TRANSCRIPT

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Lieutenant General Steven L. Kwast
Commander, AETC

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DWG: Thanks, first and foremost, to our guest, Lieutenant General Steven L. Kwast. General Kwast is the Commander of Air Education and Training Command in San Antonio. Sir, we do appreciate you finding time for us on what I'm sure is a busy trip to DC.

General Kwast, do you want to say a couple of words here at the top?

Lt. Gen. Kwast: Thank you. I make a joke about, you know, yeah, so thank you very much. But the reality is there is nothing more exciting or important than the development of the human mind to in our business defend this country, defend our freedoms. That's the ultimate high ground. The human creativity, the human ability to adapt, to be creative and to find new ways of solving age-old problems of humanity is really the exciting work of our time. That's why I'm grateful to be here.

This new role that the Air Force has given Air Education Training Command, called Force Development Command, to deliver a continuum of learning where we are responsible for the nurturing of, the learning of a human being, from the moment they have a sparkle in their eye that they want to be a part of the Air Force all the way through after retirement, that we help manage that growth is really a game-changer and I'm having a lot of fun working on this strategy.

With that, let's go ahead and kick it off.

DWG: You've spoken, in the relatively short amount of time you've been at the

command, about the challenges that human nature poses and bureaucracy poses, and in some cases just overcoming institutional momentum and old industrial-age processes that the Air Force needs to do things.

The Air Force has a pilot shortage right now that's fairly pronounced, and one of the things that you've implemented is your Pilot Training Next program, which seems to meet this goal of breaking out of legacy structures and looking for a more innovative way to train pilots faster, better hopefully. How is that going so far? And what do you do with this program if it actually turns out to be successful?

Lt. Gen. Kwast: As we took a look at this we found ultimately that we have a production engine of pilot training that was designed in the '50s and has really not changed fundamentally since then, yet all of these new tools have come out since the 1950s, and we know a lot more about how the adult human brain learns. But we really didn't have the data to be able to know what is the magic sauce that makes something good at this art of military aviation? And what is the data that tells us how we nurture the mind to learn that skill faster and be better at it?

So this Pilot Training Next is really misnamed. The way I like to describe it, this is called Learning Next. We are exploring everything from the pupil-ology where we track the eyeballs and what they're doing, because those eyes are the windows to the soul. And believe it, we're such creatures of habit that when you track the eyes you can actually start marrying up performance with eye movement, and you can start helping to coach people.

So from the eyeballs to the brain waves to the heart rate, we are measuring everything about how the human performance is learning this art of military aviation. And when we get that data, we'll have better clues as to one, how we should teach, what technologies are good, and how we might do this differently.

To just swing at a guess of how to do pilot training differently is not sufficient. You first have to have the data. So this program is about getting the data. But it's in the model of can we teach an aviator to be a great Air Force pilot, better than the traditional promotion line in half the time. So that's been the stretch goal. We'll see how this goes, but so far the indications are astounding. These kids are breaking every barrier with regard to performance. In fact they're hitting the limits of our capacity, they're so good and they're so aggressive.

DWG: So what do you do with the participants when they are done, and assuming the

final results are positive, what comes next?

Lt. Gen. Kwast: They're going to go straight into the Air Force process. For example, if somebody is tracking to be an F-35 pilot they will go straight to General Holmes and they will be one of the people that he gets. The customer gets to decide. We are measuring competence and performance to make sure they meet the standard. What I'm asking General Holmes and General Everhart and all the other customers, Special Ops, anybody that's getting a pilot out of our production line is going to get to take a look at these products that came from a different methodology and compare it with the product they get from the traditional industrial age model, and they get to decide is this better. We'll let the customer decide. So it's really exciting.

DWG: Thanks for being here.

To follow up on that, I'm wondering in particular if you can say how the virtual reality and artificial intelligence piece of that is working. Have you achieved success with that yet or other aspects?

Lt. Gen. Kwast: Nothing is ever perfect, but we see tremendous success, and here's why. As they immerse in the virtual reality, augmented reality, and artificial intelligence coach that's helping them, for example, that's tracking all these things and it's basically saying you're not working hard enough. This is too easy. And it will make it harder. So the radio call will get scratchier. There will be weather instead of clear blue sky. So it works you out so that you're working at your optimum performance intellectually in the environment.

And what we're finding, though, is the student is getting to practice the cognitive habits many, many, many times before they actually get in the aircraft, which then accentuates the actual experience in the aircraft where they learn it deeper and they learn it more persistently. So that's what we're finding. We're finding that the effectiveness of the aviator to be competence at doing the job well is happening faster because they are able to go through so many cognitive reps before they actually get in the aircraft. So that's where that technology and our understanding about how the adult human mind learns. It learns through practice and it learns through working at the optimum performance standards.

Just like a world-class athlete. A world-class athlete will never be the winner of a race if they train at a lower performance level or if they train too hard. You know, they'll hurt themselves. Finding the optimum point intellectually, physically, emotionally where a

human being is optimizing their learning is part of the data we're finding, and these tools are allowing us to hit that sweet spot which is accelerating their learning faster than any other of the traditional programs we have.

DWG: On a different subject, I wanted to ask if you had an update on the investigation [inaudible]. I understand that [inaudible] investigation board was set up. I believe they may have closed out by now. Are there any conclusions that have come out of that?

Lt. Gen. Kwast: We did set up a safety investigation board which was additive to the efforts ongoing. It was primarily to bring more resources and more focus to get after root cause. So that entire team is out in Edwards Air Force Base with the test pilots and with the engineers and scientists, really wringing this out to get to root cause.

