MacDonald and Dave Alexander and all of General Atomics. Once again, the Mitchell Institute's proud to present the General Atomics RPA trophy for 2021 to the 178th Attack Squadron, Fargo National Guard Base, North Dakota.

Okay ladies and gentlemen, please join me in one final big round of applause for the Happy Hooligans of the 178th Attack Squadron.

Heather Penney:

Good afternoon ladies and gentlemen, and welcome to our panel on autonomous teaming. I hope you've had an engaging day and learned a lot. And thank you for being here as we close out day one of the Aerospace and Cyber Conference. I'm excited to announce our latest Mitchell paper, I'm even more excited to announce our panelists. But first let me put a little plug in for a report, Five Imperatives for Autonomous Teaming. We know that the capabilities and capacity of the US Air Force's current force design falls far short of the requirements to deter and prevail against Chinese aggression, which is DOD'S pacing threat. The service must develop innovative operating concepts and grow its force size, resiliency, and ability to present complex challenges to Chinese forces that conduct large scale systems versus systems of warfare in the Endo Pacific. A family of unmanned collaborative combat aircraft have the potential to achieve these force design objectives.

Developing this family of CCA will require the Air Force to increase its understanding of human machine teaming dynamics that are critical to conducting effective CCA counter air missions, precision strikes, and other operations in contested battle spaces. The Air Force is now at risk though of making potentially irreversible force structure decisions, based on a limited understanding of how CCA can or should team with manned aircraft. We're looking to divest nearly 500 aircraft in the next five years. CCA can be a key component of achieving the force design that we need, but we need to make sure that we develop them properly.

CCA effectiveness and combat primarily correlates with how well they team with humans, not simply the capabilities they carry like weapons and sensors. Understanding these human machine teaming dynamics will be foundational to the development of CCA algorithms and the software brains, "brains" that drive these CCA behaviors. These software programs cannot be bolted on after we produce and field these aircraft.

So in the report we offer some areas that the Air Force can focus on to ensure that we get this right. Our panelists today will be able to contribute some great insight for military and industry for this critical issue of collaborative combat aircraft. So here to discuss with me our Gen. Clinton Hinote of the Air Force Futures, then we also have Mike Shortsleeve from General Atomics, then Robert Otis Winkler from Kratos, say hi Otis, and finally Mike Paco Benitez from Shield AI. Now Gen. Hinote... Now Gen. Hinote is the Deputy Chief of Staff, strategy, integration, and requirements on the air staff, the Air Force A5. We all know he is the thought leader for the Air Force. In his duties General... All right, let's give him round applause for that, thought leadership. Woo.

In these duties, Gen. Hinote focuses on developing future strategies and assessments of the operational environment. To that end, the A5 host war games and workshops to focus the development of future force design. And we at the Mitchell Institute are very fortunate to have Gen. Hinote give introductory remarks for our recent CCA workshop. Then we have Mr. Mike Shortsleeve. He's the Vice President for Strategy and Business Development at General Atomics. He's been with General Atomics for almost three years, having come from a rich experience that includes Big Safari, chairing the Air Force's C2 and Global ISR Panel, and as an A2 and other impactful assignments as an Air Force intelligence officer. Otis Winkler is a vice president for national security programs and corporate development for Kratos. His experience in a wide range of national security roles from Air Force fighter leadership and congressional liaison, to DARPA, to the Senate Armed Services Committee staff, to industry, and he has a master's from War College. At Kratos, he focuses on aligning their strategy with DOD, executive, and legislative strategy.

And Mike Paco Benitez next to me is the product manager for autonomy for Shield AI, focusing his work on a concept he calls AI for maneuver, using AI to increase combat mass and enhance mission outcomes. He's also the founder of the Merge Defense Technology Newsletter. If you haven't subscribed, here's a plug, do it now, it's great. And he's a contributing editor to War on the Rocks. His 25 year active duty career included both time in the Air Force and the Marine Corps, where he flew combat missions in both Strike Eagles and Super Hornets.

So with those introductions, we're just going to dive straight into today's discussion. Big news just a little over a week ago is that the CCA competition may kick off in 2024, which is really exciting for all of us to hear, even though we won't hear that much about this highly classified program. But the nearness of this means that it's time to separate myth from reality. So today we'll explore among our panelists where the technology is right now, and where it might be in the future and where it needs to be.

