



Mitchell Institute for Airpower Studies

**Presentation: The Return of the Bomber
National Press Club, May 1, 2007**

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► GRANT: I have a great panel this morning and they're going to speak, actually, opposite to the order in which they are seated here.

The first to speak after I finish my remarks will be Major General Mark Matthews. General Matthews is from Air Combat Command, where he holds the position in A5 of Director of Plans and Programs. Among other responsibilities, that means he's responsible for building the Air Force's strategic master plan, covering not only fighters and bombers but also ISR assets. So, this is a man who's really in the know about the Air Force's future requirements and plans and he'll tell us where the whole progress of the next bomber stands.

Speaking after General Matthews will be General Gregory S. "Speedy" Martin. I think he really needs no introduction to this group. General Martin retired as a four-star, of course, and he was Commander of US Air Forces in Europe, and he retired from the job out at Wright-Patterson as commander of Air Forces Materiel Command.

And finally, our wrap-up anchor will be General Dick Hawley, who himself of course is a retired commander of Air Combat Command. And this is a panel that's tremendously well-qualified to speak on the subject.

I was teased a little bit because none of them are actually bomber pilots. We have at this table three fighter pilots, but as General Matthews assures me, everyone's very well-integrated these days, and these three individuals with their tremendous backgrounds are very well-qualified to speak on the range of issues concerning the bomber and our national strategy.

What I want to do is just set the stage of where we find ourselves, and I hope that you all can see this wonderful picture. This may be the most famous bomber picture out there. It was taken of course on a low-level raid on the Ploesti oil refinery. This was a refinery that was a critical strategic target responsible for producing a lot of the fuel that fueled the Third Reich and the war machine of the Nazis. In order to attack this target, there is only one way to do it, and that was with bombers. And in this timeframe--this picture

from August of 1943--we as a nation understood very well what a unique role bombers played in our national security. There was no other way to touch the heart of the German war machine in those days except with the bravery of these bombers that flew at low-level, and over the course of the war and the raids on Ploesti, there were no less than 7 out of the 36 Medals of Honor won by Air Corps aircrew, were awarded for Ploesti raids.

We also understood very well what bombers did in the Cold War, and look at these B-47s lined up on the ramp in Morocco. They are pushing nuclear deterrence forward in the 1950s. Below that, you see a picture of a B-52 executing a conventional mission during Vietnam. So we understood in the Cold War that bombers were the first arm of nuclear deterrence and then a valued member of that nuclear deterrent triad. They were also a way to send signals and to send tremendous impact, whether that was supporting forces on the ground in Vietnam or here in the Linebacker raids that had just tremendous diplomatic impact.

But in the early 1990s, our sense of what it is bombers really do began to change a bit, as the Cold War went away, and as our focus shifted to theater war and expeditionary operations. So on this slide I put four events that happened very close together and really represent a change in how we looked at bombers. The first was the Gulf War, where we saw the F-117 stealth fighter carrying out many strategic attacks. It attacked targets such as command and control centers, integrated air defenses, the kind of thing that would have been done by bombers in the past, now being carried out by a tremendous, advanced fighter-bomber. Then in December came the end of the Soviet Union, and you see there, Gorbachev and Yeltsin, interestingly enough. Shortly after that, the President announced in January 1992 that the Air Force's major modernization program, the B-2, would be dramatically scaled back. Instead of a buy of about 75 new bombers, there would be just 20, a number later raised to 21.

And following shortly on that came the end of Strategic Air Command, the command that had put those forces forward in Morocco, the command that had supplied those B-52s for Vietnam and for deterrence missions. And all this meant that we would as a nation be emphasizing theater war and those priorities. Now this was good in a lot of ways; we had a wonderful precision revolution coming along, and this chart just encapsulates the sorties flown, the strike missions flown, by the B-52s and the F-117s during the first Gulf War in 1991. In blue, you see the targets hit by the -117s and in green, those by the B-52s. The basic message of this chart is that it was the -117s that weren't doing nearly as much strategic work as the B-52s, who did a lot of ground support work.

But what we found by the middle or the late 1990s was what I'm going to call a bomber gap. This wasn't like the bomber gap that we thought existed for a little while in the 1950s and turned out not to be true, this was a very different bomber gap; because from 1917 until 1997, America's airmen always had a bomber either in development, in design, or in test. And the picture faded out in the background there is in fact of America's first

America's first bomber, a De Havilland observation plane rigged up for bombing missions. And the little inset picture, of course, is the B-2. So between 1917 and 1997, an unbroken record of bomber development. After that, the nation decided to take a risk, and this quote here, which was from then-undersecretary of defense Paul Kaminski, summed it up very well. He looked at the bomber requirements, looked at the industrial base, and decided that there was not a unique industrial base that had to be carried forward. In other words, there would be a bomber gap, and the nation would take that risk. There were still unique missions for bombers, one of the most unique here, pictured in the 1999 NATO air war during the Kosovo crisis. This is a bridge finally dropped by a B-2 after other types of weapons, including the F-117, had failed to drop it, so still, a clear need for bombers to do some of that important and unique strategic work.

During the Global War on Terror, we've seen a tremendous use of bombers in roles that perhaps some never envisioned. This picture here, taken at Diego Garcia, symbolizes that support given by the bombers in Afghanistan, and of course, in Iraq as well at times. That support goes on today. There are still bombers that support NATO ground forces. They do this by providing on-call close air support. They're good at it because of their precision and their ability to loiter in the battle space and be on-call for a long time.

But the challenges that have been so ably met by our current bomber force are beginning to change. If we look ahead and project analysis ahead to a peer competitor, we see that there are problems with this legacy bomber fleet. What they add up to is that our legacy bomber fleet, the existing B-52s, B-1s, and stealthy B-2s that we have today, are not going to be able to take on all the challenges of the near future and certainly not of the medium and far-term future. The good news, is that we have ready-to-go now because of the genius of the American aerospace industry, a lot of advanced developments. These span advances in stealth that have come so far from the days of the -117; advanced engine technology and further research derivatives, radars and sensors that far out-class anything available when the B-1s, B-52s, and B-2s were initially designed.

What we don't have yet is hypersonics or a space-transiting platform. But what we do have is the ability and the technology in-hand to build a superior new bomber on a fairly short timeframe. We may even have the ability to make the crew in that bomber optional. This may be a manned bomber; well, this will be a manned bomber, the question is whether that crew flies in the cockpit in the bomber or whether in the future, that crew may fly from a ground station much as is done today for Predator or Global Hawk. So the technologies for a new bomber are in-hand, and the Chief of Staff of the Air Force has made pretty clear that the bomber is a big priority. He's talked about what it is the legacy fleet can do, but how there is an increasing need to penetrate, to be able to capitalize on the key attributes of the Air Force: range, payload, persistence, those things always summed up by the bomber's mission.

So we have a big challenge at hand. As General Matthews will tell us, the QDR of last year gave the Air Force the green light to go ahead and build a bomber and have it ready

to go by 2018. That still raises a lot of questions about how this bomber will look, how the Air Force will execute this ambitious program, and why a bomber is a national priority as we go forward in our defense budget. Those are the things that my panel will now address. So General Matthews, thank you for being here and over to you.

