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COMBAT STRESS IN REMOTELY PILOTED/UAS OPERATIONS

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P R O C E E D I N G S

DR. SINGER: (in process) -- 21st Century Defense Initiative, and I'm very delighted to welcome all of you to this important session today.

I think the fact of all of you turning out points to not just the interest in this, but how this is a game-changing topic that we're all trying to wrestle with. I was joking with some folks beforehand that while most think tanks in town right now were wrestling with defense budget, we've tried to pull back and look at something maybe far more important.

One of the most important changes that's gone on in warfare in recent years has been the introductions of robotics onto the battlefield. Our forces, for example, went from using just a handful of these systems a decade ago to having more than 7,500 of them in the air right now that range from the Predator and Reaper to the Global Hawk to the Raven.

But while they're sometimes described as unmanned or drones, these systems are actually operated and supported by teams of servicemen and

women on the ground, who often may not physically be in the battlespace, but are now integral to battlefield operations.

And while there's similarities between these new types of operations and traditional combat, there's also distinct challenges that are emerging as well, in everything from organizational identity questions to the stresses of what it means to fight war from thousands of miles away.

We have a lot of folks in the media here today, and frequently in interviews, I'll be asked about the videogame effect as it applies to these kinds of operations, of what it means and introducing robotics in war. And I actually point to the topic of discussion today as evidence that those in uniform are not treating it like a videogame, that that's a misnomer, that the very existence of these stresses shows how those in service are taking it very seriously.

But the how and the why of these challenges, they're not just new riddles for our understanding of

war and those that fight it. They're also a critical concern now on the policy side, when it comes to questions of how to actually support the warfighter.

And so we're honored today to be joined not by just one of the true experts in this area, but also someone who's dedicated his life to that mission of support. Colonel Hernando Ortega, Junior earned his Doctor in Medicine from the University of Tennessee, Memphis, and masters in public health from Harvard University.

He's served in the U.S. Air Force for 25 years, including such roles as commanding the 332nd Expeditionary Medical Support Squadron during Iraqi Freedom, and as a tour as a NASA flight surgeon, supporting astronauts in the space shuttle program.

Today, he's surgeon for the Air Force Intelligence Surveillance and Reconnaissance Agency. In this role, he ensures the maximized operational health, wellbeing and combat readiness of the agency's 17,000 personnel who serve in over 70 locations around the world, responsible for providing ISR to combatant

commanders and the nation.

Colonel, thank you very much for joining us today.

COLONEL ORTEGA: Well, thank you very much, Dr. Singer. I appreciate it. It's kind of an interesting position to be in here. I was trying to wonder who you were talking about there for a minute.

I'm not -- anyways, as just a regular Air Force flight doc who's been out there just taking care of folks who do the mission every day, it's sort of an intimidating thing to kind of be sitting here at a think tank, where most people accuse flight surgeons of not thinking too much about stuff in general.

But I want to start out just by saying that, you know, as they said in *Star Trek*, "Dammit Jim, I'm a doctor." I'm not a think tank guy, I'm not an operator, I'm not a pilot, I'm not an intel officer, I'm not a -- whole list of things.

So I think about this issue from the perspective of the human. How does the human fit into the system, and how does the human react to that

environment, and how can we better prepare that human or select that human or improve that human's performance so that the mission is taken care of in the end? And that's been the perspective of aerospace medicine since its beginnings in aviation medicine, and that's sort of the perspective that I came at this problem.

So I put together a few handouts today for you guys, just because I think a picture is worth a thousand words. And the main one is that very first one in the upper left corner that has the *Changing Air Power and Warfare* title to it.

I found that diagram back in about 2008, when I was looking at the stress levels inside of the intel community, and there's a lot of anecdotal evidence of what was going on in there, that people were saying, yeah, there's a lot of stress inside of this community. They work inside of all these secure facilities, and they're doing all kinds of things. They're really, really busy, and so I said, well, okay, let me start looking at that.

And this was part of a thing that describes the rise of the UAV inside of the Air Force, which has, as we've talked about, has just become a huge, huge portion of how the Air Force operates today.

And when you put the historical perspective back there of what it was like in World War II, thousands and thousands of humans, airmen, were involved in taking a thousand airplanes over a single target in Germany, and maybe hitting the target -- maybe.

And so that was the nature of air warfare back then, and over the years, as we've improved tactics, and equipment, and techniques and people, that's become much more efficient all the way across.

And you can see that there's a decreasing number of humans that are actually physically involved and place into the harsh environment of the aviation environment. I mean, we flight surgeons study the low oxygen pressure, hypobaric situation, high vibration, difficult communications. There's all kinds of gravito-inertial changes that happen there that

decrease performance, and so as we look at, how do we solve all those for these guys who do this business of aviation -- we used to have a whole lot of business.

And if you look down here to today, there's, like, one guy who can now hit six targets at such a point. And if you look across that any further, the guy changes clothes. He no longer has a helmet, he no longer has a G-suit, A-tags, advanced equipment that's actually helping him now to do his job, because we're taking him out of that environment.

So now this guy, basically the only thing he has left is the Nomex flight suit, which really gets to my whole issue of -- the real point of what's going on right now, I think, is culture. There's a cultural change that you discussed there in your opening remarks, and there's huge sort of inertia around this aviation culture that I think is -- the changes portend huge issues, really, for the Air Force on structural, and support, and how we're going to do this and who is going to be the high cultural status individuals in the warfare or in the military.

In the Air Force, we have sort of an aviation mindset, which is we have an aircraft and a crew. And so if you think about the manned operations, like you can go from reconnaissance, or U-2, or you can go into AWACS or JSTARS type of aircraft or you can go to fighter attack aircraft -- all those different things when there's a crew and there's a mission. And that's kind of all together as a team.

And that same concept, though, works in the RPA world as well. If you look at the unmanned systems, which -- you mentioned a little bit about language and things -- I think the language is really important, and I think unmanned systems is about the worst misnomer you can say, because they're not unmanned at all. They're manned to hilt with guys all over the place. They're just not inside the vehicle anymore, and so the Air Force went to the remotely piloted aircraft language so that we keep that -- I think you had an article just a couple weeks ago, talking about the use of RPA and what that means for how we use military force. And if we use the word

unmanned in there, it makes it real easy to use military force when, in reality, it's not unmanned at all. There's a whole bunch of guys really working hard to do that, and a whole bunch of dedicated professionals to actually make that mission happen the way the nation wants it to happen.

So that whole discussion you had a couple weeks ago about democracy and do we want to actually engage, like, for instance, into Libya and those sorts of places, that was a very interesting discussion. And the use of the language, I think, is really important, and that's going to affect the culture of what we have there.

So if you look at RPAs, the wave of the future's already been discussed. You guys know most of that. But the back end, if you look at the way RPA business is run, the front end culture -- the guys in the cockpot are the pilot and the sensor operator of the Predator, or Reaper or whatever.

The back end guys -- there's a whole bunch of other people who don't happen to be in the vehicle

either. They just happen to be at some other place besides Creech, and so they're all over the place, but they're all connected as a crew. They all work as a crew together. They're linked together with the same types of social media that all of you know, that you guys all use at home, no doubt, between all the different interconnectivity internet communications tools that are out there.

And back in 2009, there was a conference that was put together by the Air Education Training Command. It was called the Future Operator Symposium. And at that talk, Lieutenant Colonel Cantwell gave a briefing there that I put in the third slide here. This is one of his slides. He's actually here together. He's over in National War College, so here he is, and his slide basically went through and compared the roles of an RPA driver versus a regular, traditional pilot. And there are different skill sets required for those two things.

