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AIR TRAFFIC CONTROL SYSTEM MODERNIZATION: PRESENT AND FUTURE

(109–82)

HEARING

BEFORE THE

SUBCOMMITTEE ON
AVIATION

OF THE

COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES

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CONTENTS

TESTIMONY

	Page
Chew, Russell, Chief Operating Officer, Air Traffic Organization, Federal Aviation Administration	11
Dillingham, Gerald, Director, Physical Infrastructure Issues, U.S. General Accountability Office	11
Elsawy, Amr A., Senior Vice President and General Manager, Center for Advanced Aviation System Development, the Mitre Corporation	11
Pearce, Robert, Acting Director, Joint Planning and Development Office, Federal Aviation Administration, Air Traffic Organization	11
Waters, Hon. Maxine, a Re[resentative in Congress from the State of California	8
Zinser, Todd, Acting Inspector General, Office of Inspector General, U.S. Department of Transportation	11

PREPARED STATEMENTS SUBMITTED BY MEMBERS OF CONGRESS

Carnahan, Hon. Riss, of Missouri	41
Costello, Hon. Jerry F., of Illinois	109
Pascrell, Hon. Bill, Jr., of New Jersey	155
Waters, Hon. Maxine, of California	159

PREPARED STATEMENTS SUBMITTED BY WITNESSES

Chew, Russell	42
Dillingham, Gerald	112
Elsawy, Amr A	146
Pearce, Robert	42
Zinser, Todd	164

SUBMISSION FOR THE RECORD

Chew, Russell, Chief Operating Officer, Air Traffic Organization, Federal Aviation Administration:	
Responses to questions	57
Responses to questions from Rep. Costello	69
Responses to questions from Rep. Pascrell	76
Responses to questions from Rep. Honda	84
Elsawy, Amr A., Senior Vice President and General Manager, Center for Advanced Aviation System Development, the Mitre Corporation, responses to questions from Rep. Costello	150
Pearce, Robert, Acting Director, Joint Planning and Development Office, Federal Aviation Administration, Air Traffic Organization:	
Responses to questions from Rep. Mica	85
Responses to questions from Rep. Oberstar	92
Responses to questions from Rep. Costello	105

ADDITION TO THE RECORD

Thompson, Gerald L., statement and responses to questions from Rep. Costello	184

AIR TRAFFIC CONTROL SYSTEM MODERNIZATION: PRESENT AND FUTURE

Wednesday, June 21, 2006

HOUSE OF REPRESENTATIVES, COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, WASHINGTON, D.C.

The subcommittee met, pursuant to call, at 2:00 p.m., in room 2167, Rayburn House Office Building, Hon. John L. Mica [chairman of the subcommittee] presiding.

Mr. MICA. Good afternoon, and I would like to welcome everyone to today's Subcommittee hearing of the House Aviation Subcommittee.

The order of business today is going to be opening statements by members; I will lead off. We have one member witness that we will hear from.

I understand there are going to be votes at 2:30, so maybe we can get opening statements and members' comments taken care of, and we may even get into the introduction of our first full panel.

So, with that, I will begin. I have got a few comments I would like to make, and then I will yield to other members.

Of course, the topic of today's hearing is air traffic control modernization, looking at both the present and future. And this Subcommittee first addressed the topic of today's hearing, air traffic control modernization, nearly a quarter of a century ago, during the first term of the Reagan administration, and since then the Federal Government has spent a whopping $44 billion taxpayer money on a seemingly and sometimes Don Quixotic quest to upgrade our Nation's air traffic control system. However, we still have a system today that relies on costly ground-base and sometimes 30-year-old technology that sometimes we think might be best suited for display in the Smithsonian Air and Space Museum down the street.

Until recently, the ATC modernization effort has been plagued by costly overruns, scheduling delays, and mismanagement, making this one of the worst acquisition programs in the history of the United States Government. However, I have a caveat and I want to take this opportunity to commend our FAA Administrator, Marion Blakey, and also give accolades to our air traffic organization and chief operating officer, our COO, Russell Chew, and I think we are going to hear from him shortly, for both of their leadership.

I have said before in some of these ATC modernization hearings, I feel like it is Groundhog Day; I keep living the day over and over again. But they have put a halt to some of the programs that we see in some of the dog chasing the tail, and now we are seeing

some of our modernizations gain on-time performance and also looking at some reasonable budget costs.

However, if we can't sustain this progress and make significant strides in modernizing the balance of our future ATC system, then I am afraid that the next decade we may see a meltdown of our Nation's air traffic control system. Such a meltdown would cripple our Nation's economy, which could lose in excess of $30 billion annually due to people and products not reaching their destinations within the time periods that we take for granted today.

The need for ATC modernization is paramount. FAA's recent forecast conference could not have made it any clearer. Air transportation demand that is coming will demand even greater capability than we have today, of course. According to the FAA, domestic air passenger traffic will nearly double—in fact, I think this is wrong, I think it is going to more than double—annually by 2015, and by 2015 we will expect, again, a doubling in our passenger count, and by 2025 they are looking at in excess of 1.5 billion passengers annually.

While I am dismayed that our existing ATC system may be incapable of meeting air traffic demand in the near term, it is in fact a testament to the 50,000 employees of the FAA that our ATC system has been and continues to be the largest and safest in the world. It is now averaging only one fatal accident per five million flights, an incredible record.

In light of these significant future demands on the national airspace system, Congress, in 2003 directed the FAA to develop a comprehensive plan for next generation air traffic control systems, also known as NGATS. NGATS, in essence, moves air traffic control from earth to the sky and space by replacing antiquated and costly ground infrastructure with orbiting satellites, onboard automation, and data link communications.

Under the leadership of Mr. Chew—who is, again, I think, one of the finest public servants I have had to deal with and most capable people in any of the Federal agencies—I have seen this ATO plan starting to resemble a performance-based, value-driven organization, and that is I think what Congress envisioned. Both the GAO and the DOT Inspector General found that the ATO has made significant progress in meeting costs, schedule, and performance targets for its major ATC acquisition programs.

And some of this isn't easy. There is a lot of pressure from members not to make the consolidations, the improvements, and gain technology, sometimes replace antiquated systems and unneeded personnel. It is a tough fight, but he has persisted, Marion Blakey has persisted.

I am pleased with the bold cost-cutting and productivity initiatives the ATO has implemented on the operation side, and I am hopeful that the transition to a satellite-based ATC system will open up other opportunities for even more significant, albeit politically unpopular, cost-saving initiatives, including the consolidation of major air traffic control facilities. The consolidation of regional offices and the decommissioning of ground-base navigational aids can take place without, I believe, any degradation to safety.

However, in light of political opposition to such initiatives—and we saw some of that on the floor recently, and it is also evidenced

by the reaction to FAA's proposal to consolidate certain radar stations or TRACONs—I believe that we need to consider maybe another method of handling this, since it is a political hot potato. I have gotten my hands burned, and it is difficult for people in political office to respond to some of these consolidations upgrades and necessary revisions, so I am proposing that we look at a base realignment and closure type commission, a BRAC type process, in the next FAA reauthorization bill. Maybe it will take some of the politics, hopefully, out of that process.

While I am pleased that the FAA's Joint Planning and Development Office, the JPDO, has led an interagency effort towards planning and development, and they have been successful in establishing a time line for NGATS, I have two primary concerns. First, the JPDO's goal of completing NGATS by 2025, in my opinion, is too late, and that is because, again, the dramatic growth we are seeing in air travel and that we have expected to continue, and I see no reason for a change over the next decade.

Despite the expenditure of, again, some $44 billion in taxpayer dollars on ATC modernization initiatives, the GPS-based navigation system in one of the cars I rented recently is in fact more sophisticated than some of the 60-year-old radar technology being used to navigate some of our aircraft today. In light of the FAA's dismal track record on overall ATC modernization—and, again, this spans almost three decades or more—we need to consider increasing the role of industry as a means of expediting the development and implementation of NGATS.

Ironically, our European friends have adopted a more industry-driven approach to their air traffic modernization, called SESAR, which warrants, I think, a closer look by the Subcommittee.

My second concern is twofold: how much will NGATS costs and then, of course, the big question is how we are going to pay for it. ATO estimates that NGATS will cost between $15 billion and $18 billion. That is on top of the $44 billion we have already spent. We will hear more about that in testimony today.

Finally, FAA also predicts that a funding gap between the FAA's capital accounts and NGATS requirements of between $500 million to $1.2 billion will exist over the next five years.

It is important to note that most of the FAA's existing $2.5 billion capital account, which is about half a billion dollars short of the amount authorized by Congress, goes mostly for existing ATC system running, not for NGATS-related programs that we are planning.

In light of the $44 billion spent to date on ATC modernization, we owe assurances to the American taxpayer that NGATS will be a cost-effective system that will safely accommodate rising air traffic demands for decades and decades to come.

With those comments, I am pleased to recognize our Ranking Member, Mr. Costello.

Mr. COSTELLO. Mr. Chairman, thank you. I will be very brief and put my statement in the record. We have our colleague, Representative Waters, waiting to testify, and I know that we have at least one or two opening statements here.

First, let me thank you for calling the hearing today. Our air traffic system today is fundamentally based on radar tracking and

ground-based infrastructure from the 1960's. Much of the FAA infrastructure is well passed its useful life. The increase in regional jets, the growth of point-to-point service, and the anticipated influx of very light jets are placing new and different strains on the system. It has been estimated that consumers could lose as much as $30 billion annually if people and products cannot reach their destinations within the time periods expected today. Modernizing and transforming our air traffic control system is a national priority.

Yet, despite its importance, there is a major serious disconnect between the rhetoric and the resources being applied to this effort. For example, funding for the FAA's ongoing airspace redesign efforts, which is the key to enhancing capacity and reducing airline fuel costs, have been cut by almost 70 percent this fiscal year. For a third consecutive year, the Administration is proposing to fund the FAA's capital account at $2.5 billion, well below the level authorized in VISION 100.

At the same time, this Subcommittee has been informed of preliminary FAA data indicating that the initial capital cost of the Next Generation System could be approximately $4 billion more than the FAA's current five year capital plan. By starving the FAA's capital account, the Administration is slowly setting the transformation effort up to fail.

While the JPDO is a multi-agency effort, coordination between JPDO and the FAA is particularly important. However, both the GAO and the DOT Inspector General, as we will hear today, will testify that the JPDO does not have the authority to leverage key human and financial resources from the FAA. I look forward to hearing and asking questions concerning whether they believe the current level of coordination between the FAA and JPDO is adequate. If not, Congress should consider formally restructuring the relationship.

Going forward, we will clearly need the talent, energy, and know-how of the American air traffic industry to develop our Next Generation System. However, the Government must maintain its ability to effectively manage and control its contracts. Given the long history of cost overruns on large-scale, highly complex air traffic acquisitions, I see the value in a phased incremental approach. An incremental approach to acquisition has been what the FAA Chief Operating Officer, Russ Chew, has attempted to do within the agency, and I look forward to hearing his testimony today.

For many years, GAO has consistently reported that failing to involve the air traffic controllers in the technology development process has led to costly reworks and delays. The IG notes in his testimony that the need for focused human factors research has important safety implications. Common sense tells us that the people that will be using the new technology should be involved in its development. I am very concerned that the GAO is now reporting that no current controllers are involved in the next generation effort. I look forward to hearing from our witnesses on this issue as well.

Additionally, the JPDO success at transformation depends largely on its ability to forge consensus with system users. Increasingly, the aircraft itself is becoming a part of our critical infrastructure, and airlines will be asked to make costly investments in equipment

to take advantage of our new system. It may be time for Congress and the Administration to engage in a discussion about providing incentives for airlines to make the costly investments.

Again, Mr. Chairman, I look forward to hearing from our witnesses and I have a number of questions for them, and I yield back the balance of my time.

Mr. MICA. I thank the gentleman.

Mr. Ehlers.

Mr. EHLERS. Thank you, Mr. Chairman. And thank you especially for calling this hearing. I think this is a really crucial issue that has to be addressed, and addressed soon.

I recall we had a hearing about 1997, 1998 to identify the most crucial issues, and at that time it was airport capacity, or everyone assumed it was. I differed with that and commented that within the decade the biggest concern was fuel prices, which in fact is what happened. I think we will be able to resolve that problem, but not very easily.

But I do agree that the greatest problem we face at the moment is air traffic control, and the entire system, as far as I am concerned, has to be redone. A lot of developments will be taking place. First of all, we can increase airport capacity with a modern, well operated air traffic control system without building any additional airport runways.

Secondly, with the new electronics available, we can replace a lot of the human factor in air traffic control. But we have to do it right. And we have to recognize the vulnerability of that system, particularly to acts of war, because if we develop an air traffic control system based on satellites, we have to recognize how vulnerable the satellites are in moments of war.

So we have a lot of things to discuss, a lot of things to worry about, and, unfortunately, have not done well in adapting over the decade that I have been on this Committee. And I have seen a lot of money wasted on attempts at air traffic control which simply haven't worked, and it is time that we zero in on the right solution and then proceed with it.

I look forward to the testimony that we will hear, Mr. Chairman, and I hope that we will gain enlightenment on these subjects. Thank you.

Mr. MICA. I thank the gentleman.

Mr. Oberstar.

Mr. OBERSTAR. If there are others.

Mr. MICA. Other members seek recognition? Ms. Norton?

Ms. NORTON. Thank you, Mr. Chairman, and I appreciate this hearing. I am sorry I have another hearing as well and won't be able to stay for the full hearing, as important as it is.

Every time we look at FAA, its mission gets more and more complicated. It gets complicated by technology which keeps racing ahead of us; it is complicated by 9/11 and all that entails; and, of course, it is complicated by these aging facilities, which become even more important to update in relation to these other two factors.

We brag, I think justifiably, that we have the safest air control system in the world. I believe that. But it is a labor-intensive sys-

tem, and I hope we don't forget that. That under-describes our dependence on air traffic controllers.

We have just been through a very controversial labor dispute in the midst of all the rest of this. It was unfortunate that that happened. While the agency is thinking about modernization, as it must, I certainly hope it thinks about modernizing its labor relations as well. We need those controllers. We need them to be the very best, as they always have been, and it is very hard to be one of them today.

Thank you very much, Mr. Chairman.

Mr. MICA. Thank you.

Mr. Coble?

Mr. COBLE. Mr. Chairman, not unlike my colleagues, I thank you and Mr. Costello for having scheduled this hearing. And in the interest of time, Mr. Chairman, I won't take but very little time.

But for what it is worth, someone said to me the other day that airports today have become what bus stations were 45 or 50 years ago, that is, extremely crowded, consistent delays in takeoffs and landings, and it just brought to mind that air traffic is going to continue to be a very significant portion of our day-to-day living, and we need to address these problems and hopefully assuage the discomfort and the difficulty that is being felt by many air traffic customers and clients.

And with that, Mr. Chairman, I yield back my time.

Mr. MICA. Mr. Oberstar?

Mr. OBERSTAR. Thank you, Mr. Chairman.

Modernization of the air traffic control system has been a subject of inquiry by this Committee ongoing for over 20 years, years that I chaired the Investigations and Oversight Subcommittee and then the Aviation Subcommittee. In partnership with, first, Mr. Gingrich and then Mr. Klinger, we have vigorously overseen and inquired into the need for keeping our air traffic control technology the best in the world and ahead of the state of the art and ahead of the growth of aviation in this Country for safety and for efficiency purposes.

There is a tendency to think of air traffic control as a static activity; you put it in place and then you come back 10 years and you change it out. That is not true. FAA has installed, Mr. Chairman, over 70,000 pieces of technology in the past 15 years to keep ahead of the state of aviation, of the growth of aviation, of the needs to reconcile weather with travel and with efficiency and with effectiveness. Air traffic control is not a snapshot but, if you will, a movie, continuous progression over a period of time. To keep it progressing requires research, development, testing, and funding.

The FAA, on the one hand, is criticized because it didn't put technology in place fast enough; on the other hand because it moved too quickly and didn't sufficiently test. I think FAA gets it just about right. My experience over these 20-plus years is that the FAA is very cautious, isn't going to put anything in place until it is fully checked out, until controllers are comfortable with the technology they are putting in place.

And FAA has also learned something over the years: of involving the air traffic controllers and the system specialists who have to maintain the equipment at the very earliest stage, as you are de-

signing the system, not after it is all designed, engineered and the equipment purchased or the contracts let. But, rather, get them involved early on, as learned with STARS, when it took way too long from the time you push a button on the control panel for the image to appear on the scope. You can't have a .25 second wait; you need that information now when you have an object traveling at 500 miles an hour, 7 miles in the air, when there is no curb to pull over, lift up the hood and see what is going wrong.

So I appreciate all that is moving along in FAA. I used to get a monthly report on all the systems, but FAA isn't doing that any longer, unfortunately. The newest development is that of the Chief Operating Officer, Russ Chew, who has had a great career at American Airlines and has brought the advantage of his experience in the private sector to help FAA identify costs, the third leg of this modernization triangle that we need to untangle. Nothing will kill modernization faster than an underfunded system, an inadequately funded system.

We are going to need the continued modernization in order to cope with the growth of aviation, as you, Mr. Chairman, pointed out in your opening statement and as Ranking Member Costello did. Very light jets, more regional jets, more point-to-point service, shifting from short-haul, under 300 miles, to long-haul service that is far more valuable for the airlines, it is going to put new strains, new stresses on the system.

