2015 Air and Space Conference

RPAS: Tough Lessons For The 2025 Force

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MR. BARRETT: On behalf of the Air Force Association, welcome to the Air and Space Conference in 2015. My name is Mark Barrett. I'm the executive vice president of AFA, and I welcome you to not only today's session but all week long. The title of our next forum is the Air Force's RPAs: A Tough Lesson for the 2025 Force. Today's panel will focus on the lessons on operating, maintaining, and sustaining the RPA force into the future and how lessons learned today will affect the force of 2025.

Our panelists include Lieutenant Colonel Joseph Campo, Lieutenant Colonel Travis Norton, Major Jason Willey, and Major Ryan Derzon. Each will make a short presentation, and we'll open up for questions. If you notice on your seat, you will see a question card. If you'd like, fill out a question and push them forward to the front. I'll be sitting here in the front row. I'll collect those and make sure that they get some questions. With that, gentlemen, over to you.

LIEUTENANT COLONEL NORTON: Thank you, sir. Good afternoon. It's my distinct pleasure to serve as the moderator for today's distinguished panel. Today we are joined by Lieutenant Colonel Joseph Campo, Major Ryan Derzon, and Major Jason Willey, all with extensive experience as instructors, evaluators, and leaders within the community. This panel represents over 12,600 flight hours with over 34 years of combined experience dedicated solely to RPA operations. This group of leaders sits in front of you today not only to reflect on the past two decades of Air Force RPA operations but rather how we must look at applying the lessons learned over 21 plus years as we continue to the maturation of this dynamic, agile and often misunderstood aspect of air power.

As earlier introduced, my name is Lieutenant Colonel Travis Norton. I too am a proud RP Airman having served in the community since 2007. My operation RPA experience spans both Nellis and Cannon Air Force Bases as well as afforded the distinct pleasure of teaming alongside and commanding Air Force special operation commands in MQ—1 squadron to third

SOS.

We have a lot of information to cover today, so I encourage everyone to use their cards previously mentioned in order to better facilitate the limited time we have for questions and answers at the end of the presentations. Jumping right into it, our first presentation today is from Lieutenant Colonel Dr. Joseph Campo. As an RP Airman, he is currently assigned to the Operations Director Headquarters United States Air Force as a planner for joint and national security matters. Prior to his current assignment, Lieutenant Colonel Campo completed his doctorate as an Air University Lorenz fellow where he investigated the character of modern warfare and the psychology of killing via remotely piloted aircraft, his topic for today. A weapon school graduate, Lieutenant Colonel Campo has over 2,200 hours having served as a weapons officer in the F—16, MQ—1 and MQ—9. He rose through the RPA community to command the 26th weapon squadron, our community's RPA squadron at the United States Air Force weapon school. Ladies and gentlemen, Lieutenant Colonel Campo.

LIEUTENANT COLONEL CAMPO: Thanks, Travis.

I'm going to start out the panel talking about psychology which is probably not a typical topic at an AFA conference essentially since we're going to talk about killing in the context of remote combat. The reason this topic becomes important is the wider application of how the Air Force trains and develops air crew both within the MQ—1, MQ—9 and future remotely piloted aircraft. What I found during my study that Travis alluded to is that we have identified some important lessons that can be applied to our 2025 force and beyond.

One way that psychology matters is RPA aircrew are forecasted to become the largest pilot community Air Force in the near future. However, the Air Force currently separates manned from unmanned pilots at the very beginning of their careers, and it appears we are yet to ask some of those tough questions about how this is actually working. And then finally, despite the lack of investigative research on RPA crews themselves, there is a significant amount of literature that portrays them as morally disengaged, unable to comprehend the reality of the world in which the aircraft operates, and basically treating warfare

as a big video game. You can see the quote on the slide from one of the journal articles I used in the study. Yet important questions remain unanswered, what is the character of this community, and how different is this MQ—1, MQ—9 and RPAs in general from our traditional manned aircraft counterparts? And then for this panel specifically, how should we use this information to staff future RPAs that we may field?

In order to answer these questions, I recently completed a yearlong study that investigated the MQ—1, MQ—9 air crew themselves via direct interview. I took a sampling across the entire community, the whole enterprise to include active duty in our National Guard. Additionally, we actually stand at a very unique moment in RPA history where we still have prior manned aircraft personnel with experience in platform such as A—10, F—16, C—17, and C—130 that work alongside our pipeline air crew. We call them 18X'rs in Air Force terminology that come in and do nothing else but fly RPAs as their assignment. What this provided for me as a researcher is a unique community to conduct intergroup comparisons on the psychological

connections to warfare. I'm going to talk about the emotions of killing in video games specifically, but the study itself looked at a significant number of variables including demographics, rural ethos, and a version of killing.

