111717 Air Force Association Mitchell Institute for Aerospace Studies Space Power to the Warfighter Seminar with Brigadier General B. Chance Saltzman, Director of Current Operations at Headquarters U.S. Air Force, on "Multi Domain Command and Control."

MR. PETER HUESSY: Good morning, everybody. I want to welcome you all here on behalf of the Mitchell Institute, and on behalf of General Deptula, our Dean. I want to thank you all for being here. I want to welcome our guests from a number of embassies that are here, also our sponsors, also Mrs. Saltzman, thank you also for attending, and of course my partner, Kath Ryan.

Just some calendar events, on the 1st of December in Santa Monica we are having a conference on space with the RAND Corporation, CSIS and Aerospace Corporation, to discuss our aerospace policy paper. On the 5th of December, here, we will have the rollout of the paper, the official rollout, and we will hear from the Aerospace Corporation as well as the two authors, one of whom, Pete Hays (ph) who is here today. It's an extraordinary paper. We're not quite done yet in terms of publishing, but it's an extraordinary bit of work that we did. That will be rolled out on the 5th of December here.

On the 6th I'm doing a roundtable on the NPR and nuclear deterrence, and we're hearing from Jack Weinstein, we're hearing from a representative from J5, we're hearing from Frank Miller and Keith Payne, Dave Trachtenberg, a representative of NNSA and General Klotz's office, and Drew Walter from the House Armed Services Committee. It's limited to 40 people. If you have a real interest in attending, please let me know, if you would please.

And then our final Space Power to the Warfighter breakfast for this calendar year will be on the 8th of December, and that will be General Raymond, who as you know is head of U.S. Air Force Space Command. After this event we are going to have a roundtable with General Saltzman. For those of you who have been invited, it's right over here in the Bolton Room. Please get there so we can begin that as soon as possible.

Our speaker today is General Saltzman. As you know, he was a Minuteman launch officer. That's all I need to know, because as General Ward once said, I have ICBMs in my DNA. He also was with the NRO. He was also the chief for strategic plans and policy, and he's currently the director of current operations and deputy chief of staff for operations in the United States Air Force.

Thank you, sir, for coming here today. I want to thank you on behalf of the Mitchell Institute and AFA. Would you all give a real warm welcome to General Saltzman?

(Applause).

GEN. B. CHANCE SALTZMAN: Thanks, Peter, and thanks to the Mitchell

Institute and everybody for attending. It's always a little daunting when you're asked to come talk to a crowd. There's always this part of you when you wake up in the morning and think, I wonder if anybody is really going to show up? So thanks for the food, because I think that's why people are probably here.

This is a great opportunity for me because it's such a diverse audience. I see a lot of -- I was going to say old faces -- there are just old friends, mentors, colleagues, and this is a great opportunity for me to test some of my material on the road before I have to brief the four-stars. We are on the cusp of actually being done with this effort that we're calling the enterprise capabilities collaboration team. We are out-briefing the four-stars on 27 November, so that's a week from Monday. That deserves a round of applause for me.

(Applause).

It has been a great effort. We started last September and we really did cast the net wide: academia, think tanks, industry. We tried to engage anybody that we thought could bring good ideas to bear on this tremendously complex problem set. We feel like we've done a pretty good job.

What you're going to see here, unfortunately in half an hour I can't dive nearly as deep as I'd like to, but I'm hoping to give you just a feel for what it is we think is the problem, how we're trying to address it, and move forward to enhance multi-domain command and control. The title slide is hard, for the folks sitting a little further away. I tried to use the smallest possible font, to make things worse, but on the title slide, this is important.

My day job is director of current operations. I'm not multi-domain C2, I'm not (big rock ?) guy. I've been called a lot of things, but I actually have a day job. I work for General Nowland who is the A3. I'm the A3O for current operations.

But my hobby for about the last 16 months has been multi-domain command and control to organize the thinking for the team. Nikki, the next slide for me, please. We're going to kind of structure this in a way that hopefully makes a pretty complex issue a little easier to understand.

So why is it that we're changing? We've been operating in multiple domains for many years. We've been doing command and control as well as anybody on the planet for a number of years. So why is it that we're changing? Next slide, please.

