Senior Leaders hold Background Briefing on Collaborative Combat Aircraft on November 17, 2022.

Reporters sat down with Maj Gen Heather Pringle, Commander, Air Force Research Laboratory, Air Force Materiel Command, Maj Gen R. Scott Jobe, Director of Plans, Programs, and Requirements, Headquarters Air Combat Command, Brig Gen Dale White, Program Executive Officer for Fighters and Advanced Aircraft and Brig. Gen. Joseph D. Kunkel, Director of Plans, Deputy Chief of Staff, Plans and Programs, Headquarters U.S. Air Force, for a background briefing on Collaborative Combat Aircraft ongoing efforts. This transcript was edited for length and clarity.

SAF/PAO: Thank you for joining us today to talk about the Collaborative Combat Aircraft. This is intended to be an information session to give background on the program.

Today we have Maj. Gen. Heather Pringle from Air Force Research Laboratory; Maj. Gen. Scott Jobe, Director of Plans and Programs and Requirements from Headquarters Air Combat Command; Brig. Gen. Dale White, the Program Executive Officer for Fighters and Advanced Aircraft; and Brig. Gen. Joseph Kunkel, Director of Plans, Deputy Chief of Staff, Plans and Programs at the Pentagon.

To start, we're going to ask each panelist to provide a brief description of their involvement with the CCA topic:

Maj Gen R. Scott Jobe: I'm the Director of Plans, Programs, Requirements at Air Combat Command. This includes plans, long-term money type of activities, programs, and working in near-term program submissions for program elements. Additionally, the bulk of what I do for ACC 5/8/9 at the headquarters is requirements and capability development. That's really the core of what we do on behalf of the Combat Air Forces. I work for General Mark Kelly.

My association and dealings with the CCA include myself and General White, we're Operational Imperative #4 lead for the Secretary of the Air Force. We preformed both assessment analytics and capability development work through the initial tranche – which is still ongoing.

Maj Gen Heather Pringle: I am commander of Air Force Research Lab as well as the Technology Executive Officer. AFRL is headquartered in Dayton, Ohio, but the research lab actually is all over the US, as well as around the world. We fall under the Air Force Material Command. I've been in the job two and a half years.

Brig Gen Dale White: I'm the PEO for Fighters and Advanced Aircraft. Most of CCA work is in the advanced aircraft division that stood up back in 2019. I've been in the job since and a lot of CCA work, as well as NGAD [Next Generation Air Dominance] family systems fall underneath me. We are headquartered at Wright Patterson Air Force Base.

As General Jobe said, we are kind of all into this together. This is really a capability delivery timeline. It's not the traditional stovepipe approach, rather all four of us work this each and every day together.

Brig. Gen. Joseph D. Kunkel: I'm the Director of Strategic Plans within the Air Force A8 here in the Pentagon. In this role, I'm responsible or the lead resourcing officer for the operational imperatives. So getting the CCA funded and off the ground has been my responsibility. The Secretary says he wants to deliver this capability as fast as possible. So that's what my role is in this is trying to get everything resourced.

That's one role. I tell you as a warfighter and 30-year fighter pilot in the Air Force, I would think 'if only I had more missiles, I could kill more bad guys.' And this is one of those capabilities that's going to provide an extra weapons bay, additional sensors and other advancements. So as a warfighter, this is critical to me. I think it's critical for the Air Force, and look forward to your questions.

Maj Gen R. Scott Jobe: I'll go ahead and kick it off. Right now, as we look at the Secretary's words or what interests him is China, China, China. But it's really about countering Chinese aggression that is the driving forces behind our design work in the Air Force and in future capabilities.

We know that the PRC and through the PLA Air Force are fielding pretty advanced capabilities, advanced fighters, everything from J-11s, J-16s, J-20s, and beyond, and advanced sensors and missile capabilities that go on those aircraft. That is directly challenging the United States Air Force ability to provide air superiority for the joint force. So the threat has gone into significant advanced abilities. We are now doing our best to stay up and in front of that to make sure that we can continue to provide the nation what they need for the joint force, which is air superiority as a primary Air Force mission.

Because the threat is so advanced and that they are also fielding very large numbers of fighter and bomber aircraft, command & control and a lot of other capabilities – that based on all of our studies, analytics, and assessment we know we need an ability to project force that is affordable. How do I get more aircraft into an air campaign at a reasonable price point that has capabilities that get us what we need for air superiority?

And so through all of that operational assessment work to the operational imperatives that General White and I work on with the rest of the team, we came across the game-changing capability that Combat Collaborative Aircraft brings you. This is partly affordable mass, but it's also an extension of capabilities of what we have on our crewed aircrafts. So think of a CCA as an extension of what an F-22, F-35, E-7 or perhaps what bomber can do because the way we're designing and developing these capabilities, we're going to have them interoperable with multiple types of Air Force aircrafts.

We're in a transition phase of bringing a new capability to the Air Force that's more revolutionary than evolutionary. We've done plenty of operational looks at what both the threat is

able to do and then what that balance of force brings if we bring a Collaborative Combat Aircraft to bear.

There's a lot of interesting things that a CCA with a lot of autonomy brings to the fight. One of them is your ability to manage risk in a different way that we've been able to do before. So if you get into any sort of air combat engagement and you get to a certain point where you as a crewed aircraft have to either make a decision on survivability, either pro or against yourself -- it's not a very good position to put a human American pilot into. These things bring you a lot of opportunity for tactics, techniques, and procedure development, with different kinds of scheme and maneuver, with different applications of firepower that you really have not seen before because I can assume risk in different ways than I had before.