So to kick this off, Gen. Hinote, I'd like to direct the beginning of the conversation to you, because this is something I think you'll have very useful things to say for our audience. Secretary Kendall has stated his very ambitious timeline for fielding combat collaborative aircraft. But those of us who've been around the building for a while, this kind of sounds a little bit like a myth. 2027 is already within the [inaudible 00:11:18], right? And the Air Force typically can't even complete the capabilities gap assessment analysis of all alternatives and finalized requirements within five years. So are we going to have to wait for perfect, or can we buy and fly CCA in timelines that will deliver meaningful capability on an iterative basis?

Lt. Gen. S. Clinton Hinote:

Okay, so thanks Heather for setting me up with that great question.

Heather Penney:

I know. Well, we're not going to give you the easy ones.

Lt. Gen. S. Clinton Hinote:

First of all. Thank you AFA and Mitchell for sponsoring [inaudible 00:11:53] on the paper and I'm really excited about my fellow panelist and learning from them. So let's start with this. If we do it the same way, if we try to get the requirements perfect, try to [inaudible 00:12:11] we will fail [inaudible 00:12:18]. That's not where they're coming from [inaudible 00:12:30].

Heather Penney:

There you go.

Lt. Gen. S. Clinton Hinote:

Okay. Is that better? Thank you. All right. That was part of the technical training that we did not get to before we walked in. Well first I said thank you to AFA, to Mitchell, and to my fellow panelists. And I said that if we were to do things the same way as we always have, we will not accelerate change, we will not get to solving the imperatives. And so we're committed to thinking about requirements, thinking about acquisition, thinking about capability development in a different way. Now what's this going to require? It's going to require us to have war fighters and acquisition experts and testers and evaluators all together working together for the same goal. I also think it's going to require working together with our allies to be able to share the load and move forward faster. And I think there's one part of it that we need to discuss amongst ourselves as Airmen.

Because when we go fast, I'm not going to take credit for this, but I will say, I won't tell you who said it, he might take credit for it later, but it is important for us to realize that the first one sucks. Right? I mean so let's go back. I flew the first 89s, some of us did, I wasn't quite there, but they weren't all that great, and the first versions of certain weapons systems, they weren't all that great. It's important for us to realize the first few that we'll get will learn, will grow, will make it better.

They're called min viable products for a reason. We have to think about flying aircraft in the way that we think about developing software as a min viable product. And if we make improvements between today and tomorrow, we're winning, but we're not going to get it perfect the first time. In fact, we're not going to even know very much the first time we fly these things. And we've had some great partnerships with some of our great companies about flying, and figuring out what these are all about. But it will be important for us to realize that we will iterate and make improvements over time. The alternative is we wait for perfect, and you won't get it anytime soon. And that's not an alternative that I am willing to accept, and it's certainly not an alternative that we're hearing Secretary Kendall and Chief Brown talk about.

Patrick Shortsleeve:

Yeah, I just add a couple points to this. I would say that day one of strategic competition isn't going to be 2027, 2030, 2035, whatever date seems to be floating out there, I would offer that occurred decades ago with the Chinese and the Russians. And in my mindset, it's not so much about maintaining an advantage, it's about regaining the advantage. So we have no choice but to move fast on this. I mean it's simple as that. The chief staff of the Air Force I think said it best when you have to accelerate or you're going to lose. And so that's where we're at today. So from a technical standpoint, certainly companies like Kratos and General Atomics, we can go out and we can build the best unmanned aircraft that are out there. But I would offer that you've got to hone those skills well ahead of time before that platform arrives two, three, four years down the road.

Today you just saw you've got some Airmen up here who 14 years, 24/7, 365 days. That's a lot of experience. And I would offer that you could go even faster by leveraging perhaps some of the unmanned capabilities you already have in your inventory as sort of your first mover tech demonstrator for some of this development work. You don't have to wait for a platform to arrive two, three years down the road, you need to hone those skills today, because in order to meet those timelines that have already passed, you've got to use what you have at your disposal right now. Continue with the development process on the other side, but I would tap into what you already have from experience as well as platforms.

Heather Penney:

I saw you leaning forward there. Is there anything you wanted to add about minimum viable products in building them today?

Robert Winkler:

No, I think that honestly is key to where we're going. If you wait for perfect, as he has already said, right, we're we're going to wait for 10, 15 years. We'll get to something that's relatively close to perfect, but it won't be time relevant to either contain China, or be a factor to any fight that might be coming up in the next three to five years. And I think that that mindset has to grip us. I mean it's been adopted by most of the commercial industry to do a minimal viable product and then build off of that. We have that ingrained in ourselves in the military and specifically in the Air Force. We've spent a lot of time doing block upgrades over every single major weapon system. But we need to have the, in my opinion, the

attitude that we're behind and that we need to catch up as Mike said already, that to get after it instead of waiting 10 to 15 years for the next perfect.

