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MULTI-DOMAIN BATTLE:
CONVERGING CONCEPTS TOWARD A JOINT SOLUTION

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Featured Speaker:

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P R O C E E D I N G S

MR. O'HANLON: Good morning, everyone, and welcome to Brookings. I'm Mike O'Hanlon with the Foreign Policy Program, and I have the real privilege and honor today of welcoming General Mike Holmes, the commander of Air Combat Command, who is one of the Air Force's and the U.S. military's big innovative thinkers on the future of warfare. Which is, as we all are aware from the world we live in, from the National Defense Strategy as articulated last week by Secretary Mattis, and by many other documents and facts of history and just moments that we're living today, we know this is something we have to think very hard about: long-term strategic competition with potential near-peer rivals in a world in which technology is advancing very fast and opportunities, but also vulnerabilities are emerging frequently.

So we are fortunate today that General Holmes will talk about a concept that he's been working on very hard, largely in conjunction with General David Perkins of the U.S. Army, called "multi-domain battle." And as you know, the title of today's presentation is "Converging Concepts Toward a Joint Solution."

Multi-domain battle is an idea that down in the wonderful maritime regions of Virginia, the Army and Air Force are collaborating on pushing ahead, but it also builds on many other concepts that have been out there in recent years, and we look forward to hearing, both in General Holmes' early comments and then in our discussion before we go to your question, hearing how this builds on other concepts that have been in the defense lexicon in recent years, like Air-Sea Battle or the Third Offset, and concepts that predated those, as well.

So just a brief word on General Holmes. He is a native Tennessean and went to college there, where he studied electrical engineering. It's nice to see people who are thinking about the future of warfare who really have technical expertise. He also has a great deal of experience in the cockpit of fighter jets, a F-15 pilot and flew other aircraft throughout his career. Commanded a number of fighter squadrons and other higher echelon units, and has

had his fair share of Washington jobs over the years, as well, to the point where I hope I'm not betraying any secrets, he and his wife have actually grown quite fond of Washington. I'm not sure that's quite the same thing of he growing fond of Pentagon jobs; I won't make any presumptions there. But, of course, these days, as I say, he's down at Langley Air Force Base, just close enough to Washington to have his ideas get here and be heard, but far enough away to do some real thinking and have occasional peace and quiet, as well.

So please join me in welcoming the commander of Air Combat Command, General Mike Holmes. (Applause)

GENERAL HOLMES: So thanks, Michael. Thanks, Brookings. Thanks, everyone, for coming out today. I do appreciate Brookings for putting on this kind of event so that we have a chance to talk about what we're thinking about, have a chance to meet up with folks that are engaged in similar ideas and be able to interact, and I'm happy to be here today from Air Combat Command.

So 27 years ago today, we were nine days into Desert Storm. And, you know, when my speech writers put something together that's one of the things they laid out. So on that ninth day of Desert Storm the Joint Force flew 2,000 air sorties on that day in Operation Desert Storm. And to put that in perspective that's about a month's worth of sorties now in the CENTCOM AOR between the war we just brought to the next step in Syria and Iraq, and the one that continues in Afghanistan. That's about a month's worth of sorties there. We were flying that in a day in Desert Storm.

I would kind of say that that day or that period in Desert Storm changed the world because the U.S. demonstrated a conventional superiority in the world with conventional military forces that nobody really could match or had an alternative to. And that drove the world to start looking for new options to try to counter what U.S. forces could bring to the battlefield.

Desert Storm employed a lot of the ideas that came out of air-land battle. So in

the '70s, at the end of the Vietnam conflict, General Donn Starry at TRADOC and one of my predecessors, General Bill Creech at Tactical Air Command then, the predecessor to Air Combat Command, had worked together for several years on how to think about what had changed on the battlefield and to build a new battlefield construct, a new way for the Army and the Air Force to think together about that battlefield and what it meant.

And if you go back and look at Desert Storm, I won't say they followed the playbook exactly, but some of them main ideas of attacking the enemy across the breadth and depth of their force and their formation, of maneuvering forces in the close and the operational battle to drive the enemy to have to move and have opportunities to kill them as they moved, of protecting the rear area and making that a sanctuary that you could generate forces in and deploy forces from, you see all the elements there in Desert Storm.

And the services also employed then the weapon systems that they had bought to fit into that construct. So for the Army that was their big five of the Abrams tank, the Bradley infantry-fighting vehicle, the Apache attack helicopter, the Black Hawk utility helicopter, and the Patriot. And you see all those things used to great effect.

The Navy was able to demonstrate land attack cruise missiles, giving them a standoff deep strike capability. They were transitioning to the F-18 in the Air Wings with the flexibility that it's brought to them.

The Air Force employed the things that we had built for that Air-Land Battle environment in the European theater. The F-15, the F-16, the A-10, the F-111 was transitioning to the F-15E. We were still flying the F-4 in that transition. The AC-130 gunship built on things that we had done in Vietnam; EF-111, electronic attack, Compass Call electronic attack; AWACS, airborne command and control for the Command and Control; and an integrated kind of centralized theater Air Operations Center. The F-117 made its debut and brought stealth onto the battlefield. And we introduced precision weapons, although when you go back and look at it;

only about 10 percent of the weapons that were deployed in Desert Storm were precision weapons.

So demoed some conventional superiority to the world and left the rest of the world's militaries starting to think about solutions on how they might counter that.

Twelve years later might have been the high mark of that. And we had matured the approach because, frankly, in Desert Storm, although it was a joint approach and although it employed some of those ideas from air-land battle, it was still sequential: an air campaign, followed by a ground campaign, steps at a time as we worked forward. It was still done primarily to de-conflict areas for joint forces to operate in. And we still focused on kind of stovepipe solutions within services that were brought together and integrated.

Twelve years later, in the second invasion of Iraq, a more mature approach developing those ideas showed a simultaneous air and ground attack from the beginning. Integrated approaches, we were working together. We had moved from a rollback approach of pushing back defenses a little bit at a time to being able to fight both from the outside in and from the inside out.

We turned the ratio around of precision to non-precision weapons and now 90 percent of the weapons employed were precision weapons. And I would say that if I say that's the high water mark it's because I think at that moment, the U.S. was the master of that threat environment that was posed by the Soviet systems that had been developed that were employed by another nation. And we were without a peer at that moment.