We have to evaluate, once again, the en route structure that is way out of date. FAA is working on putting in place a much more streamlined en route system, but they are way behind in doing it; consolidating TRACONs and accommodating this growth. And in this regard, it is important to keep in mind that the Southern California TRACON handles more air traffic than all of Europe combined. That is an awesome responsibility. An awesome responsibility for us on the Subcommittee, for the FAA to maintain that technology ahead of the growth of aviation, to accommodate that growth.

I look forward to this hearing, the information we will develop from it, and thank you and Mr. Costello for calling the hearing.

Mr. MICA. I thank the gentleman.

Further opening statements? Mr. Petri?

Mr. PETRI. Thank you very much, Mr. Chairman. I will be very brief. I just want to commend you and thank you for having this very important hearing on a subject that has been before this Committee for many years now. There is nothing going on as far as the Federal role in aviation that is more important than to get this right, and I thank you for this oversight hearing. Thank you.

Mr. MICA. Additional members seek recognition?

Mr. LoBiondo?

Mr. LOBIONDO. Thank you very much, Mr. Chairman, for holding this hearing. As the Chairman has so ably pointed out, we are managing an air traffic control system with technology and procedure developed in the 1970's or before that are not suited to the traffic demands of today. As a result, more and more flights are delayed, thousands of gallons of fuel are wasted, and airlines are losing money, and the flying public is inconvenienced.

In order to keep our aviation system safe and efficient, we need to step up our investment in the next generation of air traffic systems. Sinking more and more money into keeping legacy systems operational is severely undermining our ability to make the investments we need to make in modernization. As we move to reauthorize the trust fund next year, I look forward to working with the Chairman and the Committee to free up money for modernization efforts through operational savings and creative financing methods.

Finally, as we move forward with the next generation of air traffic control systems, I expect that the FAA's technical center, which is located in the second congressional district of New Jersey, will play the central role in development of this technology. I have received assurances that will be the case, and I intend to monitor the issue closely to ensure the FAA follows through.

Once again, I would like to thank the Chairman for his interest and action on this very serious issue.

Mr. MICA. Thank you, Mr. LoBiondo.

Any other members seek recognition from the Subcommittee?

[No response.]

Mr. MICA. No further opening statements from members of our panel.

We do have one member witness today, and we are pleased to have joining us from California's 35th District Representative Maxine Waters. And we will grant her the customary five minutes.

So, welcome, and you are recognized.

TESTIMONY OF THE HONORABLE MAXINE WATERS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Ms. WATERS. Thank you very much, Mr. Chairman, Congressman Costello, distinguished members of the Subcommittee on Aviation. I thank you for allowing me to testify during this hearing on "Air Traffic Control Modernization: The Present and the Future."

My congressional district is home to Los Angeles International Airport, the fifth busiest airport in the world. It is also home to the Western Pacific Regional Office of the FAA's Air Traffic Organization, commonly referred to as ATO. The modernization of our Nation's air traffic control system is of tremendous importance to me and my constituents, as well as the millions of travelers who fly into and out of my district every year.

The FAA is proposing to restructure the ATO and three service areas: Eastern, Central, and Western. Under the FAA's proposed plan, the Eastern Service Area Office would be in Atlanta; the Central Office would be in Forth Worth; and the Western Office would be in Seattle. The six regional offices that would be adversely affected by this reorganization are in Anchorage, Boston, Chicago, Kansas City, New York, and Los Angeles. I believe that this plan represents a step backwards in the agency's mission to provide the safest, most efficient airspace system in the world.

The FAA maintains that the restructure will yield savings of $360 million to $460 million over 10 years. I question these optimistic projections. Despite requests, the FAA has failed to disclose the analysis that support these projections.

Congress cannot assess the agency's estimates without being given access to the full report of the ATO Structure and Process Evaluation and proper time to review it. I would also recommend a third-party review or audit of the projected savings.

Under the proposed restructure, the relocated ATO employees would spend more time in travel and less time doing their jobs. More air travel by the ATO employees themselves would be needed to support and administer California, Arizona, New Mexico, and Nevada projects and facilities from a Seattle office. That will result in less work, more travel expenses, and diminished safety margins.

Although I have seen varying estimates, approximately 400 ATO employees nationwide would be reassigned to the three new service area offices. At least count, about 86 employees in the Los Angeles Regional Office will be given directed reassignments to an office 1500 miles away. Their choice will be to leave LA or to leave the FAA.

The reorganization plan affects highly trained and qualified employees, the FAA needs to make the national air system as safe and as efficient as possible. It is not just secretaries and bookkeepers affected by the restructure; civil and electrical engineers are being given the ultimatum. These engineers are the men and women of our government's air traffic system who work with radars, navigation equipment, communication systems, and other technology that keeps planes in the air moving safely to their destinations.

Under the plan, there would be a dramatic loss of intellectual capital from the FAA. The loss of civil and electrical engineers who would choose early retirement or resignation, rather than relocation, would strain the administration of air traffic, airspace, and engineering activities in the Western Pacific Region. This brain drain would adversely affect the safety of the flying public.

Southern California is among the world's busiest airspaces and serves more passengers than any other region in the United States. Southern California Terminal Radar Approach Control, which provides radar air traffic approach control services to all arriving and departing aircraft for most airports in Southern California, is the busiest approach control in the world.

Phoenix, Las Vegas, Albuquerque, Oakland, and Southern California are among the fastest growing sites of air travel in the United States. All of these airspaces and facilities are currently served by the Los Angeles Regional Office. Under the proposed restructure, they would all be served by Seattle.

An ATO Service Area office needs to be close to Southern California facilities to provide immediate and expert attention. A Service Area Office 1500 miles away will result in neglect of these huge and critical facilities. Experience tells us that facilities located near headquarters and regional offices receive better programs and quicker services than outlying facilities. Distancing the service operations away from Los Angeles is folly.

When a controller in a tower flips a switch to turn on a radar, that radar had better turn on. If it doesn't, someone from the regional office had better respond quickly. Neither the controller, the pilot, nor the air passengers will find solace that a repair has been

delayed because the closest Service Area Office is over 1500 miles away.

In conclusion, we all know that our Nation's need for air travel will continue to grow in the coming decades. This growth in air traffic will require trained and experienced FAA employees. These employees will be able to provide the best possible service if they are located near important air travel hubs like LAX.

Modernizing the FAA should not be done at the expense of FAA employees or those who depend on their services. If the Subcommittee believes that the FAA should invest more resources in modernizing facilities and equipment, then the Subcommittee should seek an increase in resources for the FAA. Cutting FAA administrative services in order to increase funding for modernization is robbing Peter to pay Paul.

I would urge the members of this Subcommittee to support the existing nine regional offices of the ATO and exercise your oversight responsibilities to ensure that the FAA does not implement this reduction in force. I look forward to working with the Subcommittee on Aviation to ensure the continuing safety and efficiency of air travel at LAX and throughout the United States.

And I have full testimony that I will submit for the record.

Mr. MICA. Without objection, the lady's entire statement will be made part of the proceedings.

We do have about two minutes, if any members have any questions for Ms. Waters. No?

And I will say we have looked into the issues you have raised. We do have an initial response from FAA we will be glad to share with you and make part of the record also.

And then also I would like to extend to you we will have some of the people who have made these decisions on our panel. I can ask for unanimous consent, if you would like to come back and sit on our dias, and at the end of questions by the members of the panel, we would be glad to have you participate.

Unfortunately, we do have about six minutes left for two votes, so what we are going to do is we are going to recess the hearing for 20 minutes. We will return at approximately 3:00. At that time, I expect to see all the witnesses at attention and ready to testify.

So the Subcommittee will stand in recess until that time. Thank you again.

[Recess.]

Mr. MICA. The Subcommittee will come to order.

We do have our first panel, and that consists of Mr. Russell Chew, Chief Operating Officer of the ATO of the Federal Aviation Administration; Mr. Robert Pearce, Acting Director of the Joint Planning and Development Office of FAA; Mr. Gerald Dillingham, Director of Physical Infrastructure Issues at the U.S. General Accountability Office; Mr. Todd Zinser, Acting Inspector General of the Office of the Inspector General, U.S. Department of Transportation; and Mr. Amr ElSawy, Senior Vice President and General Manager, Center for Advanced Aviation System Development, with The MITRE Corporation.

And I will introduce each of you now. We will hear firs from Mr. Russell Chew, Chief Operating Officer of the ATO of FAA.

I think most everybody has been here. If you haven't been here before, if you have any lengthy statements or material you would like made part of the record, please request so through the Chair. We will give Mr. Chew a little bit more time because he has got more to chew on.

[Laughter.]

Mr. MICA. But the rest of you we will try to keep you to the five minutes and then get to some questions.

So, with that, let's hear our COO, Mr. Russell Chew. Welcome, and you are recognized.

TESTIMONY OF RUSSELL CHEW, CHIEF OPERATING OFFICER, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION ADMINISTRATION; ROBERT PEARCE, ACTING DIRECTOR, JOINT PLANNING AND DEVELOPMENT OFFICE, FEDERAL AVIATION ADMINISTRATION, AIR TRAFFIC ORGANIZATION; GERALD DILLINGHAM, DIRECTOR, PHYSICAL INFRASTRUCTURE ISSUES, U.S. GENERAL ACCOUNTABILITY OFFICE; TODD ZINSER, ACTING INSPECTOR GENERAL, OFFICE OF INSPECTOR GENERAL, U.S. DEPARTMENT OF TRANSPORTATION; AMR A. ELSAWY, SENIOR VICE PRESIDENT AND GENERAL MANAGER, CENTER FOR ADVANCED AVIATION SYSTEM DEVELOPMENT, THE MITRE CORPORATION

Mr. CHEW. Thank you. And we have submitted a more lengthy written testimony.

Mr. MICA. Without objection, the entire statement will be made part of the record.

Mr. CHEW. Well, good afternoon, Chairman Mica, Congressman Costello, and members of the Subcommittee. Bob Pearce and I want to thank you for the opportunity to testify about our Nation's future air traffic system.

You have been with us every step of the way—even before the enactment of the VISION 100 Century of Aviation Act—and we are most grateful for your continued leadership and commitment to this historic effort.

Bob is going to talk to you about the JPDO's vision. I am going to talk to you about the actions we take today and how it affects the air transportation system of tomorrow.

The Air Traffic Organization was created in 2004 as a result of your efforts, and today we can report real results. We are focusing on operations, costs, productivity, and sound fiscal management, and by operating more like a well-run business, we are able to field new technologies on time and on budget. In fact, last year, 92 percent of our schedule goals were met for 31 of our major programs and 97 percent of our major acquisition programs met budget goals.

In addition to holding the line on cost, we must continue to maximize the efficiency of today's airspace, while working on the system of the future. Our work in the last year has reduced fuel costs for our airline customers, increased capacity, increased and improved safety, all while beginning the transition to the satellite-based system of tomorrow.

In 2005, we doubled the capacity of our high altitude airspace with a program we call DRVSM and launched a new tool called URET—and completed that this year—that allows pilots and con-

trollers to maximize the airspace, predict potential conflict between the airplanes earlier, and allow them to use more efficient flight paths.

The increase in high altitude airspace allows us to offer more of our airline customers access to fuel-efficient routes, saving airlines about $5 billion over the next 10 years. That estimate could be conservative in light of current oil prices. Estimated savings to the aviation industry from URET in 2005 were 25 million miles in aircraft travel, and about $175 million in operating expenses.

And we have expanded Area Navigation, what we call RNAV. Those are procedures to airports, including Atlanta, Dallas/Fort Worth, Las Vegas, Washington-Reagan National, Washington-Dulles, Baltimore, Los Angeles, Seattle, Reno, Cleveland, and Ft. Lauderdale. These RNAV procedures provide flight path guidance that is communicated directly to the aircraft's avionic systems, requiring only minimal air traffic instructions.

Now, this significantly reduces the routine controller-pilot communications, allowing more time on the frequency for pilots and controllers to handle other safety-critical flight activities. But RNAV procedures also use more precise routes for takeoffs and landings, which saves fuel. In fact, airlines operating out of the world's busiest airport, Atlanta, expect to save more than $39 million a year thanks to RNAV.

Now, we are also implementing RNP, which is Required Navigation Performance. Now, RNP uses onboard technology that allows pilots to fly more direct point-to-point routes. That technology is reliable, accurate, and reaches all aspects of the flight, departure enroute, arrival, and approach. For example, in 2005, we partnered with Alaska Airlines to implement new RNP procedures for their approaches at Palm Springs International Airport, which is located in very mountainous terrain. Now, under the previous conventional procedures at Palm Springs, planes could not land unless the ceiling and the visibility were at least 2300 feet in terms of height and three miles of visibility.

With the new RNP procedure, air carriers with properly equipped airplanes can now operate with a ceiling and visibility as low as 734 feet and just one mile of visibility. This lower landing minima has allowed Alaska Airlines to "save" 27 flights between January and November of 2005, and these flights, which would have otherwise had to divert to Ontario, California, had an added distance of about 70 miles.

Traffic Flow Management, what we call TFM, is the "brain" of the NAS and is the reason that we could handle more traffic at our major airports in 2005 than in 2000, without the long delays that made the summer of 2000 the worst on record. The TFM system is the Nation's single source for capturing and disseminating traffic information for the purposes of coordinating traffic across the aviation community.

As the NAS is impacted by severe weather, congestion, and/or outages, the TFM system provides timely information to our customers to expedite traffic and minimize system delays, and we estimate that TFM provides about $340 million in benefits to our customers every year through delay reductions. We are also currently introducing the new Airspace Flow Management technology to re-

duce the impact of delays incurred during the severe weather season of the summer. Now, combined with the modernization of our en route systems, these systems will allow for flexible routing around congestion, weather, flight restrictions, and help controllers to automatically coordinate flights during periods of increased workload.

The future of satellite navigation is here with Automatic Dependent Surveillance-Broadcast, or ADS-B. ADS-B will replace ground-based radar systems ultimately and revolutionize air navigation and surveillance, and has the potential for broad operational applications for both pilots and controllers. We requested $80 million in fiscal year 2007 for the ADS-B program and, on June 7th, Bob and other members of the FAA Joint Resources Council approved a number of key initiatives as the program moves forward. This transformational technology is one of the key building blocks of the Next Generation Air Transportation System.

Meanwhile, the ATO has continued to improve its organizational structure, yielding considerable operational improvements and cost savings. The ATO completed the outsourcing of the Flight Service Stations, the largest non-Defense outsourcing ever in the Federal Government, which will save about $1.7 billion over ten years.

Further organizational realignments are underway, with the ATO staff support in the nine FAA regions being consolidated into three service areas, which we expect to result in over $460 million in savings over the next ten years. Overall, ATO executive staffing has been reduced by over 20 percent, and management has been reduced by about 10 percent.

But the largest percentage reduction is occurring in the non-safety positions. For controllers, we met our goal of 2 percent productivity improvement in the en route service unit and a 4 percent improvement in productivity in the terminal service unit. These achievements translated into lowering our labor costs by 1.5 percent from 2004, even as ATO provided a 5.1 percent salary increase.

To stay on target, we needed a detailed business strategy. Our new business score card, which we call the Strategic Management Process, is what was fully implemented in fiscal year 2005 and how we accomplished these. We are using the score card to formulate our fiscal year 2008 capital budget, and the ATO has specific initiatives to drive our operation.

There are four areas: achieving organizational excellence, enhancing financial discipline, increasing capacity where needed, and ensuring a viable future. The JPDO is partnering with us on this. These goals include a well defined metric set that have the focus of safety, efficiency, productivity, and cost; and they are communicated to every level of our workforce—from vice presidents to the technicians and controllers in the field—so that everyone understands the direction we are headed and the targets we are shooting for.

So, now, that concludes mine, and it is over to Bob for the JPDO.

Mr. MICA. Thank you.

We will hear next from Robert Pearce, who is the Acting Director of the JPDO of FAA.

Welcome, and you are recognized.

Mr. PEARCE. Thank you. Mr. Chairman, Congressman Costello, distinguished members of the Subcommittee, under the leadership of Transportation Secretary Mineta, FAA Administrator Blakey, and the entire Senior Policy Committee, the JPDO announced STARS as the focal point for coordinating transformation of the air transportation system across the Federal Government, as well as with the private sector. And with a strong partnership with Russ and the entire ATO, I have great confidence that we can achieve the kind of transformation envisioned by this Subcommittee.

Our vision for the Next Generation System is not limited to increased capacity. It is one which encompasses the whole experience of the air traveler, from the moment the passenger arrives at the curb of his departure airport to their exit from their destination airport. So the Next Generation System includes security, safety, efficiency, and environmental compatibility. And as we assess the constraints facing this system, we have found that focusing on just one aspect—air traffic control, environment, airport security—will not get the job done. Each element of the system is indelibly tied to others and all must be addressed; otherwise, we shift the problem, we don't solve it.

So the transformation will involve researching and adopting new technologies, changes in policy, adjustments to roles and responsibilities, and organizational change. It is important to understand we are doing this large and complex job in a public-private partnership. Individuals from the agencies are working together with about 200 private sector individuals from the newly formed NGATS Institute, and between government and industry I think we have assembled a very incredible team.