Heather Penney:

So Otis, I'm going to follow up on that because one of the concerns that we all have is in order to be able to field these aircraft, they have to be affordable. Affordability is actually one of the objectives to be able to create the mass and the numbers that we need. So how do we begin looking at breaking that cost paradigm? I mean we've heard Secretary Kendall throughout a rough estimate that the teammate for the B-21 would be about half of the bomber's cost, but that would be about hundreds of millions of dollars. And that's not really attainable if we want to be able to do this in mass. So it's not a cost equation that works for us. So how do you see making CCA more affordable?

Robert Winkler:

No, I think it's a great question, and as you said it's key to the overall program. I mean, I didn't realize this until I started working with industry and in Congress, but we buy aircraft by the pound, which is, it sounds nuts, but if you go back and look at the analysis, it's about $2,500 per pound to buy a military aircraft. And it goes back through modern history is it stays relatively constant. AFRL has done a fantastic job and doing some really innovative development, and they've brought that down by a quarter. So now we're talking about 600 pounds for $600 per pound, which is fantastic and honestly revolutionary. But I don't think that even gets us to where we need to go. If you're taking let's say an F-35, which is by far probably the most capable and cost effective airplane that we have out there at $80 million a copy and you do one quarter of that, you're still going to be in the $20 million range to produce the thing that's relatively similar to the capability of an F-35, but unmanned.

That is cost effective and that would be wonderful, but I think the real key to getting affordable mass is going to be the disaggregation. So figuring out what subsets of mission systems that you can put on each individual aircraft unmanned teammate, that the whole of the formation is more cost effective and more combat effective than the individuals. And so by doing that, the only way to do that is to fly those mission systems. We're not going to have enough information and data. We can think about it a lot and there's a lot of great thinkers in this room, on the air staff, and in OSD and the like that can think about it. But until you're actually going to go out there and fly these mission sets with real people in combat situations, whether in training or out in the fleet and the field, we're never going to really know what the maximum effectiveness is by combining those different disaggregated mission systems.

Heather Penney:

And for those that aren't familiar, the dollars per pound rule of thumb for aircraft is that's a stand in for the raw materials, for the complexity of the systems, the engines because the heavier the aircraft, the more powerful the engine has to be, and all of the weapon systems that are on board. And what we've seen recently is that as we've had more capable aircraft, we've aggregated. So we've brought on board far more complex and advanced systems, which has also then increased the cost of aircraft. So that's why I think Otis is recommending that we disaggregate these onto unmanned aircraft. So by separating out and having more single function or simple function type aircraft, we can create greater affordability.

We actually wrote about that in our Mosaic Warfare Report, so I think that's a really important piece. But I'd like to get to the current state of technology and Mike, I'm going to toss this over you and then Paco, I'd really like to hear what you guys are doing at Shield AI, because that's really interesting. Mike, General Atomics has been a true disruptor in the field of unmanned aircraft. After all you guys were visionary in how you developed the MQ-1 and MQ-9, and these platforms still do a lot of important

mission sets, and they have got the potential to continue that in the Pacific like base defense. But let's talk about the future because you're still looking to disrupt. So how is GA thinking about collaborative combat aircraft, and can you give us a current state of play for these unmanned systems?

Patrick Shortsleeve:

Yeah, it'd be great to offer you sort of what we are doing, not only today, but what we're looking at for tomorrow. Most people associate General Atomics with the MQ-9 and rightfully so, it's a phenomenal platform that I think has not been fully utilized. But I will say that for us it begins with really a far reaching vision. And this is an interconnected framework. So you got this far reaching vision, you do an intelligent design, agile capability development, and then rapid fielding, right? You have to get the capability out there as quickly as possible. So all of our future designs and concepts fall under this umbrella of being sort of collaborative combat aircraft in one form factor or another. One of those particular ones that I would like to just address today is an aircraft we call Gambit.

Gambit actually is a family of aircraft. And we looked at the ability to strike a balance in what I would say is an advanced aircraft that's durable to do whatever job it needs to do, but not so exquisite and so costly that you wouldn't want to be aggressive with it. Meaning if the platform, while it's intended to come home, if it doesn't, that's okay. Because obviously the cost issue is a big factor when you talk about these platforms, and what's going to be needed in mass. So the approach that we're taking is slightly different. It's been done before, not maybe necessarily in the airline or air aircraft manufacturing I would say, but imagine if you will, that you're at an automobile production facility and you see the wheels and the chassis coming down the line, it turns off to the left and becomes a luxury model. The one behind it turns off to the right, becomes a family economy model.