And so except for the bottom line of his chart there, which is a warrior, this is somebody who

does things that military people do. This is what you ask your military to do. And that warrior ethos, that part of the culture, is the part that has to be the same, because we're asking them to do pretty much the same tasks, just physically in a different environment.

And so when you take that piece of the culture out and you go for -- the traditional Air Force culture is an expeditionary culture. And the traditional military culture, and Marine Corps particularly and others, are very expeditionary. So we pack a bunch of guys up, we send them off to a place to fight the war, with the Civil War being sort of one of the, I guess, larger exceptions there. But even those guys came from states and traveled a long way to do that. So there's a very expeditionary mindset in our military, and it's reflected in the way the Air Force deploys people through the Air Expeditionary Forces.

And yet, now we have this distributed operations business going on, where we have guys who

have not deployed anywhere, and yet can still have combat effects and distant places. We've got a lot of systems built to actually track our deployers. We do pre-deployment assessments, and post-deployment assessments and post-post-deployment assessments. And there's a lot of things all related to the deployment, but yet there's a growing number of people who don't deploy at all.

In 2009, we had some efforts looking at terminology. Employed in place was used for folks who were actually employed doing combat missions at home station, but we really are not organized to do that. At home station, we're supposed to be training and preparing for the next deployment. And so that sort of environment is sort of a clash there, waiting to see. We've been doing this for a little over 10 or 12 years now, and it's -- there's people beginning to ask some of these questions and start trying to figure out exactly what those are.

The Surgeon General selected a little project that I put in, called Health Futures

Development Project. He has a project where they take a look at some future activity out there and say, how's it going to affect Air Force medicine? And the thing I submitted was an idea, hey, this employed in place thing, it's just going to impact how we man our home facilities, it's going to impact how we think about deployed operations, who's actually fighting the combat. This is a big change in our support structure, what we're going to do.

And that was selected back in the summer of last year for exploration and expansion into a whitepaper, and there's a draft whitepaper out now on that that's here, that's up at the Surgeon General's office now getting reviewed. But it's gone through a lot of the data and a lot of the discussions of what those differences are, and how we might have to organize ourselves in the future to do some different kinds of support missions.

And so with that, the guy who put this together is a guy who used to command the School of Aerospace Medicine, Dr. Chuck Fisher, and he made the

analogy between the 1900s, when aviation first came around, and the Army Air Corps took it and sort of relegated it to the Signal Corps and said, hey you guys here, take this airplane and just stay away from the cavalry guys, okay? We want -- the cavalry's really the elite. You just stay over there, and so those guys got in that little world, and they started working on the issues surrounding aviation, and they began to go a little further into this, and they were resistant. The military culture resisted incorporating aviation into it. And there were minimal medical resources and other things applied to the aviators at the time.

And here we are again, in a similar environment where the big military sort of takes a look at some of this, and maybe doesn't think it's quite as important as the other legacy systems that we have in it, and yet resources are still flowing there.

And so we medics were really struggling to catch up with the aviation environment back in the early 1900s, and here we are a century later, in

pretty much the same boat. There's not a whole lot of us really looking at this problem. There's not a lot of medics assigned. There's only a few of us who are actually pondering some of these questions and trying to get some data to actually help us make decisions on this.

And so if we take a look at how the culture adapted in 1903, how did the Army Air Corps develop, how did the Air Force develop out of that, what's history, there's a lot of questions there. And if you look -- I found something in some textbooks talking about 15 years after the birth of aviation, there were only 30 papers in the literature discussing the problems of aviators, the medical and physiologic problems of being in the aviation environment.

And if you go through some of the medical literature today, you'll find a handful of studies discussing this new environment as well, and so it's fascinating. There's not a word for it. There's not a connection to it. There's not a bucket that you can place these people into, and so we tried to invent a

new word. We sort of said, well, it's -- you have this whole cyber thing. There's a lot of virtual stuff.

There's a lot of things flowing out there, but if you look at these guys who actually telecommute to the warzone, the word telewarfare or telecombatant or tele-something actually gives us a bucket that we can define people in, to actually begin to study them a little more and actually define some characteristics of this environment.

And so that's sort of one of my main points here with the crowd is to come up with a word. Dr. Singer used the word in his book, in *Wired for War*, he uses the term 'cubicle warrior' is in there, and that's not -- cubicle warrior is not real sexy, and so they've had some other guys come up with some different terms.

DR. SINGER: I didn't coin it. That was what was said to me by a pilot to describe it --

COLONEL ORTEGA: Yeah. Well, that's okay. Pilots aren't the most creative guys sometimes, so --

so there's a not a -- that's part of that high culture status thing, and where does world actually build its identity around and what pieces of the culture do you actually bring from the regular Air Force into this new culture of RPA, whatever that is.

And so what -- there are pieces of the pilot culture, aviator culture that may not be the most desirable pieces of the culture that you want to have brought over. Some of the competition -- you might want some of the good competition that drives units to become better in general.

So there's a lot of different cultural aspects of what's in the Air Force, and how much of that do you actually bring over here and bring to these guys in this business, because it is a different -- as you saw on Colonel Cantwell's slide, it's a different mindset. The networked environment is different from the single guy strapping on a jet engine and going to do battle against the enemy. It's different.

And those aviators for the Air Force, the

reason the Air Force has focused on aviators for a long time is that these were the people for the Air Force who actually did the combat. They were the ones who were the POWs. Aviators were the POWs, MIAs and KIAs of the United States Air Force, mostly, especially in World War II, when our culture and our heritage was really developed.

And so that's sort of why the medical service has focused a lot on that environment, a lot of physiologic challenges. They were the warfare, the pointy end of the stick -- just the same as in the Army, the combat arms groups have sort of the high cultural status. The combat support guys are not so high and the combat services support are kind of like the last guys at the bottom. They don't get a whole lot of respect at all in that world.

So those sorts of things are out there as part of the culture. And that, I think, is really -- that's sort of the message. Who is it that we're going to put in this community, and what are the stresses that their particular functions -- does this

new function put on? There's an awful lot of stuff out in the lay press. We have all kinds of things and all kinds of papers that talk about all the stress in the RPA and how terrible it is to do this.

And so we started to look at, well, why is that? Why does everybody think that? Why is it that way -- or is it that way inside of this professional community of folks who are grown up military -- all-volunteer force who are now in the military?

So the School of Aerospace -- I'm a flight surgeon, like I said, so I turn to the people I know, which is the School of Aerospace Medicine, and I said, hey, can you guys sort of take a look at this? And they were already looking at the RPA community, and I wanted them to also look at the whole crew, not just the front end crew but the whole crew, the back end crew, the intel guys, the whole -- pilot guys who do this work for a living.

And so they devised a study that they're working on to use standardized measures from clinical psychology to actually compare so you can have a

repeatable, validated tool that actually takes a look at what their subjective and objective levels of stress are, and then whether they screen positive for other things.

And so there was a series of questionnaires. And the way the questionnaires -- it's sort of about a 15 or 20 minute total questionnaire, but it begins with a subjective report of stress, what it is and there's also some blank space for them to put in, well, this is why I think I'm stressed out. And they would put in their favorite answers, to get them to open up about what they felt was the most important aspects of why they were stressed out.