► MATTHEWS: Thank you. One thing that struck me when I came into this job and first of all, let me make one small correction. We develop the Air Combat Command strategic master plan, which we hope will heavily influence and obviously it will be the Air Force strategic plan that's under development right now. One thing that struck me in looking at combatant commander requirements, especially in the arena of ISR platforms, is the continual need and request for platforms which are persistent in their capability to provide surveillance and target information and just situational awareness inside the battle space, over and over again. And you have to ask the question of why is that such a consistent requirement from the combatants on the battlefield of today. And I think this points largely to the requirements in the future. It's because our enemy is intelligent and they're adaptable and they realize if we can find them, we can quickly and lethally attack and destroy them.

So obviously they're going to engage, as any smart adversary would, in counter-tactics designed to defeat our efforts to locate them. The opportunities to locate, define, fix, target, track, and engage targets is a very fungible environment. Targets will rapidly appear and then they will disappear, and that's something we have to keep in mind when we look at the platforms and the weapon systems that we're bringing to bear. It requires a great deal of flexibility in these platforms and also gives us a requirement to rapidly react when we do have targetable information. And that brings then to the discussion why we need or continue to need a manned bomber that has a capability to penetrate and to persist on the battlefield. When we look at the threat environment that's rapidly evolving with the rapid advancements and with (inaudible) and surface systems and other systems designed to defeat the weapon systems we have on the ramp today, and in development, we see the need to penetrate inside enemy air space, battle space; to persist, to stay there, to find, and fix these targets so we can attack them in a short order of time. Some would ask the question, "Why can't we do that with standoff weaponry? Might that be cheaper?"

First of all, it's not that cheap. If you look at the characteristics of the weapons and the costs associated with them, and there's certainly a need for those type of weapons. But very often by the time you find targetable information and the weapon arrives, the target will have moved or disappeared or hidden to some location where you're no longer able to attack it. Even for weapon systems that may in the future have the ability to be re-targetable in flight, once they get there they can only hang out so long before they have to execute their mission. To contrast that with the bomber platform giving its internal capacity in terms of range or in terms of loiter capability in the target area, and the capability you would have with such a platform to put sensors on-board to locate and attack targets, if necessary autonomously, then you begin to see again the continual need for a platform.

As Dr. Grant alluded to, the Air Force has gone through an analysis of alternatives focused on three broad categories: first was a modification to our current weapon systems, the bomber fleet we have of B-1s, B-2s, and B-52s; and then we also looked at further adaptations of new technologies on these aircraft. For example, we're currently pursuing through supplemental funding the advanced targeting pods on the B-1s and B-52s, but beyond that we could look at modifications to the aircraft, such as new engines and new sensors and those. And then the third category would be for a new type aircraft, a new concept type of aircraft. Our analysis shows that the best value and the one that meets the requirement that we see in the mid-term, the 2018 timeframe, would in fact be for a new concept bomber. Our belief is that the bomber should be manned for the reasons I just alluded to; the bomber would be subsonic, again, based on cost-benefit analysis. I mean if you look at the technologies in the mission performance requirements of the aircraft, especially in terms of range and payload. We anticipate the aircraft would have the capacity to either carry in the range of 14 to 28 thousand pounds of ordnance. We would have to have a range in excess of 2,000 miles (inaudible) fuel. We haven't come to hard determinations of exactly what those numbers would be. Obviously this has depended somewhat on the mix of sensors and weapons and capabilities the aircraft brings.

Ultimately, we're going to bring effects to the battlefield and there's a wide spectrum of effects we would have to address in the future, including targeting deeply buried targets and targets that are on the move and difficult to detect. And again, the aircraft has to have its own inherent characteristics as contrasted to many of the platforms. It has to have the ability in denied airspace against some very capable air defense systems to survive and to persist on that particular battlefield.

The question's come up, "Why have a manned bomber as opposed to an unmanned bomber?" The Air Force is committed to unmanned systems. In fact we envision a family of systems in the future, of which a component will in fact be unmanned systems. They will be mutually supporting each other in the future of combat environments, and we intend to leverage all elements of our research and development and technology to ensure that we have a mix of capabilities that's both robust and effective and that will in fact include unmanned systems. But we still see, given the level of technology today, and the requirement we foresee to have a manned bomber fielded by 2018, that the technology requires this platform to be manned at this point. Having a man in the loop allows you to make the necessary decisions, to react, again, to an adaptable enemy, a dynamic battle environment, integrate the systems on board. We envision that our war fighting in the future will in fact be heavily netted, net-centric, but again, given the capabilities for making decisions about employment of weapon systems and sensors, we still see a critical requirement to have a man in the loop.

We're making a lot of advances in airborne network integration and the technology to offload and to pack communicate the platforms including unmanned platforms, but given the nature of the environment and the level of technology we foresee in the 2018

timeframe, we haven't obviated yet the need to have man in the cockpit. So that's going to be a large part of the requirement. We anticipate this aircraft will have advanced LO characteristics. We anticipate we'll explore new advancements in propulsion technology, as well as advanced weapons and sensors to integrate on the platform. And also, again, it will be integrated into a network-centric type operations, but still have the flexibility and the adaptability that's brought when you maintain aircrew in the cockpit of the aircraft. So that's where we currently stand.

Whereas Dr. Grant alluded to, we're building our strategic master plan now. That's still in development; this is a key component of that. And what we look at is a mix of capabilities that we bring both in terms of platforms, such as F-22 and F-35 integrated in the other platforms; again, these are mutually supportive, such as the next-generation bomber and the other platforms that we bring in terms of ISR capability and other enablers to the force, including our new tanker. As Dr. Grant also alluded, this is a very challenging fiscal environment that we're under. As the Chief has said, the Air Force needs about 20 billion dollars a year more than we currently have programmed, or what we anticipate from current fiscal guidance to engage fully the recapitalization program that we envisage.

In addition to the new tanker, we're bringing on board a new rescue helicopter, new space communications surveillance, early warning capabilities, as well as the F-35. And of course, we're continuing the procurement and development of the F-22 and other systems necessary to enable our force such as the Global Hawk, the Predator, and the Reaper, which we'll field shortly. So again, it's a very challenging fiscal environment, but one we think is critical to meet the national security needs of the United States, especially in light of the many challenges that we know and the many challenges we anticipate in an unknown future for the next 15 to 30 years.

► GRANT: If I may, before we move on to General Martin, could you just sketch out for us, General Matthews, roughly how things will proceed with this program from here? What's the next step for ACC and then for our Air Force please?

► MATTHEWS: Well, the acquisition process is something I don't have a lot of depth in. You have a caveat; I'm the programmer, I'm not the acquisition guy. I'm just the one they go and beg money from. It's been through the AFROC process. The AFROC gave the go-ahead to move onto the next step, which I understand will engage the JSITS process. We'll engage with that and then we'll present the case and engage the standard acquisition process forward for acquisition of the (inaudible)--

► GRANT: General Martin, please.

► MARTIN: Great, thank you, and good morning every one. It's good to be here. I really will make my comments hopefully very short because I do hope we'll get into a good discussion in the question and answer phase. First, let me just say to Dr. Grant how delighted I am to be here and to be a part of kind of the revitalization of the Eaker

Institute and their efforts to try and get the right topics on the table for discussion. I also note, as Rebecca did, the fact that there are three fighter pilots up here getting ready to talk about bombers. It's worse than that, though, except for the fact that the master of this crowd is General Hawley, who taught me years ago when I was a young guy and General Matthews was one of my first students when I was an F-15 instructor pilot. So, everything he knows really comes from General Hawley, OK? So we look forward to hearing what the master has to say (Laughter). I also, though, would like to point out that when General Eaker was asked to establish the 8th Bomber Command in the UK in 1942, he was a fighter pilot, and started with a staff, I think, of six. The story is well-told in the brochure that you may have seen out there, "The Return of the Bomber."