But our adversaries continued to develop options and to think about how they might counter that. In the United States military we spent most of that next 10 or 12 years focused on a different problem set, focused on counterinsurgency in Iraq and Afghanistan, and modifying those forces that we employed to great effect in Desert Storm and in Iraqi Freedom to be able to work in that close air support, COIN environment. And our adversaries kept thinking

and kept working.

Now we face an environment with a rising China, with a resurgent Russia that bring integrated multi-domain approaches to try to counter that conventional might that they saw us display. So I would say that they're using still some targeted conventional force improvements, specific things to match specific things that we've developed, but have learned to use those conventional forces in unconventional ways to do things like push us back, to keep us at arm's length, to make it hard for us to operate with the freedom we're used to close to them.

They also employ irregular forces along beside to complicate the battle so that we can't just use our conventional force. And they're moving quickly to integrate cyber tools, space tools, sophisticated electronic warfare and information tools in place of conventional forces and alongside conventional forces to try to reset that advantage that we possess.

We're back to thinking about what game theory guys call an infinite vis (phonetic), a finite game, where we've been dealing as American military with a finite game, where we were given task, we're going to pacify Iraq, we're going to pacify Afghanistan. We know who the players are. We know what the rules are. We know what it'll take to win or lose. And we're back into a long-term game, an infinite game, where the rules change and we're not exactly sure what they are; where the players come back and forth and are emphasized and deemphasized.

If you watched the war on Syria and on the border of Syria, the complexity there changes every day. Our airmen have been flying against the Syrian air force and against Syrian forces while they were within the coverage of a Russian integrated air defense system; while Turkey is fighting a different war along its border involved against the same folks. So the complexity changes and we're back into that world again where the rules change, the players change. And instead of having a finite victory at the end of a battle, it's how do you stay in the game? How do you keep playing in the game? How do you keep from losing and how do you

go forward against peer adversaries?

So that's all well and good, but what actually has changed? So when Dave Perkins and I sat down to talk about this problems and Dave had a head start at TRADOC, like Donn Starry did on air-land battle, the things that I would pick out are the proliferated kind of multi-domain awareness that's available both to peers and to regional powers. So now, they have their own national technical means to bring awareness to the battlefield that's on par with what we have and what we've depended on. They will increasingly use commercial tools to get more awareness of the battlefield and then use publicly available information, social media or other tools, in new ways.

And when you marry that with ubiquitous, precision, long-range fires that can reach from anywhere on the battlefield to everywhere on the battlefield, it means that the world that we're preparing to deter these peer adversaries in or fight if we have to I would say now means that there are no boundaries on the battlefield or that they mean a lot less. There's no hiding places. There are no places you can hide from that unblinking eye of multi-domain awareness. And there are no sanctuaries where we can work through a port, unload our forces, get them ready for battle, and then move into a battle area. Our forces now know that from their garrison, before they start to move, they're vulnerable to at least non-kinetic fires and maybe kinetic fires. And so no boundaries, no hiding places, and no sanctuaries.

So when General Starry and General Creech got together in the '70s to look at air-land battle, as Dave Perkins has taught me, they started with thinking about a battlefield construct, not about exactly how to win or how many fire teams to be in a squad or how many squads in a platoon, but how would they think about the battlefield together to win? And so when Dave sat down to look at multi-domain battle for the Army, they recognized the need for a new battlefield construct, a new way to think about the battlefield together.

I would say from looking at history that our armed forces cooperate and work

together best when we can at least contemplate defeat. You know, I think we're still the most powerful conventional force in the world. I think we still bring advantages that no one else can bring to the battlefield. But when we square off and think about the peer adversaries of a rising China and a resurgent Russia, as other people say in town, there's no birthright that says we're going to win. We have think. We have to fight. We have to work hard at it.

So in the Solomons in 1942, you know, I imagine the Cactus Air Force of Army, Air Corps, and Marines and sailors together huddled in trenches on the side of the runway while 14-, 15-inch shells landed all around them from Japanese battleships, and it forced them to think about how they might cooperate. And so they kind of created the first JFAC. They learned how to work together. They built a condition where they could get the Japanese to come in and attrit their airpower out in the Solomons, so that when we had enough forces we were ready to move in and across the Pacific.

In 1970s Europe, a guy sat down and came up with the concepts that became air-land battle.

In 1942, when we invaded North Africa as the first American campaign against Germany, we learned some hard lessons about how to work together as air and land power. And we codified those in a little short pub called the "100-20," and it's something I go back to now and again as I think about how to square off and face a peer adversary. And there were about three tenets that came out of that.

The first one is land and air power are co-equal and interdependent. Neither is the auxiliary of the other. And I think airmen have gotten that wrong sometimes in the last 30 years when we've tried to argue about the interdependent part of it. Airmen have made arguments that you can win just with airpower, which has proven not to be true. Soldiers sometimes get it wrong when we argue over the co-equal part, you know. If there a dominant force? I think what we find against a peer adversary is that they have to work together.

The second tenet says the first role of the air component commander is to control the air because, if they don't, the ground commander will spend so much time fighting air forces that they won't be able to conduct their operations and achieve their goals on the ground.

And that land power should be commanded by a land component commander and that air power should be commanded by an air component commander unless they're geographically separated.

And I'm not bringing those lessons out to rub either airmen or soldiers' nose in that experience. I'm bringing it out because if we look at this new world, I'd like to avoid having, you know, my son and his counterparts sitting together to write a document after a battle that says maybe air, land, sea, space, cyber, the electromagnetic spectrum, and information operations are co-equal and interdependent, not auxiliaries of each other.

So how can we think through how we bring all those together in a way that we put pressure on the enemy? So over the last several years, the Navy and the Air Force started trying to work our way through this problem in an idea called air-sea battle, which eventually became a joint concept about joint maneuver in the global commons. The chairman has talked about multi-domain, multi-regional, using U.S. forces and our ability to be all over the world to put pressure on peer adversaries all over the world and not just on one battlefield.

And TRADOC, led by Dave Perkins, and ACC have been working together on this idea of multi-domain battle. And we'll continue to work forward to refine it. There is an article that Dave and I put out. And frankly, the purpose of that article was to try to help airmen and soldiers avoid talking past each other when they sit down to talk about this battlefield and work out a battlefield construct.