And then there's another tool called the burnout scale that we use there, and a third one is the OQ-45 for clinical distress. And then the final tool was the PCLM, which is a screening test for posttraumatic stress disorder.

And so the charts you see on the next handout really goes through some of that data. It has a lot of different comparison populations. The main

point of a lot of this is subjectively -- a lot of these guys say they're subjectively very stressed. If you look at the non-control group there, it's, like, down in the 20s for their subjective reporting of stress, and all the other guys are up there at the top, except for this -- you see noncombatant RPA control group, that's the guys at Creech.

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Well, that means they're stressed out too at Creech. So everybody at Creech was stressed out, at least at the time of this sort of thing. Subjectively, they felt stressed out, but the other people on other bases did not feel stressed out.

So the non-intel -- that's matching that other green bar up there, which is my intel guys.

So apparently the guys at Creech and the intel guys who aren't at Creech, somewhere else, they all have a similar level of subjective stress. So they all report that they're kind of part of one crew, if you will. I mean, they all have -- whatever that is, it's the same for those guys. Not that I know exactly what it is, but whatever it is, it seems to be

the same in those groups.

And the list of actually subjective complaints that they put out there are actually here in the third slide there, and shift work, schedule changes, those are top, number one issue for stress. And then they have long hours, low manning. It's really kind of a boring job to be vigilant on the same thing for days and days and days. It's really boring. It's kind of terrible. And maintaining relationships with their families -- these were the kinds of things that they reported as that were stressful for them.

And if you look through that stuff, they don't say because I was in combat. They don't say because we had to blow up a building. They don't say because we saw people get blown up. That's not what causes their stress -- at least subjectively to them. It's all the other quality of life things that everybody else would complain about too.

If you look at nurses who work night shift, anybody who does shift work, they complain of the same things -- air traffic controllers, nurses, anybody who

has to do it. So these guys have that same pattern of stress, apparently, that other shift workers do. It disrupts life. It makes it difficult to do the normal things that the rest of society is doing from the eight to five perspective.

And some of it is also the support, because remember, all the support for these guys is built on the same training schedule, eight to five, that the rest of the world is based on. So the family support center closes, the clinic closes. Everything closes at five o'clock, and so there's nobody left for those guys who are working the other 16 hours of that day. And so their access to a lot of that kind of extra supportive care is just not there.

And so that seems to be, really, the thing when you look at the next study -- is actually the same thing, just for the intel side. And the results are the same. They show the same things. Dr. PRINS, who's here, actually was the leader of that study, and it shows the same basic numbers as the RPA has. So their community, that world is the same thing, and the

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stressors are the same.

There's a couple of interesting little findings in the intel world that are a little bit different, and it's a lot younger world than the RPA world. In the RPA pilot world, there's a lot more senior people. They're older. They tend to be officers. They're all trained a little more. They've been through other things before they got there, mostly, and so they have a little bit different environment, a little bit different culture in that side of the house than they do in the intel side of the house. And that's a cultural question.

And so if you look back at the burnout scale, you can see the non-intel control groups -- there are all these low numbers. The RPAs are always higher. The active duty is higher than the garden reserve, and the crews in the front and the back end crew show the same pattern in the occupational burnout scale. And if you go to clinical distress, which is a more rigorous scale to apply to their psychological health, it goes down, but it's still the same pattern.

They still match all the way down, and it's kind of amazing.

The thing that really breaks it out is the slide. They're number six, which shows that the minute you break 50 hours of work per week, your stress levels go up. And as you break 60 hours a week, your clinical distress measures also -- they continue to break. So human beings have a threshold where they function well in a sustainment environment of about 40 to 50 hours a week of work, and there's a lot of occupational literature that's also out there showing that very same relationship. Folks, they got to have some off time to regenerate, to go back into a productive work environment.

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Of course, I'd say for maybe you who loves your work so much that you can do it 24/7 or 365 -- I don't know.

DR. SINGER: This is recorded, yes.

COLONEL ORTEGA: Just helping you out, sir.

But that's sort of a human breakpoint, apparently, is somewhere in that 50 hours of work per

week range, that if you're going to do this forever and ever -- when we deploy people, they're 24/7 to the war. And so whenever the war happens, they have to be prepared to perform whenever. Doesn't matter if it's in the middle of the night or if the enemy comes over the hill -- whenever they choose, that's when we have to be ready to do things.

So there are some other issues for when you deploy, that you take away a lot of other home stresses and just focus on that as the main thing. But back at home, if you're going to sustain this over time, you got to have that other time available to keep those healthy relationships going, and to regenerate yourself for the next day's work or however stressing or taxing that's going to be.

And the final thing on some of the slides is just the PTSD slide. This is the PCLM, which is a screening tool for -- do you meet threshold to be at risk for PTSD? And so if you look at the numbers there, the numbers of folks even in the RPA world, it's below the general population. So the PTSD -- and

this is screen positive. It's not that they have PTSD. It's that they screen positive for PTSD, and they screened at a way different rate than the OIF and OEF returning soldiers who screened positive at a rate up near 15 percent at various studies. They're between those little green arrows.

But then, our guys are below the general civilian population as far as risk for PTSD.

DR. SINGER: Because I'm sure this is going to be a point of interest, can you speak real quickly to the screening itself, how one gets put into that pool or not?

COLONEL ORTEGA: Well, this is a questionnaire, and the little questionnaire's actually shrunk up there on the slide, but it actually just asks 25 questions, I believe, and depending on which answers you endorse on the questionnaire, it reaches a threshold that's been validated that says if you're above this threshold, you're at risk for PTSD. It doesn't diagnose you with PTSD. It simply means that you're at risk for PTSD. So these numbers don't

really diagnose anyone.

And one of the things that has been asked -- I think there was a recent -- I got some recent -- a public affairs question on do we have any pilots who have been diagnosed with PTSD? And we haven't diagnosed any pilots with PTSD -- that's right, that's right. We had, I think, one sensor operator that we maybe -- was it one? Maybe screened there -- right. And so we have had no pilots be diagnosed with PTSD.

And so the population that's here, while they may be stressed -- you alluded to it. They're professionals, and they're trained to a professional standard. And there's more we could probably do to help them build their resilient up to tolerate some of the weird stresses we do. We could probably reorganize a little bit to maybe make some of this a little bit different, but it's not a PTSD problem in this community.

PTSD typically is a very -- we'll say a sympathetic nervous system problem, all right? So it's fight or flight, sympathetic system. There's a

threat to the individual. Sympathetic nervous system turns on, fight or flight takes over, and now you're very highly charged, you're highly aware, you're highly vigilant, you're doing all kinds of things, and so then that all happened.

It's kind of like after you've nearly been in a car accident. If any of you have ever done that, you kind of go -- and then you're like, look -- and then I survived. Well, that same adrenaline surge, if you will, and that sympathetic discharge is really what is out of control in the classic PTSD environment.

And if you look at what these guys have, they don't have that. They don't have an over sympathetic discharge of things. They have more of an existential conflict. It's more of a guilt feeling, perhaps, or a did I make the right decision? Could I have -- was this a friendly fire incident? Was it a good outcome? Was it a bad outcome? Could I have done it better? So a lot more second guessing in this, as opposed to the classic PTSD description of

symptoms, which is really related to a physical threat event.

Now it's not to say that they don't really feel about the physical threat to their brothers who are on the ground up there. The band of brothers, as I say, is -- I believe the band of brothers is not just in the unit. I believe it's on the network, and I believe the communication tools that are out there has extended the band of brothers mentality to these crews who are in contact with guys on the ground. They know each other from the chat rooms. They know each other from the whatever, however they communicate. They do it every day, same thing all the time.