I know this is a little hard to read, so let me just give you the Reader's Digest version. This is your threat array that we expect to face in the 2030 timeframe. From the anti-access and area denial capabilities of our adversaries, to anti-satellite weapons that can hit targets in nine minutes flat, to directed energy weapons, to computer network attacks, the threat area that this country is going to face forces us to take a new approach to how to conduct operations.

What you can't read across the top is that we just finished a study about a year ago called "Air Superiority 2030." One of its main conclusions was that the force structure the Air Force plans to have in 2030 cannot win against this threat array unless we go to a multi-domain approach to operations and leverage all of our capabilities across all of the domains that we operate in. The problem with that is, if you're going to execute capabilities across all of the domains, you have to have a command and control structure that can wield that kind of weaponry. And so that's what we were charged with. Next slide, Nikki.

The chief talks about the future of warfare and the seams that it creates. It's going to be urban. Look at that nice city there and the land mass. If you could hit advance one more time?

It's also going to be multi-regional. Future warfare is not going to be constrained to one region. It's going to be multi-domain from sub-surface to space and cyber. It's going to be multi-component, joint. It's going to be multi-nation, and it's going to unfold at a speed that we have not had to deal with in our current fights.

So the important piece here is you could describe any of our major conflicts along these kinds of lines. The issue will be the seams that are created that we have to manage. So you talk about a fight with a near peer competitor, a Russia fight or a China fight, these are not going to be constrained to European Command or Pacific Command. If you're engaged in that, it's multi-regional. You're going to have to address this across multiple domains as a joint force and with a coalition.

All of those multis create seams. It's the C2 structure that allows those seams to be really irrelevant. We can shift back and forth between domains from one region to the next, from a regional combatant commander to a functional combatant commander using capabilities from air, land, sea, space and cyber. Managing those seams is a challenge for C2.

So if you combine the threats that we're likely to face against the complexity of how we have to conduct warfare, we have to do command and control differently. That's why we're looking at changing. Next slide, please.

So what is it we're going to change? Next. Multi-domain operations, a lot of words on this slide. I'll tell you it's not just operating capabilities in those domains. We've been doing space operations, cyber operations and air operations for years, but that's not multi-domain operations the way we're envisioning it. It's more than just operations in space and cyber enhancing the air campaign. It's more than that.

It's creating offensive and defensive capabilities from those domains so that you create complex dilemmas for an adversary at a tempo that they can't respond to. That's what multi-domain really is in this vision. High velocity, operationally agile, we can shift back and forth between domains and regions and globals and functionals. That's

multi-domain operations. Next slide, please.

So a quick vignette -- these are all words, right? So it's hard, you can put a bumper sticker on a lot of different things to get multi-domain operations. But let me give you a real world mission that we don't expect to go away anytime in the near future.

In Air Force terms, we call it suppression of enemy air defenses. If you're going to strike targets somewhere and you're going to put an airplane over top of a target, you're going to have to deal with the air defense that an adversary presents to you. We call that suppression of enemy air defenses.

In 2030, and this is not a science project this is in the art of the possible, we will have the ability to conduct that mission using platforms in air, space and cyber to independently generate effects from those domains to create a bigger problem for the adversary as we move in over their territory. However, and if you hit the next (field ?) Nikki, this creates problems for us.

How do we do multi-domain packages? Who's the commander that can wield space and cyber and air simultaneously and make changes when he's in contact with the adversary? How do we synchronize the battle rhythms of three combatant commanders who own these assets: space, through U.S. STRATCOM; cyber, through U.S. CYBERCOM; air, through whatever geographic combatant commander has the air component?

Having to manage those battle rhythms, the targeting cycles, just all of that complexity of supporting and supported relationships, is the new complexity of our C2. So that's really what we're trying to organize, our thoughts around how we would do this more effectively and efficiently when we have the ability to provide multi-domain capability. Next chart, please.

Okay, how are we going to do it? This is all great theory so far, right? This is kind of a space crowd, I like it, so you start with the moon shot.

There's some interesting parts of this definition, and this is just right out of the dictionary. I didn't know it really was a word that had to be defined. There's a couple of key pieces here.

One is, it's a ground-breaking, revolutionary approach, and you're not exactly sure what the near-term benefits are. I really like that because I don't like to be held to have to produce something right away. So these near-term benefits are a little ethereal. I'm not sure exactly where this is going to lead us, but we know we need to do it and we know we have to move out in a revolutionary way.