This shows the emotion response rate to the first strike or first kill that was exhibited by MQ—1 and MQ—9 aircrew in my study. The black bar on the bottom of the graph shows the emotion response rate was approximately 74 percent for all MQ—1 and MQ—9 aircrew conducting their first weapons engagement. Above this in color-coded demographic pairs are the intergroup comparisons that I alluded to earlier. You can see pilots compared to sensor operators, aircrew with prior combat deployments compared to those without, and prior manned aircrew versus those new 18X pipeliners. What becomes immediately apparent on this graph and others in my study is that there is virtually no difference in emotion response rates to killing regardless of whether the aircrew previously flew the A-10 versus security forces Airmen with multiple combat deployments, a load master in a C-17, or came into the Air Force and has been an 18X'r RPA

crewman since we brought them into the Air Force.

Additionally, when I combined the social and cognitive domains with the emotional that you see on this slide, the cumulative response rate jumped up to 94 percent demonstrated in this overall psychological response. And then finally, at the bottom of the slide and the next few, I have included some direct quotes from the aircrew themselves, so you can get a qualitative sense of their psyche beyond the sheer numbers. I'll give you a moment to read those.

On this slide and the next, I'm going to switch into discussion on video gaming specifically to address the literature that proposed RPA aircrew treating their profession as a video game. The graph on the slides demonstrates MQ—1 and 9 aircrew are playing video games at a rate of about 2.4 hours per week on average, a bit more for my younger crowd, and a bit less for the gray hairs. The number is nearly identical to a new study which found that western adults age 18 to 49 play video games for about 2.75 hours per week. So qualitatively, our MQ—1 and 9 aircrew are not playing video games at rates that exceed societal norms. And the quotes on the bottom

of the slide depict how the RPA aircrew felt about any comparisons to video games, and specifically when I asked them during the study. I'll give you a second to read those as well.

And then finally, it's important to note that none of the over 100 aircrew interviewed for this study considered their job akin to playing video games. And while they all stated that they didn't treat their job when they came in as a video game, my study took a step further, and I wanted to measure whether they actually acted like it was a game or not. And I'll show you that result in the next slide.

The final graph I'll show you today depicts the emotional responses experienced by RPA aircrew when environmental factors were added for analysis and helped me gauge whether they were actually emotionally invested in their work. In short, the answer was yes. On the far left of the chart, you can see the percentage of aircrew that reported a negative psychological response to their first strike was just short of 30 percent. But when we add environmental such as friendly forces taking effective fire and the

concerns of near actual collateral damage or unintended casualties, the rise in emotional response was statistically significant. This informs us that MQ—1 and 9 aircrew responded to environmental factors as we would hope in demonstrating significant emotional investment in their job.

In returning to the video gaming discussion, these emotional responses are supporting their outward statements that MQ—1 and 9 operations, these to them, are not a video game. So my study concluded that MQ—1 and 9 air crew have similar psychological connections to warfare regardless of their prior experiences before they came in to operate the equipment that they do now fly for the Air Force. And in general, they all displayed a psychological connection to warfare and the troops they support. And furthermore, the pilots specifically stated it was their personal responsibility to conduct a mission and weapons deployment in a serious manner. They take their piloting command responsibility seriously.

In this vein, I had 22 study participants relay stories of how they exercise their authority and withheld weapons because something did not feel right

about the situation even though they had clearance to employ and the right to employ. And in every case, the pilot in command took additional steps to ensure it was the right target, the right rules of engagement, collateral damage clearances before they would authorize their weapons release. I had officer pilots in command that ultimately did not employ weapons based on the application of airmanship and authority to the situation that they were presented. And the underlying finding for me was that their levels of responsibility expressed by these pilots far exceeded someone who was simply following orders or basically playing video games. And this was just one of many pieces of evidence to the study that I used to determine that, in fact, the people that do this for a living do not believe they are playing a game.

If you take a step back as well, what this told me as a researcher is that the technology that we have inherent in MQ—1 and 9 systems is providing the capability for the aircrew to both separate and connect to their operational environment. Most of the literature that you read out today will talk about the separation that the technology of the MQ—1, MQ—9

brings, but what my research found was that the same technology that does separate actually allows them to put their psyche back into combat in ways that we did not initially anticipate when we fielded and weaponized the system nearly 15 years ago.

