**Lieutenant General Christopher Bogdan**

**AFA - Air and Space Technology Exposition**

**"F-35 Program Update"**

**17 September 2013**

**Lt. Gen. Bogdan:** I stood up here a year ago and I threw a hand grenade into the crowd. That was intentional. It's been a year later and a lot of things have changed. Some of them haven't changed fast enough. But what I'm going to try and do for you today is give you perspective of where the program is sort of relative to where I saw it when I first came in last year, and give you what I like to call straight talk.

Can I try the next slide?

When I came over last August we were still in the process of just finishing the rebaselining of the program because we'd gone through a very rough and tumble Nunn/McCurdy Breach, and Admiral Venlet had spent a good 18 months rebaselining the program.

The result of that rebaselining was that the department added about $6 billion to the development program and we added somewhere on the order of two and a half years to the development program, stretching it out.

Having done that, and now having laid in all the events that we need to complete the development program, I can tell you with confidence that the baseline that we're on today is pretty realistic. We've built margin in. We've built in time spans based on what we learned previously relative to software development, relative to testing. So today when I talk about where we are in the program, it's relative to that new baseline and what I can tell you is I think it's pretty credible and pretty realistic because of all that work that was done before I got there and the time and the money that we added to the program.

We are making some good progress and I'm going to show you some of that today. I put the word slow up there. And that's not a poke at the program or a poke at the JPO or a poke at Lockheed Martin necessarily. It is slow because this program is vast. This program is really, really big and really, really complicated. So when you try and make progress on anything you do on this program it crosses so many different lines of what we're doing that you just can't really move fast sometimes. That's partly a result of concurrency on the program. It's partly a result of the vastness of the program with eight partners and FMS customers and three services and running the whole stream of the acquisition life cycle from development all

the way out to now fielding and operations. We're doing all that all at once.

So when you make a small change in one part of the program it usually affects every other part of the program upstream and downstream. So progress on a big front like that takes some time, and time is something that we don't have a lot of.

We've been at this for 12 years and I know a lot of people like myself are losing patience. We want to get this program done. And for having been in development for 12 years, people look and say don't you feel like you should be further along than where you are? Here's what I will tell you. Yeah, but that's in the rear view mirror. There's not much we can do about that.

My favorite saying over the last few months is, I cannot change where the program's been. I can only change where the program's going.

So it is a fact that we have been at this for 12 years and we have some work still to go, and it's not as fast as I'd like it to be, but we are moving forward.

This is not the same program you might have thought of a number of years ago, for a whole host of different reasons. The first and foremost is years and years ago on this program, and I'm going to be straight up with you, there was not a great balance of risk on the program between industry and the government. There was not a great relationship, and we'll get more to that later. And the program was just very very different back then.

What has changed today is a whole host of things. The relationships have changed and we're going to talk a little bit about that. The balancing of the risk on the program has changed. We have made some progress in some areas where before it was just things on paper that people needed to see happen before they would believe it, and now we've got that in place. So it's not quite the same program you might have thought of five years ago.

What I always ask people to do is instead of just basing what you think about the program on opinions, base it on fact. Find out the facts about the program. And if you don't know the facts, come to us and we'll tell you and then base your opinions on that.

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Let’s talk a little bit about progress. Flight test is one area that’s fairly easily measurable, and that’s why I brought it up here today, just to show you some of the progress.

Last year at the end of calendar year ’12, we were around a third done with the overall flight test program. This year by the end of the calendar year we’ll be about 50 percent done with the flight test program. And you can see in terms of the number of flights that we added some airplanes this year to the flight test program and we are ramping up our ability to do flight test more effectively and more efficiently.

Some of the accomplishments over the last year which bode well for the program moving forward in terms of flight sciences or the envelope of the airplane, you can see we’ve completed departure testing, the airplane is flying beautifully in that regime. You can talk to all the test pilots and they’ll tell you it’s a very docile airplane when it comes to departure resistance and once it gets into departures, recovering it which is very good news.

We completed all the air start testing which is very good news. We shut the engine down many many many times and when you do that on a single engine airplane it’s a significant emotional event. So no matter where you’re doing it, even at Edwards in a test environment. So we’re very happy to have come through that quite cleanly.

We’ve tanked with all of our tankers thus far.