Also, I'd like to make sure that when we talk about the bomber gap, we think carefully about what that really means. I don't know that it's a bomber gap in terms of hardware. Eaker, by the way, had a serious bomber gap. He did not have any. He did not bring airplanes over. He was there to study the Brits and where they were going and then begin to, with American industry, which did gin up at a great rate and begin to bring bombers over for use against Germany. We don't have a system that doesn't have bombers, but we have not, and my premise will be that we have not focused some of our technology efforts on the kinds of things that will give us a steady tech base and an opportunity to take advantage of one of America's great strengths, and that's its ability to integrate technologies into warfighting systems. So what we'll find is, I think, that the bomber that we will field in 2018 is going to use the technology we have today, and the technology we have today is not nearly as far along, I believe, as it could have been, had we spent a little bit more time understanding what would make a difference for us in combat activities.

I remember when I was Special Assistant to the Deputy Chief of Staff for Plans and Operations and then the aide to the chief of staff on the Air Staff in the 1977 to 1978 timeframe that General Eaker used to come into the building regularly. Many of you will remember, he wrote an article every week on geomilitary affairs, and was very, very, articulate, and often times hardlined on where the Air Force and where the nation was going with respect to defense. And I remember at that time he went in to General Anderson, who was the DCS, Plans & Operations, and then he would go in to see General Jones occasionally. And we were, at that time, developing and fielding F-15s, F-16s, A-10s, and he said, "You guys are not putting enough effort on the strategic bombers."

Now, of course we were pushing the B-1A at that time pretty heavily. He did not know what was going on with respect to the B-2; that activity was underway and beginning to move forward. If you all recall, the first time we ever heard about this stealth bomber, I think, was during the Presidential elections in 1980. But in the '77 timeframe, it was underway and moving. I also point out that's nearly 30 years ago, the last bomber technology effort.

So the gap we're talking about, I think, is in our focus and in our technology, not

necessarily in fact of hardware, but of course, what that really means is, is that your systems are aging with old technology, and the best we can do right now is probably take what we've got and put it onto something that hopefully will be the next-generation, but not as far as we could have gone by 2018. By the way, it was in '77 that we killed the B-1, as I recall, and went into the cruise missiles, the air-, sea-, and ground-launched cruise missile system, and then we didn't get the B-1 until the Reagan Administration a few years later.

What was Eaker talking about when he said, "You guys aren't spending enough time on the strategic bomber?" I thought, first of all, although I'm not a bomber pilot, my dad was in the Strategic Air Command, and I grew up on bomber bases and felt I understood a little bit about it. So when I was a fighter guy and young, I understood the value of bombers because my dad had pounded that into me, and by the way, the whole Air Force leadership team was primarily from the Strategic Air Command in those days.

So, the fact that I was not a bomber pilot did not mean I didn't appreciate, and besides I did stay at the Holiday Inn Express, and so, I know a lot about it (Laughter.) But not last night, OK? The point is, that I felt pretty well-rounded here, and when I was in Vietnam, I was there the last year that we were doing the major combat operations, in fact, at kind of the end of my tour, the POWs came home. When we took the bombers downtown, we got the war over with. So I learned, as a fighter guy, this idea of range and payload, which I think are--Chief talks about regularly as the heart and soul of the Air Force, is range and payload--and that's not lost on me, it's not lost, I think, on many of the folks, including General Matthews.

So what Eaker was talking about was, he was talking about this effort we were going because at the end of the Vietnam War, we had begun to develop precision, and we thought that precision might be able to give us the capability we need. That's where our focus was; we needed air superiority, we'd learned that lesson in Vietnam, so that's kind of where our effort was. But in the end, Eaker was worried that those aircraft, as capable as they are, and as valuable as precision is, don't have neither the range nor the payload that we may require, all right? And that's really going back in our heritage to the Duhet days from Italy, and of course the Mitchell days, where the belief was that what air could do that nothing else could do (except today I think everyone would agree that the potential is in space as well) is go deep to the heart and soul of a nation, of an enemy, and be able to effect their activities with range and payload, and the bomber was the system that could do that. And I think we all understand that there's today value in being able to do that. And the fighters were there for air superiority and then those tactical missions of interdiction, close air support, and reconnaissance, tactical reconnaissance, but their (inaudible) and their payload were limited and that was known then and it is a fact today even though the precision can overcome some of those shortfalls.

When I think about the efforts that we have pursued primarily through our Air Force Research Lab efforts and our technology, I think you'll find that from the '80s to about

four years ago, we developed technology in stovepipes and then someone would be able to see a value to something, put it together, and begin to integrate it, but we didn't necessarily give our science and technology folks to find challenges. Just as an example, when we decided to get serious about some of our engine development, we developed a program called IHPTET, the Integrated High-Performance Turbine Engine Technology. That program now has moved into something called VAATE, Versatile Affordable Adaptable Turbine Engine Program. The original goals, if you look at that, weren't pushing us into the areas that Rebecca mentioned a few areas ago in terms of hypersonics and all of that. It really was looking at getting what I would consider to be much more efficient, much more reliable, much more capable engines on systems that we're using today. Now, of course you're going to learn some things that are important, but the goals were not to get us into what I would consider to be the high supersonic area, it was to get us into more efficient capability in the aerodynamic environment that we're operating in today.

Thankfully, we have another series of efforts going on now, some I will just use the term variable cycle engines, that are looking at not only taking advantage of that turbine engine technology that we're pursuing, but also looking at how to move effectively and efficiently into the supersonic regime. And hopefully those will begin to pay off. Those are technologies, though, I'm afraid for us, for the United States to do the kinds of things it should be doing, in particular the United States Air Force, we're probably 15 years late. When you think about the fact that we were flying sustained Mach 3 supersonic activities in the '60s, and we're unable to do that today, you have to ask yourself, "What happened here?" Well, I was asked to participate a year or so ago on a study that was commissioned by the Air Force through the National Academies; initially started out as speed versus stealth, and the premise was that, we may have put our eggs in one basket and not continued to develop some other options, i.e. in this case, perhaps stealth. As we got into the study, it was interesting we found out that really speed versus stealth wasn't really the question.

The question was survivability. And it was conditioned upon what General Matthews mentioned the mission of the Air Force and the QDR said the Air Force would need to do, and that was two of the tasks that were given to the Air Force or made very clear for airmen and airpower, was that we needed to be able to go a long range, we needed to be able to penetrate enemy airspace that would be denied, we needed to be able to persist, and we needed to be able to conduct high-volume strikes. Alright, so the high volume begins to take away the cruise missile. Now, the cruise missile may be something you want as you get in, and whether it's subsonic or supersonic or hypersonic, we can debate and talk about during the discussion, but the idea of persistence in denied airspace and high-volume attack begins to get you into a bomber, and you're talking in distances of two thousand to three thousand miles. Speed was not given, but at our engine and technology level, our only way to be able to persist is probably going to be a subsonic aircraft as ACC has determined. I would suggest that a little more money upfront and a little more focus upfront in speed after the SR-71 in our research and science and technology area would have given us options by now that we would be able to take

advantage of that we do not have in order to make a 2018 bomber timeframe.