What this says is, you have to progress even though you don't have comprehensive understanding of what the risks are. What's the risk if we shifted this? The one that comes up all the time is, if we start to virtualize our data and move data

around in different ways, do we make it more vulnerable to those that want to steak our information? That's a classic example.

I think you could probably cast that risk in a number of different ways. What I'm saying is I don't know but we'd better get after it. We'd better do this. We'd better achieve this new command and control, address those risks, and move out, because we've got to progress in a multi-domain fashion.

I want to use this moon shot analogy a little bit further, so you've got to understand it. Next slide, please. I'm sorry, this is a little bit of an eye chart, but for those of us that are old enough -- not me -- to remember the moon shot, it was a three part story.

Part one was Project Mercury, then you had Gemini and then you had Apollo ,that actually took the astronauts to the moon and back. Mercury is important because we had to understand basic knowledge about how to operate in space and how to get people to the moon and back. There's basic things like, how do you launch a rocket?

Once it's in space, how do you orbit it and how do you contact it when it's on the other side of the planet? How do you put a man on top of that rocket and talk to him in space? These are fundamentals.

And once he's on orbit, how do you get him back? How do you conduct de-orbit operations? How do you recover him in the ocean? How do you talk to him through that process? How do you sustain his life in the most hostile environment you could imagine? This is all just foundational knowledge that we had to build.

And we had to build it before you could go to Project Gemini where you learned the operations necessary. Guess what, you're going to have to get out of that spacecraft in that hostile environment. So we had to learn how to do space walks and what that took.

We're going to have to dock. That means you're going to have to put two spacecraft in close proximity on orbit and mate them together. We had to learn how to do that, because that's going to be foundational to getting on the moon.

So once we had the expertise and we understand the operations, finally you can start to talk about going to the moon. What those green bars show is that there are some long lead technology items. The Saturn V rocket of the Apollo program started in 1962. It didn't launch first until '68.

So we took advantage of that time to get our expertise down and understand our operations. There were 15 manned launches and 17 unmanned launches of the Saturn rocket. It was a tremendous effort, but all of this stuff has to green up on the right side.

You've got to get the technology in place. You have to understand the operations

and have your basic expertise down. Now you can talk about going to the moon and coming home. Not until you have all that in place. Next slide.

So what does that look like for multi-domain command and control? And let's be clear, I'm not saying that I'm doing this moon shot. Let's put that in historic perspective. Three hundred billion dollars over 15 years is what we spent going to the moon, $300 billion, $20 billion a year. Think about that. That's a monumental effort.

I'm not saying that what we're doing is a moon shot. We're not talking about that kind of a scale, not that we have that money just laying around. What I will say is that the same philosophy about build your expertise, understand how to do your operations, and then account for the long lead tech items that have to be put in place, that's the philosophy we're trying to capture here.

The point to be made, I think, is that those long lead tech items, that's where the money is. Operations and expertise, we can usually do that with nonmaterial solutions: train our guys better, do war games, do exercises, learn the operations. Those long green bars, that's where all the money is. The more stable we can have that funding, the more ready we'll be as we move to the right-hand scale here.

So trying to work with Congress to make sure we have a budget in place that we can count on and is stable over this long period of time. Down at the bottom you can't really read the timeline, but there's a lot of question marks. This is not a two year effort. This is not a three effort.

I'm not exactly sure when we get to the full right side of this, but I do know if we don't' have stable funding the ups and downs and swings will cause us problems. So that's an important point here as we address these long lead items. Next slide, please.

So what does it look like? The bullets on the right I think are the basic message. We have to have a solid foundation. I see all the time great ideas, great examples, that this is multi-domain operations, and I say that's terrific but I don't know that we're ready for it yet.

Because if we don't have the right policies, the right virtualized data constructs, the right comm networks, the right multi-domain concepts for how we're going to do business, if we don't have the right expertise, the right infrastructure, all of those foundational pillars, then the best idea in the world is just going to fall apart. We'll put it in place and then as personalities move or as technology advances, the whole system will just erode. We won't be ready for multi-domain command and control until we have all of those pillars in place. This is a building block approach.

Once we have multi-domain C2, now we're ready to do multi-domain operations. What that says is, we're not going to be successful in future conflict unless we're at the top of that building. So that's the real message of our campaign plan.