Over the next year, TRADOC and Air Combat Command, with some other help, will pursue a series of tabletop exercises that'll go to try to refine the idea and see how we'll work together and how we'll turn it into a doctrine and a concept that we can agree on. We have

identified 13 initiatives, like General Starry and General Creech picked out, initiatives to work together on between the Air Force and the Army.

And I think our goal is to try to find a way that working together, the Joint Force can hold the initiative. Because in this world where both sides see everything and know everything, both sides have long-range fires that can reach anywhere on the battlefield and strike them with precision. The side that wins, I think, will be the side that can command the initiative by driving an ops tempo that the other force can't keep up with. And the only way to do that in the world we live in, I think, is to operate between trust between commanders.

The ideas that we've lived under for the last several years where we could have joint boards that planned things that we would do two or three in days in advance, where will we put our reconnaissance assets three days from now, where we will put our strike assets or our long-range fires three days from now, in the world we're talking about fighting in those assets may not still be there. The targets may still not be there. And so when Dave Perkins talks about converged solutions, he's talking about a world where commanders operate under a joint commander's intent to work together rapidly to arrive at converged solutions, not integrated or synchronized solutions, but where we work toward the same goal as fast as we can keep up with and try to drive the enemy to react to us.

From the Air force side, we'll think about how to think about that fight. And then as you think about how to equip your force for that fight, I think all the things that we're looking at will demand the three basic areas that I'll talk about.

So the first is multi-domain awareness. We'll employ multi-domain tools to try to get awareness in multiple domains on the battlefield so we can pick a place where we have initiative and an advantage and work quickly to try to expand on success. It'll take advanced battle management to be able to bring our forces and concentrate them to that point in a hostile, contested environment. And it'll take agile, resilient comms to be able to communicate across

that force, the Air Force and across the Joint Force.

Hanging on those then are three things that we've talked about and we've been working on. One is adaptive basing. The idea that because our bases are no longer secure from those precision long-range threats, we're going to have to maneuver our forces and we'll have to figure out how to sustain our forces as we maneuver among multiple bases at high cost to be able to sustain that.

We'll think about Air Superiority 2030 and the work that we've done to figure out how we'll maintain the air advantage that the Joint Force depends on, how that fits into those three kind of bedrock capabilities.

And then our multi-domain command and control effort we'll look at in the context of how will we work with an Army force or a Navy force and, in the case of multi-domain battle with the Army, an Army force that is controlled through multiple echelons of command with an Air Force that in general is controlled at a single echelon at the Air Operations Center. How will we move out to bridge the gaps there? Will we have to build redundant multi-domain capabilities or will we be able to rely on each other to bring some of those multi-domain capabilities to the battlefield for all of us? And work out the details of how we'll bring air and land power together in a converged solution and support a Joint Force commander to solve those problems of the future.

So we're working to think through it. We'll build on all the work that's already been done. I thank you for giving me the chance to talk about it a little bit today. And I think Michael's going to lead a discussion here now, so thanks very much. (Applause)

MR. O'HANLON: Well, General, thank you. I wanted to follow up with a few questions and then look forward to questions from the audience here in a couple of minutes, as well.

And the first thing I wanted to do, you did a nice job with the historical

perspective, mentioning some of the other unifying constructs or visions that the Department of Defense has come up with over the years, starting with air-land battle. But I wanted to ask you specifically on three of the more recent ones to maybe draw out a little further how we should understand multi-domain battle.

Let me begin with some of the Joint Vision 2020 and 2030 documents and ideas that the Department of Defense was putting out, you know, 10 years ago. And I think of those as being holistic across all the forces, but being written in a period sort of prior to the reemergence of great power competition. So I'm guessing, just as you said at the end, that that vision was almost more utopian in some its premises than we are at today, but I wanted to ask you to speak to that.

But also, air-sea battle, of course, was a big idea that your service together with the Navy were really pushing about five years ago. As you pointed out, it then morphed into the Joint Concept for Access and Maneuver in the Global Commons, one of the longest expressions and longest acronyms. And once it had that name it sort of had a lifespan probably measured in months, and I haven't heard a whole lot of it since. But I'd like to know, given that the Air Force and Navy were working on that, how does the current effort being led largely by the Air Force and the Army relate?

And then finally, a phrase that I'm not sure I did hear you use was Third Offset. And, of course, people in this room will know very well for the most part what Third Offset is, but I wanted to put that on the table and ask you if you are superseding that with this idea or that this is part of the Third Offset? People here, of course, are aware that the Third Offset is a phrase that's associated with the Obama administration, so perhaps it's a little bit better to have a new name. But, on the other hand, it's also associated with General Paul Selva, who's still the vice chairman of the Joint Chiefs. And certainly the ideas that Bob Work and others had with the Third Offset were widely seen as popular or necessary throughout the department. And also,

they were broad enough that they didn't really necessarily need to be replaced, per se. So is this just sort of a new phrase to capture the Third Offset for a Trump administration or is it different?

So if you could help us understand how multi-domain battle relates to Joint Vision 2020 and 2030, to air-sea battle, and then to the Third Offset, please.

GENERAL HOLMES: I'll do my best. So I think that earlier work was fundamental and foundational to what we looked at. I think it focused on the fact that technology was changing and changing faster and faster, so we needed to look farther out into the future and think about what technology we would have at that point. And so the Joint Force 2020 and 2030 were thinking about how we might fight and what we might fight with as we look forward into the future.

I'm going to go to the end of that first and kind of come back. You know, the idea of a Third Offset, I think it's important to think about how we will change. But in a world that's governed by Moore's Law where things change really fast and we haven't been able to keep up with it, I think the focus there is it's unlikely we're going to have a Third Offset that's going to last for 25 years like the other ones did. It's going to be how can we change our approach to thinking about fights and then acquiring the systems we'll have to use in those fights to do them much faster.

So to me, what I take away from the Third Offset is that we can't take 20 years to develop a platform or a weapons system. We're going to have to make evolutionary improvements to the things that we have and anything new that we're going to field, we're going to have to take an incremental improvement. We won't be able to wait 20 years to fully develop and fully test an F-35. We're going to have to do things faster.