And those of you who have been out there, you know that -- I know there's a Marine here who's been out there before and done some of this, and I think there has been a program for awhile now where the Marines and the Army units that go forward will send some of their communications, some of their officers to the intel units who are going to be

supporting them, and they will actually physically meet, and then they will go for their 15 month or their year-long deployment, but yet they've seen each other.

And when they come back, a lot of times they will go and visit the intel units to see the same guys who are on the chat rooms with them to do that, and that really helps a lot with that communication and things.

But they do. Our world today develops relationships in a completely -- our young airmen and Marines and sailors and soldiers, they build relationships in a different way than some of us old people do. They build them online.

If you can meet your bride online from wherever, sight unseen, and get married, that's a relationship. I mean, you've sort of built one online. And I think the band of brothers is built online. I think it's out there, and these guys do participate. So that piece of the stress, I think, when something bad happens, that really is out there

in those guys.

And if you look, the intel slides on the last one just really mirror the same as the other ones. It shows you that the intel guys really matched the RPA guys in the same thing. So it tells me that the environment and the bucket that we have, whatever that bucket is, those guys are in the same one. And I believe it's a reasonable thing to define them as telewarfare. It's a little better than cubicle warrior, perhaps.

But it actually allows us to define some of those things, that if you're engaged -- and it's on one of the slides that I have there. It talks about the definition, and there's, like, five things that we sort of came up with in this Health Futures discussion, for what you can define a telewarrior as.

And so with that, there's a whole lot of other issues inside of telewarfare, when you ask yourself questions like, how does that affect the Geneva Conventions? Who's a legal target? Is my identity a legal target? If you take away my security

clearance and I can't go to work, did you just take me off the battlefield? A lot of interesting sort of legal -- and like I said, that's way above my flight surgeon level of knowledge. This is more for you guys to take and develop here at Brookings.

But those are sort of the ideas that, when you change from this revolution that you've described, when it really takes full hold, there's an awful lot of culture and an awful lot of systems that have to catch up to that environment.

And so that's really all my comments overall from the slides and the guidance. I'd love to discuss, or ask questions or get ideas from you guys on any of this.

DR. SINGER: Fantastic. I think you laid out a lot of important information for us.

What I'd like to do is follow up with a couple more questions myself, and then we'll open up to the group. But these, in many ways, may, I think, help let us all dig a little bit deeper into it, and maybe subsume some of the questions or comments.

The first is, it's often remarked that the nature of telework, or, if we're making this into war compared with expeditionary, there's a critical role that the transition period plays. You know, it's almost -- if we're talking about flight, it's the decompression. The veterans from World War II talked about how the time spent, the literally weeks on the ship coming home was where they'd decompress. They'd say things like, that's where I became a human again, or that's where I became a civilian again.

Today -- correct me if I'm wrong, but a U.S. Air Force -- be it a pilot or a airman on the ground in Afghanistan -- doesn't come straight back. We actually have a three day transition period in Germany that's designed to help them to regain that old identity. But for the RPA operator, for the ISR, there's not that transition period, be it the weeks in the World War II where the three days that we require for those now physically in the warspace.

Do you see this as part of maybe what's going on here -- that there is an all too abrupt shift

in the tasks we're requiring of them and then the environment they're jumping between -- the idea of I'm engaging in combat and 20 minutes later -- this is to quote an Air Force colonel to me, a Predator pilot -- I'm spending 12 hours fighting enemy combatants, and then 20 minutes later, I'm talking to my kids --

DR. ORTEGA: Going to Girl Scouts.

DR. SINGER: He used the example of at the dinner table about homework.

DR. ORTEGA: And that's part of the built-in environment of what the RPA world has brought us. I mean, we no longer have that long distance expeditionary thing that allows you that decompression time -- or that we built the three or four day decompression stuff in Europe as they come back from the theater. So that piece is built to do that for those who deploy.

And the non-deploying or the employed in place guys really do have -- we have been in these operations for 10 or 12 years, and so if you think about the movement of military people, we move every

three or four years, but a guy might move from Beal or some Air Force Base somewhere and go to another Air Force Base and do the same job.

So you're talking about an entire career of people who potentially will never leave this environment. And if we do it on the -- if you look at shift work and how long we have shift work, performance drops off after eight hours. 12 hours shifts, 50 hours a week, those things are human limits to sustained operations -- not to surge operations. Surge is different. You deploy, you surge, you do what you have to do to win for that time, but to sustain the operation, to sustain the people in a lower stress environment, to keep them -- to retain them in the service after they're highly trained, all of those pieces are -- and to actually select people.

There are probably people who really do this well. They're compartmentalizing. They can switch off work and switch on home. They can do this. That's one of the real driving things about pilots. They have to be compartmentalizing, because anybody

who would strap on a jet engine that might explode, and go out there and face missiles that are coming to shoot you down, that guy has to compartmentalize those risks and put them somewhere he says, they're not going to get me. That has to be blocked off, and he's got to focus on the task and the stuff in his jet at that time.

And so aviators sort of developed that skill set. They're not developed; they're selected for it. If you look at them all the way through there, they have a college education, they have a UPT, they have training, fighter lead-in, they have flight leads, they have upgrades, they have all kinds of things that monitor them and actually build that sense of compartmentalization.

In this world, we built it so rapidly that I don't think their culture internally has caught up with those. Like, we have squadron ready rooms or squadron -- we'll call them heritage rooms, I guess today would be the -- we used to call them bars in World War II, squadron bar, but now they call them

heritage rooms.

And that ability to decompress the stress events of the day with your peers in a relatively secure environment was really important to the aviation world. That's why that culture developed. There's a lot of rituals that they develop also (inaudible) maybe I will.

All right. Are you ready?

All right. So one of the aviation rituals is around. Let's see if Dr. Murphy has his -- no. But so a coin -- the coin test of who is out there as part of the unit. You have your unit coin. Those sorts of things are parts of the culture, the heritage that's grown up around aviation -- that grew up for a reason.

They do this for a reason, and part of it is to build that camaraderie and to decompress themselves from a plane crash of one of their friends who was a great pilot. How do you decompress that?

Look at the Army's boots and the helmet ritual. When they lose a fellow soldier, they put

those things together, the unit looks together. They build that thing, they put that where it -- and then they go, and they have to finish (inaudible).

So a lot of these kind of cultural things -- these are the kind of things I'm saying, what do we bring forward from the culture we have now? What do we bring and put inside of this new culture? What are the leaders going to put in there? What are the people going to put in there? What sort of things would be healthy things to bring, and what would be sort of unhealthy things to bring from that?

But that sustainment piece of this -- the reason we put stress on them is to work them long hours, and we low man them because we're rising the number of -- the requirements are just growing. And so that is what's putting the stress on these guys, and they have not yet had time to build those rituals, those things that help them decompress.

They're going to have to do it daily, and they have some already. I think at Beale, they have a sign on the door that goes in that says welcome to the

AOR, and it's in desert cami, and when they walk through there, put their game on, go to the combat zone. When they walk out, they're going back home.

So even those simple rituals like that would actually help them, but there are probably selection standards that we could come up with, the same as we finally came up with medical standards 11 years after the aircraft was invented -- came up with standards 11, 12 years later to sort of select those people who are best suited for that environment, for that function, for that stress.