We don't have any updates for you yet other than the fact that we finally, again, are getting to the data, where we're taking the entire ecosystem apart and really looking fundamentally at the data to make sure we aren't jumping to any conclusions. So we don't have any results yet, but we've got the right talent looking at the right parts of the entire system from the machine to the human being.

DWG: Are you using any [dispensers] like the [vigilox] [inaudible]?

Lt. Gen. Kwast: We are. We're using sensors to detect everything from how the human being is responding to how the molecules are evolving through the ecosystem of that OBOG system which is more complicated than anybody ever thought.

DWG: Thank you.

A sizeable portion of the F-22 fleet is for training, and a lot of the F-35s for training also, and those are not up to the all of combat standards. In your discussions with General Holmes, what do you think? Is that something that you want to do is get those airplanes up to combat configuration? Or is money going to cause you to leave them kind of in a basic training mode?

Lt. Gen. Kwast: That's a great question and I think you've framed it exactly right. It all comes down to the money. We'd like them all to be up to the same standard, and that is whatever is on the front line of the combat edge is also the environment that any trainer is a part of. So there's no negative learning. And there's no requirement to train again once they get out of the front line. That's the nirvana, is that they're all the same.

The reality of money and the time it takes to build out and code, it's disconnected. The training aircraft are not the same load, necessarily as the front-line aircraft.

So as we are struggling with really this financial problem where we just don't have enough money or time to be able to get everything concurrent, we are exploring the same thing we're finding at Learning Next in Austin, Texas. That we might be able to give these kids, these adults that are learning to fly the F-35 a virtual augmented reality where they can properly train the habits of mind of a front-line aircraft where there are no limits to range space, there's no limits to weather, there's no limits to adversaries not showing up or showing up, or threat emitters that may or may not be accurate wave forms. The ability and flexibility of an augmented virtual reality is as powerful for the human mind to practice the habits of decision-making as the real event itself. The human brain is very good at understanding those habits.

So we're looking into ways of not fixing it necessarily with the money, because there's only so much money and the taxpayers have very generously given us the money we have, but by using the technologies of our age to find clever ways of achieving the same outcome where the training is effective.

DWG: Is there an issue, though, of this is what I'm doing in the actual airplane versus this is what I'm doing in a Sim or a tabletop device?

Lt. Gen. Kwast: And this is where we wanted to get the data. The data we're discovering out of Austin, Texas, as we're really looking at this is the brain is phenomenal at blending them together, and here's what I mean by that.

We can actually break out those things that you learn that are visceral. Meaning, you know, when I was a cave man I had a club, and when I hit the saber tooth tiger over the hear with a club, if I didn't keep my hand back, I got bit. You learned that fast. It takes only one event and you viscerally learn it.

So we're finding that the visceral things, such as getting into the cockpit, shutting the canopy, taking off. Those visceral things the human body and brain learn very fast and you don't need a lot of repetitions to be good at it. But the cognitive piece requires a lot of repetitions, and the brain puts them together very well.

So for example, let's say we had an F-35 in the training pipeline that did not have the same load as the aircraft itself. That you could train them in the cognitive space, those habits that are required for them to be leading-edge, world-class, and that you teach

those things in the aircraft that can only be done viscerally, and the brain puts them together naturally. So you can actually parse it out and not suffer from the negative training. You can create scenarios in the actual aircraft that are still productive, relevant training and you don't try to, and you use the virtual environment for those things that you cannot replicate.

DWG: Based on what you're learning, do you think you'll put this into effect with the F-22 and F-35 in the next year or five years out? What do you think?

Lt. Gen. Kwast: We're building this model such that you have the speed and agility to essentially have access to this kind of training on command, on demand, on any device, anywhere in the world.

Now there are security issues, but those security issues are relatively easy to solve. So yes, the goal here is that as soon as we have this data, and we will start allowing this technology to move to every squadron in the Air Force. You can use it for absorption, for example, if you have a pilot at a mobility squadron and the weather is too bad to fly, they can still be flying because the equipment we're using in Austin is really cheap. The amount of money it costs today to get you a set of [GOGs] that gives you augmented virtual reality. And how good we are at coding the environment now, and the agility to be able to recode it so that you're in your virtual world and you're flying an F-35, and now you want to fly C-17, now you want to fly C-21. You can switch, and it's not that expensive.

So we plan on flooding the market with these technologies once we know the fundamentals of what's going on with the human brain and the human body so that we are doing it responsibly and that we can use it as a way of getting a more experienced force more ready to fight, more lethal, because they have these new tools of our age that we haven't tapped into yet that we're going to start tapping into.

The timeline. We're already using it at Austin. In fact we're already migrating it to some of our other pilot training bases as a further test bed, so it's already starting to spread. General Holmes is interested in this. General Everhart is interested in it, and they're going to be bringing it on. I think what you'll find is it will spread like wildfire. It will be like your iPhone. It's cheap -- relatively. It is useful to a person doing their job, and it spreads like wildfire, and now, you look around America, how many people don't have a smart phone, you know? The smart ones don't have a smart phone.

DWG: To wrap that thought up, probably won't upgrade the F-22s and F-35s to the

SOF configuration, the ones that are used for training?

Lt. Gen. Kwast: No, what I want is, I want my cake and eat it too. What I'd like is I'd like to have all of our aircraft concurrent. Meaning that when there's an upgrade to a software load that we have built into the system the ability to upgrade everything so that we have congruency in our platforms.