We just completed our second run-out on an LHD, the Wasp -- the small deck carrier with the B model. If you’ve seen any of the video or any of the pictures, the airplane performed magnificently. And if you talk to the pilots, especially the guys who used to fly Harriers, they’ll tell you that even flying at night without the sensors, landing this airplane on that deck is easier than doing it in a Harrier at any time, day or night. So we’re pretty happy about all that.

Mission system stuff you can see. In terms of avionics and some of the things we’ve done.

MADL, we’ve got five airplanes talking to each other and passing information. That’s a big deal for us because this airplane is so darn smart that if it can’t talk to other people we will lose some huge capability in the future on making the whole fleet and the whole battlespace smarter. So it’s very very important to get that done.

We’ve done a lot of weapon separations. The next step now is to drop a weapon off the airplane and hit something we intend to

hit. We haven't done that yet, so we're going to be starting that up here in the next few months and trying to hit things we want to hit. And durability is going well. We've got a lifetime done on the A, a lifetime done on the B, and the C model's coming right at the end of its first lifetime and we've already started on our second lifetimes in terms of structural durability.

So as a microcosm of the program, the test program we're running is easy to measure progress on, and so I just wanted to give you a sense that we are moving forward on some things.

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Let's talk a little bit about production. Another area that's very easy to measure in terms of progress.

In calendar year '12 we delivered 30 airplanes. In this calendar year we've thus far delivered 20 airplanes and by the end of the year we're going to deliver 36.

The reason why it seems like some airplanes have been stacked up now and in the next few months we're going to deliver 16 is because Fort Worth underwent a runway repair where we were down for an entire month where we couldn't deliver or flight test any of the airplanes there. So those airplanes are now in the queue getting ready to be delivered.

Probably the biggest thing that I would tell you that's changed on this program from last year in terms of scale and scope is how many different operating locations and how many different operational sites we're standing up. You can see just in the past year, operational test at Edwards, we've stood up Nellis, Yuma, Cherry Point for the depot, we've inducted our first airplane there, Ogden, the ceremony for the induction of the first airplane at the depot is this Friday there. The Italian FACO we delivered our first fuselage there for mating with the wings. So just in one year we've added five or six different sites. I can tell you over the next four years we will add another 11 sites to our operation.

So from last year until the end of 2017 or so we'll have about 17 more places we're operating the F-35. That is a big, big increase.

One of the things we like to measure is how many pilots and how many maintainers are we making. The training center down at Eglin and ultimately the training center at Luke and at Buford is going to have to keep a throughput going to keep all the pilots and maintainers we need to support all the bases we're going to open up in the next four years. So we watch very carefully how

our throughput of pilots and maintainers is going. You can see we have 67 pilots in the whole fleet of F-35s today, two of those being UK. Next year we will start putting some of our other foreign partners into the training pipeline.

On the right side you can see where we are with our partners. I can tell you that the good news out of the Netherlands today is that they decided that the F-35 is their airplane of choice to replace the F-16 so that's another partner country that has now committed to buying airplanes, which is always good news for us. And you can see where we stand on our foreign military sales and our potential foreign military sales. The partnership is a crucial portion of this program for a lot of different reasons. One of the main reasons is because we altogether, when we buy more airplanes, the price of the airplane comes down, but that's the economic side of it.

From a warfighting perspective the ability for us, the United States and our services, to be side by side with our allies flying the same airplane with very similar capabilities in an AOR is very very powerful. It is a very very powerful signal to the rest of the world that we are one team. I know our partners take that seriously. I take it very very seriously.

The last chart on here, and I should have blown it up for you. I didn't realize it was going to be this small. The projected production ramp is right there.

If you were able to see it, what you would see is 2011, 2012 and 2013 are flat. That was a conscious decision made by the Department of Defense a number of years ago because development was lagging well behind production. And the more development lags behind production the more you get that concurrency and the harder a program gets to manage. So we decided to level off that ramp.

We're at a point in time now where that ramp is going to start shooting up and you can see in 2014, 2015, 2016 and beyond the steepness of that curve.

The interesting thing about that is, more than 50 percent of that increased ramp rate is not the U.S. It is partners.