JPDO is achieving accomplishments towards this transformation. Last year, the JPDO brought the 2025 vision into focus, and through careful analysis we showed we are on track to achieve two to three times the capacity of today's system. This year we have defined the operational concept and enterprise architecture that adds meat to the bones of that vision. The block-to-block, or air traffic portion, is undergoing review right now by our stakeholders, and the curb-to-curb version that will include security in airports is under development right now. These documents help create a real target for us to aim at and help organize the many technical and policy issues that we have to face over the next several years.

But just defining that future vision certainly is not enough, and we have not stopped there. We have also created and released a roadmap that lays out the pathway, including time lines and transition sequences and so forth, that get us to the 2025 system. Based on the roadmap, we developed an initial portfolio of modernization, research, policy efforts that need to be performed, and we are busy adding detail to that, including analyzing costs and benefits to that roadmap. In fact, we are holding some investment analysis workshops with the private sector through the Institute to make sure we better understand the benefits and costs, and so that we can optimally sequence the transition to NGATS.

I have to say the benefits assessments are clearly showing that NGATS is worth the effort and will deliver enormous value to the Nation. Last year, the JPDO conducted its first preliminary interagency review, where it identified examples of how interagency col-

laboration could really deliver next generation capabilities now, not in the 2025.

As a result, we moved ahead with plans to accelerate development of key NGATS projects like ADS-B and SWIM, which, as Russ said, are in the 2007 presidential request and have been approved through the Joint Resources Council. The re-plan of the NASA aeronautics program also reflects the longer term research needs of NGATS.

I would like to pause for a minute on ADS-B. As Russ mentioned, ADS-B is a significant project for the future, and it is intended to eventually replace radar surveillance in the NAS with a cooperative surveillance system that is aircraft broadcasting on their GPS defined location. Ultimately, it is a much cheaper and more accurate system. But for it to make sense, it is both the hardware, the avionics on the aircraft, the transceivers on the ground, as well as the applications, such as pilots doing self-separation between aircraft in low-visibility conditions, that create the benefits.

And the reason I bring this up is because I think it is instructive as to how we need to go about doing the transformation. Fielding more capable infrastructure while researching ever-more advanced applications is what is going to deliver the performance and deliver the transformation. So it is definitely a process, an evolutionary process of building a little and delivering performance.

This year we are building on the success of that first program review, and we have provided guidance to the agencies and are working with them right now in the 2008 budget. Our strategy this year is to fully understand the Federal investment and to make sure we do the realignment and fill the gaps that are necessary to accelerate implementation.

We are also working closely with Russ and the ATO in restructuring the Operational Evolution Plan. This effort is going to provide a very efficient way for Russ and I to make sure that the FAA commitments to modernization and change are aligned in the NGATS vision.

We are also working internationally. We have active collaboration now with China, Japan, and Europe. NGATS has to work globally, and we are committed to making that a reality.

Mr. Chairman, we look forward to working with you and the Subcommittee on this critical endeavor. This concludes my testimony. I look forward to comments, and thank you for the opportunity.

Mr. MICA. Thank you.

Our next witness is Gerald Dillingham, Director of Physical Infrastructure Issues at the GAO.

I want to take just a moment to commend Mr. Dillingham and his team of professionals at GAO for some of the work they have done for the Subcommittee and for me recently. One of those is the impact of the unmanned aerial systems and also very light jets, their impact on our national airspace system, and also for their work on reviewing the cost of airport infrastructure projects and improvements needed to accommodate the new Airbus 380.

I do appreciate your work on those issues for me, and, again, your fine team of professionals, and recognize you now for your testimony. Welcome, sir.

Mr. DILLINGHAM. Thank you, Chairman Mica, Mr. Costello, and members of the Subcommittee. I am pleased to be here this afternoon to share with you the preliminary results of our studies of the ATO and the JPDO that you have asked us to undertake for this Subcommittee.

With regard to the ATO, the ATO has undertaken many initiatives to address the long delays and tremendous cost growth that plagued the modernization program for the past two decades. For example, ATO has instituted a revised acquisition process that includes more senior management oversight and accountability. As you have heard Mr. Chew say, one result of this and other initiatives is that, for the first time in recent history, ATO has met its goals for acquisition performance for each of the past two years. To its credit, ATO has also made improvements in its financial management of the ATC modernization program.

Mr. Chew also mentioned that the ATO expects to realize hundreds of millions of dollars through cost savings initiatives such as consolidating regional office administrative functions and contracting out flight service station operations.

Mr. Chairman, we believe that, based on well-designed business and safety cases, these types of initiatives could be expanded to include decommissioning additional legacy navigation aids and consolidating some air traffic control facilities. These kinds of initiatives have the potential to generate significant savings without compromising the safety or efficiency of the system.

Mr. Chairman, along with the successes, there are some challenges on the horizon for ATO. The first challenge for ATO is that of institutionalizing the progress that has been made in operating as a performance-based organization. This is key to extending this progress beyond the current FAA and ATO administration.

Second, ATO must continue to do what is necessary to meet its established goals for costs, schedule, and performance for its major acquisitions. And, third, ATO must ensure that it has access to the personnel and skills that will be necessary to implement NGATS, keeping in mind that NGATS will be one of the Government's most comprehensive and technically complex undertakings in recent times.

Mr. Chairman, this brings me to JPDO and NGATS. The JPDO has also made notable progress in planning for NGATS. Its efforts have included extensive collaboration among the partner agencies, private sector stakeholders, and the international aviation community. The JPDO has also established a robust suite of models to support the technical planning needed for NGATS.

However, there are some critical issues that need to be addressed. High on the list is the appointment of a director for JPDO. JPDO has been without a permanent director for nearly six months. Permanent leadership is critical to maintaining program momentum and stakeholder commitment. Another challenge is that JPDO lacks any real authority over agency budgets, and largely relies on part-time and pro bono staff. This situation could become a serious problem in the relative near term as JPDO's need for staff and fiscal resources increases.

Mid-range technology development presents another challenge. At this point, it is unclear which Federal agency or private sector

entity will plan, conduct, and pay for the research to develop a given technology from a basic level to a level that could be demonstrated in the national airspace system.

Another challenge is the timing of the development and refinement of the enterprise architecture. The enterprise architecture is the blueprint for NGATS and will identify the technologies that will constitute the system, as well as their development and implementation sequence. It will also be the basis for estimating the total cost of NGATS.

To date, only preliminary cost estimates are available. One of these estimates indicates that the cost to both continue to operate the current NAS and transition to NGATS will require an increase of about $900 million each year over FAA's current appropriation. This means that FAA will need a budget of at least $15 billion each year between now and 2025. Mr. Chairman, this could be a low estimate.

It is important that the money is available when needed. Our work on the current modernization program has shown that when ATC technologies receive fewer resources than called for in the planning documents, and those resources are not made available when needed, it was a contributing factor to significant delays in getting the technologies into the national airspace system, as well as significant cost increases.

Mr. Chairman, these are all important and difficult challenges, but because this transformation is critical to the Nation's economic well-being, failure or significant delays in implementation cannot be an option. Thank you.

Mr. MICA. I thank you for your testimony.

Now we will hear from Mr. Todd Zinser, Acting Inspector General of the Department of Transportation.

Welcome, sir, and you are recognized.

Mr. ZINSER. Thank you, Mr. Chairman, Mr. Costello, members of the Subcommittee. We appreciate the opportunity to testify today and we commend the Subcommittee for holding this important oversight hearing.

While there is considerable debate about how to finance FAA, there is almost universal agreement that changes are needed to meet the demand for air travel. At this Subcommittee's request, we examined progress to date with the JPDO. Today I will limit my testimony to three points and request that my full statement be submitted for the record.

Mr. MICA. Without objection, so ordered.

Mr. ZINSER. First, some perspective on FAA's fiscal year 2007 budget request and key modernization projects. FAA is requesting $2.5 billion for its capital account, which is $50 million less than last year's request and more than $500 million less than the authorized level. This is the fourth year that funding requests are below authorized levels. As we noted before, increasing operating costs have crowded out the capital account. Most of FAA's current capital account focuses on keeping things running, not new initiatives, and only about 55 percent of the capital account actually goes for air traffic control systems.

I would like to highlight two ongoing multi-billion dollar projects that will be critical to the Next Generation System.

First, ERAM, with a price tag of $2.1 billion, replaces the brain or central nervous system at facilities that manage high altitude traffic. This year is critical for ERAM because FAA plans to spend $1 million a day on the program, but, more importantly, if not kept on track, there will be a cascading impact on FAA's ability to deliver future systems.

Second is FAA's FTI program. It is an effort to replace and reduce the cost of FAA's entire telecommunications system for air traffic control. It has a life-cycle cost of $2.4 billion. We have concerns about the FTI program and whether or not it can be delivered on time. We have made recommendations to FAA to help FTI get on track. FAA has agreed with our recommendations and we will be following up to make sure this important program gets done.

My second point is that while the JPDO has made progress, considerable work remains to align agency budgets and plans. Central to the JPDO's mission is the alignment of agency resources. This is a complex task since each agency conducts research for its own mission. We looked at three of the JPDO's eight integrated product teams and found a lot of coordination, but so far little alignment of budgets. We found product team leaders have no authority to commit agency resources and often have no products other than plans. The JPDO expects to do much more in time for the fiscal year 2008 budget, but right now it is hard to assess alignment because JPDO's progress reports do not provide details of ongoing research projects and budgets at other agencies.

My third point focuses on the actions needed to shift from planning to implementation. Mr. Chairman, right now the key questions for the JPDO to focus on what the new office can deliver, when, and how much it will cost. Our prepared statement outlines nine actions that we believe will help shift JPDO initiatives from a research agenda to implementation. I will briefly touch on a few of them.

One is leadership. The position of the JPDO director is currently vacant. FAA needs to find the right person, a leader whose stature and experience is commensurate with the mission at hand. Getting to the Next Generation System is an extraordinarily complex undertaking. I am not sure what the appropriate analogy is—the Apollo program of the 1960's or the Navy nuclear submarine program of the 1950's—but NGATS will require an extraordinary effort from all of us, and it is too important to the Nation to not apply our best talent and effort.

Two is getting Congress reliable cost information. Last year, the Administration promised this Subcommittee that they would provide some clarity on the cost this year. That has not been accomplished. This will be critical in the upcoming debate about how to best finance FAA. Cost data is needed in three vectors: research and development that will be needed, adjustments to existing projects such as ERAM, and cost to implement NGATS initiatives.

Three is developing and implementing mechanisms for alignment. The JPDO is working with OMB to develop an integrated budget document that provides a single business case. As part of this, the JPDO has promised to provide OMB in the next several months with an architecture for the Next Generation System, as

well as a list of programs and other agency budget it intends to leverage.

Four is risk management with the Next Generation System. Given FAA's past track record with modernization projects and potential investments for NGATS, the JPDO and ATO need to articulate what they intend to do differently and what skill sets are needed. There is a lot of discussion right now in FAA and industry about whether a lead systems integrator would be needed to help integrate new and ongoing systems and manage the transition. Models for a lead systems integrator vary throughout the Government. Questions about the roles, responsibilities, and costs would need to be examined for such an approach.

Mr. Chairman, once requirements have been established, the JPDO will have to put together a focused human factors effort that integrates NASA and FAA human factors research. And that concludes my statement, and we would be happy to answer any questions that the Subcommittee may have.

Mr. MICA. Thank you.

We will hear from our last witness, Mr. Amr ElSawy, Senior Vice President and General Manager for the Center for Advanced Aviation System Development with the MITRE Corporation.

Welcome, sir, and you are recognized.

Mr. ELSAWY. Thank you, Mr. Chairman, Mr. Costello, members of the Committee. Thank you for inviting me. I have submitted a statement I would ask to be included for the record.

Mr. MICA. Without objection, so ordered.

Mr. ELSAWY. Mr. Chairman, in addressing the Committee today, I will focus on the opportunities that lie ahead for the JPDO efforts and how they have the potential for changing the way that air traffic management services are provided in the United States and around the world. Specifically, I want to address how those changes would be reflected in the architecture of today's system and what we must do now to plan for the transition to the Next Generation Air Transportation System.

Any updates that we make to the architecture of an operational system require coordination and synchronization of changes that involve people, procedures, and systems. We must have a clear understanding of the capital and the operating costs related to the implementation of those changes, and today, in an era of limited resources and increasing demand, we must also understand, as we have heard from the other witnesses, the resultant productivity, cost, safety, capacity, and efficiency benefits.

The changes that are needed to address the projected future demands on the air transportation systems cannot and will not happen all at once. History has taught us that "big bang" approaches of the planning and development of systems do not succeed, and that those responsible for the operation must drive the change to the future.

For example, NASA's aviation research programs and results will need to be ready to transition into an FAA development program that is adequately funded to mature the research and work with industry on operational integration. The FAA must have a clear understanding of the readiness of the research results and a serious, funded, plan for the inclusion of that research into an oper-

ational safety-critical system. Any gaps in the handoff between the research and implementation will significantly undermine the success of the JPDO initiative.

Today, traffic levels and delays have returned to levels seen prior to September 11th of 2001 in many areas of the Country. Those areas include airports in Chicago, Atlanta, Washington area, New York area, Las Vegas, South Florida. There have also been increases in traffic in smaller airports in many areas of the Country.

Beyond this year, commercial and general aviation will continue to see changes. The NAS will likely continue to see traffic growth, changes in traffic patterns between major airports and metropolitan areas, and changes in the mix of aircraft that make up the traffic. In addition, unmanned aircraft systems, very light jets, and commercial space launches will need to be accommodated in the future NAS, each bringing its own challenges for the operation of airspace, controller workload, and system complexity. Projections developed by DOT, FAA, and MITRE indicate that, by 2013, 16 airports and 7 metropolitan areas will need additional capacity to meet the expected demand.

In order to meet the needs of this dynamic marketplace, the FAA and the aviation community need to reach rapid consensus on the key enabling capabilities and to implement changes in technology, procedures, avionics, and policy that can, together, increase operational efficiency and productivity.

We believe that the following actions are the foundation for the Next Generation System and should be funded and started now:

First, to take advantage of aircraft capabilities and avionics to implement the FAA's roadmap for performance-based navigation. This is a significant change because it is equivalent to adding precise navigation lanes in the sky without requiring additional ground-based equipment. Mr. Chew talked about the importance of RNAV and RNP.

Second, accelerate the implementation of the airspace changes to be more flexible and to accommodate the expected growth in traffic and new airspace users such as unmanned aircraft systems. Again, this has the real effect of streamlining traffic flows into congestion areas and providing more efficient arrival and departure paths for all users. Small investments by the FAA result in a significant benefit for the users and the system as a whole.

Third, emphasize the enhancement of automation and decision support tools to enable controllers to handle more traffic by presenting them with automated conflict-free problem resolutions, thereby increasing system capacity and productivity and improving safety and the quality of service provided to the customers. With the on-schedule completion of the software development of the En Route Automation System, now is the time to plan and fund the next increment of the automation capabilities and NGATS extension.

Third, to develop a firm plan for the implementation of air-to-ground data link that will enable controllers and pilots and their respective ground and onboard aircraft automation systems to exchange digital messages that yield efficiency, productivity, and safety improvements.

Fourth is to improve the traffic management capabilities that Mr. Chew talked about.

Fifth, to transition to Automatic Dependent Surveillance-Broadcast system.

Sixth, to use advanced simulation technologies to train the new controller workforce.

Seventh, to maintain a strategic view of the investment in airport infrastructure and runways.

And, finally, to develop and implement policies that enable improved access to airports through the use of modern and improved avionics and procedures instead of ground-based infrastructures.

Mr. Chairman, these actions will position us to meet the increasing demand and improve the overall productivity and efficiency of the system. Implementing these changes will keep the United States as innovators and leaders of the global aviation community.

Thank you.

Mr. MICA. I thank you, and I thank all of our panel of witnesses. We will turn to some questions now, and I had offered to let Mrs. Kelly go first. She is ready. Mrs. Kelly?

Mrs. KELLY. Thank you so much, Mr. Chairman.

I would like to ask Mr. Chew and Mr. Pearce. I want to talk with you about a serious concern that I have with the FAA's treatment of Stewart International Airport in my district. A new tower came online last Friday. We have been waiting a long time for this new tower, and I appreciate the FAA's assistance in making that happen.

What I can't appreciate, however, was the FAA's decision to tell Stewart officials last week they couldn't take the radar they have from the old tower and put it in the new tower. Since then, the controllers in the new tower at Stewart have been landing planes with no radar whatsoever because of a glitch in the software of the new radar system.

An air traffic controller up in New York is quoted in our local newspapers as saying the action by the FAA was, and I quote, "asinine."

To refresh your memory, Mr. Chew, the FAA itself decided to install the TARDIS radar system in the Stewart tower after they had conducted a special evaluation of the airport's needs in November of 1999. Following that, the DOT Inspector General examined the FAA's actions and determined that TARDIS was assisting the controllers at Stewart. This recent decision has put us in a situation where the FAA is prohibiting the use of equipment, onsite equipment that they themselves installed and the IG has said assists our controllers at Stewart. I think it is absurd, Mr. Chew.

So while we are having a hearing down here in Washington about FAA's plans for the future, back in my district the FAA has forced Stewart Airport to return to the past, back to the pre–1999 radar standards in the air traffic control tower, back to binoculars. Can we end this stalemate right now? Can the FAA give Stewart Airport and its controllers the permission that they need today to move the radar system from the old tower to the new tower until they get what they need in the new radar system from you later this year?

Mr. CHEW. Yes.

