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DAY ONE

SESSION THREE
Finding the Appropriate Force Mix:
Balancing Capabilities with Priorities
2:30 - 4:00 P.M.

David Neyland

DR. THOMAS P. EHRHARD: Let's get started with our post-lunch panel. Welcome back, and again welcome, everyone to this important event for the Air Force and thank you for being in attendance today. And again, I'm Tom Ehrhard, special assistant to General Schwartz. And today, we have a very interesting panel for you that hopefully will accomplish what the chief's mandate was from this morning, which was to get us to think about the future security environment, think about what we need to be doing with the Air Force in the future, and try to outline some of the key elements of the debate about what we need to do going forward.

The title of this particular panel is interesting. It's called "Finding the Appropriate Force Mix: Balancing Capabilities with Priority." So right off the bat, you have two terms that are problematic. The first one is "appropriate." So what we'll do today, and job one, is to make sure we don't do anything that's inappropriate.

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DAVID NEYLAND: Thanks, Tom. General Schwartz, thank you very much for inviting DARPA to participate in this. I am personally humbled by the opportunity to come talk to this

august audience. I'm proud of my Air Force heritage and proud to be a part of bringing something back to the Air Force from DARPA.

I'm going to talk a little bit about the Tactical Technology Office, but I want to give you a flavor of DARPA as a whole. Now, most people recognize that DARPA came about as a result of Sputnik back 50 years ago. What most people don't realize is a lot of the icons that you see in your day to day life, particularly in terms of the Air Force, actually originated at DARPA. Some people may be familiar with the F117 having come out of the Have Blue program, but not everybody realizes the things like launch vehicles, the Taurus and the Pegasus, the Global Hawk, the Predator, the A160 today, a number of these things came as DARPA programs. And those things in particular came out of the Tactical Technology Office.

And I want to insert a real short anecdote here for a moment because DARPA is about the future. It is about the future, about going beyond where you think you need to go. So, in 1992, DARPA had a program called War Breaker right after the first Gulf War. And as part of War Breaker, DARPA conjectured in a command and control environment, a joint environment, that the future would hold the use of unmanned air vehicles with weapons on them controlled by joint forces that were forward deployed in a persistent manner so that you always had a weapon overhead that you could deliver against a time critical target by a guy on the ground calling the shot. Now, that was in 1992. You can imagine what the reaction across the Air Force was to that proposal from DARPA. That's where we live. We live beyond your comfort zone. We live doing things that you don't even think that you want to do.

So in TTO in particular, we're divided up into looking at weapons systems, platforms and space systems. And we do this with an analytical framework, actually a couple of analytical frameworks that had to do with these thrust areas that are persistent ISR, logistics, and effects. And we look at the problem space from the perspective of can you take away the sanctuary of the bad guy? Do you know where he is when you want to do something about it? Can you deliver the things to the place you need them to be so you can deliver, ultimately, an effect against them?

So as we go through and we formulate programs looking forward, we're trying to postulate in each one of those domains to make sure that we have a cross cut across all of those.

I want to talk about some examples. Now, this is just a snapshot across DARPA. And I'm going to give you some examples because I want to show you the pertinence of sometimes you don't even realize that you might need to be thinking about a program. The first of those is a long-range anti-ship missile. Why would you care? Well, it just so happens that it's a derivative of the JASSM Extended Range, the Air Force program. But the important part of this program is that we're developing a front end associated with this that allows it to penetrate the close in defenses around a target. Now, that is pertinent to the Air Force, even though we're developing this program for the Navy.

Another one, High Fly. We're putting air breathing propulsion for a Mach 6 missile onto an airplane and we're going to fly this summer, we're going to launch this summer. And then T3, we're going off and looking at not just replacing the AMRAM, but we're replacing it with a single missile that can do three missions; air to air, air to cruise missile and air to ground. You're not even sure necessarily that you want that yet, but we're out there pushing to go in that direction.

We're also looking at putting on lasers on aircraft. There's been a laser program since I was a second lieutenant a hundred years ago. This laser program, though, is going to shoot things down two years from now and it's going to be in a form of factor that you can put into the bay of a JSF. It can go on a C130, it can go on a B1, it can go in a Humvee, but it's a form factor for an electric laser that you can actually use in tactical applications.