So in one way when we get talking later about sequestration and the worry about how many airplanes is the U.S. Air Force and how many planes is the Navy going to buy, one thing you need to remember, in the next four or five years more than half the increase in the ramp on this program comes from our partners. That's why it's so important to keep them in on the program.

That ramp rates leads to a lot of efficiencies. We'll talk a little bit more about that later.

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What is my number one priority? What is my number one worry on the program? In terms of priorities it is affordability. You can have the best airplane in the world and I believe eventually this will be the best airplane in the world, but if nobody can afford it, it does you no good. So we have taken a strategic look at the affordability on this program and we have a three-pronged approach to trying to bring the costs down on this program.

The first prong is in development. My mantra for that is no more time and no more money.

So my commitment to the enterprise is for the requirements that I have today, as long as they stay where they are -- not an easy task all the time -- but as long as they stay where they are, given the time and the money the enterprise has given me, we will deliver on our commitment. As long as those parameters stay in place then I'm making the commitment to deliver.

Now if something comes into the development program that wasn't there in the first place, you've got to bet that something needs to come out or you've got to add some more time and more money. I'm not in the business of adding any more time or any more money on this program. So when that happens, I go back to the enterprise and I go back to the warfighters and I say okay, if you want A and A wasn't in the program to begin with, what are you going to take out to make room for A, because I'm not going to ask you for any more money and any more time. Now if the community believes that A is important enough to put into the program, then we can negotiate more money and more time, but that's not the first position I hold on the program.

Change control is really, really important when you're running a development program this complex. So I've stood up in my organization a unit called Program Control. Their job is to drive stability into this program: stability with requirements, stability with funding, stability with all those small little changes that go unnoticed at one point in time that when you build them up, now you have a program that is changing left and right. And you know in acquisition, no matter which way you change something it costs you more and takes you longer. It's one of those ironies about acquisition.

So I'm going to buy X number of airplanes here. I want to accelerate that buy. Well, General Bogdan, if you want to

accelerate that buy it's going to cost you more money. Okay. I'm going to buy X number of airplanes here but I want to slow down that buy. Well, General Bogdan, if you slow down that buy it's going to cost you more money. So either way you go -- speeding up or slowing down in an acquisition program -- it costs you more and takes longer. So the idea is you've got to drive stability into the program. That's what we're trying to do.

Production. The quote there is my quote, and what I'm looking for in 2019 is a fifth generation airplane for a fourth generation price. If we can do that then I can guarantee you our partners and the U.S. services will be happy campers.

We're on a path to do that, by the way. If you've taken a look at the price of the last three lots of airplanes, from lot four to lot five, the price went down four percent. From lot five to lot six the price went down a little under four percent. From lot six to lot seven the price went down more than four percent. And guess what? Remember that production ramp chart I showed you? That was with a flat production ramp. So we're starting to see some efficiencies in building this airplane that are not a direct result of the ramp rate, which is good, which is really really good.

By 2019 you are going to see an airplane, in my opinion, that is comparable in cost. Not exactly because you would expect a fifth generation airplane would have to cost somewhat more than a fourth generation airplane, but comparable to some of the other airplanes out there. And I have the commitment of Lockheed Martin, Pratt & Whitney, BAE and Northrop Grumman at the CEO level that we are going to work together to drive the cost of this airplane down to make it comparable to a fourth generation airplane. We have cost reduction initiatives that are in place, and that's where I invest some money, but guess what? They're going to invest some money also. And I'm going to get a guaranteed return on my investment for that.

So we're working out all the business deals there, but I can tell you that those four companies and the DoD are committed to driving cost out of this airplane when it comes to production.

Ops and sustainment. That's the big rhinoceros. One of the things I would hope is eventually somebody when they start a line in the newspaper doesn't call this the $1.1 trillion fighter. But that's the number that's been hanging around for three years now because it's the number that's in the SAR, that was the cost estimate that the CAPE made back in 2010 when we were restructuring the program. That cost estimate has not changed for three years because they haven't done another cost estimate

in three years. Not because things haven't changed, they just haven't done that.

Now each and every year my program office redoes our own cost estimate and you might have read in the press that my program office's cost estimate is $857 billion compared to that $1.1. There are a lot of things that go into that. There's an awful lot of math in there, there's an awful lot of inflation in there, there's an awful lot of assumptions in there.