By the way, that's a very, very important date in the Chief's mind. Part of the reason is, is because we really did get into the stealth business and the materiel's technology and all, pursued that very heavily, our radar models that we used tend to discount speed because a radar can see you this far if it's an automated system, therefore speed can't beat it. But the fact of the matter is, that survivability is a function of speed, stealth, situation awareness that the crew would have, countermeasures, and tactics; all five. And tactics are enhanced, not only by speed, but by the power to sustain different types of maneuvering. So the study going from speed to stealth talked about the value of all five of those and what was most interesting was when you have, as we do in the F-22, speed, super-cruise, and stealth, you give the aircrew a heck of a lot more options when it comes to penetrating enemy airspace, when it comes to engaging other aircraft that may be a threat to it, 24 hours a day, day and night, and in weather, you give yourself an awful lot more flexibility when it comes to survivability when you have played those equations properly, and I would suggest that over the last 20 years, we have shorted ourselves in terms of developing engines and airframes to give us the kind of speed advantage that would make a difference.

Then in the materiel's technology we're also, I would say, a bit short. We're working very hard on stealth; we're doing very well on observability. The problem is, is that it is not necessarily going to be sustained at higher speeds and that requires significant investment in the materiel's area. So as I think about what the ACC, what Air Combat Command is doing as they define their requirements, I would say that our focus has not given them the options they need to produce something revolutionary or very, very more advanced than what we have today. It's going to be good because what we got today is 30-year-old design. It's going to be good, but it's not as good as it could have been, and I would suggest that we look very carefully at how to better focus our science and technology assets. Today, the Air Force Research Lab has tried to do that through what they call their focused long-term challenges, FLTCs, where they are now looking across all of those technology stovepipes and asking the question, "What does the Air Force need in sort of a "wish-we-could" perspective"; wish we could do this, wish we could that." Well, if I had this, this, and this I could, and so now you got champions there that are trying to look across the technologies to determine which of those technologies when integrated would give us the opportunity to solve some of those "wish-we-coulds"? So, as I think through this next, or this long-range strike problem, I think that we'll do what Americans do well--we'll integrate, we'll do a good job, but it could be better, and we ought not let that happen in the next generation. Thank you.

► GRANT: Thank you, General Martin. General Hawley?

► HAWLEY: Well, there's not much left to talk about. (Laughter.) In a sense, I've been described, I think, as mostly qualified by my age (Laughter.) There's a limit as to what I can contribute here. So let's talk about the one thing that I don't think we've addressed yet, and that is, "Why do we want to do this? Why do we need a bomber in 2018 or in

any other time?" If you talk around this town today, it's hard to get anybody to think about anything that isn't focused on Iraq. I read a lot of editorials that question the relevance of the Air Force, period. What does the Air Force do for the Global War on Terror? Or what is the Air Force contributing in Iraq? I was in a seminar the other day; I mentored down at the Joint Forces Staff College, and I was in a seminar with 15 or 20 young field grade officers, and a young Army officer almost started the conversation by asking me, "What is the Air Force doing in this fight?" And of course I was kind of taken aback that somebody would begin a conversation that way, and I started to reply, "Well let me count the ways." And I was going to enumerate how do you get to the fight, when you get to the fight, how do you get around in the battlefield, when you're in a fight how do you know what's going on around you, when you get in trouble who is it that comes and bails you out, on and on. I didn't. That probably would have been the wrong way to run that seminar.

But the question intrigued me, and I thought that it might be worth a little time this morning thinking about, "Why do you need these capabilities?" There will be a day after Iraq, and given what's going on in this town today, it may not be that far in the future when we'll be thinking about what comes next. There will be something next. There will be issues that we have to deal with. As I think through that, I believe that we will return to a desire to deter conflict; I think deterrence will be a very important part of DOD's portfolio. There is probably not going to be an attempt to liberate another nation very soon. We all know what happened when we withdrew from Vietnam. This nation became pretty gun-shy for the better part of three decades, and we relied very heavily on deterring conflict, rather than projecting ourselves into other peoples' fights.

I think that when you think about deterrence, that deterrence is an interesting concept, and I was involved in an effort to write a deterrent concept for DOD not too long ago, and I didn't realize going in how tough it was. I thought, deterrence is just a bunch of sack bombers and missiles on alert and there are a bunch of submarines with intercontinental range, nuclear missiles in them, that's deterrence. Well, that was deterrence in the Cold War against a specific adversary. Deterrence must be designed against adversaries, you got to understand the adversary, know what it is that it takes to deter that particular adversary, and in today's world, and in the world after Iraq starts being rewritten as history, we will find ourselves in a world where the adversary is not as well-defined as it was in the Cold War. We all know that. The adversaries will be multiple, the issues, the problems will be multiple, and we will require a diverse portfolio of capabilities. I think you hear the word portfolio frequently when you talk to people in the Department of Defense today, and if you are going to successfully deter bad people from doing bad things in a world that is increasingly integrated by the process of globalization, where bad people can do bad things that have huge effects in ways that we couldn't imagine 20, 30, 40 years ago, you are going to require a very diverse set of capabilities to deter bad people from doing those bad things that could be extremely disruptive.

Sometimes, we tend to think about this bomber issue as a debate between bombers and

fighters. You know, well, you don't need fighters, you ought to have bombers. The fact is, you need both. This becomes a debate between bombers and aircraft carriers. That's not a very good one either; the fact is, you need both. You need a broad portfolio of capabilities or we will need a broad portfolio of capabilities in order to effectively deter the full range of problems that we're going to face as a nation in the post-Iraq world, and bombers are an important part of that. Why bombers? I mean, bombers are there to attack targets, right? I mean, we've got lots of ways to attack targets. As a matter of fact, if you went and Googled on me, you'd probably find sometimes several quotes where I said, we got more than enough ways to kill things, we need more investment in ways to find them, fix them, track them, and sort out what their intentions are. And by the way, I think that remains true today. The key to success in combat is what General Martin talked about--situational awareness. It's understanding what's going on, knowing what the target is, where it is. We can figure out how to hit it with something, and why not stand off cruise missiles? Well, I think Mark Matthews took that one on pretty well; they are an important part of this portfolio of capabilities, but they are not a substitute for what long-range strike capability brings to the decision maker and to the deterrence equation.

Long-range strike allows you to do some things that no other part of the portfolio can do for you. It allows you to reach out globally. Properly structured, the long-range strike part of our force structure can touch any place in the world within hours. We have demonstrated that countless times in the past, and no other capability that we field can do that. My Navy friends would probably argue with me and say that a carrier air wing can do that, and of course that's true if they happen to be within 500 or 600 miles of the problem when the problem arises. So, that's not an adequate substitute. Long-range strike capability, properly configured, can give you mass at distance. Now why do you need mass at distance? The reason you need mass at distance is because adversaries are smart and they distribute the target set. When you think about why you need strike capabilities in this world, I think you have to begin with the target set. What is it you want to hit? Why would you want to destroy things that somebody has gone through a lot of effort to create? And you do that because they're a threat to you or someone that you think is important that may need your help. And adversaries today are smart enough to distribute the targets; they're smart enough to harden the targets, and they're smart enough to make them mobile so that they are constantly on the move, and that kind of a target set demands long-range, large payload, survivable systems, and that can only be delivered by the bomber force.

I had the opportunity, as ACC commander, to fly all three bombers. I flew the B-52, I flew the B-1, and I flew the B-2. They're all impressive platforms, and some--as a matter of fact, my staff told me when I was at ACC in 1999 and we published a white paper, these things are good 'till 2037. And you know having flown them and talked to the people who maintain them and fly them, I think they're probably right, you know? If the engineers really know what they're all about, these things can probably fly until 2037. The question is: Can they fly in the environment that we will face between now and 2037? We traditionally have not replaced airplanes because they started falling apart.