If you think of these things [CCAs] as extension of our crewed aircraft and the ability to manage risk in a different way, it brings a lot of potential capability to a lower price point that we haven't seen before. And so we looked at the threat, then we've looked at the operational requirements from a warfighter perspective, and that's where we started all this activity.

What do we need to win? And that's how we started and came across all the work that the S&T [science and technology] community had already done. Then we further fleshed that out through our Operational Imperative #4, which is the Next Generation Air Dominance Family of Systems.

So that's kind of our war fighting journey. We started looking at the threat, started looking at working our way from the threat back into what capabilities we need to field and how do we do that to bring us to a position of winning.

Maj Gen Heather Pringle: Thanks General Jobe. There's no CCA on the shelf and so it definitely required some technology maturation and technology development. It required assembling a multi-disciplinary team, including my colleagues here and their teams, as well as a whole host of scientists, engineers, programmers looking at this challenge set and trying to help reduce the risk for what needs to go into the field.

And so, as you are probably aware, a couple years ago there was a Vanguard program called Skyborg that stood up and it was one of the earliest opportunities to look at an autonomous aircraft and what it might be. And this was a Vanguard program, it had a PEO, it had warfighters, it had a whole host of folks across the Air Force. We were able to look at some new technologies there. In particular, there was an autonomy core system that was part and parcel to Skyborg and this is really the algorithms that enables these aircraft to fly.

Through partnering with warfighters, with the developmental test community, the operational test community, we located some of our personnel down at Eglin to look at how these algorithms would be flying on a number of different aircraft. Not just one type of aircraft, but multiple different ones, so that these software programs, this autonomy core system would be more useful in the long run.

We partnered as well with the PEO and embedded some of our personnel there because we knew that if this technology succeeds there's a really great opportunity there. We also partnered with the warfighters here. The technology is in a great place. There's still more science and

technology to continue. These are parts of the investment review that has been ongoing here in the Pentagon. We have a number of folks looking at these technologies, testing it on the ranges even as we speak. It's really exciting to see this come together and we're in it for the long haul.

And with that, I'll turn it over to General White.

Brig Gen Dale White: The first thing I wanted to say is just based on what you just heard, we've done an enormous amount of analytical work. We've done an enormous amount of S&T and teaming and it's built a level of confidence in us that this is a capability we need to pursue and we need to pursue it quickly because we believe it's the game changer. I think the Secretary has made that abundantly clear.

And it will change the game, but it's just more than that.

From an acquiring perspective, it's going about how we do things differently in terms of just the integration of both the warfighter as well as the S&T community to move the needle, to be able to get to a capability faster.

One of the other parts I would be remiss about by not mentioning is the role and how we leverage things like the digital engineering - DevSecOps

But part of that also is the partnership with industry. One of the things we did differently as we went about this is that as we started to mature our own understanding of what the capability is, we looked to industry to tell us what their understanding is and what their capability is. And I will tell you, by and large, they have answered the call. They have shown us what the art of the possible is.

We have worked with many vendors and so we have an industrial base and very collaborative relationship. I think that's what's really key. It allows us to be more collaborative with industry and have exchanges at the engineering level to understand how we define the future and how we define how this capability can be fielded. And if we look very closely at it -- the Secretary has been very clear that capability in of itself is critically important, but the speed of ramp is really important. Because this capability is something that we do believe will change the nature of the fight.

But we couldn't do any of this if we didn't have the support of the department. So teaming up with General Kunkel, he and I had been at this for a couple years together. Making sure we had the resources in the right place at the right time. Whether we're funding the teaming arrangement we have inside the S&T community or whether it's work inside the operational community, he's been the one who made sure we had this capability with the Secretary's direction.

And I'll tell this is not one of these things where we're just sitting up here at the table together for the first time. I have AFRL people sitting inside the advanced aircraft division working with the acquisition community. I have operators inside influencing outcomes in real time. And that's typically not the way things have always been done, but we've really kind of leveraged the opportunity of this level of teaming to be able to change the game.

Brig. Gen. Joseph D. Kunkel: So how do you bring it all together? You have to resource it right. And I think Secretary Kendall has put the right resources to it, not only from a personnel perspective, as we talked about, but the warfighters, S&T [science and technology] professionals, those acquisition professionals in the room. But we're putting our mouth -- our money where our mouth is. And, you know, the Secretary repeats constantly, we've got one job. We got one job and that is to win. And we're convinced that this capability is required to win.

However, we're not going to get ahead of the Secretary, we're not going to get ahead of the FY24 budget. But what I can say is when our budget goes across the river, you're going to see a significant investment in this and the Secretary's guidance to me was resource this so we can field the capability as soon as possible. So you'll see a significant investment, not only the program, but also in some risk reduction efforts as well to help us field an operational capability as soon as possible.

Maj Gen R. Scott Jobe: I think I'll piggyback real quick. Fielding an operational capability that's [on a] threat relevant timeline is now what we're looking at. And because of the complexity of the threat nowadays, we're doing capability development - in my mind - in five distinct areas, which requires this level of teaming across the entire Air Force that's been fairly unique, at least in my experience.

The first is an acquisition path. While I won't say a strategy or an actual program, but an acquisition partnering that all goes all the way through industry, that understands what's in the art of the possible in technology. This is not something that's going to take us 10 years, but something where we can actually field a relevant capability to the threats, so an acquisition pathway. You got to have the resourcing, so money is required for anything, obviously, but it's not just that, it's also the amount of talent that's in industry. The amount of talent that's in the Air Force, the Department of the Air Force. So it's a resourcing part, money's important.