And then if you go back and look in the middle, I would say air-sea battle and multi-domain battle were attempts to take those larger concepts and fight them into a particular

theater or a particular area of operation. So the work that the Air Force and the Navy did together to think about air-sea battle at the service level continues in the PACOM AOR, where Pac Fleet and Pacific Air Forces under the PACOM commander continue to work together to figure out how air and maritime forces and ground forces will work together in that environment against the same multi-domain threat that we talked about to be successful.

And as Dave and I look at multi-domain battle, which is primarily in that kind of continental ground environment, then I'd expect these ideas to be amplified and built on by our components in the European theater and by EUCOM to think through how they fit into their problem set.

So I'd say we start with those fundamental ideas. The Third Offset to me means we're going to have to go faster than what we've done. And then we're going to take these ideas, but they're not just Washington ideas. They've got to go fit into an AOR where they're going to be used.

MR. O'HANLON: Is the Third Offset still part of official DOD thinking or is it a term that now, even if the ideas continue, the term has essentially been dropped?

GENERAL HOLMES: So like you, I haven't heard that term used a lot, but I think I still hear the ideas talked about in the halls of the Pentagon and in the things that we look at. We still have the move from all the services to move toward a rapid capabilities office to shorten our acquisition schedules and get to the things that we need in a faster way.

And I think generally I'm heartened by the idea that General Milley and the Army have decided to think through how they're going to fight before they start down the road of acquiring the next weapon systems, and I think we're trying to do the same thing in the Air Force.

MR. O'HANLON: So following up on that, that's a great point because I wanted to ask you to what extent or when will multi-domain battle start to actually be more than a

concept and actually affect Pentagon force planning? Are you already factoring in some of your ideas into the budget we're about to see in a couple of weeks or is it too soon to expect that? You've only been on this job for less than a year, I think, and multi-domain battle is a pretty new concept. So is it sort of a year from now or so that we're going to expect this concept to affect Pentagon acquisition decisions?

GENERAL HOLMES: So one of the comments that people make is, so what's new or different in multi-domain battle? What's different from the joint operations that we've been doing? And there's some truth to that. So in the CENTCOM area of operations now, Lieutenant General Jeff Harrigian is the air component commander. He's also the coordinating authority for the Joint Force for space and cyber. So we're already, of course, doing some multi-domain operations.

I think as we think through how we'll change our command and control to get away from, again, those boards and things that take multiple days in an environment where you're allowed to do that, that's where we'll start to see a change. And then for the services it'll be as we contemplate going from research and development into programs, where we go ahead with programs that we had planned for many years or where we reevaluate those programs that we haven't started and try to decide how they fit into the world that we envision fighting in in the future.

MR. O'HANLON: And that leads me to a question, as I try to understand sort of the overarching philosophy of multi-domain battle, and you clearly expressed there are a number of things that it tries to address in terms of today's world, but I guess one question I have is do you see it as fundamentally taking advantage of new war-fighting opportunities so we can sort of come on like gangbusters in multi-domains ourselves or do you see it partly as being worried about vulnerabilities? That we're going to be attacked in cyber and in space and we're not going to have the luxury of building up the big logistics and theater capabilities we had in Desert

Storm, as you described, and we're going to have think of a multi-domain battle as in a way fighting maybe in smaller, isolated pieces of the Joint Force that are not necessarily in good communication with each other all the time because command and control has been so compromised.

So do you see it as fundamentally taking advantage of opportunity and taking our sort of advantage to the next level of dominance or do you see it even more as dealing with vulnerability and the expectation that it's going to be actually harder to keep an integrated Joint Force functioning across the whole battlefield?

GENERAL HOLMES: So, you know, obviously, I think they'll be some of both. And if you look at where TRADOC started out with multi-domain battle, they took the rear area and the close battle and the deep battle concepts from air-land battle and they expanded those and made some more areas with kind of an operational rear and a strategic rear to think about how we'll defend our assets and how we'll maneuver there to be able to bring forces forward. So there's certainly going to be a defensive component. And then they expanded the deep battle out to include kind of a deep maneuver area and deep fires area and a strategic fires area out there at the end.

As Dave and I looked at it, we looked at the lines, an airman tends to look more at the function that we're trying to do and to say, okay, I want to attack that enemy IADS across the depth of the battlefield and I'm not as worried about which area they're in or I'm going to go after their ability to sustain their forces across the different areas and not as worried about where they are on the map. On the defensive side that translates to us to defending the functions that work in our operational rear area or in our deep rear or strategic rear area.

So we're going to have to continue to do both. But you won't drive the initiative and the tempo to put the enemy on the defensive if you focus only on the defensive parts of it. So like we've always done in warfare, you'd like to make the enemy fight, to scratch and claw to

take off from their airfields or to maneuver out of their own cantonments instead of thinking about how they're going to bring forces to bear against you.

So we're going to work on the offensive tools and then we're going to have to think about how much defense do we have to provide to be able to project the power.

MR. O'HANLON: Here's a question that I realize you can only address to some extent in this kind of an unclassified setting, but building on that point and that, as you say, there are offensive and also defensive elements. And reading the National Defense Strategy, the department is acutely aware that Russia and China in particular can threaten our operations much more than they could have 10 years ago. Secretary Mattis last week talked about a constantly eroding American advantage.

And I wonder, as you think about multi-domain battle, especially when you look at the command and control space, are there are couple of vulnerabilities that you think we have to get after with the greatest amount of vigilance and haste because they are sort of glaring examples of where we could really be put back on our heels?

I'm thinking, for example, of last year's Defense Science Board's study on cyber deterrence when they basically said that there's almost no U.S. cyber system that we can really vouch for at the moment. I'm thinking about space where even though we're going towards larger constellations of partly commercially based satellites, our big stuff is really quite vulnerable and might very well be attacked in the future, a hegemonic kind of war.

Are there certain specific vulnerabilities that you want to see multi-domain battle affect the way we deal with these and maybe even affect acquisition decisions pretty quickly because the vulnerabilities are so acute?

GENERAL HOLMES: So I'd pick out a couple. One would be, as you said, the vulnerability of our systems. As we've computerized them and digitized them, that's increased their vulnerability to cyber threats. So we're able to bring more capability faster, but it introduces

a new vulnerability.

On the Air Force side, it makes us think about things like moving our comm and cyber defenses out of the support group and into the operations group. It's got to be there to make sure that not just your networks, but your weapon systems are able to work. And in multi-domain battle, one of the most important weapon systems would be the Air Operations Center, which is built on software and defending it against the vulnerabilities there.