We've done that a couple of times; we almost got there with the C-17, I guess, the C-141 was getting to the point where it was practically falling apart. I think the helicopter fleet is getting to the point where it's practically--but traditionally that's not what we've done. We've replaced fleets because of capability because the environment in which they operate had changed, and we needed a new capability. Now, that gets you to the question that General Martin was getting to, I think, which is well, "Have we developed, is the tech base, well enough developed in the right areas to support something different by 2018", which is when I think we have begun to conclude the environment will be sufficiently different that we need a new capability.

I would argue that, although it is undoubtedly correct and General Martin ran all this stuff for a few years, so nobody in this room knows it better than he is to how well we were invested in some of these capabilities, and there are certainly shortfalls, but I think it is a myth that what we can deliver in 2018 is no different than what we've got today. I think it's a lot different. I think that the investment that we've made in fifth-generation fighters, both the F-22 and the Joint Strike Fighter, have developed a set of technologies which can transfer to a new bomber program in ways that will make it far more effective than any of the three bombers that we fly today, to include the B-2, which is a pretty amazing platform. We will be able to build a more stealthy platform in all of the relevant dimensions that we want to deal with. That stealth will be far more maintainable on a 2018 delivered platform than the stealth that we have today on the B-2. We will have the capability to build sustainable, maintainable systems far more capable than what we've got today.

I know that I am viewed as an F-22 advocate, and I am, I think it is a marvelous airplane, but I never hear anybody talk about some of the capabilities that we built into the F-22 which will be incredibly relevant in this program that the Air Force is embarked on today; in particular, the maintainability of the system and the deployability of the system. The maintenance man-hours per flying hour on that airplane on much less than the airplanes that it's replacing, and they were pretty good; I think that everybody at this table flew the F-15, and it was a dynamic, wonderful airplane. I mean, I remember when I left the F-4 and I went to the F-15 and I said, "Holy cow, they have reinvented the F-4 and they made it work" (Laughter.) I mean you turn the radar on and it can stay on the whole hour-and-a-half that you're flying, and it's still working when you land; the F-4 never did that (Laughter.) Well, the technologies that we have invented and matured, the manufactured processes are being matured, the F-22 now and the F-35, are transferable to a new bomber program; and they will deliver an airplane that is far more survivable, far more maintainable, far more deployable than anything that we have today, and those are important characteristics, and they are the product of the technology investments that we've made over the past 20 years in these new systems that are coming along.

There is a hole, and the hole, I guess, is propulsion. There is work being done in propulsion, and many of my friends argue that it's too late. General Martin just argued it's too late, to have an effect by 2018, and unfortunately I think they're right. But I'm not

not sure that that's something that couldn't be changed. I had the good fortune to participate in Ron Kadish's DAPA panel, the Defense Acquisition Performance Assessment, and in the course of that, we reviewed some acquisition history. And while it was true that engines are always the long pole in the tent in developing an airplane, we developed both the F-15 and the F-16 in less than seven years from Milestone A to the first operational delivery--less than seven years for both of those platforms. The F-117 was developed in less than six years--a little over five years from the conception of the program to the first operational delivery of an F-117. History would suggest that it is possible to do a good program in the what, we've got 11 years, from now 'til 2018. So, it seems to me that it is possible, if the nation is willing to invest against that target.

So that gets me to the last thing I'd like to talk about here--money. It's always the favorite subject in this town. It consumes almost everybody who works in the Pentagon, what are there, 30 thousand people working there today, something like that? I would guess 28,999 are worried about money, and the other thousand are worried about public relations (Laughter.) I stand corrected. There's an argument that says we can't afford this. There's an argument in this town that says that what we need are more ground forces and we can't afford to modernize air and naval capabilities. I reject that argument out of hand. This is a question of what you want to do; it is not a question of what you can do. And for evidence, I will point out that, when this budget year, when the '07 budget first became a year in the Defense Department's long-range program, the POM, we were not even contemplating spending money on a war in Iraq. And today, we are spending \$100-plus billion a year on the wars in Iraq and Afghanistan.

This nation can afford and do whatever it decides is important, and if we decide that it is important to field a deterrent capability in order to avoid getting in a future conflict like Iraq, we not only can afford it, we can do it without hardly breaking a sweat. Because you can fund any program; any one of the programs that you hear about today, can be funded for \$5 billion a year. There's no major program that we've undertaken in the Department of Defense, whether it be the F-22, the Joint Strike Fighter, the B-1, B-2, \$5 billion a year will buy you anything you want. Might not buy it quite as fast as you want it in some cases once you get to production, but in the system & development phase, and the R&D phase, you can buy anything you want for \$5 billion a year. That's 1/20th of what we're spending a year in Iraq, which I calculate is about two-and-a-half weeks' worth of Iraq funding. So can the nation afford this capability as well as the other elements of the portfolio that the Department of Defense needs in order to deter, and if necessary, fight future conflicts? Then my answer is, not only yes, but very easily. We can do it without breaking a sweat.

There are some myths I'd like to dismiss before we return this to Rebecca, and the myth I'd like to take on is that the Air Force doesn't want to do this, really; this is low-priority for the Air Force, they're all fighter pilots like the three of us up here, and they don't really appreciate the value of long-range strike. They don't think it's important; this is just a ploy on the Air Force's part to placate those who are pushing them to invest in long-range strike. I think that's bologna. The Air Force fully understands and

appreciates the value of long-range strike. They also understand that each of the platforms that they retain today in this portfolio is at least 10 times more effective than it was before the advent of precision technologies.

I was trying to figure out how to tell this story when I was at ACC when we were modernizing the bombers, part of this rebuttal of the myth: What is the first airplane that the Air Force modified to carry GPS-capable munitions? The B-2. Now, would the Air Force have selected the B-2 as its first GPS-capable airplane if they didn't understand the value of long-range strike? I don't think so. I think the Air Force understands the value of long-range strike, so why are we (inaudible) around like this and taking so long to get to it. And the answer is that the Air Force is constrained by the budget authority that they get from the Office of Management and Budget as relayed through OSD PA&E. And that top line that the Air Force gets will not allow them to even complete the programs that are underway, much less begin a new one, and so they're forced to prioritize and they're forced to ask the nation to take a risk, and the Air Force has been forced to ask the nation to take a risk in the long-range strike area and defer its procurement until now; 2018. And that's pure and simple why this is such a hard thing to do.

General Moseley has said that the Air Force needs \$20 billion a year more than it is currently programmed to get in order to accomplish its missions. I think he's right, and I think we should sit up and take notice. We should take that as a serious proposal, not as just rhetoric. The fact is, that if you went to the Air Force today and added up their requirements in order to provide this nation with the part of the portfolio for deterrence that the Air Force is responsible for, both in the mobility mission areas, airlift and tankers, ISR; all of those ISR platforms that are aging and must be replaced, command and control platforms which are aging and must be replaced. When did we last deliver an AWACS to the fleet? When did we last deliver a JSTARS to the fleet? These are all important capabilities that have to be recapitalized, and the Air Force has done their best to be good soldiers, salute smartly, and build budgets that fit within the guidance that they've received, and maybe part of the answer is here, the Air Force ought to quit being good soldiers, and they ought to start demanding what they need, and let other people decide how to chop at the margin, rather than try to build a budget that doesn't satisfy all the needs that the Air Force has, to include long-range strike. Thank you.