[Laughter.]

Mrs. KELLY. That was easy. Mr. Chew, I hope you really mean that.

Mr. CHEW. I do.

Mrs. KELLY. I would have preferred to have gotten that confirmation last week, when I wrote a letter to the FAA, but I do appreciate your efforts.

Mr. CHEW. I don't want to impugn the people who are trying to make those decisions. When we found that the software glitch that you spoke of would take several months to rectify, that is when the decision was changed. But we do appreciate the situation that Stewart is in, and we will support that.

Mrs. KELLY. I am somewhat concerned still about the time line for the new radar system that is coming online. The RACD–2 was supposed to be delivered and installed before that new tower was opened, and I know they held back on opening the new tower, hoping that system would be in.

Now, since you will now allow us to move the TARDIS system there, I hope that the airport officials will be hearing that it won't be until November that we get that new system. I want to make sure that the FAA doesn't use the existence of this TARDIS as an excuse to push back the delivery date for the RACD–2. I think that is very important for the safety of our people at Stewart.

Mr. CHEW. Yes. In fact, it was the desire to move ahead to the new system that was really the original genesis for saying let's not move the old system. So I will get an answer for you for that and we will get back to you.

Mrs. KELLY. As soon as possible, I think that will be helpful. But if you will allow us to move the TARDIS system, that is a big plus, and I am very grateful for your answer of yes. Thank you.

I yield back.

Mr. MICA. Mr. Costello?

Mr. COSTELLO. She quit while she was ahead, huh?

[Laughter.]

Mr. COSTELLO. Mr. ElSawy, let me ask you a few questions, please. There has been a lot of discussion, both the Chairman mentioned in his opening statement and others have talked about the comparison between the design and implementation of the Next Generation system versus what is going on in Europe. So tell me, in your judgment, are we behind what they are doing, as far as design and implementation in Europe? Can you make the comparison for us?

Mr. ELSAWY. Thank you, Mr. Costello. I think the short answer is no. If you think about progress and how we are making progress, it is really made through implementation of capabilities And let me just take you through where we are in the United States.

First of all, GPS. Satellites are up, they are running. We have one of the most accurate augmentation systems in the world providing global coverage and enabling access to over 5,000 airports in the United States, providing access to rural communities. That is unique to the United States. Other countries are trying to emulate and copy that, which I think is going to be very effective for reducing the cost of the infrastructure in the future.

The implementation of the airspace changes, the RNAV, RNP implementations that are going on today; the implementation of the conflict probe in 20 centers in the United States is first in the world and the decision to move ahead with the implementation of ADS-B to allow a completely different generation of applications to be implemented; the way that we run traffic based upon VFR capacities in the airports versus IFR capacities; the cost of our system.

In short, I think that we are making a lot of progress in building the foundations necessary for the future. The Europeans are in fact ahead in terms of building a governance structure to manage their planning activities, but I don't think that in terms of implementation that they are ahead.

Mr. COSTELLO. Thank you. The corporation that you work for made an analysis of our Government using an LSI, and I wonder if you might talk a little bit about the analysis that your corporation did and the potential risk associated with using an LSI and what recommendations that you would have should the Government decide to go in that direction.

Mr. ELSAWY. Certainly. Thank you.

Let me just refer to my notes. A couple of points I think are very important. In looking at complex acquisitions, we realize that, as we looked at acquisitions across the Government, a couple of things characterized failed programs: certainly, that the requirements were unrealistic, too complex, or too rigid and unstable; that there was a lack of operating systems engineering and architecture established; that there was insufficient weight given to the prior performance in contractor selection; there was an insufficient commitment to ensure adequate and stable funding; and that program management did not adequately anticipate risk.

And we believe that successful programs, first of all, require a strong government program office that is capable of having a peer relationship with the prime contractor or the systems engineering and program management; there has to be careful attention paid to foundational elements, including the architecture and the standards; and there has to be an emphasis on risk management and risk reduction.

The bottom line is that the Government really cannot and is unable to transfer its risk to a lead systems integrator or prime systems integrator. The Government has to know what it wants specifically. The successes that you have mentioned in the FAA, whether it is in the free flight program with the implementation of URET or the traffic management advisory system or the implementation of ERAM, really demonstrate that you have to know what it is that you want, you have to be able to manage the risk, you have to maintain the requirements, and you have to have strong government oversight.

So, without those things, I don't think any model would work, and certainly the LSI model, as we have seen around the Government and the DOD, has lots of issues. My understanding is that DOD is also going to complete a comprehensive analysis of their experience, which will be available in September of 2006.

Mr. COSTELLO. In your written testimony you call upon the FAA to accelerate their implementation of airspace changes. You heard

me and others talk about the 70 percent cut in the airspace redesign program. I wonder if you might talk a little bit about the, in terms of potential capacity, the benefits in fuel savings for airlines, how significant is the FAA airspace realignment or redesign program and how significant are the setbacks, taking into consideration the 70 percent funding cuts?

Mr. ELSAWY. And I think that, again, without referring to specific programs, we believe that the airspace changes are probably perhaps among the single most important changes and the cheapest changes that can be done to the system, because an efficient airspace structure enables runways to be used more efficiently; enables departure and arrival routes to be established more efficiently.

As we have seen in Atlanta, it enables us to implement new procedures and to, in fact, coordinate the traffic flows in and out of major areas. Los Angeles was the same way. Florida, the Florida airspace optimization project was a perfect example where, with changes in procedure and airspace structure, small investments by the FAA yielded tremendous investments and benefits to the specific airlines.

Mr. COSTELLO. Thank you.

Mr. Chairman, I do have a few other questions for the other panelists, but I have run out of time, so hopefully you will come back for a second round.

Mr. MICA. OK. We will come back.

Let me pop a few out here.

I heard some different figures on cost. Two critical things in all of us getting to more modern system in the next generation is cost. I think—well, one of the witnesses was talking about $900 million additional dollars. Was that Dillingham? Fifteen billion dollars over—and that was supposed to be a low estimate. That is correct? What does that get us and where does that get us?

And then after you, Mr. Chew.

Mr. DILLINGHAM. Mr. Chairman, I think I should preface my comments by saying right now all of these estimates are soft, to say the least. What is missing is the enterprise architecture, which is due out soon, which will in fact tell us what kind of technologies are going to be involved and give us a better handle on costs.

Mr. MICA. So you are just guessing about a billion more a year.

Mr. DILLINGHAM. Well, we are not guessing, we are reporting what some studies have in fact said.

Mr. MICA. Does that give you a full architecture to begin implementing next——

Mr. DILLINGHAM. You need a full architecture to be getting closer to a cost that you can count on. I don't think FAA or JPDO would stand behind any numbers at this point. And when I said it was a low cost, even those low estimates aren't including some of the things that would normally be included. So the need to have these workshops that they are planning over the rest of the summer will be also part of the input that goes into it. But clearly it is going to be an expensive proposition.

Mr. MICA. So we talked about some implementation, 15 and 6—we might do it by 2021 as opposed to 25? Is that in this calculation or is that just a coincidence, the 15 years you picked?

Mr. DILLINGHAM. I am sorry, I am not sure what you are referring to.

Mr. MICA. I thought you said it would take about 15 years, about $15 billion.

Mr. DILLINGHAM. That is the schedule for the end of NGATS or NGATS being in place. Of course, as soon as NGATS is in place, the next NGATS is going to start as well. So that is just a time frame, and with that an annual $15 billion.

Mr. MICA. Mr. Chew, people are accusing you of robbing Peter to pay Paul with really not much money. Right now, very small amounts or no money is going into sort of Next Generation and some of these other projects. Actually, we cited two. We are, what, $2.4 billion, $2.5 billion capital. How do you respond to those charges? And then—obviously, this is going to take more money, and we don't know exactly how much. That has been testified to. And at some point you are going to have to come up and tell us how we are going to get there. But obviously that is going to take significant additional capital contribution. Do you want to comment?

Mr. CHEW. Yes. As far as robbing Peter to pay Paul—I will take that part first—it is important to note that one of the things we have done since we started the ATO was to do a very complete review of our major capital programs. We have, in fact, reviewed over 60 of them. That review has caused us to cancel and restructure the capital programs to a savings in the last two years in capital of over $450 million.

It is very important that when we invest in NGATS, when we want to reach goals, that those goals are clear and simple. The worst thing we could do is invest in the wrong thing. We need to invest in the right thing. That means we have to make those investments carefully. And we don't want to make them just because we think it might be a good idea; we need JPDO to help us prove that it is the right idea. And once we do that, what we are doing now—and what you will hear about next week from the Administrator—is we are going to build a plan to get from the current national aviation system to NGATS; and that is a plan with milestones and achievements based upon the capabilities that the JPDO sets before us.

But we have to understand that the emerging new markets, things like very light jets, the UAVs, will add some uncertainty to that number. So I think what we will end up providing you in the long run is probably a number with some uncertainty around it, maybe a range of numbers. Is it going to be expensive? Yes. But can we economize on many of the current programs we have today? Yes.

But the one thing about this architecture is this architecture has to be complete. It has to include not just the next generation system, it also has to include what we are doing with our old generation system. And as you mentioned before, it has to include the plan of how many people and facilities it is going to take to actually execute this over the next 20 years.

Mr. MICA. Just for the record, I didn't mean to be critical of you, I wanted to just throw out some of the criticisms I have heard and that have been lodged against FAA and your actions, because from

the first day you took office I asked you to do exactly what you did, make those critical decisions, call a halt to the dog chasing its tail with these developmental programs that didn't go anywhere, the huge amounts of money we were spending and not getting hardware and tangible results for. So you have done an excellent job in that regard. I just have to put that caveat in there.

My final question, and I do want to yield to other members.

Mr. Pearce, push-backs, have you seen any? Your success depends on a whole bunch of agencies working together. What is the real story? Are we getting any push-backs? Be honest. Whole truth, nothing but the truth.

Mr. PEARCE. It is a very complex undertaking. We have made the most progress in really defining what I would say the core NAS transformation, the ATC elements and so forth, and I think we have developed an extremely good working relationship with sort of the home organization, FAA, and understanding. In fact, the reason——

Mr. MICA. But you don't have any real teeth yet. This is the low hanging fruit, and to get to where there are hard decisions——

Mr. PEARCE. Absolutely. What we need to do and what we are doing is in fact laying out the architecture, laying out the kind of putting the roadmap in place, and then, with the ability we have, holding people accountable to those objective documents. So that is what we are working in cooperation with the agencies, and we are not getting push-back.

I would say that what we need is perhaps to move a little faster with more application of people and other resources from the agencies so that we can get that document, those analyses in place. But we are not getting push-back on the process or push-back on the need or the willingness to align once that is in place.

Mr. MICA. Well, I can't get into the European model, but if we have another round, I have some more questions.

Mr. DeFazio?

Mr. DEFAZIO. Thank you, Mr. Chairman.

I guess, first, Mr. Chew. First, your reviews here look like we are starting to change direction on acquisition. That is good. And as you perhaps have heard, I mean, for years I have always said there is only one agency worse than the Pentagon at acquisition, and that was the FAA. And perhaps now you are at least up to their level, and maybe hopefully better. So that is a good, promising sign.

When are we going to get a nomination or director for JPDO? It sounds like that is absolutely critical. Is there no one in the whole wide world here? I mean, it has been six months. What is going on?

Mr. CHEW. Yes. It is hard to get the right person. However, I am pleased to say that we are well along that process. In fact, I am conducting three interviews this week on this very position. So I think that we had a false start in the beginning. Somebody who we thought was possibly very interested didn't work out at the very last minute, so we lost some time there. But I think we are going to be very, very close here; we have some good candidates on the block and with at least three to six interviews coming up over the next three weeks, I think we are going to be able to move quickly.

Mr. DEFAZIO. On STARS, my understanding is the original plan was 170 sites, and you are apparently now limiting, or at least in the short-term, deployment to 60 sites. What is going to happen to the other 110 sites?

Mr. CHEW. Each one of those locations, as they—we don't want to change the system just to change it, but as they come up for a need to change, that is when we consider whether or not that facility should be changed or should be included in a nearby facility that may already have a STARS system. So there is considerable improvement in both reliability of the system and the backup systems if in fact we do some of what has been termed co-locations or consolidations of terminal radar facilities.

So those are actually done on a case-by-case basis and through a very rigorous process of scrutiny on exactly what that would mean. So that is what those systems would be. And, in fact, if that system came up for replacement and it was determined that either the adjacent facility was too far or wouldn't work very well, then it would be—we would actually have to deploy a STARS system to that location.

Mr. DEFAZIO. So you mean came up, meaning where they were on the schedule for deployment of STARS, is that what you mean? Because most of these people are working without modern equipment, as far as I know.

Mr. CHEW. No, it is actually a combination of capacity, the maintainability of the system that is currently there, how much traffic they actually run, and whether that system that is currently there really needs to be changed or whether it is very reliable, even in its current state.

Actually, the current radar systems that we have in all the terminal facilities are not one system, they are in various states of being modernized; some have new processors, some have new back room displays and some have new front room displays.

Mr. DEFAZIO. Right. So we are not buying vacuum tubes from Eastern Europe any more?

Mr. CHEW. No. Thankfully, we are not doing that any more.

Mr. DEFAZIO. OK. I am glad to hear that.

One last question. And I understand that there is a problem, and it might not—I guess I could both have Mr. Zinser address this and you, but apparently the new communications contract is not going well. I understand that we had some significant disruption in Chicago because of a failure of what seems to me like a fairly simple thing, which is telecommunications. I understand we have some DOD contractor involved in doing that and are not using one of the operating companies. So what is going on there?

Perhaps Mr. Zinser raised whatever concerns he might have about that and then you could respond.

Mr. Zinser?

Mr. ZINSER. Yes, sir. I think you are referring to the FTI program.

Mr. DEFAZIO. Yes.

Mr. ZINSER. In the report we issued, the main point that we were making is that the project is schedule-driven, that is, it is a significant logistical undertaking. In our view, the FAA and the contractor were not implementing a schedule that was going to actually

result in all the cost-savings that they had projected. There are four parts to it: there is installing the new equipment, accepting the new equipment at each site, cutting over to the new equipment from the old, and then disconnecting the old. They were planning out the first and second part on basically a quarterly basis, and there were some coordination problems with the old system and it was falling behind schedule. And if you fall behind schedule on a project like this, you are not going to get the expected cost savings.

The service disruptions that you are referring to did occur on particular sites, and we have a review going on that right now to kind of drill down on those and see what is happening.

Mr. DEFAZIO. OK.

Mr. Chew?

Mr. CHEW. Yes. In fact, out of our new scrutiny that we placed on these projects, it was very good that not only did we discover this very early in the process of the cut-overs, but we appreciate the Inspector General's help, actually, in identifying some of these areas we need to look at.

Let me just mention two things there. One is that the schedule of installation was very aggressive. The good news is that was a fixed price contract, so the contractor doesn't get paid until the new service is accepted at the site. But the savings doesn't come until we quit having two services and we disconnect the new service—connect the new service and disconnect the old service.

So the good news on the new service acceptances is that we are not only at, but we have now exceeded our 700 level per month on acceptance. So the field is in fact ramping up and we are very happy with that result so far.

The disconnects are more difficult, and the original disconnect schedule was not based on cost-savings, it was based on convenience. So we are reordering the disconnect so that we can get the savings earlier. And on that I am happy to report that we have also been auditing this with our new finance department at ATO, and I am very happy to say that so far the savings that we projected for this program actually—and it is a small sample size, so we don't know how the average will end up, but are actually as good or better than we project.

So I think that the taxpayer will be very pleased as this recovery plan rolls out, and given what I have seen, I think we can expect the savings that we see and the recovery plan, I think, is on track. The next two months are critical for us, and we are very, very focused on getting this thing back on track.

Mr. DEFAZIO. OK, thank you.

Thank you, Mr. Chairman.

Mr. HAYES. [Presiding] Mr. Ehlers.

Mr. EHLERS. Thank you, Mr. Chairman.

Mr. Chew, I was very impressed with your very rapid, affirmative response to Mrs. Kelly's question, and so it is very tempting for me to ask for the use of an FAA plane and instructor so I can get my instrument rating.

[Laughter.]

Mr. EHLERS. But, of course, I won't do that, because that would not be proper.

Let me, first of all, say that this is one of the most upbeat hearings I have had on this topic. I have endured some terrible hearings over the past decade on precisely this issue, and I think, from everything I hear, I believe you are getting a handle on it, and it sounds like it is progressing well. I am very concerned about the lack of funding for the FAA at the current time, and I am very worried about starving the FAA and not permitting them to do a good job on this, because I believe it is absolutely crucial.

And having made those editorial comments, I have very little other to ask, because my questions are primarily technical, and it would be more suitable to get those answered in a briefing, rather than take up the time of everyone here.

So, with that, I will yield back, Mr. Chairman, with the understanding that, at some other time, I will take up my questions with you separately.

Mr. HAYES. I thank the gentleman for yielding back.

Mr. Matheson is recognized.

Mr. MATHESON. Thank you, Mr. Chairman.

I know Mr. Costello talked a little bit earlier about the funding of the airspace design, the situation with the funding there, and wanted to get a sense from you of the impacts of this funding shortfall and how it is affecting schedule. And I was interested—and I know if you are going to be able to answer specifics—how that is affecting the process that has been going on for a number of years now regarding the FAA looking at airspace design in terms of the Northern Utah Airspace Initiative, something started about five, actually, six years ago.