And then the second one is your ability to communicate in the face of cyberattacks and broad jamming delivered from air and from the ground and from space that make it difficult for you to communicate. And so even with the commander's intent, even operating toward a converged solution, we want to work on our ability to communicate and our ability to fight when we can communicate.

MR. O'HANLON: So as much as you want to get after this problem, that last comment suggests that there's only medium confidence that we can really mitigate the -- that we can really eliminate the vulnerabilities. We can maybe mitigate them, but they could be here to stay at some level. Is that what I hear you say?

GENERAL HOLMES: Well, I think it's a continuous game with a step and a counter-step, and it's not something that we'll ever solve and say, okay, now we have perfect comm, we won't have to worry about it. There'll be new vulnerabilities. We'll have to continue to address it and we'll have to be able to fight like we always have in a world where we can't always talk to each other.

And as a young pilot, I routinely trained in environments where we could not talk to each other because the enemy had the ability to do that. We built the HAVE QUICK radio which changed frequencies and now we could talk to each other again. And then the enemy built the jammer that can move at the same speed or do it across broader band and we couldn't. And so we'll have to be able to do both.

MR. O'HANLON: One last question and then I know a lot of other people want to get into this. On this, same issue of vulnerabilities, and, again, recognizing the delicacy of some of these subjects in an open setting, but I wonder how much you think about vulnerability nuclear effects. We certainly see our Russian friends talking about escalate to de-escalate. We've had multiple commissions in the United States on high-altitude nuclear bursts and their ability to fry a lot of the electronics that we all have accustomed ourselves to.

Do you worry that we have in the post-Cold War era not hardened enough communications systems against that kind of nuclear effect and that could be one of the vulnerabilities we have to really confront in the years to come?

GENERAL HOLMES: So, yeah, I think absolutely you have to worry about that. There are techniques using nuclear weapons from a high-altitude blast to be able to eliminate electronics and communications systems. We have to keep that on our threat list. I think when Secretary Mattis in the new strategy talks about being able to field the decisive conventional force, part of what I see in that is our ability to have deterrents against peer adversaries at multiple levels.

So it's important and we have to start with a safe, secure, reliable nuclear deterrent. I put that as the existential threat to the United States. But if that's the only reliable deterrent force we have, if we don't have 21st century deterrents that uses some of the multi-domain tools and a conventional force to dissuade and convince the enemy that they can't be successful achieving their goals at a level below a response that would trigger a nuclear response, then you deter, I think, those kinds of attacks by having an ability to win at the different levels and to deter conflict from the lowest level with the response that you can do that's proportional, that you're willing to do, and that you have the capability to do at that kind of conventional level.

And then the enemy has to try to find asymmetric ways to operate below that

level, to be able to go after their objectives without triggering either a massive conventional response and all the build-up and logistics and everything that takes. They think there are things they can go operate that won't -- we don't care enough about to trigger that response. So we have to have options at the medium level. We have to have options at the big, conventional deterrent. And then we have to continue to maintain a safe, secure, reliable nuclear deterrent.

MR. O'HANLON: Great. Well, let's bring some of you in. I've got other questions on the budget, but I bet a lot of them are going to come up from some of the expertise in this room. So why don't we start over here? You want to take one at a time or should we take a couple at a time?

GENERAL HOLMES: Let's take one at a time, if we can.

MR. O'HANLON: Okay. Right here, please.

MR. CLARK: Good morning, sir. Colin Clark, Breaking Defense. I'm intrigued by the idea that Multi-Domain is basically Russia and Air-Sea is basically China. But when you talk to Salty and Bob Work and others and they talk about Multi-Domain, they seem to be talking about a much more sort of universal application. Is there a different here or is this a semantic thing?

GENERAL HOLMES: So I guess I would say, Colin, that I think the fundamentals of being able to operate on those multiple domains and put the enemy on the horn in multiple dilemmas and ship-supported supporting roles are fundamental to both concepts. I would say the air-sea battle iteration of that is probably more appropriate in the Pacific scenarios. And the TRADOC-derived multi-domain battle building on the air-land battle legacy is probably going to be thought through more in the European context. But I think both of them will rely on the same general ideas, but with different forces based on the environments they'll be in.

And it doesn't mean the Navy won't play in a European scenario or that the Army won't play in the Pacific scenario. It just means that the guys that are leading it in those

areas that have to think about it hardest are in those theaters.

MR. O'HANLON: Please, and then we'll work back.

MR. TUCKER: Thank you. Patrick Tucker with Defense One. You opened up talking a little bit about precision weaponry. And it seems like multi-domain battle concepts would help with precision. You've got more sensors on target and more integration among services to bring more data to target acquisition.

At the same time, the Pentagon at the end of last year made an announcement they would indefinitely suspend the ban on cluster munitions. And there's a lot of the nuclear posture, a new (phonetic) draft that's been leaked online that talks about variable yield nuclear weapons, both of which seem like the total antithesis of precision.

So I wonder if you could talk a little bit about what those weapons mean for the future of multi-domain battle or just how you're thinking about their utility. Thanks.

GENERAL HOLMES: I mean, sure, some of that will be beyond Air Combat Command's purview, so I'll say take what I say with a grain of salt as we work through it. But we don't have an unlimited budget, right? And even if the things that we're talking about at higher budget levels, we've had waits that can spend all the money that the Congress and the administration would give us in useful ways to provide a more effective defense, but it starts with kind of knowing how much we're going to have and having some predictability, are the primary we're looking for.

And so at whatever budget level you plan, there are going to be impacts, things for a deterrent value that'll have both the mass effect and a precision effect. And you'd like to have the ability to bring both. You know, going back and looking at land mines is at least partly related to the cost of replacing weapons that we have that are area munitions with conforming or precision munitions that would do the same thing.

I have not been involved in the nuclear posture review. And I haven't seen any

more of it than you guys have until it comes out, so I'll defer comment on that part.

MR. O'HANLON: Here in the fourth row, please.

MS. KARAS: Good morning. Rachel Karas with Inside the Air Force. You mentioned tabletop exercises that you're going to start doing and I just wanted to clarify, is that the same thing as the MBC 2 exercises that General Saltzman has been talking about that are starting this fall? And if not, can you elaborate on what you're looking to get out of those, how often you're going to do them?