Here's what I'll tell you. No matter what that number is, we know that if we don't start trying to drive cost out of the life cycle of this airplane it may not be affordable in the future for all of our partners and all of the U.S., so we have to work very very hard to do that. How are we doing it?

One of the things we're doing is we're standing up a cost war room. That involves DoD, Lockheed Martin and Pratt & Whitney. It has been a tried and true way of driving cost out of the sustainment side of a weapon system. It's been used on the Typhoon in the UK, the Virginia Class submarine in the Navy has used it and we're using that model. So we're working hard with Lockheed and Pratt. Lockheed and Pratt, I'm happy to say, have put up their own resources to stand up the war room. They are manning it with their own people on their own nickel to do that. It's that important to them. DoD will be overseeing that war cost room and we're going to try and drive some cost out of the program that way.

Reliability and maintainability. You're going to see later on that is probably one of my biggest worries long term about the airplane. The R&M curves we're seeing right now are not where I need them to be. Not where we need them to be. Not where the services need them to be. So we are reinvigorating the R&M program to try and drive some of the cost out of the airplane and I'll talk to you a little more about that.

The last one is a little unusual and I have to give you a little background. That $1.1 trillion or the $857 billion that I quoted, that's for U.S. airplanes. 2,443 airplanes that the U.S. services are going to have. Nothing to do with our partners' airplanes. So our partners come to us and say but what is it going to cost us to have an F-35? We couldn't give them a good answer. All we could say was well take a look at what we think it's going to cost the U.S. to have our airplanes, and then try and figure that out.

That was good enough maybe way back when. It's not good enough now. They're investing real money and lots of money in the program.

So what we're doing is we're going to take each and every nation and we're going to sit down with them and go over the assumptions on how they plan on using the airplane. And based on those assumptions we're going to come up with a unique cost model and a unique O&S cost for each of the partner countries which I think in the future will help them make better decisions on their airplane.

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Relative to schedule. I am confident that in 2015 the U.S. Marine Corps will declare IOC. I am confident that in 2016, in July of 2016 the U.S. Air Force will have what they need from us to declare IOC. I'm also confident that right on the heels of those two IOC declarations, our Italian partners and our Israeli friends will get delivery of airplanes in their country and I'm confident that we'll make that too.

What I'm less confident about is what happens after 2016. I'm less confident about that for a lot of different reasons.

One, it's kind of hard to predict a few years in advance when you have a lot of concurrency on a program. Not that it's hard, but the range of potential things that can happen, that can drive your program off course, are many varied. What I can tell you today is our interim software, 2B and 3I, 3F heavily depends on how well that comes out. Because we are developing them concurrently and all of the resources -- the labs, the airplanes, the software engineers that are now today working on 2B and 3I eventually have to shift and start working or doing more work on 3F. If that happens in a timely way, meaning we don't have too many problems with 2B and 3I then I can tell you I'll become more confident in 3F. But if that doesn't happen, if I have to leave people and resources on the 2B and 3I longer, you can bet that affects our final capability.

So as we move along in the program people should keep their eye on what happens with 2B and 3I because that will give you a very good indication of what's going to happen at the end of 2017.

Relative to other pieces on the program, this is not just about an airplane. This is about a weapon system. There are so many other pieces that go with having to stand up a full warfighting capability. You can't forget about those. And a few of them are listed there. What I can tell you is, some of them are late. They're just flat out late. What I mean by late is we should have started doing some things a long time ago that we're now doing no so we're kind of in a catch-up mode.

ALIS is a perfect example. ALIS is going to be a wonderful system someday but we started way too late applying the systems engineering discipline that is needed to get that system fielded when we need it with the capability that we need it. We're doing it now, but we are in catch-up mode with it. And we'll be in catch-up mode for a while to get all those other pieces of the puzzle put together.

Production. We talked a little bit about that. The aircraft and engine schedules are stable. Pratt & Whitney and Lockheed are delivering on their post-strike promises which are good. We have to start planning for that ramp-up. And you usually have to plan that a couple of years in advance because you have to get some tooling and other things. So we're in the process of preparing for some of that ramp-up as we speak.