The second is requirements development. We have a lot of analytical support that shows that this actually changes the way that we fight, and it makes us more effective in the way that we engage in combat operations. This has been shown in multiple independent studies, which makes us feel highly, highly confident that we're on a solid path forward. So there's a requirements part to include concepts of operations, concepts of employment, how we plan on doing crewed, un-crewed teaming and bringing all of that together.

The next little piece of it is we got obviously have the organizational structure, right? It is the doctrine and organization; can we train our airmen the right way? Do we have the personnel that do it? We have the kind of legal authorities, we have the policy and all of those things in place, facilities to do the kind of activity - so are we organizing the right way? And that's a significant look because this is a new capability and you're probably going to see us conduct operations and organize units differently than we've done in the past.

And then the last piece is the S&T. We can't do any of that capability development without all five of those bins acting together in concert. And so we have this great partnership across the entire department of the Air Force that's pulling all those together to get this Combat Collaborative Aircraft capability.

Maj Gen Heather Pringle: Really through all of that - the experimentation and working together - that has really solidified our confidence in going forward, and we're going to continue down this path together and continue to work it every step of the way.

Brig Gen Dale White: The success I think we've had to date with ops experimentation has been pretty game changing. You have the analytics and everything that goes with it, but having that ops experimentation has given us a lot of confidence that we're on the right path of the technology. It is mature where we want to be.

And the second thing is, it also gives us confidence to hand this off to the captains and let them show us how it works. We've got to have that early user involvement. We got to have that early feedback because we have a technological foundation now where we can do just that. We have that flexibility, we have digital means by which we can design, and we have different things that allow us flexibility. We also mature autonomy in an iterate nature, and I think that's the key. The iterative nature that we're going to do this is going to be critical because 'speed to ramp' is how do we get a capability out quickly. We're going to continue to iterate that capability as a function of time.

Q: What are the different courses of action that the Air Force is considering to try to move the ball forward here?

Maj. Gen. Jobe: I'll talk about requirements just briefly. What we've already been able to identify with our industry engagements and looking at our analytics is kind of the broad requirements attributes of air vehicles, i.e. what we need with communications capabilities, what different missions we could do with what type of sensors and weaponry. We've already done that initial work drafting out the requirements attributes. They're classified so we can't give you specifics on what they are. Apologies for that, but we've identified what those are and we've gone through and put those attributes into some of our analytics and done some of the simulation models and analysis work to see how those particular attributes bear.

We've also done the requirements work at the basic level: How long can it fly? How far can it fly? How fast can it fly? We've taken a look at those and feel really confident in those.

We're doing the follow-on work right now of exploring: How do we train our airmen to do it? What would an organizational structure look like? What would a squadron in the future of these things look like?

We've just started exploring that work, but we're moving pretty fast to the requirements piece and in the concept of operation. We've done some virtual warfare center work already on this with the support with our industry partners. We've had actual F-22 and F-35 pilots and E-7 air battle managers actually have these things in a model representative environment, controlling them, and using them for war fighting activities like engaging in an air to air intercept timeline and shooting missiles, for example. So we've explored all that works and we're pretty far along in the process.

Brig. Gen. White: You have the operators in the loop piece and I think that's critically important because we're getting a better understanding of what we think we need this thing to do to do win. And that's exactly the key piece. *What capability do we need to win?* And so as a function of time, the tech maturation piece that teaming up with Vanguard was really critical. I mean we essentially, we flew the autonomous core system on four different vehicles. You've heard me talk about before the critical importance of platform agnostic autonomy. We've proven that on four different platforms.

So, we took that tech maturation and risk reduction work, and turned it into a concept refinement. We then teamed with ACC to see how do we get to the finer points of exactly what we need. Pulling in some of that ops analysis data, pulling in the S&T trades we did with -- during some of the tech maturation, doing the flights we did with an MQ-20 and UTAP-22 that you've seen with Skyborg and all of those things, and that's allowed us to build as we prepared a stand-up program of record. Once we get to that position, we have everything ready and positioned and ready to go. So we really got everything lined up.

And that's, again, what this comes back to. It's about now that we've done the homework, we have all the confidence in the world that this capability is ready to move forward and it's going to change the fight.

Maj. Gen. Heather: And I'll add that while the technologists, the scientists are helping with setting conditions for success we're also looking at what's next and what's the art of the possible. What else can we do to keep the science and technology pipeline running and just keep going looking for the next level of autonomy and the next, and the next, and the next… And what's going to feed the long-term future?

Brig. Gen. White: Yes - the key here is iterative. It's got to be the iterative piece. We're going to continue to say that, General Kelly said it at AFA, and I'll continue to say it's an iterative discussion. And the other piece is we can't do this without our industry partners. They've been with us on this journey with us for a while and that's allowed us to prepare, you know, the acquisition space to be able to move forward with this.

Brig. Gen. Kunkel: I'll just add to those risk reduction activities that I've mentioned earlier. You know, we know what it does, but how to use it is where we're exploring and where we're experimenting. And when Frag [Gen Jobe] or Dal [Gen White] talk about you know, talk about getting the captains involved early, it's getting those folks in early so we know how to sustain it and we know how to deploy it.

Maj. Gen. Jobe: And one comment on our operational analytic work for the warfighting requirements. We did not swing for the fences. We went for a base hit. I'm not talking about 'Terminator' Skyborg autonomy. We're talking about real things and real behaviors that real aircraft can do, and this is entirely an art of the possible. We're really comfortable with that.

Q: So what's left to be done before you guys are ready to roll out on a program of record? Are you just waiting for the budget?