DR. SINGER: I think a parallel would be the Navy, the screening it does for submarine crews and the like, as compared to other roles.

DR. ORTEGA: Exactly.

DR. SINGER: But I'm going to press you, though. You ended on what seemed like a fairly positive note of saying, look, the modern airmen, even though they're only network connected to someone, they're developing these band of brothers relationships online.

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We know at least the old traditional mode, the band of brothers, the unit cohesion is one of the best inoculators against combat stress, and it's everything from you fight for your team to how you decompress from losing a member of your team and the like.

Does that actually hold true on the network side? Because in many ways, you just described that there's a lack of kind of -- we haven't developed these new parts of the culture, we haven't developed the different modes of selection, but also just simply does the same impact of unit cohesion happen when the unit is actually physically disaggregated?

DR. ORTEGA: I think our young airmen actually do this. There's some literature out there about the social networks that are out there, even like in -- you mentioned the gaming world earlier, but there's some guys who study, like, *World of Warcraft* and other things like that, where there's actually a social network inside of there where they actually watch out -- even though they're just avatars and

other people -- they actually know each other and ask questions. They derive a paramount of support, even for their own personal problems, from other people in that world.

And so the world actually does do a lot of social -- I mean, a lot of our relationships are through there, and these guys have figured out ways to do that. They're not standardized. Like, they're not -- every unit doesn't have this.

And the intel guys who are here may have a little bit better perspective on exactly how the units do that, but when you're working 12 hour shifts, you can't get the whole unit together at one time because it's 24 hour operations.

And one of the things that I believe I mentioned to our Australian friends here is that the one thing, if you look at their main complaint, it's shift work. And if I can send the work anywhere in the world, why would I send it to where it's three in the morning? Humans don't work well at three in the morning. From midnight to six, people like to sleep,

and we're sort of a diurnal kind of animal. We're not nocturnal. There's some evening guys and some morning guys, but for the most part, not too many humans really dig 3:00 a.m., and so that's one of those things where you go, well, why would we send it to where it's 3:00 a.m. and make them work at 3:00 a.m.?

Well, because that's what we do. It's another cultural piece, and you go, well, the work doesn't have to be there. You sent it from the AOR all the way to California. Why not send it to Ramstein? Why not send it to Guam or send it somewhere else where it's daylight, and then guys just work day shift?

DR. SINGER: That has, of course, a cascading effect back on the family side, particularly for younger -- I remember speaking with a squadron officer. We talked about the younger officers tried to have it both ways, because then they'd, besides doing the work at night, try and still do the family side then during the day, because family wouldn't

understand if you're sleeping during that day.

DR. ORTEGA: And that builds fatigue, which decreases human performance, which leads to more stress, which leads to -- it's a cycle that fatigue is really critical in a lot of these operations in battle. When you get the troops tired, there are psychological effects -- fatigue decreases performance, no matter how (inaudible).

We don't teach a lot of our young airmen how to sleep better. I mean, they're 20 years old. They're invincible. We ought to probably educate them a little more on sleep -- how to do it better, and maybe we should move systems around. I mean, there's probably a lot of solutions we could sort of put in there if there was not -- there's a little cultural inertia as to how we do things, and you kind of go, well, how do we overcome that?

DR. SINGER: One last question before we open it up.

We've got a number of officers from other nations here that are also currently or starting to

utilize the very same technologies, and anecdotally, I remember talking to one of your colleagues, a doctor in the RAF who spoke about his -- and again, he did not have the data, but anecdotally thought that the level of stress and burnout in their unit, which was actually deployed right alongside ours in Creech, was lower.

And there were some riddles behind that, and there were some theories, one of which was the old unit cohesion thing, that actually, the Brits, while they were operating remotely, they were all strangers in a stranger land in Nevada so it created a sense of team.

Have you been able to run this kind of data past other forces, to see what they're learning, what they're experiencing, and are there mechanisms that they're putting into place that we might learn from, and vice versa?

DR. ORTEGA: Well, there's not -- the data is from this same study, and they did do the RAF flyers as well. Their tour is a shorter tour there.

Their tour is, I believe, it's a four month tour. Is it longer than that? Is it years that they spend there? Three years.

And so that sort of oversees kind of worlds a little bit different, and like you said, it's much more cohesive amongst the folks who are there.

The guys who are at Creech actually -- we've had many discussions on why that is. Why was the RAF morale so much higher? And remember, I told you some of these guys could be in this business forever, for a career. They just move from one place to another, and never leave the same environment of doing this. But these guys go here and come back home.

We have a broad system that actually -- and a lot of time zones in our land that allow us to do some different things, whereas in Great Britain, they have Greenwich Mean Time, but they have to go to other places. They have to use a lot of allies to do things like that, spread things around.

But their data -- I have not seen data from the RAF on any operations that they're doing in Great

Britain, and what the morale is like inside of that unit or what the stressors are like. I haven't seen any of those things.

I am going to go out to the European Flight Surgeon conference next March, and try to interact with some of those guys and discuss some of this stuff with them, and also begin NATO's conversations on what are the things that we need to watch out for in this community, and how do we mitigate the risks to their performance of the mission with all this as we broaden out the operations to include NATO partners and other combined folks.

But I haven't seen any data. I don't know if you guys heard anything from the MOD or anybody else there.

SPEAKER: I'm very aware that (inaudible) we have not been seeing that concept of finishing work and going home to my family. Very interesting.

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We found de-stressing times -- the drive from Creech back to where they lived. Five minute to an hour drive, and that was enough time for guys to

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get their head around what they were doing.

Also, a lot of the guys were previously aircrew on other aircraft fighters, and had been on operations (inaudible) operators, so they could see both ends -- the operations, on the ground, overhead. They could read that across (inaudible).

DR. ORTEGA: And there's something to be said for volunteerism -- to go to do this versus being placed there, which a lot of the early RPA guys were actually placed there against their desirements, and so that attitude shifts into how much stress you actually register from the operations that you're doing all the time.

DR. SINGER: Thank you. Let's go ahead and open up the -- so just really -- we got one down there, and we'll go here SPEAKER: - (inaudible)

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DR. SINGER: I mean, it'd be interesting to -- once you get a larger pool -- to disaggregate the data between those that have done a deployment physically into the theater. It doesn't just apply to them. Remember, again, all of this is anecdote. All

of this is theory at this stage, but similarly, the family's ability to help support and cope is different if the family has gone through that actual deployment before, versus it being newlyweds and the like. Those things may kick in.

The other theory that was pushed by the RAF doctor was that there was not as much of a difference between the ranks of people involved, and so the ability to go to the heritage room and talk things over is different when you've got two majors or two captains or a major and a captain versus when you might have a lieutenant and a major. There's some issues there as well.

Let's go ahead and open up to questions. Yeah? And please introduce yourself.

MR. DREAZEN: Yochi Dreazen from *National Journal*.

I'd like to ask you one question on the methodology and one more substantive.

When was this survey taken, and how many people did it include?

DR. ORTEGA: The survey for -- there's a couple different surveys that are presented here, but the methodology was the same. The survey for the RPA was about -- it began about a year and a half ago, perhaps, and then the intel side of the thing was done last year. It was probably -- yeah, last spring about this time. And there's about 700 or 800 in each -- or is that total?

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For intel. So fairly significant numbers. The response rates we'd like to be a little bit higher, which were kind of low. And what we've just discussed in brief some other places that we'd like to continue this and repeat this again, to look and see if there are changes, and to perhaps really get the leadership to push up to help support us in response rate across both the intel side and the RPA side.