► GRANT: General Hawley, thank you very much, and thanks to all the panelists for just a tremendous discussion of the issue. We have time to take a few questions. We are recording the session, and if you speak from the microphone your question will be recorded and picked up. If you speak from your seat, hard to say, but with that, let me open the floor for questions for our panelists. General Skantz.

► Q: I think the biggest challenge is to build a consensus politically within the government to support what the Air Force wants to put forth. The timing is critical because you've got to defend the 2008 POM, which means the initial investment for the new bomber. And to defend that we have to get a buy-in into the AoA, we have to get a

buy-in from the Joint Staff and the COCOMs, we have to get through the JSIT process, and this is the biggest program, I think, that will have gone through the JSIT process. And it may take a smart task force to shepherd this whole process, outside of the uniformed people on duty, to just track it way off that schedule, track it and talk to the right people who know the consensus because as you know the entire political system is going to be swept up by any (inaudible) party who will for principle on (inaudible). And you know, you're not going to get any attention from them. In fact, they'll probably say, (inaudible). So I think it's critical to lay out process on a timescale (inaudible) that 2008 budget because if I were sitting in OSD as the comptroller, come the late fall when you issue PPPs, I'd say, does the Air Force really need all this money right now, or can we defer it for another year? So I think we need some smart task force (inaudible) people to lay this out and press it and talk to whoever you need to.

► GRANT: Any comments from my panelists?

► MATTHEWS: I would just say, sir, that I agree with you that we have to make the case, I think we are making the case, about the Air Staff and concert the joint process, the JSIT process; we need the next-generation bomber. We have ongoing discussions also with the COCOMs, specifically STRATCOM, about that requirement and then some of my just informal discussions with them; they understand the needs as well. They understand the shortfall, the capability gap, that's there and we'll continue to press this just as we have through this forum and the others, we've talked about the Chief's statements and the priorities. It's interesting, the next-generation bomber we state explicitly as one of those key priorities, along with KC-X, CSAR-X, and the other ones that I mentioned earlier. But the bottom line is, we require resources to do that, and it's through forums like this and continued dialogue both with the OSD and the Congress hopefully we'll be able to garner the resources to fund and meet those requirements, and I think we're well-engaged with that process.

► MARTIN: I would agree, General Skantz, I think that's a very important point. I think it's a little larger than the long-range strike. It really deals with, I think, what the nation needs its Air Force to do under any circumstances. We can allow ourselves to get myopic here and believe that the world that we worry about is the world of the insurgent and the IED threat. That is a part of the spectrum of conflict, but that's not the only area that we will face in the next 10, 20, 30 years. And I think as the remaining superpower, we have to be the best at everything. If we're not, then an asymmetric opportunity is presented and can make us very vulnerable. So the first thing is, we have to be able to explain what an Air Force does for its nation, and then this becomes a very key program in its ability to hold at risk a potential adversary and deter them in a way that can be effective. And we don't have, I believe, that story in a way that can be presented, simply, easily, for the American public to understand and say, "Absolutely, we have to do this." I couldn't agree more, we need to work that. And it's more than you said, active duty, it will look a little like you know we're feathering our nest. It's something that we have to have support from outside the active duty force.

► Q: (Inaudible). I always wondered about long-range (inaudible) if you have to be a penetrator and return in daylight at subsonic speeds, can we escape our adversaries, that's always been a question in my mind?

► HAWLEY: To me, there's two elements to the speed discussion. Speed is good, but I think sometimes we exaggerate its value when we connect it only to survivability. Certainly, all three of us have used the phrase, "speed is life," because in the world that we were a part of, it was an important part of the equation. We were up against manned adversaries and speed reduced their decision time, and if you can reduce the decision time of a thinking adversary you're going to gain some kind of an advantage. Today, when you can shoot down a missile with a bullet, and when most of the air defense systems we face are automated with algorithms making the decisions rather than people, I think most of the studies conclude it's not quite as important as we used to think it is from the standpoint of survivability.

The thing I miss in the debate mostly is, I don't hear much discussion about the other thing that speed does for you, which is reaction time. Speed allows you to react to a threat more quickly, and there's a value in that. General Matthews talked about some things he wants in the new bomber; he wants persistence with survivability, he wants payload. If you think about persisting in a threat environment and you think about a radius of action for an airplane, speed expands your radius of action, your ability to respond to those fleeting targets that General Matthews talked about. You may have five, six, seven minutes to respond to that fleeting target, and speed gives you the capability to respond more quickly. So I think speed has two elements in an operational sense, and sometimes we only focus on the survivability aspect, which is debatable, and I think Gen Martin can talk to that at length because he participated in a study that really went into that, but I did want to put on the table there's more to it than just survivability.

► MARTIN: I agree. The ability to respond quickly gives your nation some options that are very, very useful, but one of the areas that's important with respect to speed is that, you give the enemy less time to make decisions. Now, of course, with an automated system, it takes on a parametric mi-range, missile range, speed range, those sorts of things, and becomes sort of math-driven. But what I found when I was flying F-15s was that when we were going against Mach 3 type of targets, you had a very narrow window that you could be effective. If you were off by a couple of degrees the situation changed to where you were unable to complete the intercept. So what that means is, the enemy has not only less time to react, they have much less of a weapons engagement envelope. So now when you marry that up with the right observability, the right countermeasures, and the right knowledge in the cockpit about what the enemy does and does not see about you, you offer yourself opportunities to maneuver in ways that are very, very useful to your survivability and your effectiveness to persist in denied airspace.

I would just say, you know, we probably made a mistake when we canceled the B-70. Knowing what we know now about operating at those speeds at a very high altitude with

the SR-71 and its rather limited areas of vulnerability, we would still have a pretty significant capability at Mach 2-and-a-half to Mach 3, at 70 thousand feet, with the right knowledge of the cockpit of the enemy's capability, and you would still have a fairly viable capability, I think. So my view on it is, it offers you options as an operator of a weapon system that you wouldn't have or that you won't have when you're subsonic, which then perhaps restricts the times that you can be effective.

► GRANT: Other questions. Yes?

► Q: (Inaudible) to state that the aircraft must be manned; is that a decision that the AFROC validated specifically that it would be manned? Is manned optional a consideration, and tell us General Martin, knowing what you know about technology development and where it is at, do you think that it has to be manned, or do you think there's room for a little bit of a bidding toward (inaudible)?

► MARTIN: You know when I went through pilot training in 1970, two members of my class got to fly a system called, I think, the QU-22B. They were not happy about that, OK? What was that? It was like a King Air that would fly a 9-hour mission over Laos picking up signals that needed to be sent back to our analysis and processing center so that we could understand some things about the enemy. Now, the reason they flew that airplane was because it had become so expensive with its sensor suite and its communications suite that they couldn't afford for it to crash on takeoff and landing, which was the most critical time of flight for it. So they put a pilot in there to make sure that it got off and it got back and the rest of the time, I think it was a boxed lunch for nine hours (Laughter.)

So now let's get to your question. If you take a look at the basic mishap rates that we have with unmanned rates versus mishap rates with manned systems, and then you consider the cost of a weapon system like this, I don't know we're quite there yet for an aircraft of this nature, this cost, to risk it on a crosswind landing and hope it'll work out. Now, having said that, the Global Hawk's not a cheap airplane. It is very, very capable, and we are doing that fully unmanned and automated. So that technology is coming along, but I think initially if you listen to what General Matthews said, the ability for someone to be back there and use their eyeballs and their sensor suite to make decisions about striking targets, that entire integration sort of leads you and the cost of this thing and you know, the need to handle abnormalities that will occur on aircraft of that nature, I think, leads you to believe that we're probably in the manned category. Now, I'm not the guy developing the requirements, but I can see how they would show up at this stage.