So that same kind of concept is what we're looking at with Gambit, and that's why I say family of aircraft. What you're looking at is a core capability, sort of a core baseline of what we're roughly estimating about 70% of the cost of the aircraft. This would be common across multiple variants of that aircraft. So the approach here is to have a common baseline that establishes a chassis, landing gear, baseline avionics. And then what you do after that really is left up to the choice of the customer, sort of like the trim line that you would have. What do you want? You want a sport model? Do you want a four by four? So in this case for Gambit, it could be that you want an ISR platform, you want a weapons platform, you want an EW, you want something that's going to provide adversary air training.

So all those additional pieces and parts are added afterwards. So 70% of the cost up front with the core capability, which allows you to actually to mass produce these things. And then at 30% cost for the airframe comes into the types of wings that you want, the engines that you want, all of that. And again, that's separate from what I would say is the autonomy that's going to fly these things. But that approach that we're taking now is not so much just focusing on really a platform, it's more about the capability. So you got to figure out how those mission systems are going to be integrated into this. And so for us, obviously open mission systems, open architecture, I could throw out all these different terms to you, those are the ways that you're going to get after this. So for us, we're looking at it from a different perspective. Instead of going out and building four separate type of variance or models out there, let's use a common core chassis, and then let's start adding on to what it is that you actually need.

Heather Penney:

That kind of modular approach could be very interesting. But Paco, I really want to come back to you because you've been working on the agents, the behaviors, the autonomy, really how the system thinks. And this is actually what makes this capability realistic, right? Because we have to have something that has the ability to think, perform, behave, and act within the battle space that isn't tied to a human in the

cockpit half a globe away. So Paco, can you please speak to us about where you are with the autonomy, how you're approaching it at Shield AI, and where you're moving forward?

Mike Benitez:

Sure thing, thanks. So I think the three things I pulled apart here was time, platforms, and cost. Okay, so I'll just kind of run down the line with some somewhat coherent thought, we'll see what happens. So time. 2027, is it possible? Yes, it is not a technological problem, it's a bureaucratic problem, and I think everyone recognizes that the path to get there is a min viable product. We are passed to proof of concept, we've demonstrated autonomy in a simulated environment. We've demonstrated how to build modular systems and subsystems the components, and now it's about put it together, get it in the air, and get the sets and reps to fly, fix, and fly. And so to that, I would say that that min viable product is not CCAs, it's CCA Block 1. Define it, do something, snap the chalk line, and we can get the work. Industry is waiting.

For the platform, great discussion from Mike. What I would say is at Shield AI, I don't care about the platform, I care about the platform model, I don't care about the sensors, I care about the sensor model. And I don't care about the weapons, I care about the weapons model, because we need the models to then ingest to build the behaviors, which start to look like what a human would do with tactics. And so that's the thing that's the most important as we look at the integration of that. And those models, we have to get over vendor locked when we have this kind of system. We have to be forthcoming with those models, so we can train a behavior for it. If the Air Force wants a behavior to do X, Y, and Z, but the models aren't available to do that, well you're not going to get capability X, Y, Z.

And to Otis' this point about cost, just realized just like when Block 4 F-35 starts feeling the cost is going to go up because it has more capable systems. I don't think the government is ready quite yet to have a conversation about costing autonomy, but we are, and we'll be happy. In the next six months we'll have a lot to talk about as far as cost models, business models, and way we can go forward.

But I will say that software is not cheap, it's more expensive than you think it is, and I will tell you that even the software today is more expensive than you think it is. To Otis' point about $2,500 a pound, an operational flight program, one software drop to get it from development, test, and field it to the war fighter for a fourth generation fighter averages $250 million in the Air Force today. So let that sink in, that is not cheap, and we are going to have to adopt new processes and agile means to fly, fix, and fly this autonomy, because that autonomy is never quite fielded. Because once it fields, it is evolving with the operator in the environment. So if the red threat changes, the blue capabilities change, we have to put that back and relearn those tactics and behaviors so we can establish that trust and effective tactical autonomy.

Heather Penney:

Thank you. The fly-fix-fly, would you please unpack that a little bit for the audience because I think that fly-fix-fly is a really important concept for how we think about fielding minimum viable products, and then beginning to iterate them to achieve something that is really combat effective in the battle space?