Brig Gen Dale White: The Secretary has said you can expect a program and we're being prepared to follow the Secretary's direction. We are well on that path.

Q: With the timeline that you're looking at, will Skyborg be the autonomy core for CCA or will it be opened up for other possibilities?

Brig. Gen. White: The autonomy core system was meant to build a foundation for us to build on. Skyborg was a Vanguard program to inform that autonomy core system. That will be a direct lift that we'll bring in, and we'll build on top of that to continue to mature and iterate the behaviors and the autonomy we need.

Maj. Gen. Pringle: The only thing I'll add is that part of what Skyborg really offers, autonomy core system is a great starting point, it helped us learn a lot. We have a digital infrastructure, we have a physical infrastructure, and we have expertise that has really been developed, as you're seeing here, that is really going to increase our confidence that we are ready to run when asked.

Q: And how do you see the autonomy agent on Skyborg -- it's attributes different from say a Golden Horde?

Maj. Gen. Pringle: Golden Horde is a different Vanguard program and the way that has matured is more of a proving ground. It enables industry to come together with their autonomy systems and play them out against each other. So it's a little bit more of an ecosystem, a partnership with the PEO of weapons. The autonomy for Skyborg is looking at more aviation type behaviors. It's looking at how can it be the best extension of the crewed platform? How can it be the best partner? And so it's a different focus.

Q: No overlap there?

Maj. Gen. Pringle: Well, I'm not saying zero. We know that a technology doesn't know its application until we tell it. So you're going to need people who have a computer and programming expertise that are involved in both. There are technologies that, at the technology level, you can apply it in multiple different ways. But Skyborg and a ton of Golden Horde are different programs.

Brig. Gen. White: But I think it is fair to say, and the Secretary has been fairly clear on this, that if it's an autonomy nature, it will somehow map back to what we're doing and what I'm doing. So there be some algorithm development. Not everything that's done on Golden Horde will have applicability to what we're doing, but we'll have full knowledge of that algorithm development and we're all operating in the same space. There are no independent factions of autonomy in the Air Force that I have seen. In fact, we spent the last year and a half putting –

Maj. Gen. Pringle: Putting in the same direction.

Brig. Gen. White: Pringle and I have brought them all together to make sure we're all in perfect alignment. That as you can imagine, getting that choreography together, was quite challenging, but I think over the past year and a half, we've done just that.

Maj. Gen. Jobe: I think a simple example might serve. In Golden Horde, you see weapons flying formation together. Same thing with CCA. So a simple behavior like that may be similar, exportable or transmutable to each other. But there's a lot of things that weapons do that we're not going to have our CCAs do.

Q: In regards to the autonomy question, do you all have a path yet for how you see that interaction between the human-machine? We just talked about Golden Horde, which sounds more like a collaborative autonomy and I know that you're interested in sort of iterating the autonomy over time. Could you give us a sense of what that looks like? Is it going to start with, the air crew taking some control of these things? At least at certain parts of the mission? Or is it a perhaps in the beginning a ground control station? Like the way we do it with Reaper [MQ-9] today? Do you have a sense of what the pathway looks like in terms of that human machine interaction?

Maj. Gen. Jobe: Yes - we do [have a sense of what the pathway looks like in terms of human machine interaction].

First of all, there's a fair amount of mission planning activity work that we're going to embark on. We know we've got a pretty good ability to do auto take off and land. That's a pretty simple behavior. Auto routing and fuel planning, we think that's pretty good. Then I can go to a cap, and I can cap it and orbit at an altitude. So I can do a lot of mission planning type of activities. I can also do some formations station keeping. If I take off in my F-35 and I grab custody of a CCA, I can basically tell it with some pretty easy pilot vehicle or human-machine interface to fly formation off me and have parameters already established for all those.

So that's the way we envision this working and we've got our Air Combat Command federal laboratory at Beale that's working right now with F-22 and F-35 on doing that human-machine interface. They are focusing on that in the next year. They're going to start in calendar '23 and work on what are those interfaces look like, i.e. how do I do it? Is it a hands-on throttle and stick that's part of the OFP? (Unlikely, we think it's probably in another way.) Is it a tablet interfaces with the airplane?

We're still exploring all those technologies, but we see it more along the lines of the ability to issue some behavioral commands and do some mission planning, a combination of those two. Until I get to the point where I need to lethally or nonlethally engage with an effect, there's going to be a human in the loop for the foreseeable future. We just don't see a path right now for us to

field the capability that both is effective in this warfighting capacity, but also supports American values in the law of armed conflicts.

I'm not going to have this robot, go out and just start shooting at things. That's not something we're going to do. There will be a human in or on the loop in in that way to be able to target a particular track, communicate with the CCA vehicle, and then have it engage. Think of it as just an extension to your weapons bay if you're in an F-22, F-35 or whatnot.

Maj Gen Heather Pringle: I want to add to that, because we're working together on this as well. And so part of this human-machine interface is establishing appropriate levels of trust and so working through that in an experimental fashion so that we are iterating and at the appropriate times, we are appropriately working on the autonomy in a very collaborative way. So it affects everything from decision making to communications to understanding of what the system states are, what they are doing, what they're not doing and so forth. And so this is absolutely a really important part of understanding how the humans will interact with these platforms.

Brig. Gen. White: I think also, to General Pringle's point, there's this approach that we're pursuing very heavily. One instantiation of this coming from an AFRL product is the ability to be able to take autonomous algorithms, put them in the hands of the operator in a manned aircraft, a manned vehicle in this case, an F-16 and be able to have them build on that trust and autonomy.