GENERAL HOLMES: Yes, so I think it's two different exercises. The tabletops that TRADOC and Air Combat Command will do will be focused on how our Army and Air Force force is going to fight together in that multi-domain battle. General Saltzman's experiments are going to be more focused on how the Air Force will bring multi-domain tools together and make the command and control work to support that within the Air Force.

They'll be related. They'll be some of the same people playing in both, but they're run by different organizations kind of parallel to each other.

The tabletops should have started last week, but didn't because of the government shutdown. So I'll get my government shutdown point in here that it impacts our ability to plan and work for the future. I had to cancel one of my squad commander courses because I could not travel people. So as I change out commands this summer, it impacts my ability to prepare and do that. And we'll have to reschedule the first of those four tabletop exercises because people couldn't travel to take part in them. So it impacts our ability to operate today and to prepare for the future.

MR. O'HANLON: By the way, I'm going to take advantage, too, to do a quick follow-up and then we'll come here. Last week, at his unveiling of the National Defense Strategy, Secretary Mattis talked about how the budget shenanigans of the last 10 years that a number of you had to live with, including my good friend Bob Hale, former comptroller of the

Pentagon, that they've done as much harm to the department as any enemy. And he talked about Continuing Resolutions, not just sequestration, not just shutdowns.

So Continuing Resolutions, which, of course, no one likes and I'm not expecting you'll put in a good word in there on their behalf, but do they, affect you? Do they really hurt you at the level of doctrine and concept development as much as they hurt let's say the acquisition community? Or is the bigger problem for you something like, you know, the shutdown nuclear scenario, so to speak?

GENERAL HOLMES: Both. So, you know, our acquisition community, our programming community has learned to not expect to obligate major funds or start new programs in the first half of a year because you won't have a budget yet. You won't be able to commit that money. And so you learn to try to think about doing it in the second half of the year. It makes it very difficult to plan for a future when you don't know how much money you're going to have that year until you're halfway through it. And it makes it difficult to plan in the longer term because of the impacts of not knowing whether you can bring people together to do things like we talked about.

So I agree with the secretary, the primary problem that we have as services is operating without knowing what our top line will be from year to year and without having some predictability over a four- or five-year period of what that top line will be. Given that and then given the freedom to build a force that's right-sized for that top line, whatever it is, I can bring a better force to bear than I can when I have to kind of wait every year to find out how much money there's going to be.

MR. O'HANLON: Thank you. Right here and then I'll work backwards.

SPEAKER: Good morning, General Holmes.

GENERAL HOLMES: Hi, Jack.

SPEAKER: Still very proud to be your first F-15 weapons officer and not part of

the media. I'm from the Boeing Company.

Space, one of the major domains that's a big piece of your multi-domain battle command and control. Can you comment on now that it's contested or expected to contested how General Raymond and Space Command's coordinate and working with you and the TRADOC commander in your endeavors?

GENERAL HOLMES: So, you know, when I said the three things that we'll depend on are multi-domain awareness, advance battle management, and agile, resilient comms, all those things will rely on the capabilities that American space assets bring to the battlefield. And that means General Raymond has to think about how he's going to reconstitute some of the aging parts of that system and it means he's got to think about how he's going to defend them. And that defense, like any military defense, will be about offensive ideas and defensive ideas. So General Raymond's working through that.

For many years, we've said, hey, a day without Space, and we've done those exercises, and a day without Space is a really bad day for the people in the Air Combat Command when they go to the battlefield. With space being recognized as a contested environment, a day without terrestrial conventional forces is also going to be a really bad day for Space because many of the primary threats to space systems are launched from the ground, either kinetic tools or non-kinetic tools.

So, yeah, we're working and thinking about not just how Space will continue to support terrestrial warfighters, but how terrestrial and air warfighters and multi-domain warfighters will bring those tools together to help General Raymond's forces operate and bring the advantage that they bring to us.

MR. O'HANLON: Here in like the sixth row or so, the woman in the glasses.

MS. McCULLOUGH: Hi, good morning, sir.

GENERAL HOLMES: Good morning.

MS. McCULLOUGH: Amy McCullough with Air Force Magazine. I wanted to follow up on the idea that you mentioned about evolutionary improvements and how the Air Force and military in general can no longer afford these 20-year development programs. How does that work with the idea that General Goldfein and General Saltzman and other Air Force leaders I've talked about it with new-new versus new-old?

GENERAL HOLMES: So I think it means you have to do both. We learned to do that in the '50s and '60s when we were facing a peer adversary that focused all our efforts and intensity on defending our way of life. And so, we fielded new systems routinely and periodically and we fielded them incrementally. F-84s might have straight wings one lot and the next lot had swept wings because we had learned they were better; or we added a new sensor to it or we added a new part of the weapons system or a new weapon to it periodically.

We've lost some of our ability to do that because there was -- in the absence of a peer threat, we could draw a line as far into the future kind of as we wanted to, we could take as long as we wanted to to get to that next capability, and we'd still be there ahead of our adversaries. Because that's changed, we have to make evolutionary changes to things that we have and then we have to think about fielding the new things, the missing parts faster. And in Air Combat Command we talk about accepting risk to bring the future faster.

Our part of that is we can't take two and a half years to define the requirement anymore for something. We're going to have to start with requirements that are achievable in the short term and make our requirement document a living document so that we can trade it off with our acquisition partners as we go forward and decide what can we get now. Is that better than what we have? And if so, let's go do that instead of trying to think 10 years into the future.

MR. O'HANLON: Yes, sir, here on the aisle.

MR. HEDERMAN: Thank you. Bill Hederman, University of Pennsylvania.

GENERAL HOLMES: Hi, Bill.

MR. HEDERMAN: And a reformed double E as well. I started at Bell Labs. My question is work I'm doing at the university relates to cyber and the power grid. And the analogy has been raised that if the way that the utilities have to take responsibility at the moment it's as if in the Cold War PanAm and TWA had to expect a call from the Air Force that migs were coming, but PanAm needed its own jet fighters to protect its airlines. What's wrong with that analogy? And how are things going to change in your thinking?