First, I want to thank the FAA for briefing my staff on this in May. It was very helpful to get some information on the project. This is a project where the FAA has proposed a scenario, put it out for comment. A couple of major airlines have expressed concerns about the design, as has the Salt Lake City Airport Authority. It is my understanding that the FAA, in response to the Salt Lake City Airport's alternative proposal, engaged MITRE Corporation to do a study to look at the Salt Lake City Airport proposal, and I am wondering if you know what the status is, where that MITRE study is, and if there is an opportunity to review the MITRE study.

Mr. CHEW. I apologize, I don't have that at hand, but I would be happy to make sure that gets to you so we can initiate a discussion on what can be done.

Mr. MATHESON. I appreciate that. When we had—when my staff was briefed by the FAA, one thing we were told is that the FAA was in something called a strategic pause and would know what the next steps of this overall process were going to be some time in the second week of June. And I have also heard from the Salt Lake Airport that they have received some conflicting information about the timing of the status of the project. So with these funding issues in doubt, I am wondering if you do have a sense of what the status of the project is or schedule, if there is any insight you can offer there.

Mr. CHEW. Well, I think the only insight I can offer is that, as was mentioned before, the airspace redesign projects, while they may involve some new displays and things, and so there is some capital or F&E budget requirement, most of it is funded by the op-

erating budget. And as we all know, there were priorities in the recision that gave us some pause about which ones we could fund this year.

Now, I will say that those projects that got pushed to the lower part of the priority and that were suffering delays from this year are back on the docket for doing it in 2007, and our submission of a budget in 2007 is meant to put those back on track. Most all the analytical work was already done for those; it was implementation money and training and these things that are part of the operating budget.

So if there is any delay, and I am not sure that is the case, but assuming that there is a delay, my expectation is, given our budget climate for 2007 and what our operating budget looks like, if we get our request and there isn't any kind of unanticipated recision of some kind that is needed, that we can put these back on track.

Mr. MATHESON. I think that the one item I would leave with you is that I am anxious to make sure that the FAA, even though it came up with its original proposal for design, is willing to consider alternative proposals by either the airport authority local groups that would make traffic flow more efficient but at the same time avoid noise impacts over wilderness areas, which the concern about the current proposal and play, let alone densely populated areas under the FAA's proposal. So I would certainly encourage that openness.

I have some specifics that are probably better for me to give you in written form, just like Dr. Ehlers, so if I could just submit some written questions to you as well, I will yield back the balance of my time.

Mr. MICA. [Presiding] Thank you.

And Mr. Costello moves that we keep the record open for at least a period of two weeks for additional questions to be submitted, and we would appreciate response from the panelists.

Mr. Hayes.

Mr. HAYES. Mr. Chew—thank all of you all for being here. Sorry I missed the early part—if you had to prioritize the top two or three ATC modernization upgrades the FAA can make over the next three to five years, what would those be?

Mr. CHEW. I think we are doing them, actually. It was mentioned by Mr. Zinser that ERAM was an important program for us to watch. ERAM, or En Route Automation, will become our future platform for what is the real brain, the guts of how we keep airplanes separated today.

Now, the good news is that has been somewhat modularized, so it is on schedule and, in fact, may be slightly under-budget right now. So we are very, very focused on that program and deploying that one, and we don't want to impose new requirements on it as they come up or that program could suffer. So what we are doing is, as we look at what is planned for the future, we are looking at what phases of the post-initial deployment will be needed for that.

FTI is another one, because we have program alongside ADS-B in modernization that we call the Systemwide Information Management System. That, in fact, is this notion of information sharing, much like the Internet of today. FTI is not just important from a cost-saving perspective. FTI lays down the infrastructure for the

Internet for aviation system, which would connect airplanes and airlines and business jets and even general aviation into the system.

And once you plug that into the system, we can create applications that are valuable to making the system running better and create it better for the customer using the system. So I think that is a very—not only getting FTI on track, but being able to make use of that FTI system with the new Systemwide Information Management System, what we call SWIM.

So those two programs are very important, along with FTI, and those are not only on our radar screen, we are monitoring those very, very carefully.

All of our programs are part and parcel to what is happening with that. With ADS-B on the horizon, we have retimed and scaled back our future long-term radar needs, because we believe that as we develop those requirements over the next year, ADS-B, that program will tell us exactly how many radars we will need in the future, if any. And I suspect there will always be something there, at least for the next 10 or 15 years. But all those programs are working in concert with each other, and an integrated plan of how that all fits together, along with how many facilities we will have, things like that, is part of all of our focus with JPDO and further. So I would put those three up at the front.

Mr. HAYES. Having said all that, that is a lot of good expensive cockpit management, sophisticated equipment. What happens to the VFR guy in all this? What are your long-range plans for VFR and those good folks?

Mr. CHEW. Well, the VFR and the general aviation customer is extremely important to us and the growth of that industry. We don't anticipate that some of these very, very difficult and very high-tech requirements will be required by every airplane in the system, because there will be need for some of these VFR airplane, whether it is for recreational use or non-recreational use, to have use of airspace without those constraints. It is the really, really busy metropolitan areas that will become the most constrained, and they are the ones, and those areas, that will need the most technology and modernization to be applied to it.

So we see differing requirements for different segments of aviation.

Mr. HAYES. So VFR will still be a big part of what you do and not going to be phased out as a result of—a lot of this high-tech equipment keeps your head down in the cockpit, which is not always a good thing.

Mr. Chairman, they didn't announce they were opening Reagan National before I got here, did they?

Mr. MICA. No, but one thing that hasn't been announced, but we will be having a meeting that we talked about, and I think it will be around the 17th, not the first week we get back, and we will have two of the three principals committed to talk about that and some other pending issues.

Mr. HAYES. I want to make sure I didn't miss it. I thank you and I yield back my time.

Mr. MICA. Mr. Costello, did you want to take a quick shot?

Mr. COSTELLO. Well, Mr. Oberstar is coming in. Let me just ask——

Mr. MICA. Well, we could adjourn now.

Mr. COSTELLO.—a couple of quick questions.

We could, but I don't think that would be a good idea.

[Laughter.]

Mr. COSTELLO. Mr. Zinser, let me say that in your prepared statement you note that you have seen cost estimates and we know that the JPDO, in industry workshops, have talked about cost, they have thrown some figures out. I wonder what sort of funding gap—we have heard others talk about the funding gap. I wonder what, from your perspective, what the funding gap is and when can this Subcommittee expect to see cost estimates from the FAA?

Mr. ZINSER. Mr. Costello, I guess I would say a couple of things about the cost estimates. I think that the numbers that you have heard today are in the ballpark. There are a couple of things going on right now that are very important. One is the work that is being done to try to build a single business case so you can see what all the different agencies are doing, what they have ongoing, and what this program can leverage in terms of the work already going on in other agencies. I think that that has some dollar implications.

Mr. COSTELLO. So the numbers we have heard today, they are in the ballpark?

Mr. ZINSER. Yes, sir. My concern is that you have to find out what you are going to spend it on. The ATO does deserve all kinds of credit for not going out and wasting money on projects that we don't need. However, if you give an agency a bunch of money before you know what you are spending it on. We are asking for trouble and the money could be wasted.

Mr. COSTELLO. Agreed.

I yield the balance of my time in this round, the next five minutes, to Mr. Oberstar.

Mr. OBERSTAR. I thank the gentleman for yielding, and I appreciate the questioning that he has offered.

At the outset of my remarks, I referred to the cooperation and ultimate involvement of air traffic controllers in developing STARS very early on, after a number of stumbles. FAA, in a previous administration, realized that they needed to engage controllers in the design, in the—before the engineers got in and said this is the way it is going to be, consult with the controllers and say how do you think it ought to be. There is certain expertise they have, certain expertise that engineers have.

But then as I reviewed Mr. Zinser's testimony and a letter that just recently came to my attention from GAO to our colleague, Sheila Jackson-Lee. I am troubled. The IG statement says the union that represents controllers is not yet participating in JPDO efforts for a variety of reasons, but needs to be. History has shown that insufficient attention to human factors can increase the cost of acquisition and delay much needed benefits. We have demonstrated that in numerous hearings in years passed.

Problems in the late 1990's with FAA's STARS were directly traceable to not involving users early enough in the process, which I just referred to. And then the IG goes on to say that FAA expects the controllers' role to change from direct tactical control of aircraft

to one of overall traffic management. I know that is still somewhat theoretical, but one of some concern as to how well thought out these changes are.

And the letter from GAO, which was signed by Dr. Dillingham, said that the controller who had been acting as liaison was among the controllers who returned to his facility, and since that time no active controller has participated in planning for NGATS.

Mr. Chew, aren't we missing an opportunity here? Why aren't controllers being actively engaged in this process?

Mr. CHEW. Mr. Oberstar, I actually share your exact perspective on the need to get the people who have to use the system to be part of it, whether it is a controller or a technician who touches that equipment.

Now, the good news is that while we have canceled our liaison program, what is important is that we involve the controller, not necessarily the union. The air traffic controller gives us two really important parts, and one of them is the human factors piece that goes into this of any new system.

Now, the JPDO, which is right now modeling what kinds of things we will need in the future, isn't even close to that at this time, so the involvement of the actual human in the loop in design is yet to happen as that concept of operation is developed. Now, as that idea matures into something that we want to actually test with people attached to it, then it becomes very important to do that, and we in fact, in things that we do today, even without a liaison program, do involve actual air traffic controllers in the process, even though it is not in the liaison program.

For instance, the Houston terminal and en route airspace redesign this year, we included air traffic controllers in that design process. We also included them in this year's productivity evaluation in terms of workload of the current system. And we are testing some new en route simulation training devices that MITRE helped to develop, and we are using actual air traffic controllers in that.

So I just want to differentiate between air traffic controller and the union, because the liaison program was a union program to involve air traffic controllers, but we have other mechanisms to involve them, and we very much value that involvement.

I will say that the liaison program was very, very inefficient, especially when you need someone for just a little bit of time. Where we have massive programs where you touch the controller like the DSR program, which was a whole replacement of the display system that the controller sees, the keyboards and things, that is already done and that is over, so those aren't needed anymore. But any time we develop a new one, where there is an interface that really requires hands-on, I would agree with you.

Mr. OBERSTAR. Well, I am glad to hear your response, rather extensive, but whether involvement of controllers is through the union, NATCA, or through controllers just as—whether tower or TRACON or en route controllers—as individuals is very, very important. I remember in the development of the software for STARS, there were many problems that developed where the contractor had to go back and change things because FAA had not engaged controllers in evaluating what the engineers had designed, and that led to delays, to cost increases.

I note in your testimony the reduction in deployment of STARS from the planned 170 to 60 sites, and I know there is some consolidation going on at the smaller TRACONS, which was a problem that surfaced in the course of the transportation appropriations bill last week. Nobody had an idea of what was going on, why these consolidations. Had there been a briefing for the Committee—not necessarily a hearing, but a briefing—so that we understand what you are doing, that confrontation on the floor could have been avoided.

But tell me. So you have picked 60 sites. On what basis? I know we have the top 50, but some of those top 50 are not among the 60. So what goes into the 110? Are they left with ARTS III? Is it ARTS IIIE? Is it a color ARTS? What are you going to have in those 110 and how are you making that decision?

Mr. CHEW. So the decision on exactly what they need in the future—the reason we took the STARS program and we broke it into useful segments was because we had some that knew we had to do, they were critically needed for either the capacity of the radar system or it was getting so old it wasn't maintainable.

Because the radar systems throughout the rest of the 110 are at different stages, both in terms of modernization—Are we going to build a new tower there? Is that an old display with a new processor? Is it an old processor with a new display?—each one of those is considered and prioritized according to that. So it is a function of how much is needed, how much traffic is there, whether the traffic forecast can be supported by the system there.

And that is what is part of the next phase. In fact, we renamed the STARS program because it isn't just about putting the new STARS there; we have actually found that some of the older systems that are currently there have been upgraded to the point they are extremely reliable. For instance, some of our busy sites, while we were developing STARS, the Common ARTS system in four of the cities, the major cities, have been upgraded to the point that if we put STARS in there, there may have been no discernible benefit for a long time. So we made a lot of——

Mr. COSTELLO. Well, that is what some of the controllers at MSP were saying to me at the TRACON, that if you put OLLEY in, which was an L3 color, and just bracket it on to their existing system, that you would have the equivalent of STARS.

Mr. CHEW. That is right. So, in fact, when that would become a candidate that needed replacement for whatever reason, whether the building was getting old or the system was getting old, we would evaluate what the best value is to the system in putting that in, rather than just saying, well, let's just make it STARS because we have it.

Mr. COSTELLO. Well, we need to have a much longer conversation about that matter so we can better understand how you are making these decisions.

What is the relationship between growth in operations and decisions you are making in the JPDO and in the development of your new system? For example, what has been the growth in operations? I am not talking about passengers, but growth in operations—which is important for air traffic control—in the en route, in TRACONS, in towers? And within those categories are some facili-

ties growing faster since 2001 than others? Will aircraft equipment changes have different effects at differing facilities?

For example, the four passenger jet that we are going to be seeing in large numbers produced in the United States can be operated at ever-smaller runways—ever-shorter runways, I should say. And that may increase operations in some areas where you haven't had increases and not at others. So what assessment have you made of growth in operations, at the various three major facilities, approach control, towers, en route centers, and do you notice disparities within facilities that require equipment upgrades?

Mr. CHEW. It is very different than it was 10 years ago. Post–9/11, the marketplace has changed, and there have been new business models that have emerged. So what you are seeing is that the airports that were crowded before, some of them are becoming even more crowded even faster, and some are not growing at all. Probably the most recent example of high growth and all of a sudden no growth was Washington Dulles, because of a new carrier entrant there that suddenly spiked the number of operations, and now that operations is down.

Now, when you are planning the system forward, both operationally, both for safety reasons and financially, you really do need good forecasts, and to do that you need to study the different emerging business models, for instance, the business models for the very light jets. And we have been engaged in not only looking at those new business models, but trying to find which business models make sense at what airports, and the airports—we are actually looking at redoing our airports plan to engage some of these newer models and to see whether or not our old perspective on the 35 largest airports or busiest airports needs to be revised in the future so that we are more sensitive to these emerging needs of the local communities and some of the smaller communities that suddenly may be experiencing growth from the new business models. So that is very important not us.

Mr. COSTELLO. Well, I am encouraged to see that you are making those evaluations, making those judgments. There are other factors, of course, with the A380 entering in service. O'Hare Airport manager tells me that they are prepared, they are ready; their runway is going to be able to accommodate the new aircraft, they are readying the terminal to accommodate passenger deplaning and planing.

But what about the airspace? What have you seen of modeling at Toulouse by Airbus of the wake vortex created by the 380, and what will be the effect in the airspace of wake vortex and, therefore, on separation? We are not going to have hundreds of them flying in the airspace at one time, but we are going to have some, and there is going to be a wake vortex effect. What is it and what effect does it have on your operations?

Mr. CHEW. And, in fact, we are extremely aware of and plugged into what the emerging requirement, yet to emerge requirement is on what the wake vortex turbulence requirement of separation will be for the A380. That is actually still in some controversy, but the procedures for separating airplanes with needing longer wakes is actually a very well defined procedure even today, as we have different wake turbulence separations for size airplanes, made easier

by the fact that there won't be a lot of them all at once, which will help us to accommodate that.

Mr. COSTELLO. Well, thank you. There are many more aspects of these issues that I would like to pursue, but I realize time is——

Mr. MICA. And we will welcome questions.

I am going to do a quick couple of questions round, and then if people have other questions, we will either get to them or submit them.

Let me just touch on a couple of points. First of all, I have heard the issue raised that there is not enough air traffic controller employee input into some of these technological changes. Now, I have been out there and I have talked to some of the people about some of the problems in delays in bringing about the new technology, and part of it I viewed—and I think I discussed this with you—that the tail was wagging the dog.

And I welcome the input. I think these are the people that have to provide us with input because they work these systems day in and day out. But at some point somebody has to make a damn decision, and that is what I have wanted you to do, and you have done. So we are not turning this into just a continual go back to the drawing board effort.

And, also, some of these technological changes do dilute some of the need for having as many personnel, and some of them actually provide better safety backups than the human factor. So I want to see these technological improvements put in place with decisions that are developed again with input, but not that being a delay factor. And you have done that, so I thank you.

This contract—Mr. DeFazio is gone—the telecommunications contract. Didn't he raise that? I was on the phone. OK. I want that to move forward. There have been delays in that. I understand that some of that went beyond the expectations.

If we have to have the Inspector General follow that—I don't want the vendors who now have the telecommunications service and who benefit by not having the new installation by getting more money from the old system and keeping the old system in place that doesn't do the job. In fact, if I have to, I will direct you to that effort. And I have seen some of those people up here trying to screw up the process, and that has got to stop too.

The benefit to that is having twenty-first century modern communications system that works and that is installed. That is the first benefit, where the backup systems, redundancy, whatever. And the second part of that is that we save money. And the quicker is installed, we save money. So it may not be as much as we looked at in the beginning, but we are going to get the damn system done, and I expect tough oversight. And if I hear anybody trying to deep-six that, I will sic my dogs on them. All right.