So what does this mean for 2025 and beyond? I think first we have to realize that the MQ—1, MQ—9 simply represent the continuing evolution of warfare that's been marching along for centuries as the world transitioned from Romans carrying the short sword to the English bowmen, artillery aircraft and RPAs. The current standards have always nearly the next evolution for lacking in war traditions or bearing a resemblance to real combat. Yet in every case the transition has been made and the ones critiqued were then able to pass judgment on the next evolution. In this cycle, RPA aircrew have fared no worse and probably a lot better than others considering that early bowmen and riflemen were apt to lose their fingers or an eye if were caught on the battlefield. This is simply the cycle of technology, warfare, and the war tradition.

In the Air Force though, we've made some very

large assumptions about the difference between manned and unmanned crews based on the removal of the cockpit and so built some extensive walls, the RPA aircrew. They wear different wings. They use a completely separate training pipeline. Different pay authorities. They're staffed differently. Even their terminology is different. They call their cockpit a GCS instead of using the term [sortie], they like to use the term [dap]. But then when we conduct studies such as mine, we find actually more likeness than difference in many cases, and specifically when you can do things like we have the opportunity now where we enter group comparisons among the various demographics that fill the ranks.

So the recommendation that I make going forward is that we should be assuming likeness and only making adjustments when actual differences are noted. Officers serving as MQ—1 and 9 pilots still bare a tremendous amount of responsibility and authority in their role. All of the aircrew still require a tremendous amount of technical ability and aptitude. And finally, the overall psychological response to their job mirrors those who have been there and done

that. So if even the next generation RPA removes the stick and throttle all together from the cockpit, we should not assume this has altered the fundamental requirement for air manning this and psychologically engaged technically competent air crew that stand ready to deliver effects for the nation. Thank you.

MR. BARRETT: All right. Thank you, sir. And now I'll remind and encourage you to use the cards provided to capture your questions as they arise to pass up in preparation for the Q-and-A session. For our next presentation, Major Ryan Derzon will look at the evolution of RPA beyond simple tactics, techniques and procedures, and will focus on how the innovations of young Airmen from within the community have not only matured RPA tactical operations but caused the evolution in both the mission sets and scopes of responsibilities that fall on the shoulders of our RPA airmen.

Major Derzon comes to us today from Nellis Air Force Base in Nevada where he serves as the director for lessons learned and tactics development of 561st joint tactic squadron. An RPA Airman with over 3,400 hours, he has led operations at multiple levels since

2006 when he converted to RPAs from a seaman 30. With his initial RPA experience within special operations, Major Derzon went on to graduate the Air Force weapons school and became part of the initial cadre responsible for establishing the 26th weapon squadron, and eventually served as the squadron's director of operations. Major Derzon, the floor is now yours.

MAJOR DERZON: Thank you, sir. I am truly honored to be here today to have the chance to talk to all of you about the evolution of MQ—1 and 9 through our innovation. So in the beginning the MQ—1, which actually was the RQ—1, was thought to only be for intelligence, surveillance, and recognizance only, so patterns of life, truth movements, battlefield essay. And it was a temporary setting which meant we didn't have a lot of individuals on the staff, so we didn't have a lot of experienced people in the acquisition process or on the staff to talk to senior leaders to let them know the true capability of this aircraft. But it didn't take long for a pivotal moment to happen in the history to kind of change the course of MQ—1 and 9.

In 2001, the MQ—1 was weaponized, hellfire was

strapped on the wing, and it was employed in combat. In 2003, interesting note, we see the first hellfire attack in Iraq, and it was actually against a triple A piece, so we would have thought at this point, this early in the evolution of the aircraft, that the MQ—1 would be employing at the target that actually could shoot back at it. Soon after that, the MQ—1 and eventually the MQ—9 start supporting ground forces with close air support in Iraq, Afghanistan and around the world.

In 2008 and 2009, we see the addition of test and the weapon school. Which means that about 2010 the first graduates through the weapon school and they start going out into the field. So operational tests and weapons school is the mechanism that the Air Force uses to develop, fine develop, record and teach tactics to the Air Force. So the MQ—1 and 9 didn't even have this for almost nine years after the aircraft was weaponized.

After 2009, we see a significant addition to the mission sets that the MQ—9 and MQ—1 are capable of doing. So today, they are still doing intelligence, surveillance, and recognizance. And the weapon

school, since 2009 until today, is teaching combat, search and rescue, air operations and maritime service warfare and dynamic targeting to include strike coordination. So these mission sets aren't done in a vacuum. They are actually done with fighters and bombers integrated along with C—2, in other words command and control assets, in a medium to high threatened environment. And not only is this done in a high threatened environment and integrated, but it's done with multi-ship tactics. So manned aircraft fighters and bombers, their standard is to operate as a two ship for mutual support and visual formations. RPAs do this same thing, but it's an electronic formation. Once you get used to that transition, it becomes exponentially more effective to the ground force with sensors and massing weapons effects.