We're going to have to continuously feed that idea that trust is going to be key, right? And I think one of the things we need to be very careful with. There's this idea that the advancement PVI [Pilot-Vehicle Interface] required for this is going to be significant. I would submit to you, if you're talking about it from a perspective of a fourth gen aircraft, you would probably be right. If you're talking about it, from a perspective of a fifth gen plus, PVI has advanced considerably. So, our plan is to make sure, as we meet the minimum viable product on the autonomy to get something fielded, we're going to leverage as much PVI we currently have and then build trust in autonomy on top of that.

Maj. Gen. Jobe: We'll iterate through autonomy pretty quickly, too. I actually see autonomous behaviors or things spilling out of the CCA and into the fourth and fifth gen fleet as we know it. And I give you a prime example. In 2020, when I was in Afghanistan and I put a sniper pod on a Taliban in a tree line, engaging the enemy, right? And then I'm told to go put a gun pass on that. It's a very, very difficult task to manage your sensor, manage your aircraft positioning, and set yourself up on a dive angle, and then engage the gun on a very small point target.

Well, if I have an autonomy behavior that can tell me to put myself on a 25 high angle straight wire by pushing a button, how much easier is it to me just to manage the sensor, right? Now my life just got a whole lot easier. We're going to see a lot of that cross-pollination of tech out of CCA that goes into every everything else.

We're pretty excited about that as well.

Q: General Jobe, you had alluded to the idea that, you know, there's a whole DOTMLPF set of changes that you have to make to accommodate all this rapid iterations. I know it's early and so this is maybe an unfair question, but have you thought yet at all about the kind of organizational change? Like, whether you need new kinds of experimental units? Whether current flight test squadrons are really appropriate for this kind of thing.

Maj. Gen. Jobe: Yes - we have. In fact, we probably see a place where it's a combination of what we know is developmental test now or operational test. It's probably not either of those is probably a bit of both. To a *Guardians of the Galaxy* reference - something good, something bad, a bit of both - it's probably going to be a bit of both. But we're working our way through what that looks like and it is going to change over time as well. So we're going to be flexible in our approach on how we develop these operational units at the end state that have CCAs that are doing mission generation that then go team up with crewed craft - then we have crewed effort teaming and we are rocking and rolling.

But in the interim we're going to have to iterate our way through what that looks like. So something that we have never really even thought about before in a typical fighter squadron is - do I need a data scientist, a coder, and an intel person that's digitally savvy to bring in all of the data that comes off of one of these and then do the reprograms and behaviors to be smarter like from the first go of the morning to the first go of the night? Questions like that. We haven't thought about that in any way shape or form. So we're going out to our tech industry partners to help us understand what that looks like. To that end, we've talked to them about mentoring us on how we do that squadron development organizational structure because it's a bit different.

Brig. Gen. Kunkel: And how they got to be [integrated] are they connected within a fighter squadron or are they somewhere else? You know that's all part of it [what is being explored].

Maj. Gen. Jobe: We are not being deterministic about that right now. We're being open minded about it, so that we can do it smart.

Brig. Gen. White: We do know though, and we continue to reiterate this across the four people sitting in this table, the experimental ops requirement is consistent need and we will pursue that. We're still testing. We just finished more testing on the XQ-58 out of Eglin. And that testing focused on building resilience within the range so that we can continue to build on it, so that there's no shortage of opportunity we'll continue down that path and experimental operations will feed that.

Maj. Gen. Pringle: It absolutely is informing where we're going. What we want to be able to do ultimately code in the morning, fly in the afternoon, but frankly, even faster than that. So it's going to require different ways of thinking about how we get after this. And we're learning a lot from what Vista is doing, what the other experiments are doing right now today and working with ACC so that they're ready when the time comes.

Brig. Gen. White: As you hear all this going on, the one thing we want to make sure you know, and the Secretary has said it – is the speed to ramp that is going to be key. It's been our key

focus. I mean that's what this discussion is all about. We've done the analytics, we've done a lot of the tech maturation. We thought we moved the needle and speed of ramp will be the focus.

Q: Based on all the work that you've done already, with industry, everything you've observed where that technology and all those other things that you've talked about -- based on where those stand today, how long do you think it will take between the time that you kick off a program of record for CCA? And how long do you think it'll take to actually field a system that has at least the initial capabilities and attributes that you're looking for as part of the CCA vision?

Brig. Gen. White: I don't know that I would go into timelines because of the sensitivities, especially since were are pre-'24 budget.

Maj Gen R. Scott Jobe: So the warfighter will tell you, six months ago was when I needed it, no matter what really happens. [laughter]

[crosstalk]

Brig Gen Dale White: Big surprise, that's always the case.

Q: In terms of having the man in the loop when applying lethal effects - do you envision having a pilot, commander on the ground or crew member actually hitting a button or pulling a trigger to actually launch a missile? How would that work in a very dynamic air-to-air combat environment?

Brig. Gen. Kunkel: We''ll work on the PVI on this. I don't know if its going to be pushing a button or some other designation. American values there will be a person in the loop and there will be a person that consents to weapons coming off an airplane.

Maj. Gen. Jobe: And probably some non-kinetic as well. I mean, you could easily see some non-kinetic effectors being just as bad if things go wrong as a kinetic effect. But I think our initial thoughts are its probably some sort of designation on a screen or a button or something in a cockpit with a person flying in vicinity of one of these. But there's also probably some mission planning aspects of it, too. There's probably [inaudible].

Q: I wanted to ask a question relating to Ghost Bat. Could you talk about why a single platform was chosen for that from Boeing Australia instead of having a competition for that?