I talked about the Italian FACO being stood up. Right on its heels comes the Japanese FACO where the Japanese will build their airplanes. We have started in earnest working with Japanese industry and the nation of Japan to stand up that capability.

We already talked about fielding. We are growing in leaps and bounds when it comes to fielding. The good news about the depots is that we're standing them up as quickly as we possibly can because what we really need is we really need to develop some organic capability to fix pieces and parts and systems on this airplane and that's because one, that will help drive costs down and two, that will relieve the OEMs, the original manufacturers, of the need to do constant repairs as we ramp up in production and provide some of that offload capability on the depots do to do some of those repairs.

Luke Air Force Base is the first major training center for the U.S. Air Force and that is on track for standing up.

As you know, the U.S. Air Force made a decision probably a month or so ago to add three more F-35 squadrons to Luke, so there will be six F-35 squadrons at Luke to do international partner training and FMS training as well as Air Force training.

Buford is on track to be stood up as the U.S. Marine Corps training base. The UK will be joining the Marine Corps there and they will be partnering just as other partners are partnering at Luke for the standup of that training.

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From a technical standpoint, we have put what I would consider to be a disciplined systems engineering process in place over the

last two years. Admiral Vinlet started it when he started rebaselining the program and I have picked up where he left off.

One of the aspects of that is we rely heavily on the SYSCOMs, NAVAIR and LCMC to help bring us outside technical expertise to watch the program and provide us that level of expertise that we don't necessarily always have inside the JPO.

I can tell you we're starting to see better results. The best thing I can tell you is we now have a better idea of what's going to go wrong and when it's going to go wrong before it happens and we get surprised. So from a predictability standpoint in terms of software, in terms of flight test, I think we're doing a better job of kind of getting a heads-up on what's coming down the pike for us.

We have worked very very hard over the last year to come up with some solutions for some really tough problems. The helmet being probably the toughest of them, but the tailhook is completed redesign. We'll be putting the new tailhook on the airplane and in October/November timeframe we'll go up to Lakehurst and we'll do some traps up there and see how the new hook works.

Lightening is always a great discussion on this airplane. One, because of the title of it; and two, because a fifth generation airplane and you can't fly it in lightening and everybody gets a chuckle at that.

The truth of the matter is, you usually don't get the clearance to fly an airplane in lightening until the very end of a development program. We're in the middle of the development program, guys. We're only 45 percent done with the flight test. So what we've done is we have pulled back all the work we need to do to get this airplane lightening qualified so it will be done by 2015. I'm confident that that will happen.

Fuel dump is another interesting problem. We're stuck with the design we have on fuel dump because we dump fuel from the bottom surface of the wing. Anyone who has Aero-101 knows what the bottom of the wing has, and it's upward pressure. So anything you try and dump out of the bottom of a wing is going to get pushed up into the wing. So we have a little problem of fuel attaching to the back of the wing.

We have solved that in a number of ways. We've changed the design of the exit, we have changed the pressure under which the gas comes out, we have also sealed up portions of the back of the airplane where fuel could migrate. We've tested that fix and we're confident now that although it's not perfect, it will meet the needs of the U.S. Marine Corps, the U.S. Navy, and whoever

else is going to buy and fly Bs and C models because that is a routine occurrence for the Navy and the Marine Corps to dump fuel. Not so much for the Air Force

We talked about software still being the number one risk on this program -- absolutely no doubt. It is tricky, it is hard, and it is the number one thing that paces the development program right now.

Again, I think the interim capabilities we talked about are pretty secure. I am less confident on the back end of that in the 2016, 2017 timeframe with our final capability and it's because of the software. Ten million lines of code on the airplane, ten million lines of code on off-board systems. That is just an awful lot of software to develop. And even when you're making small minor changes, you've got to go through the whole process of ensuring that that software is safe to fly on the airplane, and that just takes some time and it's hard to do.

We talked about reliability and maintainability. There are pieces and parts on this airplane that are simply breaking too much. When they break and we take them off the airplane, getting them repaired takes too long.

The good news is, now that we have 8,000 hours and 5,000 sorties under our belt, we have a very good list of all those bad actors, so we are systematically going through and applying engineering discipline, money, and work to try and bring that list down.