We are working on that foundational approach. It's not about the next idea that's great, the next technology that you put on top of this. It's about a ground up sustainment effort to build the foundation so that we're ready to accept multi-domain operations ideas. Next chart.

How we're going to start doing this is along three lines of effort. I'll start at the bottom, foundational. We need a trained cadre of multi-domain and C2 operational level experts. For those that have been around the Air Force long enough, you know that the way we do operational level C2 is we grab people out of the operational career fields, we drop them into an AOC for anywhere between one and three years, and they do God's work and then they go back to their regular career field.

A lot of times they see that time away from their main career field as a problem. So they drop in and they want to be there as short a time as possible. There's really no corporate knowledge that's built into that. There's really no long term sustainment effort because it's like driving a rental car.

You don't take that to the car wash, right? You drop in, you get what you need, and then you go back. So we need to establish this operational level command and control cadre to build the corporate knowledge, train, experience, multiple assignments at our C2 nodes, to really build those support structures.

The second level there in the middle, enabling technology. We know that there's just state of the world technology that we're not leveraging that can allow us to do C2 better: faster decision supports, faster and better situational awareness, more assured direction of forces. We know that's there and we have to organize ourselves so that we can better leverage those capabilities as they're made available to us.

And then lastly is the C2 concepts. Like I said, how do you build a multi-domain force package? We've been building tremendous air packages for years, to great effect. But as you start saying that you're going to create offensive and defensive effects from space and cyber as well, who's the package commander?

How does this come together? Is this one AOC that runs this, or is this three different op centers that are integrating and it comes together at the point of application? I don't have the answer to that. I just know we need to investigate, experiment and explore with those concepts to get it right. Next slide, please.

So how do we get started? Next slide. This is an important concept, I think, for this crowd, and I'm stealing General Goldstein's words. He has described his frustration with new-old.

What he means by that is those same basic capabilities that we've always used, and we spend our money to modernize and upgrade them slightly. It's the next best version of however we were doing business. The fear is that just simple evolutionary progress doesn't get us to where we want to go. Or even if it does, it doesn't get us there

at the right time.

We have to have something disruptive. What are the new ideas? And this is what he calls new-new.

He thinks MDC2 is new-new. It's a different way of packaging things. It's a different way of seeing how we do operations.

Here's the problem. The system -- and I mean this internally, looking at the Air Force and Department of Defense -- we are designed for new-old. Our processes, the way we account for requirements, the way we use our money, is all designed -- the risk is all in doing something that's outside of the standard operating procedures. That's risky. We want to be risk-adverse. We want to protect our resources, husband those few resources that we get. And so the system is designed to give you new-old.

You can see this, the industry is there to support new-old. The ConOps are well defined, if you have a new-old system. Our expertise, we've trained, we've educated around those old ways of doing business. It's seen as low risk, but we're still enhancing capability. There are very clear linkages to how we do business, and there's just powerful cultural inertia.

I can't tell you how important this is, and I see it all the time. When I give these speeches, you can just feel the uncomfortable ness. This sounds like a big shift. Are we sure this is the right way to go? The system just won't let you progress in that way.

If you look on the new-new side, think about this, just be objective. This is high risk because there's a lot of unknowns when you go to new-new. We don't have clear linkages to how we do business. It's seen as entrepreneurial, a risky way to spend the scarce resources that we have.

So all this is to say, if we really want to progress we have to be aware that the biases and the cultural inertia shifts us to new-old. That's where the ballast is in the ship, right? It's going to keep things kind of operating on a steady keel. New-new, far more disruptive.

And we have to see the risk for exactly what it is. How much risk is there if we don't change? Testing the null hypothesis is really important here. Next slide, please.

So we're going to pick three activities, one for each of those lines of effort, that starts the ball rolling, so we can get some early successes and prove the concepts out. We're going to start -- for our C2 concepts -- we're going to build a multi-domain war game. There's plenty of war games that focus on C2, but they don't focus on the future concepts the way we designed it here.

So that's what we want to do, is build a war game series, think outside the box for how we're going to do multi-domain command and control. What we're doing is slightly

different because we're not using people in their day jobs to do C2. So we're not taking a crew of AOC people and pulling them in to do a war game.