GENERAL HOLMES: Well, so I think we are going to have to figure out as a nation how we're going to defend the infrastructure that we all depend on every day and then is also the basis of my readiness. But I think we'll have to come up with a uniquely American solution because the American people have demonstrated that they have some reservations about who is poking around in their network. Right? And so we're going to have to work through that together as a nation.

From my perspective, I'm open to whether it's the U.S. military that defends those networks or whether it's someone else in the government, as long as somebody is put in charge of it and given the resources to do it, the authorities and the resources to do it.

MR. O'HANLON: Over here, please the fourth row.

MS. INSINNA: Hi, Valerie Insinna with Defense News.

GENERAL HOLMES: Hi, Valerie.

MS. INSINNA: Hey. So you talked a bunch about the interdependence of air and ground forces during your speech, but when you ask, you know, a normal Army person or Marine Corps person about the Air Force, you know, they always point to the A-10. Last week, there was a story that alleged that the Air Force did not want to continue the re-winging effort and that it would, you know, basically try to stonewall that from happening.

Can you address that? You know, is the Air Force wanting to move forward and re-wing the 100 A-10s that are still -- that still don't have those wings left? And is that something

that the service is planning to ask for more money in the '19 budget to do?

GENERAL HOLMES: So we have money in the current budget that will allow us to reopen a wing contract. So the previous contract that we had was with Boeing and it kind of came to the end of its life for cost and for other reasons. It was a contract that it was no longer really cost-effective for Boeing to produce wings under. And there were options there that we weren't sure where we were going to go, and so now we're working through the process of getting another contract. The money's there to do it.

The first part of that contract, like all new contracts, the first sets of wings are expensive as you work through the engineering and the design work and working through that. And then you have options to go back and get them.

In the '19 program that we're working, we also buy more wings. And so we move forward to address the wings on the A-10.

As far as exactly how many of the 280 or so A-10s that we still have that we'll maintain forever, I'm not sure. That'll depend on a Department of Defense decision and our work with Congress. But we plan to maintain the A-10 out into the 2030s at least.

And then, you know, we live in a world, again, with a limited budget, so how many fighter squadrons can we afford to maintain? How many will I have the O&M to be able to operate and how many does the nation need? And so as F-35s come on board moving toward 48 or 50 a year, I won't be able to just add those on top of the squadrons that I have. We'll have to make some decisions.

So you probably saw recently the Air Force announced that the next two F-35 Ops 5 and 6 in the Air National Guard will replace the preferred candidate for those bases. We still have to work through environmental impact studies and those things, but the preferred candidate are bases that fly our oldest F-16s. You'll know when we're talking about retiring A-10s when we start replacing them and those decisions.

MS. INSINNA: When will you know how many of the nine squadrons that you guys are going to need

MR. O'HANLON: It's not a decision that we have to make right away, so we'll continue to plan and work back and forth. It'll depend on what we have, what we need, and what's useful on the battlefield year to year as we go through.

MR. O'HANLON: Before I take the last couple of questions from the crowd and we have a few more minutes here, I wanted to on the subject of specific weapons, ask if there's anything that you wanted to make a plug for. Obviously, I would assume you support the full upcoming DOD budget request and so I'm not going to ask which might be lower priorities out of that. But to the extent that you want to make a specific plug, especially in the context of multi-domain battle, for anything, whether it's an Air Force or a Joint program, whether it's a communications hardening or whether it's an offensive strike platform, is there anything that to make multi-domain battle really come alive in the near term you feel we need to prioritize?

GENERAL HOLMES: So, again, fundamentally, those three things that I talked about: multi-domain awareness, which means not just airborne sensors for ISR, not just space-borne sensors, not just cyber sensors, but how you pull those together in the right way to get the information that commanders need; the advance battle management, which will include some algorithmic approach to it, it'll be some big data analysis, but it's still got to allow people to fight in real wars where you have a hard time talking to each other; and then the comms that will work through that.

Those things are going to be fundamental. And whatever we acquire in those areas, they need to be able to operate in that contested, degraded, operationally limited environment that we face against a peer adversary.

And then fundamental to being able to exploit the air is being to control the air and space. And so the Air Force is going to focus on, as we go forward, we're going to have to

make sure that we bring a capability to control the air and space so that the Joint Force can exploit it. So General Raymond will be outlining the space mission force and the things that he believes are necessary. Our study of Air Superiority 2030 has produced some ideas. Some of them are in those broader three context, some of them may eventually lead to replacement platforms. And so those things are fundamental to the things that the Air Force brings to the Joint Force.

MR. O'HANLON: Great. So let's see, the gentleman about the eighth or ninth row back there. Yes, please.

MR. CHETHER: Tony Chether (phonetic ~~4:18:13~~), old guy. (Laughter) I believe that multiple-domain will remain a concept until we figure out how we're going to do fully integrated multiple-domain training against a fully integrated multiple-domain Op 4 (phonetic ~~4:18:30~~). And until then, people won't have trust, they won't have worked with each other, and we will probably really find out what we need when we get into that. But I don't hear any talk or any sense that we're leaning towards that.

GENERAL HOLMES: You know, that's a great point. So when we talk about the high water mark of U.S. superiority in air-land battle being either Desert Storm or that 2003 invasion, you can't leave out the impact of realistic training driven by veterans of the Vietnam War drove on the force, and focus in on training in realistic ways against realistic threats and the ability to do that. That is one of the areas that we've lost because in reduced budgets and uncertain budgets, we haven't funded the threat systems that we train against to keep up with the systems that we bring to the battlefield. So there are initiatives going on to do that.

And for the Air Force, in our red flag environment and in our weapons school, kind of our premier tactical instruction school, in the graduation phase, which is the integration phase, we bring other services to bear there, where we do train together against a multi-domain threat to the best ability that we have in a realistic environment. And we'll continue to do that

and introduce ways to do it. So we bring space aggressors, cyber aggressors, air aggressors there into that space.

MR. CHETHER: Bring together, you know, Air Force, ground.

GENERAL HOLMES: Right.

MR. CHETHER: And maybe it's time to think about bringing back JFCOM, I guess.

GENERAL HOLMES: Yeah. Well, bring back what? I'm sorry.

MR. CHETHER: JFCOM, Joint Force Command.

GENERAL HOLMES: Oh, Joint Forces Command? Yeah.

MR. CHETHER: Which was Admiral Giambastiani with his fully integrated training.