And once we get says the top 20 bad actor parts, we'll go for the next 20. Once we get the next 20 we'll go for the next 20. We'll keep doing that like whack-a-mole until we get to a point where we believe the reliability and maintainability on this airplane is what the users need. So we're working very very hard at that.

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Sequestration. The sequestration that occurred in the FY13 timeframe, what I can tell you is we, the F-35 program with the help of the department, with the help of the services, we are coming through FY13 relatively unscathed. We thought we were going to lose somewhere between, I heard numbers between three to five to seven airplanes in our Lot 7 which is our FY13 dollars. We didn't lose a single airplane.

The deal we negotiated with Lockheed Martin on LRIP-7 was such that we saved enough money and we scraped up money from other contracts that we definitized, that we were able to buy back all the airplanes in Lot 7 that the services thought they were going

to lose because of sequestration. The same thing on development; we did not lose a single penny in development in FY13, mainly because the services and the department know that this is a priority and they have made it a priority and have shielded us from a lot of that.

What does FY14 have for us in store? The question is, I don't know. I don't know. I don't know because until the services decide how they want to pay their potential bills, and I use the word potential because we're not quite sure what that bill is yet. Until the services decide how they're going to pay their potential bill and we roll all of that together, because you can't do it in isolation. You can't have the Navy off paying part of the F-35 bill in one area and the Air Force paying the F-35 bill in another area. You've got to bring those all together to have a whole program. Until that happens and it gets up to OSD, I can't tell you what's going to happen.

Here's what I will tell you. Just like in FY13, the services and the department are committed to not breaking this program. It's as simple as that. Does that mean that there might not be some changes to the program? I can't tell you that but I know there's a commitment from the senior leadership of the department and the services that sequestration will not break this program, so we will just have to see how that turns out.

I'm fairly optimistic after I saw how we worked through FY13 that the future for this program is good. Part of that has to do with our partners, by the way. Like I said, even if the services were to move airplanes to the right and lower our ramp rate, we still have partners there that are creating that upward ramp rate which is what we'll need to get to eventually to drive the cost of the airplane down.

Program culture. I stood up here last year and I threw a bomb at you. I still believe what I said then was true then. What I will tell you today is things are getting better. Are they getting better as fast as I'd like them to get better? No, not always. Do we still have pockets on both sides, the government side and industry side where we can sometimes prove to be dysfunctional? Yeah, there are still pockets like that. But overall, things are starting to get better.

I can tell you one thing. The communication that my program office has today with Lockheed Martin and Pratt & Whitney is orders of magnitude better than when I got here a year ago. I can tell you when you start communicating and you start listening to each other, you start finding solutions to problems instead of finding blame. So that's part of what I'm fairly happy about.

But culture takes an awful long time to change. And it's a journey. There's always setbacks. I'm encouraged where we are today. I would like to be a little further along but we're getting there.

A perfect example of that was LRIP-6 and 7. To be able to negotiate two lots of airplanes in about seven or eight months when the last lot before that took 14 months by itself tells you that you've got to be communicating a little bit better. Pratt & Whitney and we are now embarking on the same kind of path for their LRIPs-7 and 8 on their engines. We're doing those together.

So you've got to be able to communicate to do that.

The other part of the relationship piece that I talked about that didn't get much publicity, that was probably my fault because I didn't communicate it well enough, was the risk-sharing on this program. I had always thought when I got here last year that that was out of balance, that the government was accepting just far too much risk on this program, especially after being in it for 12 years.

So I embarked on a journey with Lockheed & Pratt and the rest of industry to try and put some balance back into that. We're working that, so let me give you a few examples.

LRIP-6 and 7 that we negotiated with Lockheed just recently; there is zero government liability for any cost overrun on the production of those airplanes. So the price we negotiated for LRIP-6 and 7 is the absolute price that the U.S. government will pay for those airplanes no matter how much they cost Lockheed Martin to build. On the up side.

On the down side, if they build them for less than what we said, we share in that money. That's the kind of sharing that we're talking about.

Concurrency. The cost of concurrency is also being shared between the contractors and the government now. We talked about standing up the war room. Lockheed Martin, Pratt & Whitney are putting their own resources into the war room. Those are examples of the things that we're trying to do to put balance back into the program in terms of shared risk. I can guarantee you when you have the right balance of shared risk on the program, behaviors change and things get better. When those things are out of balance one way or the other -- too much risk for the contractor, too much risk for the government -- bad behaviors happen. So when you put that balance back in and you

get the right incentives for everybody, you start seeing some better behavior.