So I do not want to live with a fact that we have built an architecture where the front-line fighter has a different load than the trainer. That's unacceptable to me. So I do not want to take pressure off that. I don't want to live with that. But in the short run, with the hole we're in with sequestration on a number of fronts, as we're digging our way out of all of these holes. From infrastructure to readiness to aging aircraft, we can't do everything at once. So in the short run these technologies give us a bridge. In the long run, I want to build systems and technologies that when there's an upgrade, everything is upgraded. Just like our iPhones. You know, when you get a new IOS, everybody loads it and everybody's on the same page of music.

DWG: Can you give us an update on the status of training women to serve in battlefield airmen jobs such as TACP? I believe the last time I checked on this, there is an airman who had begun TACP training in August, and self-eliminated a few days later. Has there been any others who have attempted TACP or other training since then? And stats for them?

Lt. Gen. Kwast: It's a great question. What we'll do is we'll get you the details so you have numbers and people and all of that. But the principle here is that women are open to every career field and that our effort to make sure that we're treating everybody like world-class athletes. Where we're proactively using physical therapy and training techniques that are uniquely fit for the human being in the program to make them healthy and get away from the industrial age model where you put a rucksack on their back, you put them in combat boots and you make them run five miles. You hurt their knees, you hurt their ankles, you hurt their back. Those are the days of old. We are treating them like world-class athletes now so that every woman who is coming into the battlefield airmen has a coach, and those coaches are designing the training uniquely for them to make them healthier, faster, better, stronger and smarter, all the way along. So it's already producing tremendous results, meaning that the wash-out rate is going way down, but the competency, the level of performance, is going up. So we're already seeing great benefits from that.

We still have to work harder at the recruiting piece, where we are inspiring a broader

swath of society to come into this because we align their passion, their propensity and their skills and talents with our requirements. And part of our requirements is the diversity where we look like the demographics of America.

So we've got to work on that piece, and we're making great headway on the piece where when we get them in, we are uniquely designing their performance portfolio and their development portfolio, unique to their individual skills, talents and attributes.

DWG: The coach thing, that is something that is specific for the female airman in battlefield airmen?

Lt. Gen. Kwast: No, it's all of them. If you're a male coming in. Let's say you are extra tall. There are unique exercises and training and muscle development that need to happen so that your height is not a detriment because of lower back pain that can happen later on in life. There's an example where a male would have that training coach that helps them say okay, because of your height, historically people this tall need to have extra strong muscles right here and these are some exercises you need to do. The same is true with women, and with short men.

So it's unique to the individual, agnostic of their sex, although that plays a role because, for example. Women make great fighter pilots because center of gravity is slightly lower and they can pull more Gs sitting without any assistance than a male. That's just physiological, but it's great. It's a great advantage. And if we play to that, ultimately it's about the lethality of the human being in the fight that we're looking for and making that performance as high as possible.

DWG: So have there been any women who have graduated from battlefield airman training?

Lt. Gen. Kwast: Not yet. But that's partly because it's about a two-year process and it just takes time. We'll get you those details so we don't have to guess. Thanks for the question.

DWG: This is going to what John was actually talking about a little bit. [Inaudible] Air Force Base where the commander there was talking about how the performance of the F-35s for his trainees was a little down because [inaudible] models [inaudible], and he kind of sounded this alarm of saying, you know, I would like those software upgrades, but we have [inaudible] getting more sorties.

But is this surprising to you, that this commander is concerned, and maybe others are concerned on the Pentagon's latest and greatest aircraft out there? Is this expected as aircraft age in the next coming years, especially the F-35s?

Lt. Gen. Kwast: Again, another great question. When you take a look at the history of every program we've ever had, whether it was the B-1 or the F-16 or the F-15, when you rewind the tapes back, every one of them suffered from these same growing pains. It's just natural for a system that complex, that capable, that not everything is perfect the first time out of the gate.

And it's like with any innovation. You evolve as you go, you learn as you go, and you get better as you go. So we're used to a very mature F-16 and F-15 fleet, for example, where we worked out all those kinks. We still stumble on kinks like the [longeron] on the F-15, for example. But generally speaking, we've ironed out all the kinks.

We're still at the very early stages of this F-35 becoming a perfectly mature weapon system. So historically, this is not unexpected. In fact, it's relatively low compared to other historical examples. I'll take the B-1. Look at what President Carter went through with the B-1. It was a national crisis. And now the B-1 is, even though it's big, it is incredibly capable.

DWG: I know that [inaudible] talk about [inaudible]. The number of airmen that were [inaudible] simulators and having the same infrastructure, having enough people to [inaudible]. Can you give us a status update on that program or that initiative, what your vision is for [inaudible] maybe?

Lt. Gen. Kwast: This goes across a number of fronts because it's not just remotely piloted aircraft, although that's the one that has a fairly high manpower bill for every sortie that is flown for our combatant commanders.

But it really goes down to the business case that one of our biggest costs is the human cost. And if you can design a system, an enterprise, that delivers a mission for the Air Force with a lower manpower footprint that is much more efficient economically, much more efficient economically, than one that has a high footprint.

So this constant battle of bringing it down is important. So artificial intelligence comes into play here. Machine to machine learning comes into play here. And techniques such as our, one person controlling multiple aircraft instead of one person controlling one aircraft, are all journeys that are happening concurrently across a lot of systems. RPAs

is just one of them. It's making progress but it just takes time because we get trapped into it was built a certain way, and to change it requires industry, it requires congress, it requires the executive branch, and getting all of those elements together to actually change the way we build things is hard. Because there are production lines out there building at a certain way that's predicated on this many people and those people that are working on that product line are feeding their children and they're voting for their congressional representation. So you can see that this just takes time.