The RPA side had a really good response rate. The intel side had a much lower response rate.

SPEAKER: Again, anecdotally, kind of similar to what Peter was talking about -- people I've talked to in this community, the two issues that they

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raised besides stress, one was the feeling of sort of guilt, that they were watching a battle take place, and they could see it in extraordinary detail. They may have seen an American get wounded or killed with no ability to help.

And the other one was this sort of related feeling of just powerlessness, that they can try to relay information, but the battle's happening far away. They can't necessarily help dictate it beyond what they're seeing, or if it's obviously an armed weapon trying to fire something, that helps.

Were you surprised that those types of issues seem to have been overshadowed so completely by work of life -- home/life stress issues?

DR. ORTEGA: That, I think, is really one of the major things, the major findings of the work so far has been that the popularized idea of watching the combat was really not what was producing the most just day to day stress for these guys.

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Now there are individual cases -- like I said, particularly with, for instance, when something

goes wrong -- a friendly fire incident or other things like that. Those things produce a lot of stress and a lot of, as I mentioned before, more of an existential kind of guilt, as you said, and sort of could I have done better? Did I make the right choices? What could I have done more?

But there's multiple ways to communicate there. They can't communicate to the whole place, but there's a lot of communication that still goes on, even with the tools they have now. And so a lot of them do -- the person next to you controlling the RPA may not have a lot of -- there's multiple ways that information is still getting forwarded to those guys. And that produces a lot of stress for the guys. That lack of control, I think, is one of the main features of producing stress. I mean, when you can't control what's going on around you, you get stressed out about it, and these guys tend to not be able to do that.

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There also tends to be a long period of -- I can't even remember who described warfare this way, but it's long periods of boredom punctuated by moments

of sheer terror, right? And these guys complain of the same thing. They describe it the same way as regular warfare. They say, God, you're just hanging around here, just bored, bored, and all of a sudden -- and they're all on game and they go -- and then they're back to moments of -- and then it's just watching the same truck again for a long time.

So those sorts of things are -- that's the similarity of the warfare, between the two groups. That's what Colonel Cantwell's slide was all about, is that there's this similarity there. It's warfare. That's what it is.

And the individual risk factor seems to change that stress calculation, whatever that is, but the lack of control is -- I think it's one of the big things they do mention a lot of -- a lack of control.

DR. O'DONNOL: Hello. I'm a federal executive fellow here at the Brookings Institution for a year.

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I had two questions, dovetailing on the immediately previous question.

In regards to guilt, were you able to examine guilt in relation to casualties, both civilian and enemy, as well as combat troops on the ground? That's my first inquiry.

And my second is, there is, of course, a big difference between this remote warfare and those on the ground, and that is danger to self. And I think that might be a bit of a taboo topic in some of these groups, but I wondered if there's been explicit discussion of those differences and what they mean in terms of the warrior identity, and also the culture of how things are unfolding.

DR. ORTEGA: I'll take the guilt question last, because I think your last question about the identity of the warrior is kind of interesting. The Air Force has been in this environment since its beginning. Aviators are separated from the warzone, if you will, according to the Army, right? I mean, the Air Force is up there, and they don't have to get their hands dirty up in the sky. They're just flying their airplane up there, and we have to live in the

trenches down here.

And so there is that separation, and the Air Force, when you take a look at it from the Army perspective, they look at the Air Force as not really having to get their hands too dirty, because they're just up there, flying around in the sky.

That's a simplification, but that's sort of the going in perception of that separate -- and now we're talking about an even separator -- distance is that much farther from the same line.

And so I think the Air Force already has lived through some of this culturally.

DR. SINGER: You're talking about external imposed identity. That is, you're talking about a mythology. In reality, the combat losses of bomber crews in World War II were higher than they were for infantry. It was safer to be GI Joe in the foxhole than it was -- but so her question, though, is not about the external identity.

It's about the internal identity, that there was -- that pilot in World War II was actually going

to be in danger, whereas the remote operator is not actually going into danger. Their most dangerous part of their day is their commute. That's what she's asking about.

DR. ORTEGA: No, understood, and I think the perception that the person doing this is not a warrior is not an internal one. These guys know they are. They know they're doing this. It's the culture that looks at them as not a warrior. It's the pilot culture that looks at them as not -- it's the external -- it's the other things that say, well, you don't really go -- no, no, that's why I had to have a new word.

It's not the same. It's not your grandfather's war. This is a different kind of war, but it's still war, and so they understand some of that, and they do internally feel -- but it's a different person.

If you look at that slide from Colonel Cantwell, the requirements for the new kind of "aviator/warfare/airforce operator," it's different.

They're different all the way along, except for that last thing. It's a highly networked thing, it's a lot more communicative sort of thing than it was for a single fighter person. It's just different.

So that cultural aspect -- and the question is now is that they are not a very highly valued culture in the culture of the Air Force or in the culture of the military right now, except for their performance. They're actually desired by everybody in the world to come and do this. They want people overhead, they want the information, they want what those guys bring to the fight.

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But culturally, I mean, the Air Force is behind the times as far as doing that. I think internally, they have to learn to bring the best pieces of this, to actually help them be more resilient to those stresses, which are the guilt things and the other things that are out there. And we haven't really studied exactly which pieces of the guilt portion of that there are. We know there are when there's a bad thing that happens. They

internally begin to talk about things.

We're actually trying to put more chaplains inside of the secure environment as well, and more medical technicians, enlisted medics, because there is a divide between the enlisted force of the intel world and the officer force of the pilot world. There's a divide between the enlisted and officer, and so now these guys are -- they maybe won't come talk to the colonel doctor. Maybe they'll talk to the staff sergeant medic.

And so as we get those guys their clearances and try to embed them into these units, we're hoping that will open up the access for them to come and get whatever sort of -- I mean, medicine uses the language of patience. And in warfare, it's kind of interesting. You really don't want to make somebody a patient, because that increases their risk for posttraumatic stress disorder and other things. You want to make them a valued piece of the unit that need to fix them -- and the whole battle mind concept that the Army's working with us to say, this is normal. I

mean, you get shot at. It's normal. You're supposed to be stressed out.

But you got to learn to control the stress. Use your buddies, be part of the unit and recover, and let's go keep getting the mission.

SPEAKER: If I might just add one comment to that, the data on the relative lack of posttraumatic stress, that hyposympathetic response in the remote group would match the triggers that cause posttraumatic stress, which is immediate danger to self and helplessness to do anything about it.

But you did make an interesting comment about how those who are in this remote position are very worried about their colleagues on the ground with whom they have relationships remotely. And that would kind of bring posttraumatic stress back into the picture, would it not, because of that secondary trauma that might come in?

So my question was more focused on the experience of the person him or herself, not being an immediate danger to self in the moment of warfare, and

how this might make for a very different self identity, and how the vocabulary's kind of struggling with this core identity issue. So --

DR. ORTEGA: Those are all -- that's part of the whole discussion of how the culture's going to react and bring value to what these guys do, and how they're going to internally organize, and what rituals and what resilience tools are they going to build for themselves? How much can I input into that as a medical guy? Can I help them do that? can I improve their performance for that?

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I mean, I wish I knew some answers. I mean, that's why I came here to talk to you guys. You all are supposed to kind of help me with that.

SPEAKER: So this is following up on those two previous questions also, and one kind of methodological question.