I do have further questions about the schedule, and I do want to submit them, because, again, I think it is time for us, as soon as we get the schedule gel, and then we can look at the costs, I think that it is important that we develop that time frame. I am understanding that I am going to get a clearer picture of that, and then basically a printout of where we are going and that we will have accountable milestones, costs, and schedule. OK? All right, so that will be the last thing that I require.

And I will submit the balance of my questions for the record.

Mr. Costello.

Mr. COSTELLO. Thank you, Mr. Chairman.

Dr. Dillingham, in your written statement you note that there are no current controllers involved or working with the Next Generation Initiative, and I wonder if you might tell us why that is and why is it important that the controllers be at the table and be involved with the Initiative.

Mr. DILLINGHAM. Mr. Costello, I think this is, in part, what was being discussed a few minutes ago in that there was a liaison program between NATCA, the controllers' union, and ATO for technological developments, and that program was terminated in 2005 and the controllers were returned to the boards. At that point in time, the controller who worked with JPDO was also a part of those controllers that returned to the boards.

And I think Mr. Oberstar pointed out that it is very important, especially from a human factors point of view, that you involve those individuals that are going to be working that equipment, and particularly in this JPDO NGATS environment, where there is going to be a shift in the responsibilities of the controllers. It will be a different air traffic management system and they will have different responsibilities than they have now. So it is very important that the controllers or controller expertise be a part of the development of the system.

JPDO has indicated that—and Mr. Chew has also indicated today that-when they need controller expertise, they will find that expertise and they will have it and use it. We don't, at this point, know how that is going to happen, but we assume that there is a way that it will happen.

But the Chairman makes a good point as well, in that you need controller input, but you don't need a situation where input is such that it stops or delays the implementation of technology. So you need to strike a balance, and it is very, very important.

Mr. COSTELLO. It is important that the controllers be at the table.

Mr. DILLINGHAM. Yes, sir.

Mr. COSTELLO. Very good.

Mr. Zinser, you mention in your written testimony, you talk about the human factor and the importance of workforce safety and the implications that that has, and I wonder if you might comment on that, as well as the relationship between JPDO and the FAA. Do you believe it is adequate? And if not, what do you recommend be done to strengthen it?

Mr. ZINSER. In terms of human factors and safety, these are many issues that need to be analyzed and understood to get the expected increases in capacity the fundamental mission of the FAA and the air traffic controllers is safety. Their job is to make sure that the planes are separated and operated safely. We cannot lose sight of that. Any changes you make in procedures or how traffic is separated, is a safety issue. .

In terms of the relationship between the FAA and the JPDO, I think the JPDO has done what they are supposed to have done at this point—it is still evolving. The point we made about the FAA finding leadership for the JPDO is very important, and I think that

the things that they have going on right now, such as working with OMB to come up with their business case and coming up with the architecture, are going to be very important steps. We are anxious to see what they come up with.

Mr. COSTELLO. Final question, and then I have a comment for Mr. Chew.

But, Mr. Pearce, the FAA consolidation, the facility consolidation as a part of JPDO, is that a mandate or a mission that the JPDO has taken on? Have you been given the responsibility? Is it a mandate of the JPDO, the facility consolidation?

Mr. PEARCE. No. I mean, there is no mandate on the JPDO to do consolidations. It is certainly the role of FAA to look at that. Our perspective is one of meeting the goals for the future of air transportation, and if consolidation helps us along that way, then that will certainly be a part of the plan. But consolidation in and of itself is not a goal of the JPDO.

Mr. COSTELLO. Can you see the goal of accomplishing, tripling the capacity by 2025 without consolidation?

Mr. PEARCE. The challenge of tripling capacity is finding the right technologies and getting those technologies to the system that allow the productivity of the controller, the automation, that interface to be there. Consolidation can certainly help in that regard in terms of getting the right people together in the right facilities, with the right automation and so forth, but it is not—like I said, it is not a—we haven't determined exactly the ways in which that would need to take place and, like I said, it is not a goal, in and of itself, to do consolidation. So we really do have to do the architecting to see how the people interface with the automation and then what the right level of those facilities are to come to that determination.

Mr. COSTELLO. Thank you.

Mr. Chew, let me associate myself with the remarks made by the Chairman in the job that you were doing. We have confidence in what you are doing and will continue to work with you. Let me say that in the transportation appropriations bill in 2006, and then again this year, in the House version, the Congress encouraged the FAA to move forward to install the ASDEX radar system at O'Hare and to implement the RNAV arrivals and descent. Yet, I have been told that the FAA has not taken any action to move forward on these initiatives at O'Hare, although you have moved forward at other airports with less traffic.

And I just want to tell you that we still have caps, as you know, at O'Hare on a number of flights and the delays persist. I will be following up with you with some written questions that I would ask that you would respond as quickly as possible concerning those issues.

And on a related topic, we are focused here today talking about the year 2025, but there are steps that we can take today that will and can dramatically impact capacity and the airline fuel costs within a few years, and I would say that accelerating the deployment of RNAV and RNP procedures and supporting airspace redesign efforts are two prime examples. And, Mr. Zinser, let me say that I will be in touch with your office to review the progress being made on near-term solutions, and there is no question that it is

critical that the Congress keep these important near-term projects on track.

So, with that, Mr. Chairman, I will yield back the balance of my time.

Mr. MICA. Thank you.

Let me get Mr. Hayes.

Mr. HAYES. Thank you, Mr. Chairman.

Mr. Zinser, regrettably, your recent report on the status of FAA's telecommunications infrastructure, FTI, has been mischaracterized by some interested parties. I wanted to confirm that your report did not raise any safety issues involved with implementation of FTI. Is that correct?

Mr. ZINSER. That is correct, sir. Our report did not include any safety issues identified.

Mr. HAYES. Thank you.

Mr. Chairman, I yield back.

Mr. MICA. Let me just—everybody has had a final word here.

We were talking about where we were in JPDO, and one of the things that was mentioned—I think someone raised a question about Europe—in my opening statement I made some comments we ought to look at it, and then they raised questions about it, and then you commented, Mr. ElSawy, that, as far as organization, they were ahead of us.

Don't you see us needing to get to some point where we sort of have some teeth in this and some organization that can make decisions and move forward? Because right now you don't have that capability. You know, like I said, they are picking low-hanging fruit. I mean, aren't we getting pretty close to where we are going to need that?

Mr. ELSAWY. I think, as I mentioned, in Europe, what they have chosen to do is to basically let out a contract to a consortium of 32 companies of industry to do the initial planning for the JPDO or for the Next Generation Air Transportation System, and they have developed a fairly comprehensive governance model for how those companies interact with each other.

I think in the United States, with the interagency agreements, the work that the JPDO is currently doing on the concept of operations the development of the architecture, and then working with the NGATS Institute really should focus on that activity of how industry will engage in the future, how the contracts will flow, and then, at the appropriate time, what is the right balance between industry participation and government participation. So I think we are getting there.

Mr. MICA. The other thing is maybe in talking with Mr. Chew, I don't know when we come up with the cost, there will be costs absorbed by other agencies, too. Looking at that whole picture, we may get a better idea of how we may need to put some other authority together to make things happen.

Mr. ELSAWY. I think Inspector General Zinser really hit the nail on the head in the sense that the budget process that drives the JPDO governs the progress and governs our ability to really have an integrated plan. This is a very complicated process; it is really an experiment in government in the sense of coordinating the budgets and the projects and the programs with multiple agencies,

multiple authorities, multiple years, different missions. So it is fairly complex.

Mr. MICA. But then you have got the other part of the equation is getting the compliance and setting some implementation. I mean, there is cost involved to air carriers,——

Mr. ELSAWY. Absolutely

Mr. MICA. —to general aviation, to a whole host of folks. And we are going to have to have some teeth, we are going to have to have some deadlines, and we are going to have to have some implementation schedule that is going to be tough.

Well, again, we will have additional questions. A very interesting hearing. We got some great witnesses today who provided us, I think, at least with a good status report. Hopefully we can get the balance of the blueprint in additional meetings and hearings.

There being no further business before the Subcommittee today, again, we thank you, and this hearing is adjourned.

[Whereupon, at 4:47 p.m., the subcommittee was adjourned.]

OPENING STATEMENT OF
THE HONORABLE RUSS CARNAHAN (MO-03)
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEE ON AVIATION
U.S. HOUSE OF REPRESENTATIVES

Hearing on
Air Traffic Control System Modernization: Present and Future

Wednesday, June 21, 2006, 2:00 PM
2167 Rayburn House Office Building

Mr. Chairman and Mr. Ranking Member, thank you for holding this subcommittee hearing today.

The United State's Air Traffic Control System is the nation's most complex transportation network, moving billions of dollars of goods and nearly half a billion people each year. In some cases the technology running this vast network is now entering its fourth decade of usage, and each year a record amount of air traffic uses our ever-aging grid. With air traffic predicted to double in ten years and triple in twenty, it's rather apparent that we need to upgrade the system, which is already outdated in this decade, to be prepared for the next two or three decades.

Unfortunately, previous attempts to modernize our air traffic control system have been over budget and been behind schedule as the rule instead of the exception. The main concern I have today is that we lack a firm, cohesive plan to upgrade our aviation infrastructure. Vague objectives ultimately result in vague overpriced results. We need specific plans for specific upgrades that will lead to results. Our air traffic control system is essential to our country's citizens and economy. I would like to find out how we can get the resources, expertise, and a plan quickly in place so that we may begin implementing these sorely-needed changes.

Thank you for your testimony today. I'm very interested in how we can solve these pressing problems.

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JOINT STATEMENT OF
RUSSELL L. CHEW, CHIEF OPERATING OFFICER, AIR TRAFFIC ORGANIZATION OF THE FEDERAL AVIATION ADMINISTRATION
AND
ROBERT PEARCE, ACTING DIRECTOR, JOINT PLANNING AND DEVELOPMENT OFFICE
BEFORE THE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEE ON AVIATION
ON THE AIR TRAFFIC ORGANIZATION AND THE JOINT PLANNING AND DEVELOPMENT OFFICE

June 21, 2006

Introduction

Good afternoon Chairman Mica, Congressman Costello, and Members of the Subcommittee. With me today is Robert Pearce, Acting Director of the Joint Planning and Development Office. We thank you for the opportunity to testify today about how the FAA's Air Traffic Organization (ATO) and the multi-agency Joint Planning and Development Office (JPDO) are working together to foster the development of the Next Generation Air Transportation System (NGATS) while providing operational and safety enhancements today.

You have been with us every step of the way – even before the enactment of the VISION 100 Century of Aviation Act – and we are most grateful for your continued leadership and commitment to this historic effort. The NGATS initiative is also a high priority and shared commitment for Secretary Mineta, Administrator Blakey, and the JPDO's partner agencies. We are all in this together.

We recognize that there are many challenges in converting JPDO's vision of the Next Generation Air Transportation System into reality. Because JPDO is not an implementing or executing agency, the FAA must work closely with the JPDO to develop an implementation schedule for the operational changes required as new technologies are deployed to realize the NGATS vision. We intend to use the construct of the Operational Evolution Plan (OEP) to help us. We will expand the scope of the OEP from a capacity only focus to a plan that will take us from today's National Airspace System (NAS) to tomorrow's NGATS.

JPDO transformational initiatives will be identified, rigorously evaluated, prototyped, and tested so they can be ready for transition into the NAS operation. Required operational implementation schedules will be tracked, as well as dates by which initiatives must be funded in order to meet those schedules. Cost will be a vital factor: we cannot create a Next Generation system that is not affordable. The NAS and NGATS Enterprise Architectures will provide the backbone of this new OEP by specifying roadmaps for system and certification requirements, operational procedures, program phasing, and prototype demonstrations. The NAS to NGATS OEP will be the mechanism by which we inform our owners, customers, and aviation community of our plans and progress towards the JPDO vision, while assuring that the JPDO and the FAA are jointly on-track to deliver the Next Generation Air Transportation System.

Achievements and Successes of ATO

Mr. Chairman, the Air Traffic Organization was created in 2004 as a result of your efforts, and the hard work of this Committee. Now, we are producing real results. In FY2005, the first full fiscal year of the ATO business structure, significant improvements were made operationally, financially, organizationally, and managerially.

One of the core responsibilities of the ATO is to ensure the safety of the users by maintaining the proper separation of aircraft; and the failure to maintain this separation is called an operational error. In FY2005, the en-route service unit significantly reduced the number of operational errors. In FY2004, there were 373 Category A and B operational errors in the en-route environment, which are the more serious types of errors. In FY2005, these were reduced to 308, an improvement of more than 17 percent. These safety gains can be attributed to increased controller awareness and performance, as well as new technology and procedural improvements related to the deployment of Domestic Reduced Vertical Separation Minimums (DRVSM) and the User Request Evaluation Tool (URET).

In 2005, the ATO implemented a new procedure, known as Domestic Reduced Vertical Separation Minima or DRVSM, which is truly exciting. DRVSM has significantly increased capacity in the en route airspace by doubling the number of usable altitudes between 29,000 and 41,000 feet. The procedure permits controllers to reduce minimum vertical separation at altitudes between 29,000 and 41,000 feet from 2,000 feet to 1,000 feet for properly equipped aircraft. DRVSM allows greater access to fuel efficient routes that was previously unavailable due to the increased separation requirements. We

originally estimated DRVSM would save airlines approximately $5 billion through 2016, an estimate that could be conservative in light of the increase in fuel prices in the last year.

The User Request Evaluation Tool (URET) is a tool used by pilots to request from air traffic controllers a new, more direct course between point A and point B, and the controller to predict potential aircraft to aircraft, and aircraft to airspace conflicts earlier, allowing them to construct alternative flight paths. URET allows these conflicts to be addressed in a strategic sense rather than a tactical sense, with fewer deviations to the route or altitude. Fewer deviations can result in less fuel burn. The system makes it easier for controllers to respond to pilot requests for more efficient routings, more fuel efficient altitudes, and wind-optimal routes, all while improving safety at the same time. Estimated savings for the aviation industry from URET in FY 2005 were 25 million miles in aircraft travel, and $175 million in operating expenses.

Financially, capital programs are also being managed better through phased development and implementation. In FY2005, 92 percent of schedule goals were met for 31 major programs, and 97 percent of major acquisition programs met budget goals. Increased oversight for major capital investments has resulted in three Facilities and Equipment (F&E) programs being rejected, and ten others being restructured for additional savings.

The ATO has continued to improve its organizational structure, yielding considerable operational improvements and cost savings. The ATO completed the outsourcing of Flight Service Stations, the largest non-Defense outsourcing effort in the Federal

government, which will save $1.7 billion over 10 years. Further organizational realignments are underway, with the ATO presence in the nine FAA regions being consolidated into three service areas, which we expect to result in over $460 million in savings over the next 10 years. ATO executive staffing was reduced 20 percent and management was reduced by 10 percent. This translates to a 3 percent cut overall since ATO's inception, with the largest reductions occurring in non-safety positions. This resulted in lowering our labor cost per flight by 1.5 percent, even as the ATO absorbed a 5.1 percent salary increase.

Improvements in all areas stem from the managerial improvements. The Strategic Management Process, which is what we call our business scorecard process, was fully implemented in FY05, with Strategy Map's four pathways being completed. The ATO has linked metrics to the objectives on the strategy map, and deployed tools to allow our managers to "drill down" to individual service delivery points to determine why these targets are being met or missed. As a result, the ATO has improved its ability to meet the performance targets on its scorecard. In FY04, the ATO met only three of its seven targets, while in FY05, six of seven targets were met. We are using the Strategic Management Process to formulate our FY2008 capital budget along the lines of the four strategic pathways. The JPDO participates as a full member of Pathway 4, entitled, "Ensure a Viable Future," and has submitted FY2008 budget requests to ATO via this Pathway. Moreover, JPDO takes part in reviewing ATO capital projects and prioritizing ATO projects submitted to Pathway 4.

Operational Improvements: Today and 2025

The ATO and the JPDO have taken a dual and complementary approach, keeping our eyes focused on the 2025 Vision, while we are working in concert to use existing technology to provide important and tangible operational benefits now and in the future to those who use the national aviation system. We are finding ways to make existing capacity work more efficiently, through advanced technology and operational improvements. Indeed, some of these efficiencies are not only providing relief today, but are helping to lay the foundation for the Next Generation System.

One major ATO initiative is expanding the implementation of Area Navigation (RNAV) procedures to additional airports. In 2004, thirteen RNAV departure procedures and four RNAV arrival procedures went into full operation at Atlanta Hartsfield-Jackson International Airport – the world's busiest airport. RNAV procedures provide flight path guidance that is incorporated into onboard aircraft avionics systems, requiring only minimal air traffic instructions. This significantly reduces routine controller-pilot communications, allowing more time on frequency for pilots and controllers to handle other safety-critical flight activities. Also, RNAV procedures use more precise routes for take-offs and landings, reducing fuel burn and time intervals between aircraft on the runways, and allowing for increases in traffic, while enhancing safety.

In post-implementation studies by MITRE and the Center for Advanced Aviation System Development (CAASD), the annual operational benefits to airline operators from RNAV procedures at Atlanta are estimated to be $39 million. Delta Airlines anticipates potential

benefits up to $30 million with refinements to the procedures published in 2005. Additionally, sixteen RNAV departures implemented at Dallas/Fort Worth International Airport in 2005 are expected to provide operators with estimated savings of $10 million annually through reduced delays. American Airlines anticipates operational benefits up to $20 million with increased throughput and departure capacity gains. The FAA has over seventy-five RNAV procedures under development this year.