Brig. Gen. White: I think you'd have to ask Australia for that question. Yeah. That was I mean, that's what that was born out their RAAF [Royal Australian Air Force] and so I don't know the details behind how they pursued it.

Maj. Gen. Jobe: Can I ask for a clarification? We haven't made any decision on any air vehicle, and we will have competition in the in the CCA.

Reporter (follow-up): I think the experimental side of things. From what I understand from, there will be experimentations with CCA using Ghost Bat.

Maj. Gen. Jobe: Right now, because our partnerships are so important to us, we're partnering to learn from the Australians and what they're doing with their program. Not that we're adopting that program, but just to learn from them. And then they're doing the same thing for us. We have multiple engagements at Air Combat Command and here up in the Pentagon, with the Royal Australian Air Force on what they're doing with their programs. So we're trying to learn from each other. This is really about a campaign of learning, it's not about MQ-28 Ghost Bat.

That's what they've chosen. We're just trying to learn on their journey - what crewed, uncrewed teaming kind of concept that they call 'loyal wingman', as well as other things over the time. Just trying to learn from them on what they've done well or what they done poorly. And they're going to be the same thing with us.

Brig. Gen. Kunkel: And our partnership with Australian Air Force and the Royal Air Force and advanced capabilities is really strong.

[crosstalk]

Maj. Gen. Jobe: We're doing the same thing with E-7 Wedgetail too. We're learning from them since they already have it

Maj. Gen. Pringle: And we're doing the same on the science and technology side. We have a S&T relationship with Australia, as well as other countries.

Q: A lot of CCAs talk is about the software side of things, the algorithm side of things. How do you match that with the actual platform - developing what the requirements are going to be for the vehicle?

Brig. Gen. Kunkel: Platform and mission systems, is that what you are getting at? Platform and mission systems and then the software or systems required?

Reporter: Yeah. What the actual vehicle is going to look like, that it's going to have?

Brig. Gen. White: It's really more a function of the environment it's going to operate in - how much range it's going to need, how survivable it needs to be. All those things are still things that lead to discussion in terms of what an air vehicle is going to be. And so that part hasn't really changed. In this particular case, we've said before that the future fight is more of a systems fight, and that systems fight is found really in software and mission systems. You're still going to need a platform because it gets those systems to the fight, but the simplicity of what an air vehicle is going to be - how it's designed - is going to be based on the simple things we've always had -- which is range, survivability and payload.

Brig. Gen. Kunkel: But you're developing those concurrently?

Brig. Gen. White: Absolutely, they are developed concurrently.

Maj. Gen. Jobe: And the architectures are such that you have things like basic flight controls that are not tied and coupled to mission systems. You have different skills that you can bring. And I hate using the iPhone [example], but it's a pretty good one, right? Where you can bring in different skills by bringing a different app in that. But it doesn't get into now I got to go test all the flight controls again because all that's tied together, the way we've traditionally done it - we're getting more of that open mission system.

Brig. Gen. White: We're very architecture based in a sense that any -- any air vehicle on side of this discussion will be done through digital means that we'll use more advanced manufacturing. With digital design you can design the vehicle 10,000 times before you bend metal. It's just a very different environment. You have that flexibility and we can do the software, the autonomy, the vehicle's mission systems all simultaneously. The industry has been on this journey with us very collaboratively for quite some time.

Q: I just want to follow up on the partnership, question. The Navy N98 talk a lot about their NGAD CCA effort. Can you talk about any overlap there? And in a briefing, they talked about even being able to hand over their CCA to say an Air Force controller. Do you envision that sort of jointness on an Air Force CCA?

Maj. Gen. Jobe: Yes – I talked about this early ony. You're going to basically, *and we don't have really good terminology for this yet, but lexicon's coming*, but 'take custody of a CCA'. Basically who's got the command and control functions of it, all the management functions of it.We're designing, hopefully, the interoperability, especially with the Navy, because we have a strong partnership with Admiral Loiselle and the N98 team.

If you get the right communications between your crewed aircraft and your CCA, and the data standards and everything that goes with it - you shouldn't have a problem being able to issue commands. Buut you've got to have the right data sets for message, behavior, commands and all that kind of stuff developed. Those have to be in common. Right now, we're not there yet. But we are talking to each other a lot. I don't want to talk to the Navy's program, but we are in collaboration with them extensively to make sure we try to be interoperable as best as we can.

Reporter: Is there a way to collaborate and test to move faster?

Maj. Gen. Jobe: I don't know the answer to that right now.

Brig. Gen. White: I mean there's always an opportunity to collaborate and -- we haven't gone that far down the discussion yet. We're focusing on what General Jobe said. I think in it's most basic form, the future of interoperability is based on architectures and standards. So that's where the focus of a lot of the discussion is.

Maj. Gen. Jobe: I might be able to tell you after Monday I have about an hour long meeting with N98 to discuss that exact point.

[crosstalk]

Maj. Gen. Pringle: -- even this week our teams are working with them on a variety of different things--

Brig. Gen. Kunkel: -- experimental operations. We're talking through that together…

Maj. Gen. Jobe: -- communication standards, datalink standards, all that we're in close collaboration with the Navy.

Q: Did anybody talk about whether or not you plan to just buy a single unmanned aircraft here or if you plan to have multiple for different types of scenarios?

Brig. Gen. White: To the extent the funding allows, we're going to probably carry multiple competitors. Keep them involved in the development as long as possible. It will be a competition, but again, based on resourcing we will keep it as multiple competitors involved with the development process. That's the plan.