GENERAL HOLMES: So the Joint staff is making an effort to kind of relook at the joint exercises and the way we schedule them and bring folks together through the J7 to get after the chairman's goal. So I think you'll see them step up into that role and reset some of that.

You know, I agree with your point, we absolutely have to figure out to do it and we have to find ways to bring our forces together to do that. One of the things that we're experimenting with between the Army and the Air Force is a Joint Air-Ground Integration Center, or a JAGIC. And we're employing that in our exercises together. And a JAGIC is alongside the division TOC, a combination of division staff and our ASOC staff, to try to bring the Air Force's tools together in the moment in that battle space.

But we won't be in multi-domain battle until I present a multi-domain ASOC to that division that brings everything that the Air Force brings and goes beyond the cast that we bring to their battle space, but brings all the tools there. And so I agree with you.

MR. O'HANLON: Here in the second row, please.

MR. ROSE: Herb Rose. You mentioned Europe a couple times, but I'm just

wondering how much effort there has been to collaborate with NATO and to integrate concepts here in multi-domain battle.

GENERAL HOLMES: You know, that's a great question and the NATO headquarters, the NATO Joint Supreme Allied Commander for Transformation, what used to be Atlantic Command, is there at Norfolk. And I'm 15 minutes or so from Dave Perkins and that NATO Command led by a four-star French Air Force officer is about 15 minutes away on the other side of the tunnel in Norfolk, as well. So we have been working together with them as NATO thinks its way through these concepts. NATO has their own name for it, but they're focused on the same ideas and we get together twice a year or so, bringing TRADOC and Air Combat Command and our Navy counterparts together there with that Supreme Commander Transformation at Norfolk to try to think through it.

Again, the realization of that will happen in Europe on those training grounds as the forces there operate together. And we've taken steps to both improve our posture to deploy forces there and position forces there and our ability to be able to train alongside our NATO partners with a rotation Army brigade that's there to support that training effort with NATO brigades that are standing up in those Baltic countries that have multi-components from multiple forces to work together. And then in the Air Force we use an idea we call a theater security package to send folks over for training. Right now we have I think the Ohio Guard just deployed for a several-week deployment into the European theater to train alongside NATO air forces and ground forces, and to assure our allies and to deter Russia from taking action.

MR. O'HANLON: Before I give the last question to my friend Ché in the back, I wanted to also bring up one other theater that hasn't received a lot of attention today and I think it was even more striking how little attention it received in the National Defense Strategy. That's Korea. And I think the National Defense Strategy, to my mind, is a very interesting and excellent document, forward-looking, worried about big long-term concerns, and yet here we find

ourselves, hopefully a very small chance, but a non-zero chance of engaging in what would probably be, as Secretary Mattis said, the worst war that we've waged as a country since World War II if, god forbid, it happens.

Is there anything about what you're doing that speaks to Korea, that speaks to the issue of handling an airspace where there could be a lot of missiles, there could be a lot of artillery? This is an Air-Army kind of environment. Is that more of something you just have to trust to PACOM and General Brooks and Korea Command right now and you're thinking more long term or is this something where multi-domain battle can make a contribution?

GENERAL HOLMES: I think the ideas are certainly being used and thought about as Combined Force Command, the headquarters in Korea, works through looking at their old plans and thinking about what they will do and what they'll need to do. My primary focus is the Air Combat Command commander is to present ready forces and I'm pretty focused on improving what we'd call the full spectrum readiness of our force.

For 15 years we've been in a rotational readiness model where our guys knew when their next turn was going to be to rotate to the CENTCOM AOR, and they focused on providing that fairly narrow skill set to the best of their ability to operate alongside coalition ground forces and our U.S. ground and special operations forces and do that job very well. What we're asking our units to do now is to regain readiness in some of the tasks that would be more appropriate in that Korean scenario as a steppingstone toward regaining the full spectrum readiness that we would need to be able to counter a peer adversary there.

So we're certainly focused on it in Air Combat Command. Our focus is on readiness of the forces that we'd present forward.

MR. O'HANLON: Thank you. And Ché.

COLONEL BOLDEN: Sir, good morning. Ché Bolden, general neophyte and Michael O'Hanlon disciple. (Laughter) No sanctuary, no hiding place, no boundary. You

mentioned adaptive bases as one of your three tenets. One of the things that often gets overlooked in our ability as a force is our ability to base whether it's in CONUS or forward. You mentioned adaptive bases and the Air Force has a long history of treating their bases as weapons platforms. Any advice or comment on how multi-domain battle looks at our basing posture, particularly for the other services, to kind of take that as a roadmap to go forward?

GENERAL HOLMES: I think we're going to have to put some more emphasis into the defensive part of protecting our bases. We haven't had to do that as the Joint Force because of our overwhelming offensive superiority. We did defense by making sure that the enemy couldn't take off from their airfields instead of stopping them from shooting cruise missiles at our base. So we're going to have to address the defensive part of that in the short term, and you'd like to do it in a cost-effective ways.

Are their ways to reduce the cost equation so instead of it costing you more to shoot down that missile coming at you than it does to buy the missile, are their ways to get after it? And those are probably some non-kinetic ways, whether that's with cyber left of launch or whether that's with the electromagnetic spectrum or things that you can do there, whether it's directed energy or whether it's finding a cheaper way to use a rail gun and a powder gun and some of the Third Offset ideas that we talked about.

We're going to have to address that part of it, but we're also going to have to continue to work on the left of launch part of it to try to defeat things before they're launched and defeat them before they can be brought to bear against our forces.

And then because we're fighting against tough, smart guys that have worked out problems, we're also going to have to think about how we fight through those attacks, how we recover from them, how we respond to them, how we sustain forces that make that targeting problem harder by moving between bases. That probably means we won't be able to rely on just large, efficient bases that we build and maintain over time. We're going to have to relearn

how to operate from smaller ones for shorter periods of time. And the real difficulty there is in sustainment, is in being able to provide the fuel and the weapons and the food and the power and everything that you need there in bases that you move between.

So our enemy's giving us a problem, which is how do you operate close enough to them to be persistent enough to have the effects that you'd like to have? And we're going to have work through some counters to that.

MR. O'HANLON: Thank you all for being here. Please join me in thanking General Holmes.

GENERAL HOLMES: Thank you.

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