But there's a recognition that there's a business case to be made here that we can deliver better capability for cheaper price points if we don't design it with such a heavy manpower footprint that we've really never had before.

DWG: How long [inaudible] to implement something like this? Ten years, 20 years?

Lt. Gen. Kwast: Well, no, I would hope it would be a lot faster than that, but it really, it depends on how fast congress will let us move. Ultimately congress controls the purse strings and the -- so ultimately this is about reshaping the way the tool is built so the tool can be done with fewer people than we currently are using. But I would hope that we can have some real progress in the next five years.

DWG: Is there a single thing you can point to, or a small number of things that have led to this split essentially where, you know, in some cases it takes ten pilots to run an RPA operation and one and a half pilots for a manned fighter. Why is the difference so huge?

Lt. Gen. Kwast: It's because we had to rush to the sound of the gunfire in 2005. Ultimately, Secretary Gates was dealing with Iraq and it was a mess. We needed MRAPS so that our soldiers were not being hurt by IEDs. And we needed ISR to make sure we could empower them. And we just didn't have enough. So we just threw all the money at it and we designed it this way because that was the fastest way to get relief to our troops.

When you don't take the time to design it so that it has all of the business case fundamentals, this is what can happen. So this was just a result of history, and there was nothing else you could do about it.

What is the quickest way to get ISR to our troops on the ground in Iraq? This was the way. What was the price tag? A little more manpower required. Okay? It was a bill worth paying at the time because we needed to get that ISR to those soldiers. But now,

you know, how it goes. Once you build it, then the congressional blessing that is the jobs and all the other things build up around it and make it impossible to let go.

So the permission to stop doing something a certain way is political, and it just has always been that way. So that's why the split. It was the urgent need of our nation for ISR to say what is out there right now that will work, and it turned out there to be the MQ-1 and General Atomics in San Diego. Go visit their factory when you go out there. And it was brilliant. I was out there watching this surfer dude who was crafting the wings, you know, just like a surfboard. It was done by hand and it was great, it was brilliant. But again, it had a high manpower cost. We knew it and we accepted it as the price of doing business to get ISR in time.

DWG: I wanted to ask first about the TX trainer contract. Is that award still expected in July? And then once that is awarded, how is this [inaudible] expected to help reach [inaudible] expectations [inaudible]?

Lt. Gen. Kwast: Thanks for the question. I have full confidence that we are on the timeline with that, and I have nothing to indicate that there would be anything other than that. You can never anticipate or predict the future, but I'm very hopeful that we will stay on time, and we really need to. In fact, if I could accelerate it, I would because the faster we get there, the more quickly we will be able to jump into the future. The intended effectiveness of this TX is to give us the kind of agility and flexibility to take advantage of all those things we're discovering in Austin, Texas about how the adult human brain learns, and how you can accentuate it with technologies that are cheap and effective. And when they're coupled with an aircraft that is essentially a software driven aircraft, that can morph itself into all kinds of different things for different missions and different ways of training, you really start getting some magic in how quickly you can teach people to be good at this business in a machine that is reliable and low cost.

DWG: There's also a [inaudible] portion to this effort [inaudible].

Lt. Gen. Kwast: Absolutely.

DWG: Has there been any update or more information you may have on the T-38 crash?

Lt. Gen. Kwast: We had the engineers, the scientists and the safety investigators out there taking a look at everything. I will tell you, the initial indications are that this is not linked to the T-38 crash we had down at Laughlin Air Force Base with regard to root

cause. But again, we don't want to jump to any conclusions. We make sure that these safety boards are thorough and uncover every possible root cause so that we, again, do not brush over anything that could be [inaudible] to our future.

It's primarily because we value these human beings that are doing the business so much. And we understand the foundation of training has got to be safe so we can be effective in the long run. So we're going to do this by the book, like we always have, and, but I can reassure you that initial indications are that this is not a trend from Laughlin Air Force Base. It's something different, but we'll find out once we get all the facts in.

DWG: If I can just follow up really quick. What was the root cause for the crash at Laughlin?

Lt. Gen. Kwast: That was material failure. So that safety report is out. It's a dual gear box failure, basically. It's extraordinarily rare. In fact the engineers when the plane was first built back in the '50s thought that it would never happen, but they never though we would be flying it in 2018 either.

DWG: Clarification. A gear box with [inaudible]?

Lt. Gen. Kwast: Right.

DWG: The indication right now is that it's not the cost, it as just something totally different and [you're just] waiting for information, but you can rule that out?

Lt. Gen. Kwast: Well, again, we don't rule anything out. That's why it's always dangerous to say anything about any accident before the safety investigation board is out. But I just wanted you to know that having had so many years of experience with the T-38 as an Air Force, we know the aircraft very well. And even though we'll wait for the final report, the initial indications are that people do not have to worry that this is a trend, or that this is somehow linked. They are not. But again, we'll wait for very detail of every engineer to take apart every part to make sure there's nothing we are not looking at.

DWG: Columbus had already had their safety stand-down.

Lt. Gen. Kwast: They did.

DWG: Do they need another one?

Lt. Gen. Kwast: No. No. Again, in order to preserve the sanctity of that safety investigation board, we don't talk about details until everything is out. We wait to take a look holistically. But this had nothing to do with the fact that somehow a stand-down would have prevented it.