Maj. Gen. Jobe: I think it's a fantastic question. I think early on once the competition phase is done, we'll have a singular vehicle. And then, later, I think we'll see missions expand. I think we'll see capability development continue. I think we'll probably see different vehicles. I don't know at what time that would occur -- if it's like a different increment or different series of the same type, or if it's different if we're talking about modularity.

Brig. Gen. White: Yeah, I think people both typically view acquisition, from a cold start perspective and that's not what we're doing here. We've been with industry for a while in concept refinement and we're working through these things. This is not one of those cold start kind of things. There's an aspect of this as when we talk about our confidence and how much we know, we also look at things like industrial capacity, the rate at which we could produce these things.

All of those things are consideration because we think about affordable mass. That's obviously something that's measurable and it was not -- we need to be able to build on the industrial base so you can do that. Having multiple vendors involved as long as funding can support, we'll do that as well as long as possible.

Reporter (follow-up #1): Quick follow up on this approach you're taking - I guess it's very unique compared to, you know, other major acquisition programs in the past. Is there talk of using this kind of methods for stuff like munitions maybe in the future or other types of weapons?

Brig. Gen. White: I will tell you, I don't know. I'm not sure what you mean by unique. I think that is one of the things that we're looking at. I think this could be applicable to anywhere. General Jobe said when we started, we understand what the threat environment is, we understand the threat timeline, and I think that fuels the need to move at a certain pace and that pace is dictating the strategy that we use. That's what's fielded.

In this particular case, the one difference is we're actually pursuing something that we've not had in our inventory, right? So we're bringing with that things like changing culture, operational structure, operational organizational structures, and things of that nature. We're very serious about that, but again, it comes back to a level of confidence and speed to ramp.

Maj. Gen. Pringle: So I'll kind of add to that as a science and technology organization, we're certainly looking to continue to accelerate any of the technology partnerships that we have with PEOs [Program Executive Officers], acquirers and warfighters. So whatever we can do to builf digital threads and make the job easier for our partners, wherever we can continue to work hand in hand, you know, as we do on Golden Horde with PEO weapons, as we do with navigation technology satellites in multiple PEOs. The closer we can build those relationships. It does offer a different way of getting after a technology. We are looking to continue that trend.

Q: General Jobe, I think you mentioned that you guys are planning on keeping around the competitors for as long as possible, but eventually probably getting down to one vendor. So that makes me think you guys are no longer thinking about a portfolio that would span from like low end to high end. How much are you guys thinking price point wise?

Brig. Gen. White: Yes - we're going to keep multiple vendors involved with development process. And when we get down to a decision on what we produce, when we produce, and how many we produce, that will be a different conversation. I don't think we've closed the door on any of that yet. I think in time will tell as we stand the program up how we execute that and how we lay out that strategy.

And remember that there's two different pieces to this puzzle, right? There's the development piece, where you test the industrial capacity, the intellectual capacity, what they can design, and what timeline they can design it? And then then what we've produced, how fast it can be produced, and how many vendors can produce, right? Those are questions we have not fully flushed out. That'll be a part of the function of the actual acquisition strategy and how the development programs go.

Reporter (follow-up #1): Do you guys know when you will have an acquisition strategy?

Brig. Gen. White: Well, we already have an acquisition strategy. But that's how the development program goes. We'll make the decisions to go and produce something, right? But You still have to go through that EMD [Engineering and Manufacturing Development] program, that part is not going to be excluded.

Reporter (follow-up #2): At AFA General Hinote mentioned to me that the Air Force was going to take delivery of an MQ-28 to do some experimentation and this was like an agreement with Heidi Shyu's [Undersecretary of Defense, Research and Engineering (OUSD(R&E))] office or something with R&E. And then there's also another effort happening at Eglin with the Valkyrie and doing additional testing there and there's Vista. Can you guys kind of like map out what's the scope of the testing that each of them are doing and what sort of you unique benefits do they have for you all as you're trying to move CCA forward?

Maj. Gen. Pringle: Is now a good opportunity to talk about that working group?

~Unidentified Speaker: Yeah.

Maj. Gen. Pringle: What we have is a working group that brings together a lot of the DOD partners that are working on autonomous activities. And so, we're talking to each other. What we want to be able to do is know what each of these are doing, what they're trying to accomplish, and how we're ultimately trying to get to the same goal.

Brig. Gen. Kunkel: And risk reduction efforts. And again, there's risk reduction efforts in the '24 budget that, you know when it goes across the river we'll be able to talk more about those things/ However, specific R&E activities or partnerships with those? I think would be able to talk more about those soon

Brig. Gen. White: Yes - if you're wondering the choreography that goes into all of this. It's fairly tremendous and the majority of it falls on General Jobe, General Pringle and I have to make sure after General Kunkel gives us all the resourcing to do it. The discussion we had just this morning as we were talking through it is we make sure that all of these activities are complementary to each other and then they inform the process --

[crosstalk]

Brig. Gen. Kunkel: And that they converge into operational capability at the same time. So, there's multiple lines of effort that are converging on a capability and there's, as you can imagine, the things that are required to bring on a new capability.

Reporter (follow-up #3): It would just be great to get sort of a rundown of that because I feel like we've been talking for an hour now and I still feel like I only am grasping handfuls of what y'all are working on.

Maj. Gen. Jobe: Let me take a stab at it since I'm the simplest person up here. [laughter] So for example, when I talk to the Australians about what they're doing in their MQ-28 program - theirs not ours - mostly what we talk about is - How do you mission plan? What is your maintenance people doing? And how are you organizing that unit?