Combat search and rescue. MQ—9, MQ—1 are well-suited to be on—scene commanders. That on—scene commander portion happens from the shoot down to when the task force arrives to rescue that downed pilot. As a two ship, the lead aircraft typically will communicate with the survivor, keep sensors nearby him to find his location while the second aircraft

searches for threats and communicates with outside assets that might be inbound.

The advantages of the MQ—9 and 1 is the longevity to be able to stand station for an extremely long period of time, to protect the survivor and also its reach back, to be able to reach back to the decision-makers with amplifying data and what's happening with the survivor and the battle space. In addition, we can actually push information straight into the rescue mission commander’s cockpit, information on the survivor and the threats situation.

Strike coordination or recognizance. The MQ—9 and 1 have the ability to take the kill chain from find all the way to assess. So with find, our sensors on board, especially our Synthetic Aperture Radar, or SAR, is used to search a wide area which is very important in scarring down a target when you don't know where the targets are but you have a large area to search. And over there you'll see an image of the SAR. It actually found a [inaudible] ballistic missile which is pictured in the middle and allowed us to cue our sensors into that and then eventually attack that target.

Our pilot is what helps us to fix the target with high fidelity ability to look at and identify what the target is. We can track because of our long loiter capability, we can wait for the right time to strike this target, or we can wait for the right asset to show up with the right weapon pairing to take out the target. And in target engage, we have the ability to weapon here and employ flexible laser guided weapons.

Libya was an important time for the MQ—1. It was a great success story for the MQ—1 to be able to do strike coordination. Again because of its long loiter time, it was able to build a target deck. And as fighters and bombers showed up with limited fuel, they were past those targets, struck the targets, and were able to RTB while the MQ—1 continued on station and continued to develop target sets.

Recently, the weapon school traveled to off the coast of Florida where they did an over—water test. This was the first demonstration of MQ—9 actually completing the full kill chain in the maritime environment. Weapons officers developed tactics on how to mitigate the effects that water has on a laser—guided weapon. So those tactics coupled with the

flexible hellfire made for a very successful hellfire kill rate. In addition, they participated and integrated with other aircrafts such as the F—16, A—10, and F—35 in a maritime environment with the adversary was swarming boats, and they worked together very effectively. And again, the MQ—9s working as a two ship were the strike coordination for this. One aircraft was able to zoom out, get a big picture of where all of these boats were, pass that information to the fighters, while the secondary craft could zoom in and basically figure out friend or foe to speed up the kill chain process.

The other thing that helped us out is the radar, so I want to take a minute here and kind of show you how it is we find a boat in a gigantic ocean. So our radar is what really helps us out. And you can see in a 25 by 20 nautical mile area there we have used our SAR. And up in the upper left corner, you can kind of make out a manmade object. We take a higher photo that was shot on the bottom, and we still see that object, but you can also see a weight behind it which is clueing us into this is a larger vessel. Take another image, just above that to the right, and we

start to see some definition which now tells the pilot this is definitely a ship we need to take a look at, cue the sensor over, and we are actually able to see the ship that's out there. And that's how we take a large ocean and start to break it down to find threats.

So I've spent a little bit of time talking about the mission sets that have evolved through innovation, and I want to take a little bit of time to talk about some of the tools that have been innovated by our lieutenants, captains, and majors, and our air crew that enable these mission sets to happen. Soon after the first hellfire left the MQ—1, the requirement came down to billow head a TOT or a time on target. To this day, 14 years later, since the MQ—1 came into inception; there is no timing software, no timing ability in the software for us to use to hit a TOT. So some of our —— we had a young captain who had some programming experience created this Excel sheet. Pilots can put the data up in the top. The center section actually gives him the data he needs to know when to turn in and when to actually hit the target. And there's some amplifying information on the

bottom. So with this sheet and this, which is actually a kitchen timer, our crews that are trained properly can track a target, can hit a target within two seconds of a TOT.

Our hellfire capability has grown immensely over time, so initially our first hellfire had a very small area. This red zone here in front of the air craft kind of depicts the area the weapon can actually hit a target. And here is today. So we actually have a weapon that cannot only shoot in front of us, that can shoot either side of the air craft, or it can even shoot behind us which is an amazing ability to have a weapon that can shoot behind you, but it also brings up a lot of considerations that you need to think about when a missile is going to leave the aircraft and hit a target behind you.