DWG: Last time I spoke with you the non [inaudible] policy where [inaudible] unable to [inaudible] to be separated kind of came up. Do you have any updates on that? Are you doing anything, any special programs to kind of keep people [that have small issues] in the service?

Lt. Gen. Kwast: This really gets back to, let me make sure I get the essence of your question. Repeat the first part of your question.

DWG: Sure. Just a general update on how many people have left, or how [inaudible], getting people out of the service or how many left, that kind of thing.

Lt. Gen. Kwast: On --

DWG: Oh, the non-deployable policy from --

Lt. Gen. Kwast: Okay, I'm with you now.

This is the art of policy where you need a policy that's a general rule that helps you achieve your purpose, which is what he set out. But you also need data to be able to manage risk and reward.

For example, even though we may have a policy that everybody is deployable, if we have a world-class hacker who has a little eczema, that really doesn't affect anything other than the fact that if, if they were to deploy, and if something were to flare up, that we might not have the medical care there. You know, there's an infinitesimally low probability of something happening. Yet the talent is so extraordinary. You need exceptions to policy in order to use common sense to maintain talent.

So that's really how we're approaching this. The policy is a good policy, and we are grateful for the Secretary of Defense articulating that because we believe it too. What we're doing is managing it so that we manage the commander's decision-making authority to make sure that we have the talent to do the job, and that when there are exceptions to policy required, it is done with the right data. That we have data on what

the talent is and we have data on what the risk is so that we do not fall back into an industrial age model where if you don't have 2020 vision you cannot fly. You know? And then their selection rate is PNA, which has nothing to do with being good in the cockpit, for example. We want to avoid rules that are absolute because then you fill effectiveness and efficiency. But you also need rules that guide you to the right end state.

So this is a great rule. We're working on the data to make sure that every time we have an exception we know the data on the talent, we know the data on the risk, and we're making a good command decision on [inaudible].

DWG: on a separate issue, when it comes to [DOTMA], Senator [Tillis] said that this [NDAA][inaudible] going to have some pretty big changes. Is there anything that you would welcome, any changes to [DOTMA] when it comes to helping with retention and with recruiting?

Lt. Gen. Kwast: Yeah, I think there are, what he's getting after, what is really needed in that is that [DOTMA] is a construct that was crafted quite a long time ago, and there are nuances in it that were really meant for an industrial age model of the military.

We live in a day and age now where we have the data that gives us insight into every human being down to the granular level. Maybe every single human being versus large swaths of human beings, which is how we kind of managed it in the industrial age. So all of these updates, there's probably a hundred of things that could be put into that that will help us to be able to use the data to make decisions, instead of having policies that assume we do not have the data. That's a big change that will come, and it will give us agility and flexibility in the way we manage our human force. That's what I'm looking forward to.

So I could give you a number of specifics. All of them, though, are specifics that drive to the same two principles. The principle that we have data now that allows us to manage this with more nuance because of super computing and literally, the information age we live in, the digital age we live in. And two, using that data to give me the kind of flexibility and adaptability to be able to go up and down and it's discoverable. You know? The old rules are set where there's no way Congress could validate or verify that we were being responsible with the money and the people. Now they can verify and validate, so it gives them more trust, to give us a little more flexibility, and that's what I'm looking for.

DWG: If I could go back to the RPAs. Congress in this year's [NDA], or [inaudible] [NDA] said you guys are making steps with Global Hawk, for letting enlisted pilots come in. You need to start looking at the MQ9. So I'm curious what steps you've already taken towards that. A bunch of people have been on the Hill in different [inaudible] saying we are starting to use lessons learned from Global Hawk to apply to the rest of the enterprise.

I just want a little more clarity on how you're working toward that, and if you're starting that goal toward opening the MQ9 enterprise to people.

Lt. Gen. Kwast: That's a great question. What we're doing is we're starting with the data. So this Learning Next in Austin, Texas, this pilot training. This is one of the reasons for its existence is to give us the data. So part of that beta test, part of these people that are going through that beta test in Austin are enlisted aviators that were heading off to that weapon system. And so we're going to start with the data and the allow the decision to be made by Congress and our Secretary of Defense, Secretary of the Air Force, at the right time. But the data gives us the visibility into the business case of how we do this. And the enlisted are part of that, and that's why they're a part of it, so that we don't just make arbitrary decisions saying okay, we're going to start here and this is what we're going to do. We're actually looking at the data so we know what we're doing, know what we're getting into, and there's a good hard-core reason why we're doing that. There's a good reason for lethality, and there's a good reason for stewardship of the taxpayers' dollars so that we're doing this smarter and more efficiently than before.

So all of those things have to be predicated on data that says here's why. Not just we like it so we're going to do it, but here's why. And the data's looking good.

DWG: So how is that different from what you did with Global Hawk pilots? What physically are you looking for for MQ9 that would differ from [inaudible]?

Lt. Gen. Kwast: Well, one difference between those two, one is literally dropping bombs and doing something that currently policy requires an officer to have the authority to drop bombs from aircraft. So that's one piece.

But there are other pieces as well. But the reality is that we have to open up every presupposition we had before and really look at this holistically about why are we doing what we're doing, and how is it based in the bottom line? Lethality, efficiency, effectiveness, and the agility and flexibility. That's where we need the data.

So the decisions before, you know, were made without some of the data that we're gathering. This data will allow us to make better decisions and take bigger steps in the right direction.