► MATTHEWS: And again, as I said, I think you would agree you have to have a man in the loop somewhere. We're not quite at the point yet where we're going to rely on machines to make decisions alone for us, especially lethal decisions, so the question becomes, where do you put the man in the loop? Does the man sit in an air operations center, or someplace or a mission control element someplace and make a decision, and

we do that with some weapon systems today. We have the capability to do that, but you have to think about the environment that we envisioned this particular platform is going to operate in the 2018 timeframe, how robust it would be, the weapons load that it carries, how dynamic that environment would be. So where we think we are with technology today with this platform we see it being a manned platform. Now, that's not to say there couldn't be surprises in terms of how technology advances; there's a term being used nowadays, these "optionally manned" systems; I never thought of myself as an option on an aircraft, but I guess I could be a consideration in the future.

And again, as I said, remember, we're talking about, looking across the Air Force portfolio, a family of systems, many of which will be unmanned. We use Predator today in conjunction with our strike aircraft to hit targets as we will. With the Reaper in the future as we are with the Global Hawk, it's a sensing platform. But these unmanned platforms have their limitations; crosswind landings is just one of those, the ability to operate in denied airspace, but if we are going to use them as a sensor, you have to offload information, you have to receive the information, you have to fuse it, you have to make decisions with the information. Then again, ultimately, someone's going to have to make a decision what to do with that information, and then act with it, and then communicate it to the platform that's going to release the weapon. We're not quite where I think the technology is at the point that we can depend on a platform like this given its payload, its complexity, and probably its cost, to go out and leave that as an unmanned platform. So the decision that went through our analysis of alternatives recommended and the AFROC agreed with the concept of a manned subsonic bomber, where technology leads us today.

► Q: (Inaudible). If I am correct that this bomber is a vision for both nuclear and conventional missions, I was wondering to what extent this nuclear mission (inaudible) carries nuclear weapons drives that (inaudible)?

► HAWLEY: Well, I can't address what the potential to carry nuclear weapons, how that drove the decision, yes or no, in that equation. I'll just say that the platform the capability to carry a variety of weapons.

► Q: I'd like to ask the panel to go into more detail on their view of the long-term budget situation post-2008 elections. I'm sure you've been doing scenario planning as to who would sit in the White House and which party controls Congress, and since all of you are noted historians as well as being operational experts, I'm sure you know the history of budgets post-Vietnam, post-1991. If you can comment on that, and what in fact it would be on this particular program?

► MATTHEWS: Well, actually, I haven't engaged in any scenarios in anticipation to the 2008 elections. I'm agnostic in that sense. We'll respond to our national leadership and the Congress and what our responsibility is as a war fighter is to state what we see as a requirement to meet the national security guidance that we're given by our leadership. And I'm confident, regardless how the elections turn out, that that leadership will

respond to those needs. That may seem a bit (inaudible), and as General Hawley talked about, I do worry about perhaps some of the impacts would be on the nation following the long-sustained conflict that we're engaged in, but as the President has said, repeatedly said, this is a long-term conflict that we're engaged in, and we should anticipate it as such. I don't think that reality is going to change as a result of the 2008 elections, and I think our leadership will respond to that.

My responsibility is to present to my commander so we can carry forward to OSD and to our national leadership what we think the best options are to meet those defense requirements in the future. It's not only against the threat from terrorism, but other potential threats. We have to look across the broad spectrum of potential adversaries in the future, some that have direct capabilities to attack the United States, and we have to have the capability to hold at risk any potential adversary regardless where they are, we cannot allow anyone to have sanctuary, so that's our responsibility. And again, I'm interested as a private citizen in how the elections will occur, but wearing this uniform, I'm confident my leadership will respond to that.

► Q: A question about some of the requirements for the 2018 bomber and beyond, talked about persistence in a denied airspace or a high-risk airspace. Part of that has to be consideration of electronic countermeasures--do you anticipate, General Matthews, part of a payload of that airplane will be a self-contained electronic countermeasures suite, or is there a consideration in your internal debate for the development of a, a concurrent development of an electronic warfare platform. We did away with the EF-111, we've got some EA-6s still flying; is there going to be an EA-something or other for 2018 and beyond to provide a blanket countermeasures suite above that denied airspace and above the battle space?

► MATTHEWS: I think airborne electronic attack will be an element of any concept for employment in the future. I anticipate what we will operate is a family of systems, which would most likely include some kind of capability on the platform itself, without specifically (inaudible) what that capability would be. As you know we have under development in the Air Force right now in our program several systems, we have the Miniature Air-Launched Decoy, an active variant to that we call MALD-J, as well as our (inaudible) to develop a core component jammer, which would be housed in the B-52. Our anticipation is to proceed on with that program. Again, as with many other programs, there are a lot of funding challenges and some technology challenges with those systems, but we anticipate that would be the environment, using those capabilities and others in a family of systems to react to the battle space of the future, and that will be required to operate.

► Q: As I understand, this is the first capability in 2018, long-range strike is also looking at something for the 2034 timeframe, and I was wondering if you could go ahead and address what that capability might be?

► MATTHEWS: Well, there is a Phase III; we refer this to what the 2018 bomber is part

of a Phase II program. The Phase III program would be a long-term capability. This is more along the lines of the evolutionary type of, revolutionary, excuse me, type of capabilities that were discussed here. Advances, for example, and again, this is hardly speculation, but we are looking at technologies associated with directed energy, further advancements in stealth technologies, engine technologies, active self defense, continued evolution of the global information grid, perhaps enhance the capability to further develop unmanned systems, as examples of technology. But again, these are more along the realms of technology research & development and areas that we will continue to explore. But again, as you point out, that would be a follow-on system in the 2035-plus timeframe.

► MARTIN: Let me, if I could, make a comment along that line. If you all remember in the early '90s, we were trying to look at what we were going to replace our relatively large number of tactical fighters and particularly the strike, the attack, part of our fighter force. And the Marines had the F-18, the Navy had F-14s and F-18s, and we, of course, had A-10, F-15, and F-16, that we were operating and we were now beginning to look at what we need to do next. So we established an organization called the Joint Attack Strike Technology Office, JAST, if you remember that; I think George Muellner set that up. Now, JAST was not designed to settle on a particular airframe or a particular system. It was really oriented at looking at the entire technology array and picking those kinds of areas where we thought we would be able to benefit from in developing the next strike system.

Unfortunately, we turned that into the JSF; not that there's anything wrong with JSF, that's great. The problem was, is that we stopped JAST. Now, we thought we'd keep it going because JSF was actually three programs; it was the concept demonstrator, it was going to be then taking the best from the concept demonstration and producing an operational system, and, as I recall, there were nine technology maturation areas that were a part of the program. So you had three parts of the JSF program, but as funding constraints occurred or as cost growth occurred, where do you start sacrificing? You start sacrificing in the technology maturation areas, and somewhere along the way you got to freeze it, so that you can actually develop a system that we'll field.

So if we had continued the JAST mentality, a lot of things that General Matthews just talked about would be on the table, there would be opportunities for demonstrations, there would be opportunities to proof some of these technologies. So as a nation, and getting back to a point that General Skantz made, and when we start talking about the 2008 election and what's likely to happen to budget; if we want to be the best, we're going to have to develop a mechanism by which we're able to continue to pursue technological opportunities in a way that is useful as opposed to just six-one type of stuff. So I think, one, we should posture ourselves in a way that allows those kinds of opportunities to continue, because they will feed your modification program, and they will feed your next system generation, such as directed energy or hypersonics or whatever, so I think that's an area that we as a nation ought to look at.