On the bottom left, it shows the MQ—9 HUD. You can kind of make out on the right side of that is a staple from the top to the bottom on the right side. That is what our pilots use to determine whether or not their weapon —— their aircraft is in a suitable position that the weapon can reach the target. That stable is not nearly enough information to give the

pilot what he needs to know when you're looking at a capability as large as our current missile. So this staple has virtually been inaccurate for 14 years. So again, we had some captains put together a software —— met with some software teams in the hellfire industry and developed this software for us. The software allows the pilot to put in the information they need and it pushes out some numbers that they can actually type into their system to make that staple somewhat usable.

But they didn't stop there. They took it a step farther. They actually created a real time moving missile capability. So here you can see real time. This is what the pilot can look at in his cockpit of his aircraft flying. You can see the weapon engagement area of the big green circle. The target just turned red which means that the missile is not capable any longer of hitting that target. The blue is actually the missile path. So if you're concerned about objects and things that are behind you or other issues, this gives you some essay as to how the missile is going to fly to that target. And on the right side, there's a bunch of situational awareness

information that the staple just doesn't have.

Zeus is the tactical display that the MQ—1, MQ—9 uses. The problem was our current system has a moving map, but it doesn't have the computing power to handle what we really need it to do, or it doesn't have any communication or link capability. Again, lieutenants and captains worked together and found software that existed in the command and control world and adapted it to what the MQ—9 and 1 needed to be able to operate in contested environments. So we have here in the middle you can see in the current two-ship there is an MQ—1 with a circle around it and an MQ—1 with a square around it. That's our two-ship today.

On the left side, you can see airspace boundaries for the blue lines that actually show up on there, and you're able to tell exactly if you're in a restricted airspace or not. Up on the top, we have a text capability that actually can send messages direct into other aircraft's cockpit. On the right side, we have stacks. We have a very good air picture. And on the bottom, you can see the red rings, and those are actually threat rings. And you'll notice that that two-ship is actually operating inside of a threat ring

right now working with a package to get in there and strike a target. But this is really what allows us to integrate, and this is what allows us to fly in contested environments, give the essay that the crews need to actually succeed in those complex environments.

MQ—1 and 9 have come a long way and know smart because of its Airmen. As stressed by the secretary this morning, young Airmen professionals have been responsible for the advancement of the Air Force. We started the RQ—1 as an intelligence, surveillance, and recognizance platform, and we have pushed the boundaries in close air support, combat search and rescue, strike coordination, and maritime environment. Additionally, we are actively testing the MQ—9 capable in air-to-air role further demonstrating our ability to advance the platform's capability beyond its initial concept.

MR. BARRETT: Thank you very much. And thanks to those who have provided questions to this point. Please continue to push them throughout the remainder of this panel's time. Our final panel member today will focus on how we are translating the

lessons learned captured by Major Derzon into future RPA development efforts. Major Jason Willey comes to us from headquarters United States Air Force RPA Capabilities Division where he serves as the MQ—1, MQ—9 functional manager. Major Willey is an RPA Airman with over 3,400 hours of flight experience across C—5, MQ—1 and MQ—9 operations. Having joined the RPA community in 2008, Major Willey has served as an instructor evaluator across multiple RPA squadrons at both Creech and Whiteman Air Force Bases where prior to this assignment he rose to become the director of operations of a squadron rich in Air Force heritage and legacy, the 20th recognizance squadron. Without any further delay, Major Willey.

MAJOR WILLEY: All right. Thank you, sir, and good afternoon. Today I'll provide you an overview of the current and future MQ—1, MQ—9 program developments and talk about the concepts and missions we are pursuing for future remotely piloted aircraft based in large part on the lessons that I just briefed to you. Today MQ—1s and MQ—9s have collectively flown 2.4 million hours and currently the Air Force is flying 61 combat sorties per day in support of combat

operations worldwide. The Air Force MQ—1 predator which first saw combat in the Balkans in 1995 as an RQ—1 has served as the bedrock of the Air Force medium altitude RPA program for the last 20 years.

In 2018, the Air Force plans to retire the MQ—1 predator. Retirement does not mean scaling back, however, as we are currently in the process of transitioning MQ—1 sorties to an all MQ—9 force by 2018. The MQ—9 program is expected to operate for at least the next 20 years; therefore, the following ongoing developments are intended to improve and sustain the MQ—9 program into the future. The Air Force is currently developing and testing an MQ—9 with extended range tanks that provides an increase in range and loiter capability. New MQ—9 versions with enhanced capabilities are rolling off the production line and will soon undergo testing and evaluation.