We're actually going to go to Maxwell and pull people out of ACSC, Air Command and Staff College, and out of the Air War College, and we're going to take these students who are trained professionals, but they're in a position where they're not tied down by their day-to-day jobs, so they have a chance to think more broadly and innovatively. So we're going to leverage those students as our players for that war game series.

The second one in the upper right is the shadow operations center. It's just a catchy name. In fact, I don't really like it, to be honest with you. It's just something we said early on and now I can't shake it.

But think about this, this is just agile acquisition. It's development operations. These are words that are very familiar in commercial IT. It's how you build, prototype, test and field software capability faster, and we know we have to keep pace with the tech cycles if we're going to be successful. And so we're building a node out at Nellis to basically be a test platform for C2 software development, so we can go as fast as the technology will allow us to go.

In the bottom left is the C2 cadre that I talked about. We're standing up for officers a mid-career cross flow opportunity so after 10 or 12 years of operations the way they're currently defined: space, cyber, intel-rated operations, there will be a board that selects a certain number of officers to move over to a new career field. We're calling it 13 Oscar and for the rest of your career, eight or 10 years, you'll be an operational level C2 expert, trained and educated, and you will move around to those C2 nodes so we get that experience and that corporate knowledge built. Those are the three initial activities over the next year that we're going to put in place to really get the momentum moving behind this broader campaign plan. Next slide.

For the lot of words here I apologize, but for this crowd I wanted to hit some of the key technology pieces that we're pursuing. I think the main bullets really summarize what I'm trying to say. We need our systems to allow procurement and acquisition of our capabilities on a faster pace. That's essential, and so there are several efforts there. I mentioned the shadow Ops Center as one of them. But we want to go faster for fielding these C2 systems.

We also know that all the greatest decision-making in the world is useless if you can't direct the forces in the face of an enemy who is trying to prevent you from talking to the forces. So an assured comm network all the way out to the tactical edge of the battlespace is critical to success. And then the final one there is, there's a lot of advanced technology that we're not taking advantage of: artificial intelligence, machine learning, automation, that makes our C2 processes faster, more robust.

We take advantage of all the data we're collecting using big data analytics, trend

and predictive analysis. These are things that we know will help us, but we haven't done a good job of experimenting with them and then operationalizing those capabilities. That's another place where we're looking for help. Last slide, please.

Final thoughts. I said I've been doing this for about 16 months, and the chief has done such a good job of publicizing his MDC2 effort that everybody thinks I've been done for a long time and I just won't tell them the answer. This is not true. We are just getting started.

Like I said, this out-brief on the 27th is really the first time I've formally presented my findings to the four-star level for approval. So we're going to need a lot of help, and as soon as I get the go-ahead we're going to go back out to industry, back out to the think tanks, back out to government, and explain to everybody exactly what we have in mind, where we need assistance, what we don't know, etcetera. So that effort will be ongoing.

I will tell you that our senior leadership is absolutely committed to new acquisition processes. The problem is, it's easy to say, and then it's hard to execute. One, we've got to make sure that it's legal, first and foremost. But the Congress has been pretty clear on their intent that they also want to go faster, and so there are authorities and there are things inside those acquisition regulations that we can take advantage of. It just has not been in our culture to do it, and so there's all this momentum behind not changing our ways. So we're going to have to get after that.

There is a big cultural shift. If your industry here and you love big C2 programs and programs of record with 2,500 aggregated requirements, we just can't do that anymore. We've got too many examples where that no longer gets fielded ever because it's just too complicated and the integration problem is too much. So we want to disaggregate those, pull those big programs of record away, and deal with smaller chunks to be more agile and faster in delivery.

Proprietary data, data that is wrapped into algorithms, that's got to stop. We have to be able to share out data universally. I know that owning the information can be important to a business in its differentiation. I understand all that. But it also hurts operationally if our data is not universally accessible, and so we've got to work together on better ways to do that.

So what I'm telling you is we're going to come out and we're going to explain our vision. Make me explain it to your satisfaction. It's important that everybody understands exactly what we're trying to do. This is a dialogue. We have to completely understand this.

Then you've got to help me understand what you need. Whether you work through Congress and this is what you need to see and hear, whether you're in industry and this is what you need from the government to be successful in closing your business case, we know this is going to be a partnership across a very diverse group or people and we want to work together to make this happen. Next slide.