DWG: Do you have any time line for when you might open the MQ9 enterprise to --

Lt. Gen. Kwast: No, again, because this requires Congress to be a part of this conversation. This requires the Secretary, the Chief to be part of the conversation. And what they need is they need the data. That's what I'm getting for them. We should have the data, it will grow over time, you know, but the initial data by next fall.

DWG: Can you give us an update on the Air Force pilot shortage?

Lt. Gen. Kwast: The current pilot shortage is still something that is a problem and we're getting after it. There are 69 different initiatives that are getting after this. The one for me personally that has the most potential is this Austin Pilot Training Next where we're taking a look at how aggressively we can teach these pilots to be world class. Meaning the standard of performance is even higher, yet we can get to that standard of performance in shorter time lines, at lower cost points, and with a deeper persistence of that knowledge and their performance of the job over time.

Because most of the solutions now nibble around the margins of this problem and will eventually get us there. But we are living in an age where the strategic environment is changing so rapidly. Whether it's airlines that are hiring, because this is really a national crisis. Whether it's airlines that are hiring, or whether it is budgets that are rising and falling that allow us to either build things or not build things. Our old model of major power plants of production, meaning pilot training bases, that require years and billions of dollars to build, and a long time and a lot of money to take down, that's too slow for the perturbations of the world that we're going into. And this idea that we can have more agility and flexibility. When we need two times the amount of pilots this year, that we can produce those and we can have the agility and affordability to be able to do it, and when we have to profuse half the pilots that we need we can do that, and we don't have to spend five or six years building it out to do that, and by the time we build it out, we no longer need it.

So we're trying to break that cycle. We call it the red line/blue line, where it's like a bath tub. You know, you turn on the faucet because the bath tub is low in water. And as it's filling up you see that it's going to overflow, but it takes you two years to turn off the

faucets, and by the time you turn them off it's overflowing. And then it starts draining out and it's going to empty. And you turn them back on, it takes two years to turn the water back on and before you know it, it's empty.

The same thing is happening with the demand for pilots and the number of pilots. It's been a red line/blue line of sine waves that have been at opposite ends and we're trying to break that cycle.

DWG: Have you got an actual number of what the current shortage is?

Lt. Gen. Kwast: I'll bet you that number exactly.

DWG: Also, differently. Israel recently conducted its first combat strikes with the F-35. I imagine that data gathered on a mission like that is pretty invaluable for training purposes. I was wondering, did the Israelis share any of the data that they collected during those operations with the U.S. Air Force?

Lt. Gen. Kwast: Just like the last question where it's nuanced. The last question about numbers changes every day, because as we tweak -- the syllabus, for example, it produces a few more pilots quicker. So whether it's 1400, 1800 or 2000, we'll get you the exact number. But it will change tomorrow. We'll get you a number today, it will change tomorrow. The same is true with the data in the F-35. It depends on the classification level and what Israel has decided is proprietary for them and what we have agreed upon to share. So there is sharing, no question about it. And with Israel there's a lot of sharing. But there are classification levels and things that Israel does that they want to keep to themselves, and those things are not shared.

DWG: But have they already said that --

Lt. Gen. Kwast: Again, I can't talk to that this morning, but it's a good question, and I guarantee you that the relationship is rich and it is a sharing relationship, but I can't get into the details of exactly what is share and when it was shared.

DWG: The Air Force seems like it's making progress on the QE replacement. I'm wondering if you expect training new partners for this new helicopter, do you expect it to be seamless, or might there be some issues involved? I know the Air Force has tried to acquire Black Hawks in the past, but the other helicopters are old. UH-60Ls, and the militarized commercial aircraft.

Lt. Gen. Kwast: The same issue exists for the helicopters as with the aircraft. That is the agility to be able to produce more pilots more rapidly that are as capable if not more capable than in the past is at the heart of this dilemma. And everything that we're doing in Austin is also applied to the helicopter pipeline. So the speed and agility that we already see emerging from the data in Austin will be applied to the entire pipeline of helicopter pilots. So as these people are learning, they can go through hundreds of cognitive reps that they never would have had if they had to wait to get into an actual helicopter to do it. But effectiveness far beyond what the simulators of old are.

A perfect example. In the industrial age we thought that these hydraulics that moved the simulator were important. A lot of money spent on these very elegant boxes with hydraulics that tried to move it to simulate the environment. What we discovered is the brain doesn't need any of that. In fact the brain doesn't need all the granularity. It doesn't even need the gauge to be right there. As long as you can see your hand and feel your hand touch something, and that something does something to your environment, the brain makes all those connections and you don't need any hydraulics, you don't need elegant systems that are expensive. You can literally do it with just a cardboard cutout in front of you and a hollow lens or something that has virtual augmented reality with the artificial intelligence and super computing that's coded for that aircraft. So all of that will be applied to the helicopter pipeline, and the same promise that is showing true with pilot training will happen with helicopter training.

DWG: Is there anything different that you're learning between helicopter physiology and regular fixed wing physiology? They're a little bit different aircraft.

Lt. Gen. Kwast: They are, and that's where the data is so rich. So as we go, we're getting more and more data on what is different about a helicopter than an aircraft. Sometimes it's very individualized as well, depending on the human being. But the data is getting richer and richer with every human being that's going into this. And as this technology is propagating out from Austin, it's going down to other places -- Randolph and Langley and Fort Rucker. All of that data is being poured into the same data pool that is being algorithm'd so that we, again, start getting down to some real insights about what is it that helps people learn faster? And what is it about you that helps you learn faster? You learn better when you listen and see, or you learn better when you read.