The Air Force is also exploring adding an auto takeoff and land capability to the MQ—9 which will provide further operational efficiencies. Furthermore, cockpit upgrades will soon be delivered with additional [inaudible] plan in the future. But lastly and most importantly to this forum, the Air

Force is looking to broaden MQ—9 capabilities and missions to further enable operational employment in non-permissive type environments. As Major Derzon explained, our aircrew at the operational units and weapons school have already pushed the mission boundary into air interdiction, combat search and rescue, maritime surface warfare and strike coordination and recognizance. We intend to support these efforts and expand on the grassroots work that has already been accomplished.

So what does the future hold? In 2014, the Air Force released the RPA vector. This vector refines the Air Force strategic vision for the future of RPAs and emphasizes the inherent potential and emergent capabilities of small, unmanned, aerial systems. As the list shows, the vector covers RPA concepts and capabilities relative for today and over the next 25 years. It is also intend as a strategic planning document. The vector, along with the other lists of documents, highlights the values, roles and capabilities RPAs can provide for the future and alter means. I'll start the discussion with a brief overview of the small, unmanned, aerial system.

The Air Force defines small UAS platforms as group one through three which is any platform equal to or less than 1,320 pounds, basically anything smaller than a predator. These aircraft traditionally are perceived as serving in limited tactical roles organic to ground units. However, in early 2016, the Air Force plans to release the first ever small UAS flight plan with the intent to open the aperture enhancing small UAS roles and missions well beyond their current use. We envision that ready or nearly ready technology enhancements in size, weight, and power will enable small UASs to provide the persistence and range capabilities on par with our larger RPA peers.

With these capacities, small UASs can serve as a significant force multiplier to existing legacy platforms. Imagine a small UAS system working in conjunction off the wing of fourth and fifth generation platforms providing specific enhancing capabilities to achieve strategic effects. We can also envision long enduring small UASs augmenting existing ISR platforms such as the MQ—9 providing additional full motion video coverage or other capabilities over a target area to achieve amplifying

effects. As we look to expand the operational capabilities of medium altitude RPA, small UASs can be employed in both permissive and non-permissive environments. Low cost small UASs are proving difficult to find, fix and track validating some of our concepts for non-permissive and aerial denial applications. The potential low cost of small UAS platforms can allow greater flexibility in both permissive and non-permissive environments through treatability. Treatable platforms afford commanders flexibility to reduce risk by protecting expensive and most importantly man platforms when engaging in higher end fights.

The fiscal challenges of the present and future will necessitate leveraging these developing capabilities at an increasing rate. The bottom of the slide contains a segment of the technologies and capabilities envisioned for small UASs. For example, advances in building smaller power plants can enable persistence in the form of increased range and endurance similar to that of our larger RPAs. So to round off this discussion on small UASs, they represent a new frontier in smaller RPA technologies

which increase the inherent agility of air power and provide offsetting capabilities across multiple missions and domains. The Air Force needs to leverage these rapidly developing capabilities to insure air and space superiority in the future.

Leveraging existing knowledge based on the last 20 years, we derived the following considerations for the future. In the near term, within the next five to ten years, the Air Force maintains the following interests: First and foremost, we must continue to expand the normalized RPA access to domestic and global air space. This will require close coordination between technology developments such as sense and avoid and the policy guidance which is ongoing. We must make RPA integration around the globe commonplace to ensure the Air Force's global reach and power long term.

To further ensure access around the globe, we need to ensure RPAs are equipped with enhanced weather mitigating technologies to boost awareness and survivability in challenging weather conditions. As Major Derzon said earlier, we need to boost RPA capabilities in all spectrums of warfare while

demonstrating that these platforms no longer represent a niche capability. Lastly, pursuit of enhanced automation capabilities can provide long term manpower and operational efficiencies. Now, this is an important point. These technologies will not replace Airmen but will enhance their ability to carry out the mission. It is important to underscore that regardless of the developments, boosting RPA capabilities, Airmen will continue to serve as the strength behind the employment of all air power.

As we look to next generation RPAs who want to consider the following, a family of systems approach that will develop and coordinate the capabilities of all RPAs to collectively support missions. Open architectural interfaces and modularity will maximize operational flexibility and improve the acquisition efficiency. We will also want to continue to enhance survivability of our command and control and data links. Underscoring all of these efforts will be the requirement to rapidly and adaptively acquire new RPA capabilities. The last several years, as Major Derzon highlighted, require rapid solutions to meet the ever changing war fighter demands.

The MQ—1 and MQ—9 have been providing a continual learn as we know capability for the last several years. For example, in 1995, very few of us would have envisioned that an RPA —— or an RPA that had the capability to act in a strike coordination and recognizance role, but we now have demonstrated that capability in two conflicts. With these platforms specifically, the Air Force has just completed a scientific advisory board study on possible improvements to MQ—9 making it more viable in threat environments. And we just completed a policy analysis on the subject as well. So given our recent analysis and lessons learned from the operational community and our weapons school, we anticipate the MQ—9 remaining in the fleet for quite a while continuing its ISR and strike role. But we will look to further expand this mission set and ability to operate in threat environments in a stand-alone mission or in support of fourth and fifth generation platforms.