So that I know how many, you know, three level maintainers I need or seven levels or how many avionics troops I need. We're capturing a lot of organizational things that they're doing like, are they at the point where they can schedule that yet and put all the airplanes up on a schedule. We're doing some pretty fundamental things with them - How do they do in maintenance? How they're doing operations from basic planning levels.

They have that part, I think Valkyrie and XQ-58 mostly autonomy work like, that's autonomy, autonomy, autonomy, like so the thing that we're really pursuing is autonomous type of capability. Vista autonomy. Learning at what levels do we get trust and confidence for the FAA to fly in the national airspace because I have a pilot that's flying a Vista that has autonomy. Those are basic things that we need to figure out and learn. I think if I was going to bin those, that's how I bin them. So, it's not as complicated as it seems.

In my mind, I'm just simple and I got those were the things that we're learning, but those are, they're not simple things, they're really, really complicated things. That's what we're trying to learn on it.

Brig. Gen. White: But as you take the body of knowledge and the body of work that General Jobe just talked about, what it allows you to do, it informs you, where you found it, where you stopped to snap the chalk line to deliver what the fielding capability will be. So we'll have this body of work. All of this tech maturation across all of these fronts and they'll inform what the final fielding product is.

Maj. Gen. Jobe: So something cool, about a Vista kind of thing, right? Is you have an F-16, it's already certified to carry weapons, it's already certified to fly. I can do autonomy now to do weapons deployment from another F-16 that's not autonomous to the autonomy thing that's replicating. A CCA, right? That's complicated stuff, but it's pretty fundamental that we --

Brig. Gen. White: prove out trusted autonomy as well as you prove out the autonomy architecture at the same time.

Q: I know you mentioned that there's a foreign interaction or interaction between the Air Force foreign allies and partners, at least on a tangential basis. Is there any direct engagement with foreign allies or partners in the CCA program itself, or the initiative or however it's sort of defined at present? Is there any vision already for a possibility of if that's not the case of a like a tangential effort down the line for some sort of broader effort, you know, to use a very general example like the F 35 program to bring in allies and partners into a sort of different end of things, but along a similar line?

Maj. Gen. Jobe: We're exploring all of those and we don't have a decision on any of them yet, quite frankly. We are exploring for example, again, back to the Australians. What are you learning in your programs? We're learning that too. We know we're going to do our own competition in our own industrial base for a CCA so it's unlikely we're going to go buy an MQ-28. That's a direction that Secretary Kendall given us. But we haven't excluded, the potential of us now and then marrying up at some point on an acquisition pathway in the future. That is still a possibility. I won't speak for the Australians or anybody else, but for -- Brits, for example, we've had conversations with them. We're going to keep those dialogues open so that we don't close the door to any of them, but we're not ready to really commit.

INSERTED CORRECTION: "While the nature of the question was related to the MQ-28 Ghost Bat and, by association, our partnership with the Australians, the response was NOT meant to suggest that Ghost Bat or ANY vehicle is exempt from the competitive program for CCA. The context of the response was meant to communicate that the CCA program will be a competition, and to highlight that discussions about ANY vehicle is pre-decisional. As Maj Gen Jobe stated; our partnerships remain on-going and strong with this and other activities."

Brig. Gen. White: And I think the Secretary has been very clear on his visits to other countries that there's been a lot of discussion and there's been a lot of interest expressed in this area because of already existing partnerships. I don't think we're there announcing any major partnership, it's just a journey we're on and I'll continue discussions.

[Closing Remarks]

Maj. Gen. Pringle: I'll just say - I'm excited. The work is ongoing, and there's work ahead of us. I couldn't have better partners and I feel like we've been working well together over the past couple of years, figured out a lot, but there's a lot more work to be done.

Maj. Gen. Jobe: And think -- first of all, thanks for the time. I do appreciate you getting in the building which is always not so easy. To echo General Kunkel's words, flying fighters for 30 years and having engaged in all sorts of levels of combat over my time - early on this journey, I was quite frankly a little bit skeptical. I am no longer skeptical in any way, shape, or form.

We've looked at this long and hard from multiple different angles, both from an operational perspective and all the way to science, technology acquisition. We've been pretty deep in this for a while and feeling pretty confident and pretty excited about it, as well. I think it's pretty interesting time that we're in right now as we move forward. So, it'll be an interesting thing to see play out. I'm excited.

Brig. Gen. White: I'm really proud of what the team has done and how far we've come, frankly, and I'll tell you look, honestly it's amazing what can be done we have a clear mind about what the threat is and the threat timeline. And the Secretary is telling us exactly what our priority is going to be. So we've been able to drive this far, this fast and continue. I'm sure we'll have discussions after '24 is released, but you know, we'll continue down this path and we've made a quite a journey. It's amazing what you could do when you have a great focus in the Secretary helping us. The OI effort I think that General Jobe talked about really has been critical in helping us focus this narrative and get us to where we are.

Brig. Gen. Kunkel: And I'll just follow up with General Jobe said, you know, when you're sitting in a flying squadron and trying to figure out what you can do in the future and you dream up some stuff on a bar napkin. Then you get here and you start working on a program like this and you see how team's really bring it together into an operational capability. It's great to be part of the team. It's great to see this thing come alive and confident with team's work.

Brig. Gen. White: It's awesome too. One of the things I was thinking the other day as I was walking through the unit and passed Badger Wallace. So an operator who's running a lot of Fed Lab work that he talked about, with F-22 better -- just basically sitting inside with the acquisition AFRL in these years, everybody working together and that's very unique. I think that's what the future is going to hold in as long as we continue on this path we'll be successful.

SAF/PAO: Thank you. Appreciate everybody's time.