In some of them the person is able to read what they need to do, not just listen to it. And they learn faster. So it individualizes it, just like the world-class athletes where we have individualized coaches. So too in training for these things. It starts adapting the

environment to suit your method of learning which is different for you than it is for you or for me. That's part of the power here. The more people that start doing this, the more data we get, the more refined is not only our ability to teach, but our ability to recruit.

So this goes back to now what I have is a game that when somebody says I want to be a pilot in the Air Force and they're out in high school or college. I can have them play a game on-line, and that game gives me insight into their skill, their knowledge, their attributes and their characteristics. I don't need to know their name, but I know that IP address so and so has really got unique skills to be a helicopter pilot. Or to be an F-35 pilot or whatever it might be. Then I can start recruiting that person and again, marrying up their propensity, their passion and their talents with my requirement in the Air Force.

DWG: Where do you play this game?

Lt. Gen. Kwast: On-line.

DWG: Is it at AF.mil or --

Lt. Gen. Kwast: We're developing the game right now. Because we just started, it was only two months ago that we started getting this data in Austin, and this data is pouring into the game that we'll assess. This is a journey from accessions, where we're measuring talent in civil society, we're matching that talent with our requirements in the Air Force, we're developing that talent and nurturing it so that they learn more rapidly than any other competition in the world to be better at doing their job and knowing what they to know, being able to do what they need to do. And it's optimized for their personality, for their learning style, and for their effectiveness. That's the long-term. It applies to helicopters and it applies to everything. It applies to maintenance. You know? I can have maintainers now that can be just a general mechanic, and they go up to an aircraft and they can, through their virtual and augmented reality, they go up and the artificial intelligence knows that's an F-35 and it can break it apart and say here's the part you're going to go after, and it can watch them, talk to them and say that's the wrong tool. Or that's the right tool, but your torque is set on the wrong torque setting. And as they're doing the job it will say you're torqueing too hard. Or the technique is better taking that bolt off first and then that one. Ten times out of twenty, it will strip if you do that one first and not that one. Not every time, but here's a good technique.

All of those are in the database, the cloud, that allow the entire population of mechanics

to be informed by the master mechanics of our time, and as the data grows, an entire historical knowledge of what works and what doesn't work. So it's really powerful. We're very excited about what this means for maintenance, for every person doing a job in the Air Force, this applies.

DWG: That really sounds fascinating. Do I understand correctly, you're developing games that young people are going to be able to play on-line. You'll be able to track who plays particularly well, and get in touch with them ab out possibly joining the Air Force.

Lt. Gen. Kwast: Yes, sir.

DWG: What's the timing on this? When will it become a reality?

Lt. Gen. Kwast: There are multiple things that have to be done in order to make that come true. You have to have the infrastructure, you have to have the game, you have to have the data, and we've been building that out for a while now. But I'm hoping that the first iteration of that game will be around the summer and we can start playing with it. But it's amazing what we know about, you know, our team of psychologists, sociologists, cultural anthropologists. When they get together and you take a look at the body of knowledge out there, it's amazing that by just running you through a couple of scenarios and making you make some decisions and answer some questions through a scenario or a game, I can measure things like critical thinking, creative thinking, conceptual thinking, contextual thinking, collaborative thinking, constructive thinking. I can tell if you're empathetic. I can tell if you cheat. I can tell if you cut corners. I can tell if you're morally courageous under pressure, or whether you save your own skin. You know? Are you selfless? I can tell all kinds of propensities, attributes, characteristics, knowledge and skill. And that's where we're going. I want somebody that has high integrity, who has the right intellect, who has the right passion, and boy, there's nothing more powerful than having a person do something they love and that they're good at, and then giving them the tools to develop their skill, to be better and better and better. This is what we're looking for in the human capital, and that's the promise of the force development command that we are now in Air, Education and Training Command. It's all about the data, but it's taking advantage of something that's already been invented. It's called the internet, and it's called big data, machine to machine learning, artificial intelligence, supercomputing, virtual reality, augmented reality, and then utilizing that as a tool of our age to accelerate the learning of the force, to be more ready and more lethal than any other Air Force on planet earth. That's fun.

DWG: Have you see the Last Starfighter, sir?

Lt. Gen. Kwast: Oh, yeah. And Ender's Game. And I'll tell you, you talk about that, but throughout history story-tellers and futurists can see deep into human nature and its technology far beyond the average populist. They always have. This is why movies are so interesting to us.

Even if we watch a movie. I remember when I first saw Ender's Game, I didn't really know what I was looking at. But the person that wrote that was really wicked smart and they could see technology, they could see its implications to human nature, and they wrote a movie that kind of described what you could do if you could measure talent like that. And of course they always cloak it in drama and intrigue and all kinds of other things, but the fundamentals are very powerful.

So it's not surprising that Star Trek had a communicator and now our flip phones are essentially communicators that nobody could have envisioned in 1960 except for Rodenberry.

The same is happening today. The movies you see today that talk about the future, some things will come true, some things will not. We can never predict. But it charges the imagination of people who actually build the future and right now we have sitting on the table of our age the tools to be able to develop what I just talked about in ways that could be a game-changer.

DWG: I believe you said that you wouldn't have people's names, but you would have their, you could tell their IP addresses. So is that how you would see who's doing the best and track them down via their IP address?