Mike Benitez:

Sure. So I'll tell it in three steps. So step one of we call fly-fix-fly happens at the engineer level internal, and that's in a simulated environment. So not like a fighter sim but an actual engineering sim. So AFSIM, those type of environments. So what we do is we'll go and we'll build a behavior, we have objectives, we have a risk, we have commander's intent, and then we actually break it down by mission tactics, task behaviors, and primitives. And that's kind of the structure we use. And in that we field these systems

internally and then we actually put them through a red team analysis, and we would call team play. So they actually fight each other, play with each other and they're learning about what to do and what not to do. And we use reinforcement learning for most of it, but that's how we iterate on a very, very fast scale.

And that is one level of the fly-fix-fly. The second level is when we get the models provided from the systems integration lab so SIL, some of you might have heard of that. So now we're going to take that out of the simulative models, and we're going to actually plug it into the actual hardware on a bench in a lab and run the same things. And then the next step of that is taking an airborne. So we have engineers down on the squadrons for this experimentation for min viable products, CCA Block 1, we go fly, I like this, I don't like that, and we fix it. And how do we fix it is debrief. The most important part of everything we do is not the planning, it's not the execution, it's the debrief, and having a way to have explainability of what the autonomy is doing and what it's not doing, and what we want it to do and not to do is the feedback loop that we need to rapidly iterate to fly-fix-fly and establish trust in the autonomy.

Heather Penney:

Thank you. Gen. Hinote, I'd like to come back to you because again, you are the thought leader for the Air Force. We're a firm believer that to build effective human CCA teams, we must deliberately compose them to exploit the strengths of both the humans and the CCA. So in your mind I'd like to understand what do you think humans are good at, and what are CCA good at, like what's autonomy good at? And how do we then begin to compose and build those teams, Moneyball style so that we've got the right package going forward?

Lt. Gen. S. Clinton Hinote:

Yeah, it's a great question, and it's a question that I don't think we've fully understood or answered yet, but let me give you some thoughts that I think will help us all kind of move forward together in this. The first is that humans are... We're going to be making the decisions on lethal force, the employment of lethal force. That's an important principle that our government has placed on these systems, and I think it's the right one. That doesn't always mean that it's the next instant. Somebody says "Yes, I am ready to shoot a weapon," and the weapon comes off and it hits. There have been times when we've used autonomy, and there's some length of time between when the decision is made and when the outcome is achieved. I think that will happen again with CCAs, but the original decision to employ lethal force is going to be a human decision.

And in many ways the invocation of values into the way we fight is likely to be a human endeavor. And so in many ways when we go fight, we bring our values with us. That might include things like ethics, that might also include things like we're not going to leave our wingman behind and things like that. And so those types of decisions are likely to remain in the human realm. Machines are really good at executing, and they're really good at seeing an input and creating an output. So the execution of tactics is likely to be something machines are good at. They will know when they've trespassed or when they've gotten into a minimum abort range, and they will have the ability to execute off of that, in ways that humans can sometimes be challenged in because of all the information coming into the cockpit. Clearly autonomy in flight is going to revolutionize flight.

That will not only be true for combat, it's likely to be true for a lot of different areas across our economy and across our country. And I'm really excited about the democratization of flight that happens with autonomous flight. Lots of capabilities out there. We're seeing it with things like the delivery of logistics and the sensing of crops and such, and we're going to see a lot more of that. But clearly we do not need to have humans do the flying of these aircraft. There was a concept at one time where somebody

thought it was a good idea to have a pilot in a single person cockpit with one hand flying his or own aircraft and the other flying the autonomous vehicle, and that's not going to work. Any of us who have tried to actually go execute air tactics, no that would be very difficult. We expect that machines are going to be pretty good at execution.

Where I do think there is going to be kind of a gray area is in between that, in between execution and the use of judgment. And we're going to have a lot of experimentation to do in that area, and I expect that people in this room are going to be leading us in that experimentation. And when we talk about having war fighters in the development of these systems, I think that's where that happens. And I know that we have started that process. We have brought in war fighters to help in certain areas to help us understand what the human machine teaming might look like, but that's only begun, there's a lot more to go. And that's where it'll be fascinating to see what we all learn together.