So if you'll permit me, we made a cool video and I kind of want to show you a vision of what multi-domain command and control could look like. Then I'll take some questions. If you could run that for me?

(Video played).

That fires you up, right? C'mon, that's good stuff. I hope that gives you just kind of a snap shot of what we're thinking about for the future, the work that we have to do, and the first few steps that we're taking to move in that direction.

So if it's okay, I'll open it up to questions.

MR. JAMES DREW: Hi, James Drew from Aviation Week. How does the demise of the Air Operations Center 10.2 that has recently been canceled, how does that relate to the shadow center you're looking to stand up at Nellis and are there any links there?

GEN. SALTZMAN: It certainly links and it's more of an opportunity, quite frankly, from my perspective. 10.2 was about a modernization of the existing AOC structure. The shadow ops center is trying to not just upgrade but move to that next level of capability, taking advantage of artificial intelligence and things that the 10.2 wasn't really trying to address because, quite frankly, they're busy fighting a war. And so we need to just upgrade our capabilities without really taking too much risk and experimentation.

Where they're connected is, as 10.2 came down money because available. So now we can start to share resources, put some against modernization -- we're still going to upgrade our current capabilities -- but then shift some of that capability over to experimentation. How can we automate to change the footprint that's available in the AOC? How can we take advantage of tools faster?

The best way to say it is it's not about sharing the money, it's about an opportunity to re-evaluate how we want the AOC looking going forward. Shadow OC is going to be an important pairing to the AOC upgrade options.

MR. DREW: Could you just give us a bit of the timeline on when you expect to roll that or start constructing some sort of shadow IOC?

GEN. SALTZMAN: We're right now doing the design phase, if you will. What is it exactly that we need? We're going to leverage existing resources that are already at Nellis in terms of facilities.

My goal, and this is just a goal at this point, is to be conducting experiments by late next summer. That's a general timeline. If you don't have a timeline you'll never get to it, so I've kind of planted that flag that if we can be running our first set of

experiments by next summer, then I think we'll be on track.

MR. MARK PLUMMER (ph): Hi, I'm Mark Plummer with C4ISR Net. As you're developing this concept, what has the relationship been like with the Army and Marine Corps as they work on their multi-domain battle concept as well>

GEN. SALTZMAN: Two important connections there. One is, one of the working groups we established right out of the gate was our Interoperability Working Group. We actually have a British officer that's leading that Interoperability Working Group.

The key was, we don't want to do anything in a vacuum. As I said in that future of warfare slide, we know we're going to fight as a joint team and we know we're going to fight as a coalition, so we can't really build a C2 structure that doesn't account for those capabilities. We've had multiple joint officers and coalition partners as a part of the team from the beginning to make sure we're always looking that lens, if you will.

Second is we've been engaged in table top exercises with TRADOC and the multi-domain battle team to make sure that the concepts and the terminologies are consistent between the two. We really see the one as nesting inside the other, and it's not clear which one nests inside of which one. But in general, the Air Force looks at things from a theater perspective, not necessarily a corps maneuver element, and so they're really complementary.

But the key difference was, we're using different terminology. That's easy, let's just get in the same room and let's define our terms so that we're consistent, and then we can marry the two concepts together.

We're also working with the Navy as they flush out maritime distributed operations and how they use their RF network differently. We want to make sure that whatever they're buying in terms of technology fits perfectly with our technology. That way, any sensor collecting any data can be used by all players that need to use the data. So the bottom line is, tightly coupled and making sure that we're nested together moving forward.

MS. INGRID MCCOLLUCH (ph): Ingrid McColluch, Air Force Magazine. Can you elaborate a little bit on how you see this war game series rolling out? Is it more like a table top exercise, is it kind of like a onetime thing as you're trying to figure this out. Or would it be more of a regular event?

GEN. SALTZMAN: Our plan is, and what was approved last summer, is it will be a war game series and we'll start with an annual event. We plan to do our first one the fall of 2018. The idea is it really kind of will look like a table top exercise to some degree, until we get our modeling and SIM capabilities up to multi-domain standards, if you will.