In the en route environment, we plan to publish more than 20 low-altitude and high altitude RNAV routes. The high altitude routes eliminate the need to over-fly ground-based navigation aids and allow the design of more direct, efficient routes. Low altitude RNAV routes allow direct routing through terminal airspace for Global Navigation Satellite System equipped aircraft. These routes are especially useful for general aviation flights, which previously would have been vectored around the terminal airspace.

ATO is currently implementing additional technological innovations, including a system known as Required Navigation Performance (RNP). RNP uses on-board technology that allows pilots to fly more direct point-to-point routes reliably and accurately. RNP is extremely accurate, and gives pilots not only lateral guidance, but vertical precision as well. RNP reaches all aspects of the flight – departure, en route, arrival, and approach. For example, in January 2005, in partnership with Alaska Airlines, we implemented new RNP approach procedures at Palm Springs International Airport, which is located in very mountainous terrain. Under the previous conventional procedures in use at Palm Springs, planes could not land unless the ceiling and visibility were at least 2,300 feet and three miles. With these new RNP procedures, air carriers with properly equipped aircraft can

now operate with a ceiling and visibility as low as 734 feet and one mile. This lower landing minima has allowed Alaska Airlines to "save" 27 flights between January and November, 2005, flights which would have otherwise had to divert to Ontario, California—an added distance of at least 70 miles.

We must also make sure we are using the best technology to maintain a safe and efficient air traffic system. The en route air traffic control computer system is considered the heart of the NAS. En Route Automation Modernization (ERAM) provides the basic foundation upon which many of the transforming technologies moving us from the current NAS to NGATS needs. ERAM replaces the software for the Host Computer System and its backup. It will enable the FAA to increase capacity and improve efficiency in a way that cannot be realized with the current system, which is a mix of different technologies that evolved over the years and is extremely difficult to expand or upgrade. In addition to supporting new transformational technologies, ERAM itself can process more than double the number of flight plans, and use almost triple the number of surveillance sources as the current system. The ERAM system is scheduled to be deployed and operational at all 20 Air Route Traffic Control Centers by 2010.

Traffic Flow Management (TFM) is the "brain" of the NAS, and is the reason that we could handle more traffic at our major airports in 2005 than in 2000, without the long delays that made the summer of 2000 the worst on record. The TFM system is the nation's single source for capturing and disseminating traffic information for the purposes of coordinating traffic across the aviation community. As the NAS is impacted by severe weather, congestion and/or outages, the TFM system provides timely information to our

customers to expedite traffic and minimize system delays. The FAA is currently in the process of modernizing the TFM infrastructure through its TFM Modernization program. We are currently introducing new Airspace Flow Management technology to reduce the impact of delays incurred during the severe weather season. FAA estimates show that TFM provides roughly $340 million in benefits to our customers on a yearly basis in reduced direct operating costs through delay reductions. ERAM and TFM together will enable flexible routing around congestion, weather, and flight restrictions, and help controllers to automatically coordinate flights, during periods of increased workload.

The JPDO and ATO will work together to analyze the changes that will needed to both ERAM and TFM so they meet the needs of 4-dimensional air trajectory-based operations – a key capability of the Next Generation System. Today's flight planning and air traffic paradigms will be transformed into a system that manages operations based on aircraft trajectories, regularly adjusts the airspace structure to best meet customer and security/defense needs and relies on automation for trajectory analysis and separation assurance.

The Next Generation Air Transportation System

Our vision of the Next Generation System is not limited to increased capacity. It is one which encompasses the whole air travel experience – from the moment the passenger arrives at the curb of his departure airport to his or her exit from their destination airport. The Next Generation System includes security, safety, and efficiency of passenger, cargo and aircraft operations. Technology will change the way America flies. Aircraft will be

able to use information technology in a more robust way, with enhanced cockpit, navigation and landing capabilities, and far more comprehensive and accurate knowledge of real time weather and traffic conditions.

The Next Generation Air Transportation System will be more flexible, resilient, scalable, adaptive, and highly automated. The NGATS operational vision is not just related to the air traffic management system alone, but also includes the preservation and growth of airports, heliports, and other future landing and departure facilities to fully incorporate the emerging NGATS benefits. This system will be built on a far more robust information network than anything we have seen to date, ensuring that the right information gets to the right person at the right time, while keeping the nation safe and the flow of traffic running smoothly. We will increasingly cut the cord between ground and air as we put more information directly into the cockpit of intelligent aircraft through sensors and satellites linked together through network communications.

The importance of developing this system of the future is also quite clear to policymakers in Europe, where a comparable effort is well underway. This presents both a challenge and an opportunity to the United States. Creating a modernized, global system that provides interoperability could serve as a tremendous boost to the aerospace industry, fueling new efficiencies and consumer benefits. Alternatively, we could also see a patchwork of duplicative systems and technologies develop, which would place additional cost burdens on an industry already struggling to make ends meet.

Our overarching goal in the NGATS System initiative is to develop a system that will be flexible enough to accommodate a wide range of users -- very light jets and large commercial aircraft, manned and unmanned air vehicles, small airports and large, business and vacation travelers alike, while handling a significantly increased number of operations with no diminution in safety, security and efficiency. Research will continue to help us find the right balance between a centralized ground system and a totally distributed system, where aircraft "self-manage" their flight with full knowledge of their environment.

Under the leadership of Administrator Blakey, the JPDO now serves as a focal point for coordinating the research related to air transportation for agencies across the Federal government, including the Departments of Transportation, Commerce, Defense and Homeland Security, as well as NASA and the Office of Science and Technology Policy. The JPDO achieved important milestones in 2005 towards building the NGATS system. The JPDO completed its internal organization and created eight government/industry Integrated Product Teams (IPTs) to break this large and complex project into manageable strategies. These strategies focus on those aspects of aviation that hold the keys to capacity and efficiency improvements – airport infrastructure, security, a more agile air traffic system, shared situational awareness, safety, environmental concerns, weather and global harmonization of equipage, and operations. The Teams work closely with our stakeholders to ensure that they have an early window into our thinking and that we take full advantage of their expertise every step of the way. What truly sets this new structure apart is that it eliminates duplication of effort and resources among Federal agencies

involved in aviation and gets them working toward a common goal – creation of a NGATS system.

One of the misconceptions about the Next Generation System initiative is that we have to wait until 2025 to start seeing the benefits. This idea is demonstrably false. In 2005, the JPDO moved ahead with plans to accelerate the development of key NGATS projects, such as Automatic Dependent Surveillance-Broadcast (ADS-B), and System Wide Information Management (SWIM). In FAA's Fiscal Year 2007 budget request, the Administration proposed several targeted investment areas, to promote early implementation of elements of the NGATS system. The details of other programs will evolve over time as the Enterprise Architecture is fully developed and system requirements are established. These accomplishments are highlighted in the recently published "2005 Progress Report to the NGATS Integrated Plan" that was transmitted to Congress on March 10th as required by Vision 100.

One of these very promising initiatives, with potential for broad operational applications, is the Automatic Dependent Surveillance-Broadcast (ADS-B) system, a technology that will replace ground-based radar systems and revolutionize air navigation and surveillance. For FY 2007, the President's budget includes $80 million for the FAA for the ADS-B program. The ADS-B system was the key enabling technology for the Capstone demonstration program in Alaska. Capstone is a technology-focused safety program that seeks near-term safety and efficiency gains in aviation by accelerating implementation and use of modern technology, in both avionics and ground system

infrastructure, with the goal of reducing the exceedingly high accident rate in Alaska for small aircraft operations, which was nearly five times greater than the national average. Through 2005, the program achieved significant safety and efficiency results. Aircraft equipped with ADS-B have had a consistently lower accident rate than non-equipped aircraft. From 2000 through 2005, the rate of accidents for ADS-B-equipped aircraft dropped significantly--by 49 percent. That is real progress.

Given its fundamental importance to the success of the NGATS System, establishing an initial Network-Enabled Operations (NEO) capability is a high priority for JPDO and its member agencies. Current efforts focus on identifying the network architecture and enacting standards for information and safety data sharing. This is the situation today: DoD has already invested considerable resources in information technology and telecommunication research focused on NEO and information access and sharing. FAA, DHS and Commerce are also committed to developing network-centric information architectures. The opportunity now exists to synchronize these efforts, especially in the areas of data interoperability and compatible network-to-network interface mechanisms. Two on-going DoD initiatives – the synchronization of DoD and DHS classified networks and DoD's development of its Net-Centric Enterprise Services – will serve as templates for this effort.

In 2005, the JPDO, FAA and an industry team demonstrated how network-enabled concepts developed for the military customers can be applied to Air Traffic Management. The Joint Network-Enabled Operations Security Demonstration connected seven Air Traffic Management and security systems distributed over 12 different locations. It

showed how sharing information in real time across air traffic, air defense, and law enforcement domains helps agencies respond to a security incident more efficiently. The exciting part of the NEO demonstration project is that it enabled communication between agencies' individual, stove-piped networks, eliminating the need to throw out all the individual legacy systems and create a brand new mega-system, which would be prohibitively expensive.

The President's budget proposal for Fiscal Year 2007 requests $24 million for FAA's System Wide Information Management (SWIM) program to conduct a follow-on to the very successful NEO demonstration and to jump start the FAA acquisition program responsible for implementing such technologies operationally.

These technological and operational improvements are positive steps down the road to building the Next Generation Air Transportation System. We know, however, that we continue to face many challenges. Over the next few years we will work to achieve better cost management; determine the best solution for our aging and deteriorating facilities; plan more effectively for catastrophic events, like hurricanes or terrorist attacks; and, conduct research on convective weather to reduce flight delays associated with summer storms. Everything in our business – pay, job performance, future technology, the nation's economy – is linked together. We strive to improve efficiency, while searching for innovative ways to provide safer services even more efficiently. As we decide how to wisely invest in our future, we will continue to work closely with our customers, our employees, and of course, Members of Congress.

Mr. Chairman, this concludes our testimony. We would be happy to answer any questions the Committee may have.

Air Traffic Control System Modernization

Question #1: The DOT IG found that most of FAA's Facilities and Equipment (F&E) account funding goes for sustaining the existing ATC system, not for new initiatives like NGATS. Consequently, FAA is forecasting a significant funding gap as it increases funding for NGATS programs over the next five years. The annual gap is expected to range from $500 million in FY 2008 to as high as $1.2 billion in FY 2011. In light of this funding gap, how is FAA going to pay for sustaining the existing ATC system and investing in NGATS?

Answer:

- The FAA is committed to sustaining the existing ATC system while transitioning to NGATS. The majority of the current F&E FY 2007 budget request is dedicated to keep major on-going programs on track, and continue infrastructure investment at an acceptable risk level. Core NAS infrastructure programs for facility improvements at ATCTs, TRACONs, ARTCCs, and unmanned facilities are funded at previous years levels and key on-going major acquisitions, such as STARS, ERAM, FTI, WAAS, ITWS, ATOP, TMA, and ASDE-X are fully funded. In addition, three new key NGATS initiatives were also introduced in the FY 2007 budget request (ADS-B, SWIM, and NAS Voice Switch).

- The NGATS vision of a seamless, flexible and more technology based air transportation system is a long-term transformation process. Legacy programs fit into the NGATS vision primarily as a bridge to it. Recently the FAA and JPDO have identified F&E programs supporting NGATS into two categories, enablers and direct contributors. This is determined based on how the program contributes to the NGATS capability goals. In FY 2007, $359.9 million of programs in the budget are categorized as direct contributors and $738.4 million are categorized as enablers.

- In the next five years, many of the major ongoing acquisitions such as ERAM, FTI, ITWS, STARS, and TMA are nearing completion, and the need for capital funding , which was high in recent years, will go downward in future budget years for FY 2008 and beyond. As the funding needs for these programs decrease, this will also enable us to introduce additional new NGATS initiatives in future budget submissions.

- We are continuing to revalidate the capital program needs to transition to NGATS and continue to sustain the NAS during this transition. These efforts are ongoing, and will be incorporated into the FY 2008-2012 reauthorization proposal, anticipated to be submitted next year.

Automatic Dependent Surveillance –Broadcast (ADS-B)

QUESTION #2: A key component of NGATS is Automatic Dependent Surveillance – Broadcast or ADS-B. I understand this satellite-based technology will help increase capacity, enhance fuel efficiency, and curb runway incursions. What are the major challenges in deploying such technology?

RESPONSE: Currently, the ADS-B program office faces the following challenges: rulemaking, determining the backup strategy for ADS-B, separation standards for Air Traffic Control (ATC) displays, and the effects of the uplink saturation in the high density airspace.

Rulemaking:

In order to enable the ADS-B applications and achieve the optimal benefit, all aircraft operating in certain controlled environments must be equipped with ADS-B technology. To achieve universal equipage in the target areas, the Surveillance and Broadcast Services Program Office has requested that the FAA undertake a rulemaking effort to mandate ADS-B equipage in defined airspace. The agency is targeting the release of a Notice of Proposed Rulemaking (NPRM) in September 2007.

Backup Analysis:

Another challenge of the program is to determine how to mitigate the impact of a loss of GPS on the National Airspace System (NAS) surveillance and navigation services. To mitigate this risk to the program, a workgroup has been established to recommend a backup strategy and identify the performance needs for the ground system and avionics in applying the recommended backup strategy. This workgroup will have a final report in November 2006.

Separation Standards:

In order to mitigate the risk to establish separation standards a cross organizational workgroup has been formed to:

- Identify, develop and validate aircraft separation standards for use with ADS-B
- Define the methodologies and outline the processes necessary to effectively determine suitable separation standards for ADS-B in a mixed ADS-B and radar environment, as well as in an ADS-B to ADS-B environment

- Identify and conduct analyses, modeling, simulations, and tests to validate separation standards
- Generate products in the form of technical notes, papers, and reports, with supporting conclusions and recommendations, to support decision making for requested separation standard approval(s)

Prior to the NPRM being release, the FAA will have the above mentioned documentation and tests completed. The Agency will be able to demonstrate viability of ADS-B to meet separation standards for national deployment, which will lower the risk to the program. This analysis will provide justification for minimum performance requirements for the planned NPRM release in September 2007.

After the NPRM is released, the Agency will deploy ADS-B infrastructure in selected Segment One locations. A series of test and analyses will be conducted, in order to obtain separation standards approval for the key sites in Segment One. The risk will be retired prior to the publication of the final rule, planned for November 2009.

Uplink Saturation:
There is a limitation on spectrum occupancy. If the spectrum requirement for implementing 1090 Extended Squitter (ES), which is used by commercial aircraft, exceeds spectrum limitations, then there may be interference to the Traffic Collision Avoidance System (TCAS) or Secondary Surveillance Radar (SSR) systems. A technical analysis is currently underway by the Agency to determine the effects of this issue, which will be completed in October 2006. It is anticipated that the solution challenge would be one of spectrum management and not technological feasibility.

Automatic Dependent Surveillance – Broadcast (ADS-B)

QUESTION #3: Do you believe incentives (i.e., tax incentives, financing options, or targeted deployments for users that equip early) will be needed to spur ADS-B equipage?

RESPONSE: Incentives will play an important factor in driving the ADS-B program forward. In the absence of a mandatory rule, the FAA strongly encourages early adoption of the ADS-B technology. For example, the Helicopters Association International (HAI) and United Parcel Services (UPS) have partnered with the agency to become early adopters of this technology.

The FAA has signed a Memorandum of Agreement (MOA) with HAI. They will be providing several million dollars of in kind contributions and the FAA will be providing the technology in the Gulf of Mexico within Segment One of the program. UPS has voluntarily equipped with the technology which has provided them with unprecedented savings in fuel and greater capacity. Louisville, Kentucky and Philadelphia, Pennsylvania, two of their major hubs, are included in the Segment One implementation activities for the program.

The FAA is continually looking for these types of partnerships early in the program to increase early benefits and drive the earned value process for both the users and the FAA.

Question #4: The time frame for NGATS is 2025. FAA predicts that domestic air traffic will double over the next decade. Can our existing ATC system accommodate this dramatic growth in the short term, or is a system-wide meltdown inevitable?

- The FAA's 2006-2017 forecast projects a 33% increase in IFR flights and a 44% increase in en route operations over the period although there are locations where doubling of demand may well be experienced within the decade.

- While our existing ATC system will not accommodate this growth, we are implementing and planning system improvements to meet the challenges for this decade as transitions steps to NGATS.

- The operational improvements in the current Operational Evolution Plan (Version 8), enabled by these system changes, should meet this growth and result in the same level of delay in 2015 as we experienced in 2000.

- In order to sustain this growth through and beyond this decade, the FAA continues to work with its JPDO partners towards the NGATS vision. We are moving to and will use the new Operational Evolution Partnership to assure the same level of coordination and commitment that the community has experienced in the current OEP.

Question #5: In 1997, the bipartisan Mineta Commission recommended several potential cost savings initiatives, including consolidating major ATC facilities, consolidation of regional offices, decommissioning ground-based navigational aids, and expansion of the contract tower program. Have you given any of these proposals serious consideration?

Answer: The Federal Aviation Administration (FAA) has taken the recommendations of the Mineta Commission very seriously.

FAA is developing plans that would reduce the current number of 168 TRACON's operating in the NAS by more than 50% through collocation using current technology. Initial implementation of this plan has already begun with 5 collocations already announced.