As a panel, we see this as imperative in the air of sequestration and with the rising capability of our possible adversaries through the proliferation of RPA related technology. One of our other key lessons

regarding the MQ—1 and MQ—9 came as a result of the rapid technology enhancements that were available in the past decade, but our acquisition process was simply not able to keep up. Often the solutions came from the aircrews of both the operational squadrons and the weapons school. Major Derzon painted these as innovation success stories, and they truly were, as they greatly enhanced the strike capability of the platform and the pilots' situational awareness. However, in institution, we have to make changes to our acquisition strategy to hasten the fielding of technology as it becomes available.

The last challenge knowledges today's fiscal constraints and that future developments will need to leverage our specific RPA developments that balance cost savings and operational capabilities. So let’s step beyond the MQ—9 to talk about a future RPA or next generation platform. At present, the Air Force future office is conducting early analysis on next generation ISR requirements which one day may lead to a fall on RPA. But beyond this effort, we still need to scope out the full range of RPA capabilities for the future and select a viable pathway forward. It

would be fair to say that all three of us on this panel think that there is some work to do in harnessing and developing this technology for future applications and systems. As the MQ—1 and MQ—9 have clearly demonstrated in both training and combat, RPAs have the potential to expand beyond our current ISA and close air support mission to include supporting global precision attack and personal recovery.

We would also recommend investigating the future of RPAs and missions such as air lift and air refueling. Range and endurance will serve as the cornerstone requirements for RPA systems in the future, and additional open architecture and modularity is absolutely essential for these systems. We simply cannot be tied to the multi-air development cycle for updated avionics and integration of new sensors and weapons onto these platforms.

So to close out the thoughts from the panel, Lieutenant Colonel Campo and Major Derzon have shown us where the Air Force has been over the last ten years in MQ—1 and MQ—9. And as our panel title states, these were some tough lessons born from a technology that we didn't fully comprehend as an

institution. But now that we are divesting the MQ—1 and looking to continuing MQ—9 operations for years to come, we are taking a hard look at these lessons and how they can be applied in the future of the MQ—9 in additional missions and threat environments.

Finally, as we start thinking about what's next after the MQ—9, we now have an incredible data set of lessons learned and a significant cadre of airmen with experience in remotely piloted aircraft that are ready to help guide and inform these efforts. This conference challenged us with the question of, what if. And I don't think you have to look any further than the MQ—1, MQ—9 community to see a generation of airmen that are asking this question every single day. Thank you.

MR. BARRETT: Thank you, Major Willey. And now for our question-and-answer period, we have a few minutes. We have about ten minutes to go or less. And so what we've done is we divided up the questions. We had multiple duplicates. So first I'm going to hand it over to Major Derzon to address the questions that he was focused on.

MAJOR DERZON: Thank you, sir. All right.

The first question, that was most of today's forces, no coin but not A2AD, anti-access, anti-denial, can you talk about how the US Air Force needs to, should, will prepare to operate in A2AD space with RPAs? This is something that we actually do today, and we really started in 2009 when the weapon school started training to those mission sets. They got involved with missions, scar, DT, in those types of environments integrating with other aircraft. They mitigate the risk and keep an eye on the future for the nation is what —— or for the aircraft is basically what the weapons school is doing.

MR. BARRETT: Can you take the next one?

PANEL MEMBER: The question was in regard to cockpit upgrades. Well, these upgrades help with task saturation. Certainly, that is exactly what these upgrades are working towards, improving the ergonomics for the air crew in general. And certainly this is an evolutionary process that we are looking to improve over the next ten years, so you will see some improvements in that realm.

MR. BARRETT: Now, Colonel Campo has a question on the often frequently asked PTSD.

LIEUTENANT COLONEL CAMPO: So a couple of questions on PTSD related to MQ—1 and 9 aircrew. I'll just encapsulate them. So we have had several cases of posttraumatic stress disorder with MQ—1 and MQ—9 aircrew. One of the things we've done as a service to address the issues and the mental health in general of our aircrew during their RPA mission is assign operational psychologists that actually work at the wings. And while PTSD obviously is a concern for the Air Force, and we've worked to support the Airmen in that role overall, we also are looking at the general health and wellness and the mental well—being of our Airmen due to things like long duty hours, shift schedule, et cetera. So our operational psychologist and some of the training that we give our line personnel are aimed specifically at supporting them in the mental capacity of doing the mission. And then if they, in fact, do have an example of PTSD, we have the right personnel now on staff ready to stand up and support them.