I would hope that facts are starting to overcome opinions on this program. That's one of our mantras. When you look at the facts of the program and not people's opinions, you can then maybe draw different conclusions. So we're on a transparency kick in our program office.

That takes me to my last bullet. We have some operating principles on the way we run our JPO and I guarantee you, every one of my JPO folks that are sitting out in that audience, if you ask them how does the JPO do business these days, they can rattle these things off. We do business with integrity, we do it transparently, we hold people accountable. We hold Lockheed and Pratt accountable. We hold ourselves accountable for the commitments we make. We hold the stakeholders accountable; because sometimes, despite their best intentions, stakeholders can derail your program also. So you've got to hold them accountable for what they're doing.

Finally, you've got to do things on this program, on a program this size, with discipline. Sometimes people tell me oh, General Bogdan, how can you manage a program and get into the details? My answer is, how can I manage this program if I don't get into the details? The details will kill you on this program if you don't get into them.

So we have that mindset in the JPO. As we move forward and things get harder, we'll need to fall back on those principles, but overall I think it will serve us well in the future.

I think that's going to be my last slide before I open it up for a couple of questions.

It's not the same program it was. We're not out of the woods yet. We still have work to do. There is still risk there. We're doing everything we can to drive the risk out of the program and to meet our commitments.

I want to thank you for showing up. I appreciate it. Thank AFA for hosting us here. And I'll try and open it up for a couple of questions.

**Question:** I wanted to ask you about this kind of danger that you talked about, the kind of death spiral, right, if your orders go down. So are you out of the woods on that with the number of foreign orders that you now see on the horizon? Or is that still a realistic risk? And why is it that even if the Navy postpones orders for two years, that that isn't going to have an impact?

**Lt. Gen. Bogdan:** The death spiral thing is a reality on any acquisition program. I personally and professionally don't think that the F-35 will be afflicted by that. I don't for a lot of reasons.

The first reason is, there's no indication whatsoever that the U.S. Air Force, the U.S. Navy or the U.S. Marine Corps is going to stop buying F-35s any time soon. They may not buy the quantity that we expect right away, and I don't know that yet, and I won't speculate on that. But I have zero indication that any of those three services is not going to buy an awful lot of F-35s. I have partners who have already committed to many many F-35s. The combination of my true belief in the services and what the partners and the FMS customers have committed to leads me to believe that I do not think this program will suffer from that problem. I just don't think it will.

For sure, you don't buy as many airplanes as you plan in the near term and prices don't come down as much as you want, but that's an economic fact of life and we will do everything we can with all those other initiatives to try and continue to draw the price down. I've told Lockheed and I've told Pratt, and you guys have heard me say this, the expectation is lot over lot, the airplane's price and the engine price will and must keep coming down. There is no scenario I see where that can't happen. Not on my watch. I won't let that happen. The price needs to keep coming down, no matter what.

Like I said, I think given the partners' commitment, given the FMS customers' commitment, and the known commitment that we have from the services, that we won't be affected by that.

**Question:** A quick question on the program strategy to have alternate sources in some cases and not in others. In the case of the helmet, can you talk to us about when you plan to announce whether there will be a down-select, if there will be a down-select, if there will be a fly-off so that you can actually go ahead and start building the helmet of choice?

Secondly, if you could address for us, there's been a push for transparency on the program and I think there has been more transparency with Lockheed's pricing, but Pratt has declined to put their pricing out there. Is that something that you are willing to support?

**Lt. Gen. Bogdan:** The plan has always been on the helmet to continue the development of both helmets and take them to a fly-off and then down-select. That plan as of today has not changed other than the fact that we have made good progress on the

original helmet in terms of its technical capabilities and its technical problems.

What I will tell you is, there are two pieces to the helmet down-select for me. One is the technical aspect. Once we decide on a single helmet we better be darn sure it's going to meet the requirements of the warfighter. We're getting very close to that I think on the original helmet. But there's a business aspect to this. The business aspect is if and when a program manager, and I'm talking in general terms here to all my future PEOs. If and when you have to make a decision to down-select to a single source, you better start getting the best deal you can for the price on that piece of equipment before you down-select. I'll just leave it at that. That's what I'm working on right now.