And I would just say, with respect to the 2008 business, it comes back to a task force; what do you want your military do? Where do we think we're going to use it? Where can it be best advantaged, and then what does it take to give that capability? Period. Got to do it. The nation will pay whatever it takes for national security; we just need to make sure they're paying for the right things and it benefits them the best.

An example: the Horn of Africa--maybe 1,100 to 1,400 people are there, in seven countries and a failed state, working with those countries to try and produce activities or give them opportunities to develop, to grow, so that it doesn't become a haven for the next group of terrorists who we'll face. Not a lot of money, but where are we going to continue to deploy our forces and does America feel that's important because you don't see the value of that today. That's something you see 20 years from now. Those are the kinds of things I think we need to think about--where will we be engaged and what equipment will it take for us to be successful in that type of environment? And the 2008 election story will then get funded.

► HAWLEY: On this issue of future budgets; it's easy to be pessimistic I think, you go back to the analogy of post-Vietnam era and all of us, many of us in this room, lived through some pretty austere times and some difficult decisions had to be made. So it's easy to be pessimistic, but I think there's also a reason to think it might be different, and the thing that strikes me about the current environment as opposed to the post-Vietnam environment, is the attitude of the American people towards its military. When I came back from Vietnam, I had no clue what the attitude was in this country. In those days, you didn't have much contact when you were overseas; this was another world. And the stewards came on the air as we were approaching Spokane and said, you know, "You might encounter a hostile audience when you land, so we'd recommend that you go change out of your uniforms very quickly and complete the rest of your travels in civilian clothes," which was kind of an eye-opening comment to those of us on the airplane who were just coming back from combat zones.

I went to a military prep school in upstate New York, and in the aftermath of Vietnam, it closed. First, it turned into a civilian school of some kind, and then they just gave out the ghost. Countless ROTC programs around the country folded because in those days, the American people were mad at the military, or at least a lot of American people were mad at the military, and that's not the situation we see today, I don't think. I think the American people support their military; there's evidence that they have a strong appreciation for the importance of a strong national defense, and I think that that is a significant difference in the political environment that we'll see post-2008 election than we did in the post-Vietnam timeframe. So I think there's some room for optimism that reason will prevail, and that the nation will invest what's required in order to support that portfolio of deterrent capabilities that we need to take into the future.

► Q: Kind of a follow-up to the question about the JAST and the technology maturation, my question is, are we doing something to one, identify (inaudible) the JAST concept to where we pull these technologies like hypersonics and (inaudible) technology to where

we get to General Hawley said, pull it in (inaudible) 2035. Maybe it can be 2020, and so if we had a coordinated effort to do that something that we're looking at from an Air Force standpoint. In fact, I was thinking General Martin that, seemed like the nation was working toward a JAST-like program for a long-range strike, was called LRSA, up until 2003 I think it was supported by Undersecretary Aldridge and in fact, General Moseley, I think, briefed as Vice Chief the HASC on the plan, and it was a little bit longer a timeframe, and it did kind of put more technologies on the table, and then between 2003 ("It became a 2035 technology.") Well, yes, and then, oops, there's this 2018 bomber that we've got to have right now with the technologies that are available today. What happened? Why did the nation's direction change? Why did we turn away from that?

► MATTHEWS: Well, I'll just comment on a couple of things. I'm not so familiar with that decision, that process, or why those particular decisions were made. I will say from Air Combat Command's perspective, we routinely sit down with our laboratory, the AFRL, and review emergent technologies that are categorized on the risk level where those technologies are. I remember when I was on my first tour, with the Air Staff a long time ago, about 20 years ago, we were taking a strong look at a hypersonic platform, a hypersonic bomber then, and it seemed promising. But it turns out the technological challenges were far greater than we ever anticipated; the cost was far higher. And then when you went in to an actual assessment of the utility of the weapon and how you would actually use it, it turns out that it wasn't as great a value as we thought. General Keys likes to use the analogy of, if I get a hypersonic weapon that can get me to the target 40 percent faster, but the enemy is still gone by the time the weapon reaches, so why would I spend the money on it, even though it gets me there 40 percent faster? It's 100 percent ineffective. So, sometimes as we go through these analyses and we actually get down to see how they're going to evolve, it turns they just don't evolve as fast as you think they are.

The other thing on the next-generation bomber we're looking at is, it's probably a bit of a misnomer to say we're using today's technology. It's technology that (inaudible) today that we think is acceptable risk to field in 2018. There is new technology associated with this. Great advancements in LO technology both in its practical application in terms of denying adversaries the ability to detect the aircraft and as General Hawley alluded to the maintainability of the systems, which is very important if you want to sustain the high sortie production, revisit rates, and payloads necessary to address the target sets we're talking about. Advances in sensors, potential advances in the engine technology. So these things are there, and we explore these on a routine basis with AFRL and the things that are promising we move into development.

► MARTIN: When you talk about the change there in LRSA to where we are now, I think QDR had a large effect on that, and the fact that you now are focusing on a program as opposed to what I would consider to be technology efforts that support that. But as I mentioned, whether it's LRSA or JAST, what that does is that's a--technology stovepipes don't naturally connect with other technology stovepipes. It takes a different effort, it

takes an integration effort, and so, that's what, as I mentioned, the Air Force Research Labs came to in the 2005 timeframe, that they needed to have some connective tissue at the top. And so the future long-term challenges, or focused long-term challenges, is that connective tissue and there are champions there that now are looking across the entire technology spectrum to work a problem and begin to integrate those. And I recall one of the problems that this is, we won't put any names on this, but this was very interesting; we were trying to develop a capability to kill tanks under trees; that became known as TUT, and so the Chief asked the Research Lab guys to go out and figure that out. And they came back to them a few months later and said, there's no one silver bullet, it's going to take this, and then six months later, they came back with some opportunities for that to occur. But it was about, oh, I think, four or five different technologies that had to come together at once to make that work. And so, about six months after that, we were down in the corporate board structure room that we have, and everyone was reviewing the status of the budget with respect to our goals in the Air Force, and it turned out that just by serendipitous action, all five of those technologies had been zeroed out.

The Chief kind of took that personally. He said, "Hey, I want to put all that together and let's do Tanks Under Trees," and then we reviewed the budget status, and all five technologies had zeroed out, because the budgeting process didn't have a champion for that that was orchestrating those technologies and each of the technology stovepipes themselves were looking at that technology versus the other things they were trying to do, and it wasn't as productive. It did sound almost like a conspiracy, but it wasn't, it was by accident. But the fact is, as a result of that came this opportunity to do champions there that now try and take an outcome that we want to be able achieve and integrate those technologies, and the Research Lab guys are doing that now. My view, though, is that's kind of within the Air Force and they interact with the other services, but if you go to the JAST model, there is a continuing appetite for pushing that envelope that can provide capability along the way, as long as perhaps that next huge jump that may take you 15 years.

► Q: A credible basis for decision?

► MARTIN: Yeah.

► GRANT: Well, thank you all very much. On behalf of the Air Force Association and the Eaker Institute, I want to thank first our terrific audience, and most of all, our tremendous panel, General Matthews, General Martin, and General Hawley. Thank you all very much. (Applause.)

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