MR. BARRETT: Thank you. The next question we had had a concern to Major Derzon talking about he mentioned multi-ship operations and whether that was

multi-ship as just RPA or to include traditionally manned aircraft. So Major Derzon.

MAJOR DERZON: Thank you. The question was, you spoke of RPA flying as a two-ship, do you mean two RPAs or one RPA plus one manned aircraft? The one I'm speaking to is truly two RPA aircraft flying in formation together and sometimes more. Since we are on the ground, we have the ability to connect in different ways since we've not in the air. So communications are able to tie into each cockpit. We can share the feed from each aircraft, so it actually gives the flight lead an extra set of eyes as to what's happening on the battle space. And our tactics are all developed very similar to manned aircraft with massing fire power, so it is two, sometimes more, RPAs working together at one time.

MR. BARRETT: I had a couple of questions here which I can address relatively quickly. The first question was what is your opinion of Facebook CEO Mark Zuckerberg's unmanned solar powered aircraft with a stay time of 323 hours which is nearly [inaudible] times longer stay time of any current unmanned system? And before I let Major Willey remark

on this, I think this touches exactly to his point of helping out and partnering with the industry partners out there beyond your traditional defense industry to get innovations throughout the entire community to make sure that we are leveraging the best possible in acquisition solutions as we go forward and not just from the singular scope of what we're used to seeing with an RPA. So great question.

And another question came up in regards to the upcoming 18X, OTS board. How many —— do you see this panel helping on manning short falls, and do you forecast a high selection rate and a continuation of this board in the future? While I can't talk directly to selection rates of the board, we can talk, and I'll open this up for anybody else that would like to talk about how this will help the manning of our community. But really our community does not have an accessions problem. We have found that we have quite a large amount of people that are interested in joining into RPA operations. The key is making sure that as these individuals come in, we do as Colonel Campo discussed which is make sure they receive the appropriate training and exercises and, as we go

forth, to make sure they have that air minded asset and understand what they are getting involved in as they come forth to operation. So it's not so much the selection boards that are going to help us, it's more of making sure that we have the appropriate training as we go forth. Would anybody else like to address that one?

PANEL MEMBER: No.

PANEL MEMBER: Another question, does an RPA pilot need a flight physical? The answer is yes, absolutely. The Air Force has worked for over several years to modify some of the medical requirements to serve in the RPA community, but our med community and online community both treat RPA aircrew, both pilots and sensor operators. As aircrews, they go in for their annual checkups and requirements. It's just that those requirements have some modifications that are unique to the RPA community and the aircrew themselves.

MR. BARRETT: We have another one. I think we have a chance for about two more questions here. One question that came forth is, are RPA and manned pilots different enough that we should have separate

pipelines? I think what we are looking at here is what Colonel Campo discussed and what the panel is going to say in general is that it's not that the pilots themselves are different. They are actually employing air power, and the air power affects in very similar ways. It's the means that they go about to do so, and what we need to focus is not on the differences but the similarities therefore. However, as far as training pipelines where you can have efficiencies in RPA that we don't have to necessarily have when you have an undergraduate pilot training program. So we need to look at making sure those training pipelines are similar where they need to be similar and focus to make sure that the uniqueness, the small uniqueness of their differences are focused on and we develop the airmen with that strong focus as they go forth.

Finally, I'll go with —— Major Willey, if you could address that last question on there was the —— where do you see the benefits of the NAS integration and how they'll adjust our future efforts as we develop programs?

MAJOR WILLEY: So yeah, the question

specifically was, what do you see as the major challenge to full NAS integration? Well, Number 1, I think it's certainly an education piece. This is a relatively new system, so one is we got to get the message out there that we've been demonstrating that we can fly this airplane in a safe manner over the last two decades. And then I think it's also a joint effort with the commercial industry and the Air Force working with the FAA to find the air space clearances and the procedures for doing that. And that's an ongoing effort that we are working with the FAA on right now. So it certainly is going to be a challenge in the future as RPAs are relatively new and there's a lot of misperceptions about RPAs out there. But as the technologies evolve and certainly these aircraft would become much more capable than they are right now in the NAS as the technologies progress. So that's it.

PANEL MEMBER: Well, thanks very much for a great panel. Please join me in showing your appreciation for them.

(Applause)

PANEL MEMBER: Thank you for joining us this

afternoon. We have the rest of the afternoon and a couple more days, so stick around, come on by the AFA booth down on the exhibit floor for great information on half—priced memberships. Thanks.

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