We don't really have good simulators or modeling in SIM to project that at this point. So it will be a table top exercise, and what we'll do is we'll say these are the concepts that we want to evaluate. We'll divide up into multiple teams that look at the problem from different courses of action. We'll play it out against a Red Team, and then see which one has more merits and then kind of debrief it across the whole group.

So we'll say this course of action against this threat set worked better than this course of action against that same threat set. We'll evaluate multiple concepts at the same time using different control groups. That's the initial planning going in, but to be fair, the team hasn't really gotten together and built the whole war game design. They'll start that in January for a fall execution.

MS. COURTNEY ALBION (ph): Courtney Albion with Inside the Air Force. (Off mic) -- space element in this command and control vision. What will the relationship be in that effort?

GEN. SALTZMAN: Perfect, thank you. I should have said that when I mentioned the shadow ops center. Really the shadow ops center is a multi-node capability.

I talked about Nellis because that's the thing that we're going to add initially to the enterprise, is building this capability at Nellis. But the work that General Raymond is doing at the National Space Defense Center, he's already got a development operations capability out there. There are others, down in San Antonio working with the cyber team at the 624th. There's some back here in the NCR with the NRO.

We're going to leverage all that. We want to virtually connect to all those capabilities because the tool set that we want to create is going to be multi-domain. It's not going to be air specific. So connecting to the work that BMC2 is doing is paramount.

General Raymond and I have had this discussion. What cannot happen is we build a stove-piped space C2 system and a multi-domain Air Force C2 system that's incompatible. So we are working together.

His team is just ahead of our team, quite frankly. We're kind of laying out the design for this (broad ?), he's already starting to execute and put things in place. The good news is we've had enough foundational discussions that some of those decisions about interface standards, how you're going to format your data, what your baseline infrastructure is going to look like, are all consistent with the way we're progressing, so the two systems will be perfectly interconnected.

MS. ALBION: Can I follow up? The question about modeling and simulation, do you expect that work will drive near term additional investment in modeling and simulation?

GEN. SALTZMAN: The good news is, my office is two doors over from General

Smith, who is in charge of Air Force's operational training infrastructure. He is already thinking this way. We know that we won't be able to live fly all of the capabilities that I discussed: air, space and cyber. It's just not feasible and not cost-effective.

So he's building a multi-domain operational training infrastructure. There's plenty of work to be done to define exactly what that means, but it is baked in from the outset that if we upgrade our capabilities it will be from a multi-domain perspective. So the work is already in progress.

MS. : (Off mic) -- I liked your video a lot. I was interested so much about the man in the loop. So I'm curious about how you're thinking about automation and automated (signaling ?) and reducing some of the operational levels?

GEN. SALTZMAN: It's paramount. We don't have enough people. We're not likely to get the ideal number of people by 2030. We don't just have extra people to throw at the problem. If we can't automate some of the simple processes and make it machine-to-machine, we're going to struggle to do this work.

So thanks for saying you liked the video. For those of us that have kind of done the C2 business, and there's some real experts in this room, you would probably say there's a lot of automation there that we haven't done. What you're seeing is one, two, three, four people involved in executing four different command and control centers bring together capability, with slicking fingers around. There's hundreds of people at each of those facilities that would be in charge of working details of an operation.

So actually there's a lot of automation in there that we don't currently have, and the shadow ops center is one of those places that we want to experiment. Can we automate this? Is this enough of just algorithms and data crunching that we don't need people in this loop and it can be automated? That's where we want to experiment, because we don't want to take risks out at the ops centers that are actually fighting a war. This is the place to test some of those concepts, so that's an important piece.

MR. JEFF WALD (ph): Hi, Jeff Wald. Can you tell us of your vision initially of -- (off mic) -- is it beyond Five Eyes or are there other coalition partners you envision here?

GEN. SALTZMAN: I think the short answer is that our initial efforts have been Five Eyes. I think I can say, I don't believe we've made any decisions that would unilaterally exclude any partner. Right now we're keeping it kind of generic, but the idea is if you've got information that we need, we want to be able to integrate you into the system. If you bring any capability to the coalition, we want to be able to C2 that capability.

So I don't think we've made any decisions where there's a regret factor that somebody will be excluded. We really worked hard to make sure that's the case. Like I said, this interoperability group, their primary charge was to make sure that didn't

happen, that we built an Air Force specific system that wasn't compatible with the other services or that wasn't compatible with coalition forces.