Lt. Gen. Kwast: There are a thousand techniques on that, so I don't mean to dive into it in technical detail. What I'm describing when I say that is the fact that if there's a 15-year old kid out there that is just on fire intellectually and cognitively to be a fighter pilot, let's say. I have no right to know who they are. Their privacy, they're independent, their civil liberties. But as the game is out there and they sign up, if they say hey, I'm interested in flying and they see this game the Air Force has, and as they go in, it says I agree to the policies, and the policies are that we can look at the data, but we will not look at you.

But if I find this 15=year old kid that is just brilliant, I'll probably send a message to that IP address saying go tell your mom and dad that you are special, and I will offer you a $100,000 sign-up bonus and I'll send you to Harvard for four years for free if you're

willing to tell your parents to come in to a recruiting station, or come out to the airport when we have the recruiters there to meet with somebody who can put a face to the name. But we go through the parents, of course, that kind of thing. Or when they're 18. You know.

So we preserve the values of our society, but we can still see the talent. I can see 380,000 people in our society that are playing this game and I can see the ones that have the attributes. Let's dial it to empathy. Let's dial it to creative thought. Let's dial it to critical thinking. Let's dial it to strategic thinking. And you can see these attributes, these skills, this knowledge, these characteristics and you can say okay, mechanics are this kind of person and here's the 400,000 that are that kind of person. Fighter pilots are this kind of person. Cyber warriors are this kind of person. You can see the data, and then you can recruit the high talent. And now you've raised the bar.

The cognitive complexity of those coming into the service is now more appropriate for the job we need them to do and we don't have this old clunky method where somebody comes in, and even if they're the most brilliant brain surgeon on the earth, finding the security forces, you know, they go to security forces. That's the industrial age way of doing it where you put a round peg into a square hole. That's what the data allows us to get away from, that policy that allows us to get away from that.

DWG: The game would be clearly labeled as like an Air Force recruiting tool? Or would it just be an Air Force game?

Lt. Gen. Kwast: We'll let the lawyers --

DWG: We have time for just one or two last 60-second follow-ups. So John and then [Matthew].

DWG: The last time the Air Force offered any opinion of how much over-capacity it had, it said somewhere between 25 and 30 percent. How does that affect your pilot training bases? Can you consolidate your bases, especially given the kinds of tools you're talking about today in terms of speeding training up and doing things in less time?

Lt. Gen. Kwast: The implications for this are huge. And I'm not going to speculate on what we can do. But what we will do is show this data to our Secretary and our Chief with some of the business case implications that this could have on how we can use our current infrastructure to produce what we need. That remains to be seen to what

degree, and I'll wait until the data shows us that.

DWG: This is a good one, jumping back to the game for a second, I know you said it's still in development and the people playing it would know that it's an Air Force game, but is it something where you play it and there's a cockpit in front of you? Or is it something where one portion of the game is maybe like a puzzle, and based on how they do that, what are the [inaudible]? Is it more abstract or --?

Lt. Gen. Kwast: It's all. What we're trying to do, the principle we're trying to achieve in this environment is people will get to choose. They are in charge of their own -- they go where their excitement and their curiosity takes them, and by doing that we start being able to discern what their passion is, what their propensity is, and in going where they want to go it's very easy to have the questions and the scenarios and the environments and the experiences to reveal these things about their personality, their character, their quality, their skills.

But it's designed so that when they go in, they look around. It's like a candy store and they go where they want to go. Because where they want to go is where I want them to perform a job in the Air Force. Again, I want the passion to be married with their job, so they love doing what they do.

DWG: Just to be clear, is that the same, is it related to Pilot Training Next in terms of is it the same group of people coming up with it? Or is it a fully separate --

Lt. Gen. Kwast: They're all part of the same -- Pilot Training Next is taking a look at the data of what makes somebody good at the art of military aviation specifically. But there's a component of it that's looking at maintenance. There's a component looking at every skill in our Air Force. All of them, collectively, are pouring into the game designers that are managing a game that allows somebody to go in, and when they're done playing the game I know that this person is going to make a great mechanic. They want to be a mechanic, they've got the aptitude, they've got the attributes, and they have the foundational integrity -- service before self, and excellence in their pursuit of intellectual curiosity, and they're never satisfied with good enough, they always want to be better. They're hungry to learn, and they're good at adapting to a new environment. So those are kind of the foundations. And then on that we build, you're a good mechanic, you're a good cyber warrior, you're a good space warrior. But it's designed to be something that can quickly discern what a human being would be good at and why.

DWG: General, we are out of time, but I guess one of the lessons that we draw from

today is that people would love to hear you again.

Lt. Gen. Kwast: So this tape into human nature. To some degree it's escapism, you know, but it's also doing something you love.

I tell you, the one society that figures out how to marry up people's passion with the job they get to do for society and for their communities, you know, we can move away from the days where you go to work and you do your job and you can't wait to get home, you can't wait for the weekend. That's a scourge. What you want is people like us around this table. I know you all love coming to work because your job is so cool and it can go anywhere. I love coming to work because I get to do things that are so cool at defending these values that are in our constitution. I would pay to do this if they didn't pay me. Don't tell the Air Force that. [Laughter]. But I want everybody in the Air Force to feel that way, and I tell you, I want everybody in society to feel that way. And with big data, we can probably do that, as long as we protect our civil liberties, our privacy and our independence and those values that make us uniquely American. That's the trick.

DWG: Thank you, sir.

Lt. Gen. Kwast: Thanks, good to see you all. I'm glad you enjoyed the conversation, too. I know I did.

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