But with these top sources of stress, were those just based on narrative comments or okay -- so narratively.

DR. ORTEGA: All narrative. They had a

blank slate to write whatever they wanted as their top whatever -- however much they wanted to write, and then we just grouped them into subcategories that matched up.

SPEAKER: Do you have any concerns at all that, in a sense, maybe they downplayed just the idea that they're very well aware that they're not in physical danger, and that their comrade in arms are facing this danger. So maybe this sense that it might feel presumptuous of them to talk about their combat experience.

I mean, is there -- are you guys making any effort to delve into that side of it, those feelings of sort of guilt?

MR. ORTEGA: Lilian, I don't know if you have any information on that from your study --

MS. PRINCE: Okay, can you hear me? Hi, I'm Lilian Prince. I'm with the School of Aerospace Medicine and did participate in several portions of the studies that we're referring to.

But I did some individual research in this

area to do with what I call vicarious combat exposure, and I sought to assess what the implications of that might be. I kind of went into it with the thought that okay, they're physically separated, but is there a potentiality for some of the stress manifestations all the way across the spectrum, from exhaustion to clinical distress, even to PTSD, to see how that actually manifests if properly studied.

And what I found is that, first of all, there aren't very many cases of PTSD, and you can see that from the slides, but also that those who were experiencing it seemed to have a perception of a more active role in the combat event, perhaps.

So it was individualistic experience for them, where they felt that much more engaged in the combat event maybe than their peer group. A lot of factors might go into that -- more experienced so a bit of resiliency seasoning, other life experiences that could have contributed to their -- maybe more of a susceptibility to a PTSD-type response.

But there's definitely a distinction there

in terms of a person's likelihood to hit that mark or that threshold.

I think your question also about sort of being more open about their combat experience -- in that study, I sought to sort of measure what combat experience might be like in this vicarious way, and we had to establish a mechanism to sort of account for that.

And at least for the subset that I was able to look at, there was a moderate amount of combat exposure that was reflected by these people, part because it's a very young demographic. A lot of them had only been doing this mission for a couple of years, and so that would make sense, that they would have only accumulated a modern amount of combat exposure.

I don't have an indication that would suggest that they would shy away from identifying that. Do you know what I mean? I think it's just a manner of the mission, although it's been growing now for several years. There are a lot of individuals

coming in, and they're newer. They're cultivating that experience. They're more susceptible the younger they are, and as they go along, they'll cultivate that resilience tentatively.

DR. ORTEGA: Our question is, can we actually add some steps to their training --

MS. PRINCE: Exactly.

DR. ORTEGA: -- to their pieces to improve their resilience -- the young age group, the young demographic that's in the enlisted side of the house that does that.

The pilots tend to be very screened and rigorously selected all the way through a long trail of how they are trained to do this, but the enlisted side doesn't appear to quite have that yet, and that's kind of where we are, is to try to say, can we boost it? Can we do something different? Can we select them a little bit? Maybe there's some psychological traits that allow you to better perform in this environment.

And there are particular types of missions,

if you will, that are more stressful than others. Watching the truck all day is not terribly stressful, but chasing down a bad guy somewhere and all those sorts of things that the team is trying to coordinate and trying to get there, and mission failure at the end -- that's a pretty -- all the work they've done, and those sorts of negative outcomes seem to have a lot more of -- lot harder for them to deal with.

MR. SWEETMAN: Bill Sweetman, *Defense Technology International*.

It seems to me that there's a few factors playing here that only have secondary -- are not directly connected to remove operation. I think we're hearing that maybe the difference between the U.S. and the RAF crews is that the U.S. crews were selected without prior combat experience, and I'm willing to bet that they thought they -- some of them may feel that they were passed over for manned aircraft. That's not a good way of starting.

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We haven't had 24/7 air combat operations before, because the aircraft couldn't do it. Any

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deployed squadrans spends a little time in the air and a lot of time decompressing on the ground.

So that, again, is a secondary factor, and if we were trying to do 24 hours coverage with manned aircraft, I think we'd be having some of the same burnout issues.

DR. ORTEGA: Operation Northern Watch and Southern Watch were largely that way. We just had multiples shifts of guys who did it, and each mission had a start and an end, and you had to trade aircraft out. So they've sort of done that on occasion, but it hasn't been huge.

MR. SWEETMAN: But your combat duty times in the RPA world are higher than , some historically, and then I noticed a spike of Global Hawk sensor operators, which may reflect the fact that the Global Hawk sensor package isn't actually all that it's cracked up to be, and it's probably quite hard to get results in.

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DR. ORTEGA: And they were very low manned at the time and working extra long hours, and so that

sort of -- those were the real mitigating factors for the Global Hawk sensor guys, is that they really were at a time when they just didn't have manpower and were really stressed.

MR. SWEETMAN: So it might be interesting if you could take some of those issues out of the way. Maybe you'd find that the remote challenge is not as big as we thought it was.

DR. ORTEGA: And the aircrew -- exactly, and I think the aircrew piece of this is naturally limited by crew rest rules beforehand and the mission link and the amount of time you can stay on station inside of an aircraft. Those have all been limited by our regulations over time, and so we kind of know where that is, and these are not terribly limited. They go 12 hour shifts, and some places are working six days a week, 12 hour shifts. Some are working less, some are working more.

The garden reserve tend to be able to control their amount of work a little bit easier. They tend to take -- I'll take these five orbits, and

then the active takes up all the rest. And so they don't get much of a chance to sort of say no, whereas the garden reserve can kind of control that ops tempo a little bit closer, and so you see their stress levels are lower across the board as well.

MR. SWEETMAN: We learned to restrict aircrew hours in actual airplanes because we started crashing planes.

DR. ORTEGA: It would be the human performance aspect of doing it -- that's right. And here we have humans in the -- it's not unmanned. It's remotely -- it's telewarriors, and they have the same human limitations.

DR. SINGER: Saw Wayne, down there.

WAYNE: Thank you, Peter. First of all, I want to thank you for putting this on, and Colonel, for your participating.

I kind of want to go beyond the study that you did to get more into some technical issues very quickly. I mean, most of the advanced research that's done in the cognitive sciences, in cognitive workload,

cognitive reserve, brainwave patterns, neuroimaging, the neurosciences, is done in the academic community and the university community, in their kinesiology department, sometimes their psych departments, in their neurosciences programs.

To what extent is the Air Force working with the academic community to advance the science and the technology for this, for human performance augmentation, and where do you see this going in the future?

DR. ORTEGA: Wow. It's a big question. I don't know, Sean, if you've seen anything up from the air staff perspective going that way, but I would just start out by saying that we do have the School of Aerospace Medicine, which actually works with universities and other things to work on studies, and particularly, there's the 711th Human Performance Wing at Wright-Patterson up in Dayton, Ohio. Actually, they have an entire division that goes into how do we integrate the human entities' operational weapons systems that we have out there?

And so they do engage a lot with outside research and other folks to do this, but I don't know of any efforts that are going on from headquarters level. (INAUDIBLE)

DR. SINGER: Let's get a couple more questions in here. Let's bundle these two right here. So first you and then --

Hold off answering. We're going to stress you, and ask you to handle two questions. (INAUDIBLE)

MR. LARA: How are you doing, sir? Captain Dave Lara. I'm a PhD student at Georgetown. I'm an instructor pilot in the Predator, and I was at third as of about eight months ago.