Now, in the sense of platforms, we took Predator, which we developed in the '90s and we said, "Okay, that's an absolutely fabulous platform. What could we do if we made that a VTOL platform? Something that could operate autonomously for 24 hours, operate up to 30,000 feet, be able to carry a thousand pounds payload and be an ultimate stable platform, something you could put an MTI sensor system on and have it just hover over a target area and collect MTI data.

And we've got robotics. Why would you care about robotics? Well, this is something that'll carry 300 pounds of payload any place a human being can walk. I don't suppose there's any JTACs hiking around the mountains of Afghanistan where they can't take Humvees, right? Wouldn't it help them a little bit to be able to offload some of those radios, let them carry them with them? Or better yet, if they want to look across the hill to the other side to see what's going on the other side, instead of having to task up echelon to get something like a Predator to give them a view, how about a Wasp or a Shrike that they can pull out of their backpack and it can fly for an hour and give them a perspective of what's right beyond their line of sight.

As we go on about platforms, we're looking at formation flight and air to air refueling. We did a demonstration back in 2006 for hands-off air to air refueling. Air to air refueling; if you've ever been in the back seat of an airplane, which I was, it's amazing to watch these guys in the front seat with the courage that they have to go connect to a boom or a probe and drogue. It is scary every time I was there watching that happen. But we found a way to automate that so you can actually have the airplane fly the entire event from pre-contact all the way to taking the gas.

That wasn't enough for us, however. What we're doing now, what we have just started, is a program to do that between two Global Hawks; seven days of operation, nighttime refueling, autonomous location, pre-contact, pass gas, go off and fly. Now, not because we're trying to make it so you can go and do seven day operations with Global Hawks, we want to prove the art of the possible. We want to prove that you can do this sort of autonomous operation for whatever your next generation of aircraft is, either an ISR platform or an unmanned bomber, whatever it might be.

And then I mentioned formation flight. If you can reduce the amount of fuel consumed on some of these long legged missions going across the ocean, transport missions, by one, two, three, five, ten percent, would that have an impact on the total fuel consumption across all of the logistics that you move? We found a way that if you can find the right sweet spot to fly with the aircraft, it's too small of a position to fly with a man flying it, but if you can get into that sweet spot, you can actually use the aerodynamics of the vortices coming across the wings to increase the

performance of that aircraft by something on the order of a 10 percent drag reduction, which translates into fuel usage.

And we looked at the number of flights across the ocean. We found without even scratching our heads, we found 250 missions in the last year where you had three or more aircraft going the same mission at the same time, the same place, where you could have done this with no change to the planning cycle and save gas on every one of those flights.

In the space operations area, we're looking at ground based space situational awareness. We fly space missions, we build satellites and we're looking at fractionating major satellites.

And then the last one I want to mention is what's next? General Deptula mentioned 11 years to get from a JCIDS decision today to a next generation UAV. We're going to decrease that by a factor of five. The META program is looking at how can you decompose the problem into a set of stochastic models and engineering and hardware models where you can do millions of iterations of a solution up front before the first design is put on paper, and literally to reduce that cycle by a factor of five.

So how do we decide what to work on? This is the bottom line, and there's two points here; one of which is I want to make a shameless recruiting pitch to this audience. We have $3 billion a year, TTO has $500 million a year. There's 400 programs across DARPA. There are no programs without program managers. The program manager's job is to go out there and talk to the world like this list of people here, all of you folks, to find out and listen to what you want done and then to think forward from that. Our job is to look beyond where you're seeing, beyond your horizon. But we can't do that without program managers. And my recruiting pitch is if you want to be a part of this, if you want to be part of inventing the future, you got to send us your PMs. You send your best PMs to DARPA. That's how you control the investment, that's how you get the future invented. Send us your best.

And I will tell you, if it doesn't hurt to send the person, it's the wrong person to send to DARPA. So look deep, find the best of the best and send them to us. And General Schwartz is making a note of that, so he's going to give me some candidates, good.

Thank you very much. [applause]

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