The engine. I'm going to defer to Pratt & Whitney because Pratt & Whitney for me has been quite transparent. Through our should-cost analysis that we do know with the help of OSD we know an awful lot about what it costs to build an airplane and to build an engine. That helps us. Pratt & Whitney and Lockheed Martin have been part of that should-cost analysis in that we ask them for a lot of information and they give it to us.

Now relative to what Pratt & Whitney does with their prices for everyone else, I'll defer to them.

**Question:** You mentioned briefly during your speech that there are certain parts of the plane which are breaking too frequently. Can you give some examples of that and what's being done about that?

**Lt. Gen. Bogdan:** Probably the easiest one to understand and to explain are tires. You would think that tires are not rocket science. But let me explain something to you about tires, especially tires on our B model. The B model's a STOVL, it lands this way, it lands this way. So when you design a tire and you want the tire to be able to land this way, you have to design that tire with certain characteristics that are very important. One of those characteristics is called float. How much buoyancy does the tire give when it hits the ground when you're landing that way. Okay?

The other thing you want when you're taking off this way on a tire is durability and toughness.

Well, wouldn't you know it, that float and durability live kind of on the opposite ends of the spectrum when it comes to designing a tire. It's almost like stability and maneuverability on an airplane. If you want an airplane that's really stable,

it’s hard to maneuver. If you want an airplane that’s very maneuverable, it’s probably not all that stable.

It’s the same thing with the STOVL tire, believe it or not. It is a hard technical challenge.

Those tires today come off the airplane way way way too frequently. There is no way operationally we can sustain that.

So we’ve gone back to Dunlop, we’ve gone back to UTS, we’ve gone back to Lockheed and we’ve said hey guys, this is not going to work. You have got to figure out a better way to give us a better tire. They are doing that.

Here’s my part of that equation.

When we figure out how good that tire can be, and when we get that new tire on the airplane, I’m going to want a performance guarantee from Dunlop and from Lockheed and from UTS that says okay, now that you’ve built a better tire I need you to stand behind it.

The other piece to that, just to let you know is, I’m not paying a penny for the redevelopment of the STOVL B tire. That’s because of the contractual relationship we have and the sharing of risk that we just talked about with Lockheed and UTS and Dunlop. So the tire is a perfect example. That’s one where we have to go back and redesign.

There are others where we don’t have to redesign it. What we have to do is we have to figure out how to fix it quicker. We have to figure out how to get it off the airplane easier and fix it quicker. That’s part of the O&S cost war room that we talked about. That involves maintainers and it involves OEMs on repair cycles. It involves a whole lot of things. That’s the example.

**Question:** The cost war room, can you give us some idea of how this works? Do you put people from each company in the corner and beat them until they agree?

**Lt. Gen. Bogdan:** That is a technique, isn’t it?

No. The concept behind a cost war room is Lockheed Martin puts some of their cost analysts and some of their folks that understand their supply chain. Pratt & Whitney does the same thing. They both put manufacturing experts and supply chain experts and cost analysts together. We do the same thing on the government side. We put them all together and then they systematically look at the entire supply chain and they look at

maintenance, they look at R&M, they look at everything and we start coming up with ideas to reduce costs.

The whole key there is if Lockheed and Pratt are willing to work their way through their supply chain with us, we can come up with better solutions. You've got to have transparency there. You've got to open up your books a little bit on both sides. We have a commitment at the CEO level to do that. So I'm cautiously optimistic that over the next year or two we will see some good results out of that.

The cost war room itself, physically, is located in Lockheed Martin's Fighter Development Center. A couple of blocks from Crystal City -- Lockheed Martin on their own nickel has an entire half a floor of space put out for our people, Pratt's people, and their people, full time. So they've set that up. I think, like I said, the PEO from Virginia Class, and I can't remember the admiral's name, and the program manager from the UK Typhoon, they could tell you how their cost rooms worked out and I know it was worth billions of dollars of savings.

**Moderator:** General Bogdan, we sincerely appreciate you coming today. Thank you very very much for all you do to keep that airplane coming to us.

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