Just wanted to follow up on the warrior point. I've done both. I was an AC-130 pilot, and then I was a Predator pilot, really at the end of the day. In neither platform are we focused on our own protection. I mean, there's other jobs out there. If that was our primary priority -- in both cases, our primary consideration was a guy on the ground.

So I think that just to follow up on what

you said on that from my perspective -- and I think, Mark, that was very accurate -- just to pick up on the origins of stress, in your report, a lot of them were moral issues. In my experience, that wasn't really actually the primary driver.

Deleted: (inaudible)

There's certainly shift work, but aircrew worked through that. Neither is it really the combat stress. I mean, we're warriors, like you said.

But there is cognitive dissonance and then perverse incentives were huge for us. I mean, you brought up compartmentalization. There is tremendous obstinacy on that -- that in a physical aircraft, your mind automatically switches. For us, I think it was really more of a cognitive choice -- that I'm at war right now.

So deployment served as a wall of separation -- not just physically but cognitively, and one of the problems that we kept running back into is that you need to actually create this cognitive space as a factor of will. Well, there was no point at which we were ever in peacetime. We were just permanently

somewhere between war and peace, which then created further organizational incentives, especially for squadron leadership, who's incentivized to train that if you have your bright shining star, you'd rather bring them across the street and make sure that your stoplight looks green, rather than have them across the street where they're not really making you any organizational money.

So I guess I'd love to hear your thoughts on what the institution as a whole is doing in terms of incentive structures and building sort of a war/peace differentiation.

DR. ORTEGA: Yeah, the performance side is -- there's a lot of literature on the performance side, as far as stress. It's a performance curve like this. So you reach a certain place where you're peaked out at your performance, given what the task is. So it's different for different kinds of tasks.

For instance, a vigilance task is a lot harder to sustain beyond a short period of time -- 30 minutes, 15 -- but peak performance is reached for a

certain time, based on the sympathetic and systems that they get involved in. It improves your awareness and your ability to collate information and the thinking speed and those sorts of things -- that time dilation thing that happens when you're really in the groove. Those things happen, and that's well documented over time.

In this environment, we haven't had a chance to really study what are the actual skill -- what are the maximal performance time things for each task? I mean, how long can you watch a full motion video screen for something, and where does your performance wane? It's usually in the -- it's kind of like when you go to a class. It's 50 minutes long. Why? Because human performance says I can only pay attention for about that long, and then I start getting restless and I want to go to the bathroom, and I don't want to listen to this guy. It's about an hour, it's about 50 minutes.

So somewhere in there, you can sustain pretty good vigilance for that period of time, but

then you have to do something else. And so that's a procedural thing, inside of the procedures of the RPA world. We haven't applied those techniques or concepts yet inside of that operational world. So there's probably a lot of work still to be done in which tasks am I going to -- how do I do that? How do I let -- you should really automate the stuff that's dull, dirty and dangerous, right? That's what you give to the robotics or the automated intelligence thing.

And so those tasks that are really dull, dirty and dangerous, that's what we should be working towards to automate and allow the human to be more actively involved, perhaps, in shorter, cognitive sort of things. And so that's kind of the principles of that, but I think there's a lot of work to be done there.

And the organization itself -- some of the leadership is really attempting to do more things with building the camaraderie inside the units and putting people around -- but I think there's a lot of

procedural inertia that is just out there because that's the way we've done it for a long time, and so there hasn't been somebody who really wipes the slate clean and says, okay, now I have this environment, I have this telewarfare environment. Okay, now if I were going to maximize the human inside of this and the tasks that he's going to do, how would I do it?

And then let's organize that way. But we haven't done that. We sort of said, we're going to stick him in here, and we're going to do this, and then we keep adding, and sort of we just kind of build on top, and we haven't really designed the system with a human in mind. And that's part of what the human systems folks are trying to get their hands into the next generation of these kind of things, to sort of say no.

For instance, why is the little box of the RPA -- why is it a little box? Why aren't they sitting at a table with a lot of -- well, because we built it to put it in a box so that it would go overseas, so you could ship it on a container. So

it's in a container-sized thing, and they have to sit in the box, and you go, why? They don't need to be in the box.

You could be at a table like this, and then I could see you, and I could see that you're having trouble over there, and I'd say, hey, you need some help over there with what's going -- the environment would be more of a I'm working on my mission, you're working -- hey, what's -- now I begin to actually use the power of the human being and those relationships even locally to help reduce some of that stress or increase performance or all those sorts of things.

And right now, we just stick you in the box. Paradigms are just hard to break. They're hard to get out from.

So if we wipe the slate clean and start from scratch, I think we'd have a lot more chance of setting up something based on the human, and what they can do, and what their limits are with procedural things. I sort of mentioned why would I send it to three in the morning? I don't want to put the work at

three in the morning. That's when humans are worst. Their diurnal rhythm is at the nadir right then. Don't do that. Do it during the daytime. Move the work to where the day is.

So there's all kind of things that we can do to fix some of that. We're just beginning that discussion, and this paper lays out some of these things, which I'm sure the general is not quite ready yet to send out, but it's getting pretty close. We can put out now a whitepaper that discusses some of those ideas and thoughts, and futuristic -- how do we organizationally do things? Great question. SPEAKER: (INAUDIBLE)

Because of this data, the Air Force has adjusted, and said, we're not going to fill as many caps as you guys want because we can't. We need to rest the system. We've got to recover. We've got to back off the surge. Of course, we've been surging for 10 years already. So at least they're going to back off the surge for a little bit, allow the training pipeline to catch up so that hopefully we can relieve

some of the pressure on the guys doing this work now, and then at some point in a few months, perhaps as the need gets greater, we'll ramp it back up and we'll begin to go even further.

The leadership has stepped back and taken a look at this and said, okay, got it. We're going to back it off, and we're going to let you catch your breath for a second. So a lot of squadron leadership is stepping in right now to do those things, to sort of take some guys off and build morale.

And we've had a couple of days where we actually stood down one of the units that does this on the intel side and moved the work to the other units, and let them have a whole day where just the whole squadron came in at once, and they all sort of hung out together for a couple of days, to decompress and talk about resilience and how do you keep this thing going?

So a lot of smart people out there hopefully trying to do that, and now the leadership has listened and given us a little bit of breathing room there, and

we're going to take advantage.

DR. SINGER: We're getting to our closing time here, and I think you have shown a point that I often talk about in discussions on this broader topic, particularly in talks with military officers, as I pose the question whether you're talking about the issue of manning the unit to the tactics or doctrine that you use on the battlefield or its impact on the politics. There's a layer to the questions.

The first question is, simply put, do you see this as the same or different of using manned versus using remotely operated, unmanned, robotic, what everyone calls it? But we're just now at that stage as kind of accepting it as different, but the point is that that's not the important question. The question we have to figure out now is, how is it different? How is it different in terms of its impact on the units and the stressing to how is it different in its impact on our democracy to how is it different in terms of what's the best tactic to deploy these out?

And that's the how that we're really getting to that part of the historic -- if the parallel, as you put it, is the first couple years of aviation, we're now moving into okay, we accept that aviation is different, but how? What plays out?

And so I think we all today owe deep thanks to you on a couple of levels. The first is coming here and talking to us today about this, and doing it in an incredibly open and forthright manner, and I think we all deeply appreciate that.

But the second is the spirit of questioning that you've approached this, of dealing with that how, of trying to answer these hard questions. The effort that you're part of, I think, we'd all agree is just so important. So we very much thank you for both of these parts today.

So please join me in a round of applause.

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I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

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