MR. : (Off mic) -- Department of State. Have you taken any lessons from the Schriever war games series about working with allies across these domains?

GEN. SALTZMAN: Man, these are great questions. I'm going to drag you guys around the Pentagon with me sometime. I just came from the Schriever war games. I've been involved in the last three.

The short answer is, absolutely. Not the least of which are some of the micro-details that come with, how you put coalition partners hands on keyboard to interact with your IT system? It's one thing to have a piece of paper that has a classification at the top and you say, we'd like to share this information with our partners. We know how to do that. But if somebody says, I'd like to log onto this system, and they happen to be wearing a different uniform, all of a sudden, you're going to see the big board, right? You can't.

So the lessons that they've learned trying to overcome that, we are absolutely taking note. All of that interoperability working group is at the Schriever war games taking those down. Let me tell you, one of the activities, and I just talked about the three main ones, but there's nine more specific activities in this plan moving forward. One of them is to stand up a working group, a follow-on working group, that does nothing but evaluates our security risk framework.

Just in short, I'll tell you that we recognize that we need to shift from need to know to protect information, to need to share. We have described the security risk associated with information in such a way that says, you must prevent and limit the number of people that have access to information, otherwise the information is in jeopardy. That has been kind of our mantra forever.

What we're going to now is saying listen, there is tremendous operational risk if we don't share our information broadly. That's just a different way of saying the same thing, but it hasn't been accounted for in our security processes and policies. So we're going to have one of those activities follow-on from this, is a working group that outlines what those issues are and what the policy changes need to be.

MR. GEORGE NICHOLSON: I'm George Nicholson with the Global Special Operations Forces Foundation. General Neller, the Commandant of the Marine Corps, last year said the biggest threat to the Marines of the future is their dependence on SATCOM and GPS. Admiral Richardson said the same thing, at an event last week at one of the think tanks. Your boss was there and crystal clear he made the comment that Admiral Richardson also said that. He said, we agree in the Air Force.

He said, GPS was a legacy system. We need to look forward. In terms of your connectivity, how dependent is all this going to be on SATCOM and those capabilities?

What kinds of things are you doing in the war games to look at alternative means to provide that capability?

GEN. SALTZMAN: Two thoughts there. First, you're absolutely right. We fight now as a force using space and cyber capabilities in such a way that if those capabilities were not there, it's not that we would fight in a less effective way, it's that we would not be able to fight at all.

That's a significant emotional event if you're a surface force and you're relying on these capabilities in air, space and cyber that say, listen, if they're not there, then we don't have a Con Ops anymore. We don't have the ability to project forces or do our capability. That's an important shift. We haven't always been there, in terms of our mindset.

And so the second is, how do you make sure that they're there? What you asked is about resiliency. I'll talk from a space standpoint first. General Raymond has done tremendous work in terms of his Space Enterprise Vision and the Space Warfighting Construct, and talk about resiliency and how we're going to do that more effectively.

But now the discussion is moving up. From a multi-domain C2 standpoint, the chief is recognizing that if you don't have space superiority you may not be able to get air superiority. And if you don't have air superiority, you lose on the ground.

That's an interesting (flow ?) that we haven't really talked about in the past. So all of a sudden we're talking about fighting and contesting in the space domain to make sure that we can provide those capabilities to our forces. And so, I don't have any here's what you've got to buy, kinds of answers to your question. But I think it's an important transition that we've gone to. We know we need space superiority, the same as we need air superiority, and we know we have to be resilient because we don't have the ability to fight without those capabilities.

MR. HUESSY: Very well done, sir.'

GEN. SALTZMAN: Thank you.

(Applause).

MR. HUESSY: Thank you all, and would you proceed, if you would, to the Bolton Room for the post seminar event? I want to thank you all for being here. General, thank you for your remarks.

Thank you to our sponsors and our guests. We will see you on -- if you're out in Los Angeles, we will see you in December. If not, we'll see you on the fifth for the Space Policy breakfast which we'll have with Jamie Morin, Pete Hayes, and his colleague Jim, who has also written this publication, will be here. We'll see you then.

General, thank you, on behalf of General Deptula and the Mitchell Institute. Thank you, on behalf of AFA. Thank you, Kath. Thank you all for your support and your help. We'll see you, thanks.

(Applause).