Heather Penney:

So as we've been thinking about it at Mitchell, what it comes down to for us, and this is just one small component in addition to the form, fit, and function, right? So we've talked about disaggregating autonomous systems so that they can have different capabilities to feed that together, and how that might potentially change those formations. But what are the cognitive benefits, what are the cognitive differences between humans and autonomous agents? So what are humans good at? Thinking through uncertainty, improvisation, applying a cross domain learning, single shot learning. These are all things that humans are good at, and those judgment calls when there's no clear right answer.

Whereas autonomy seems to be really good at things like mass data processing, pattern recognition, and other things. So how do we begin to understand and create greater fidelity around those particular strengths so we can then field formations in ways that create conundrums, and cause uncertainty for the adversary and confound their ability to target. So with those thoughts from Gen. Hinote and how we've been thinking about this, I'd like to pass this back to both Mike and Paco. And Paco, we can start with you for a moment. What implications do you think, or Mike happy to go to you as well, whoever wants to jump in first. How do you think this is going to impact how you build the autonomy?

Mike Benitez:

Great question. Well, that's a lot to unpack in just a couple minutes remaining. So what I'll say is that war is a human endeavor, there is always going to be a fog and friction of war. When you look at the concepts of man on man teaming and CCAs, at the end of the day, outside of 10 miles, if you're flying at F35 that's outside within visual range, you are relying 100% on your sensing and your ability to sense and make sense of the environment, so your perception. We can do that with autonomy.

Decisions is where it gets the... That's where rubber meets the road with the conversation, but once the decision is made, that execution is machine speed and optimized to perfection based on the RL. And so what you're talking about is decisions, not perception, not execution, but making decisions. And that's where it gets back to the different degrees of autonomy and where we want the operator. Do we want the operator in the loop, on the loop, or off the loop? And I think we already said probably not off the loop, especially not in the CCA Block 1 min viable product, but eventually CCA Block 3, 10 years from now, there's a lot of things we can do in that decision space, that cognitive, and we're going to learn so much in the next just 24 months. It's going to be amazing.

Heather Penney:

Thank you. So while we've just got a few moments left, this is going to be the speed round, and so we'll go from Paco down to Gen. Hinote, because sir, we want to give you the last word. What do you

gentlemen believe is sort of the top two or three priorities that the Air Force needs? What actions do we need to take to begin to make these capabilities real in the timeframes that we will need them? Speed round.

Mike Benitez:

Act with a sense of urgency, aligned resources, leadership, and accountability.

Robert Winkler:

Well done. That gives me extra time. I think most important is to get this capability in the hands of the war fighter. Let them go out and execute, gather the data that Paco needs to be able to develop the algorithms to be relevant in a war fight.

Heather Penney:

Buy them and then fly them.

Robert Winkler:

Yeah. Buy them asap to get the data to fly them.

Heather Penney:

Mike.

Patrick Shortsleeve:

I would say prioritization of the mission and roles that you want to start with first.

Heather Penney:

Gen. Hinote, wrap it all up for us.

Lt. Gen. S. Clinton Hinote:

Okay. I 100% agree with what's been set up here. Paco, that was really good. Can I use that later on? This...

Mike Benitez:

It's yours.

Lt. Gen. S. Clinton Hinote:

Yeah, we need it. I think the only thing that I would add is that I have had our allies come to me and come to our Air Force, and say how much that they want to be involved in this process of learning and development. And I think that there's a possibility that it looks different with them than it does just with us and in a good way. I also think that with some of the agreements that have been put into place, AUKUS is an example, it's not the only one. But there are some incredible opportunities for us, as Airmen across different countries and different nationalities to learn together in ways that increase our ability to actually use this in a deterrent way, and in a way that helps us fight and win in the future.

And what I'd say is, in addition to everything we've talked about up here, I can't wait to be involved with our allies in making this real. Because I think it has the potential to do some really great things, not only

in the furtherance of the technology, but also in bringing us together for a common cause in a new world, in a world where we actually do have to stand up against something that feels somewhat evil, and feels quite urgent and we're not alone.

So I think the thing I'd like to close out with is I'm really excited about the possibility of partnering with these allies, and making this a really interesting journey that we all get to walk.

Heather Penney:

Thank you sir. Well, that's all the time that we have for today. And gentlemen, thank you again so much for being here on the panel today. Gen. Hinote, thank you for the leadership of everything that you're doing for our Air Force and for our war fighters. This is how we are finishing out the first day of the conference. We're excited to see you back tomorrow for our Mitchell panels on long range strike and future force development. And don't forget to pick up a copy of our new report on CCA teaming imperatives and back. If we run out, swing by our booth and have a great air power kind of day. Thank you.