The contract tower program remains a cost effective method for providing air traffic control services, currently at 233 low-activity visual flight rules airports. As part of the annual terminal facility planning process, the FAA continues to identify opportunities to provide these tower services in the most cost effective manner.

Last December, the FAA announced plans to restructure the Air Traffic Organization's administrative and support functions by moving from nine regional offices to three Service Centers – Seattle, Atlanta and Ft Worth. Savings from the ATO regional consolidation are estimated to be at least $360 million over ten years.

In August 2002, the FAA published the Navigation and Landing Transition Strategy that outlined the transition strategy from ground based navigation to satellite based navigation. This strategy suggests that the FAA reduce it reliance on ground based Very High Frequency Omnidirectional Range (VOR) and Category I Instrument Landing Systems by half. To this end, the FAA is working on a Navigation Evolution Roadmap that reflects the August 2002 strategy and will layout the implementation plans and schedules for a transition to a Global Navigation Satellite System (GNSS) based navigation system. The roadmap will include the changes, timeframes and funding requirements to implement the navigation portion of the Next Generation Air Transportation System (NGATS). In Fiscal Year 2005 the FAA removed 276 navigational aids from service and for Fiscal Year 2006 176 additional navigational aids have been removed from service as of the end of July 2006.

Question #6: Should we consider an independent mechanism, perhaps a BRAC-like Commission, to re-examine the usefulness and cost-effectiveness of FAA's physical assets?

Answer: Using existing authority, FAA has already been able to use new technologies throughout the system to realign and consolidate certain functions. The goal is to reduce capital, operating, maintenance, and administrative costs on an agency-wide basis with no adverse effect on safety or efficiency.

For example, FAA used the A-76 process to contract out Automated Flight Service Stations (AFSS). On February 1, 2005, the FAA awarded a contract to Lockheed Martin to consolidate services provided to general aviation pilots through a government network of 58 AFSSs. This will involve consolidating the existing 58 sites into 20 facilities, lowering costs and improving service delivery.

Although the FAA currently has the authority to take further consolidation and realignment actions, a "BRAC-like" process could be useful. In certain circumstances, an independent Commission's impartial review of FAA recommendations for services or facilities realignment or consolidation could help address the concerns of parties potentially affected by such an action. This would be most useful where the parties affected represent a broad constituency outside the immediate FAA realm.

In any case, the agency would expect to continue its role of establishing the criteria used for realignment and consolidation recommendations, and to apply those criteria in developing further realignment and consolidation plans.

Question #7: "One of the primary causes of airlines delays is weather. I understand that primary means by which NOAA collects weather data is via weather balloons, which are based on 60-year old technology. What steps, if any has the FAA take to upgrade its weather forecasting program?"

Response: We agree that weather is a principal cause of airlines delays. NOAA/NWS and FAA are addressing the problem in several ways:

- NOAA/NWS monitors the atmosphere through a variety of sensors that include surface based observations, balloon soundings, lidar technology, lightning detection network, weather radar, satellite remote sensing, and automated reports from aircraft based sensors. FAA directly supports the surface observation program, the weather radar program, and automated reports from aircraft.

- The combination of these technologies provides a three dimensional assessment of the atmosphere that is used to provide terminal, meso, and macro forecasts of convection, icing, turbulence, and low ceilings/visibility that cause delays and pose safety hazards to aviation weather.

- NWS provides forecasts of these aviation weather phenomena based upon a combination of sophisticated numerical models and expert human forecasters to produce intermediate and longer range aviation weather forecasts (2 to 30 hours into the future).
  The FAA develops and operates automated forecasting tools for very short range forecasts (0 to 2 hours).

- The FAA sponsors aviation weather research to improve the forecasts produced by both agencies. This applied research is principally conducted at the National Center for Atmospheric Research, Boulder Colorado, Lincoln Labs Massachusetts Institute of Technology and other leading universities.

Question #8: As the National Airspace System continues to become increasingly congested, the issue of aviation safety as it relates to both the mitigation of weather-related accidents and the efficient and safe utilization of the Airspace has taken center stage. I understand that a new technology called TAMDAR has been developed and initially deployed on a regional air carrier's fleet that can significantly help in addressing these and other safety challenges. Is the FAA aware of TAMDAR and what steps, if any, are being taken to make the benefits of this technology available to the flying public?

Answer: The FAA is aware of TAMDAR and has worked jointly with NASA and the National Weather Service (NWS) in supporting the development of the TAMDAR sensor as a candidate technology for providing increased weather data collection from low altitude aircraft operations. Data from low altitude aircraft operations (i.e., TAMDAR) will provide coverage in data sparse regions and are essential inputs for improving the fidelity and accuracy of aviation weather products and support to National Airspace System (NAS) operations.

The operational TAMDAR sensor was developed and patented by AirDat LLC, a privately held company. AirDat has deployed TAMDAR sensors on 50+ turboprop commuter aircraft operated by Mesaba Airlines (a Northwest Airlines affiliate). AirDat has also established a near real time network and data center to collect and distribute the TAMDAR data. AirDat proposes to assume all operations and maintenance of the TAMDAR sensors and to sell the TAMDAR data to the government for public use, including NAS weather
support.

The FAA is conducting a Cost Benefit Analysis (CBA) to establish the basis for any FAA funding for purchase of TAMDAR data. The final CBA results will be available by the end of the year (December 2006).

Question #9: I am concerned with the long-standing problem of runway incursions, especially at Boston Logan. I understand that advanced surveillance equipment, ASDE-X, will be deployed at 34 major airports, including Logan. What is the status of the FAA's ASDE-X program?

Answer:

- Planning for the ASDE-X installation at Boston began in January 2006 and commissioning is scheduled by January 2009.

- It takes approximately three years for an ASDE-X system to become operational at an airport. This process includes site survey, site design, lease approval, completion of environmental requirements, site preparation/construction, installation, optimization, and acceptance and commissioning activities. The site survey for the multilateration remote units is complete and the environmental and site design work is scheduled to begin soon. Boston has a complex airport configuration that includes intersecting runways. Due to safety concerns from the construction of the new runway, the FAA initiated the BOS ASDE-X implementation process early. The FAA will continue to look for schedule efficiencies to expedite operation of the ASDE-X in Boston.

- The FAA plans to deploy ASDE-X systems to 35 airports, including Boston Logan International Airport. Eight systems have commissioned to date. Two additional systems are installed at Charlotte-Douglas International Airport in Charlotte, NC and Louisville International Airport-Standiford Field in Louisville, KY and will be operational by September 2007.

Question #10: One of the primary benefits of ADS-B and other new ATC technologies is increasing capacity of the National Airspace System by reducing separation of aircraft. Reducing separation of aircraft raises the long-standing wake vortex problem. What research has FAA carried out so far with respect to development of wake vortex avoidance system technology?

Answer:

- FAA has teamed with NASA in the research required to apply technology to mitigate the air traffic impacts of aircraft wake turbulence.
- FAA's role has been the development of the operational concepts for the application of technology and the role of NASA has been to develop the technology applications to enable these concepts.
- FAA has invested in the development of pulsed LIDAR based sensors that are able to track the wakes of aircraft arriving and departing airports and has used the collected data to develop proposed changes to air traffic procedures that will better utilize an airport's closely spaced (centerlines of the parallel runways are less than 2500 feet apart) parallel runways during weather conditions requiring instrument landing system operations.
- Additionally FAA has developed the operational concept of taking advantage of wind direction during departures on closely spaced parallel runways and eliminating the wake mitigation wait time when the wind direction is favorable.
- NASA has been developing the feasibility prototype of a system that would predict the favorable wind conditions on a highly reliable basis and provide that information to the air traffic controller.
- The joint wake turbulence research effort is well positioned to support NGATS and the transition to that system from the current NAS.

Question #11: Has FAA considered using a Lead System Integrator (LSI) to help develop and implement NGATS?

Answer: We have considered using a Lead Systems Integrator (LSI). As a matter of fact we have considered many times; but, we always come to the conclusion that, at least in the early stage, the time is not right for a LSI.

Implementation of the Next Generation Air Transportation System (NGATS) must take place incrementally. It cannot be engineered externally and "dropped" into the NAS. The ATO must work in close concert with JPDO to move their transformational concepts toward transition to operational systems. The ATO is in the best position to understand how new concepts fit into the NAS; where systems are ready to transition; and how to accelerate that transition. This process has already begun with ADS-B and SWIM and will continue until NGATS is fully operational 20 years from now. This approach is more flexible and more cost effective than working with a prime contractor who brings along all the subs that would be necessary to obtain the requisite expertise. It also allows the flexibility to adapt to and incorporate new JPDO concepts as they emerge. Such adaptations would require re-scoping for a vendor.

June 21, 2006
Subcommittee on Aviation
HEARING on
"Air Traffic Control Modernization: The Present and Future"

Questions for the Record from Rep. Jerry F. Costello to:

Mr. Russell L. Chew, Chief Operating Officer
Air Traffic Organization of the Federal Aviation Administration

Mr. Russell Chew, (COO FAA)

1. Mr. Chew, many have attributed part of the ATO's recent success with highly complex ATC acquisitions to its "incremental" approach. Can you explain what is meant by an "incremental" approach and, if possible, provide examples?

2. Mr. Chew, Acting Inspector General Zinser states in his written testimony that part of the ATO's recent cost cutting success is due to your decision to defer several complex efforts such as Controller Pilot Data Link Communications (CPDLC), Next Generation Communications (NEXCOM) and the Local Area Augmentation System (LAAS). Will any of these programs, or concepts, be brought back and, if so, when?

3. Mr. Chew, in November 2004, the Inspector General raised concerns about aging displays at 4 large sites, including Denver and Chicago. This is the most urgent issue facing terminal modernization and has important safety implications. What steps are being taken to replace these displays?

4. Mr. Chew, last year in the FY06 Transportation appropriations bill, and again, this year in the House passed FY 07 version of the bill, Congress has encouraged FAA to "expeditiously" install the ASDE-X radar system at O'Hare and to implement RNAV arrivals and descents. Yet, I have been informed that FAA has not taken action to move forward with these initiatives at O'Hare although these navigational aids have been deployed at other airports. In the meantime, the FAA has continued caps on the number of flights at O'Hare, and delays have persisted. What steps has FAA taken to comply with Congress' direction to move forward expeditiously on these improvements at O'Hare. What is the timetable for completion?

ATC Modernization

Question #1: Mr. Chew, many have attributed part of the ATO's recent success with highly complex ATC acquisitions to its "incremental" approach. Can you explain what is meant by an "incremental" approach and, if possible, provide examples?

Answer:

"Incremental" approach refers to breaking down large, complex investment programs into smaller more manageable phases or segments. The JRC approves each phase incrementally. Segmentation clarifies schedules for several useful segments and allows the JRC to assess how well work is progressing before approving additional phases. Approval to the next phase is not granted until successful demonstration of the previous phase. This approach gives FAA better control of costs and schedules. Since implementing this philosophy, the FAA has had fewer schedule slippages and cost overruns. Some examples of this approach are as follows:

ADS-B - The approach is to develop a backup strategy for Segment 1 of the program without having all the answers but provide more definition to the strategy in subsequent program segments.

- Segment 1 of the program consists of ADS-B infrastructure deployment, the issuance of a notice of proposed rulemaking, expansion of the Traffic Information Service – Broadcast (TIS-B) and Flight Information Service – Broadcast (FIS-B) infrastructure and basic aircraft to aircraft application deployment.
- Segment 2 includes complete ADS-B NAS-wide infrastructure deployment, publication of the final rule, the start of avionic equipage, the completion of TIS-B and FIS-B deployment, the continuance of basic aircraft to aircraft application deployment and requirements definition for advanced aircraft to aircraft application development.
- Segment 3 provides complete avionics equipage, targeted removal of legacy surveillance, complete basic aircraft to aircraft application deployment and the initiation of advanced aircraft to aircraft application deployment.
- Segment 4 includes complete removal of targeted legacy surveillance, TIS-B removal and completion of the advanced aircraft to aircraft application deployment.

WAAS – The revised approach was to divide the acquisition into two segments:

- Segment 1 will provide precision approach capability (250' minimums at ¾ mile) in 2008. This segment involves improving the availability of lateral precision approaches with vertical guidance (LPV) utilizing the existing L1 frequency. This segment will be completed by 2008.

- Segment 2 will provide precision landing capability (200' minimums at ¾ mile) in 2013. This segment, Global Navigation Satellite System Landing System (GLS) development, will be completed in 2013, at which time WAAS will use both the L1 and L5 frequencies.

The WAAS program management team will return to the JRC in 2007 with an updated business case to request approval to proceed with Segment 2.

ASR-9 – This program was divided into two phases (Phase 1a – ASR-9 and Mode-S Sustainment; and Phase 1b – ASR-9 Sustainment):

- Phase 1a consists of external antenna and waveguide modifications and the replacement of obsolete ASR-9 and Mode-S Control and Monitoring equipment. This includes the procurement and installation of antenna reinforcement kits at the six known problem sites and at all Operational Evaluation Plan sites (total of 47 installed kits) and the procurement of 13 additional reinforcement kits as spares. The Mode-S Control and Monitoring equipment replacement involves the re-hosting of Control and Monitoring equipment software on new COTS computer equipment at all 135 sites.
- Phase 1b consists of the design and development of a modification for the ASR-9 transmitter. The transmitter modifications are needed to mitigate increasing system failures and reduce associated maintenance costs as well as maintain the current level of system availability until 2025.

ATC Modernization

Question #2: Mr. Chew, Acting Inspector General Zinser states in his written testimony that part of the ATO's recent cost cutting success is due to your decision to defer several complex efforts such as Controller Pilot Data Link Communications (CPDLC), Next Generation Communications (NEXCOM), and the Local Area Augmentation System (LAAS). Will any of these programs, or concepts be brought back and if so, when?

Answer:

- The ATO is currently developing the concept, business case and implementation strategy for a FY 2008 data communications initiative. This includes the capabilities of CPDLC but looks at the broader context to data communications including those additional capabilities required to meet the Next Generation Air Transportation System (NGATS) concept.

- The ATO is completing the upgrade of the ground portion of the Next Generation Communications (NEXCOM) infrastructure. This sustains the air-ground infrastructure and will support the next phase of the NEXCOM program. That phase will be initiated when the forecast of spectrum depletion sets a target date for the need and supports the additional investment.

- LAAS is currently in research and development and a decision to move it from research to implementation will depend on the development and verification of a capability that supports Category II and III landings.

ATC Modernization

Question #3: Mr. Chew, in November 2004 the Inspector General raised concerns about aging displays at 4 large sites, including Denver and Chicago. This is the most urgent issue facing terminal modernization and has important safety implications. What steps are being taken to replace these displays?

Answer:

- Displays at Denver and Chicago are being addressed as part of the Terminal Automation Modernization/Replacement (TAMR) program

- The FAA has issued a Request for Proposal (RFP) to the selected contractor to modernize these two sites (along with Minneapolis/St. Paul, and St. Louis). The FAA expects to authorize design and development efforts to begin in July 2006.

- Displays at these four Terminal Radar Approach Control (TRACON) facilities and their associated Air Traffic Control Towers (ATCT) will be replaced as a part of this modernization effort.

- Estimated completion for this effort is mid-2008.

ATC Modernization

Question #4: Mr. Chew, last year in the FY06 Transportation appropriations bill, and again, this year in the House passed FY07 version of the bill, Congress has encouraged FAA to "expeditiously" install the ASDE-X radar system at O'Hare and to implement RNAV arrivals and descents. Yet, I have been informed that FAA has not taken action to move forward with these initiatives at O'Hare although these navigation aids have been deployed at other airports. In the meantime, the FAA has continued caps on the number of flights at O'Hare, and delays have persisted. What steps has FAA taken to comply with Congress' direction to move forward expeditiously on those improvements at O'Hare. What is the timetable for completion?

Answer:

- The current waterfall reflects the ASDE-X system commissioning at Chicago O'Hare in September 2009. However, the FAA is working to expedite the deployment of the ASDE-X system at Chicago. It takes approximately three years for an ASDE-X system to become operational at an airport. This process includes site survey, site design, lease approval, completion of environmental requirements, site preparation/construction, installation, optimization, acceptance and commissioning activities.

- In response to Congress' request to expedite ASDE-X activities at Chicago Ohare, the FAA has accomplished the following activities to date:

    - Completed a revised site engineering report
    - Completed tower and remote unit plant drawings
    - Completed related environmental activities
    - Completed and distributed site preparation bid packages

- The FAA is also working with the City of Chicago to support the planned expansion of the airport, specifically the planned new north Airport Traffic Control Tower and planned new north runway. Equipment to support the north expansion area could be ready for operations in the 2009/2010 timeframe.

- As part of the O'Hare Modernization Program (OMP), there are two area navigation (RNAV) standard terminal arrivals (STAR) for O'Hare and one RNAV STAR for Chicago Midway International Airport under development for publication in January 2007. Additionally, one O'Hare conventional STAR for non-RNAV-capable aircraft is also scheduled for January 2007 publication.

- Also under development are RNAV fixes on the airspace periphery. This work was initially started as part of the Chicago Airspace Project to address current-day issues at O'Hare. The

Federal Aviation Administration has met with the users to evaluate development of RNAV standard instrument departures (SID). Development of the RNAV SIDs is deemed unfeasible in the short-term due to planned operating changes in the current O'Hare runway configuration during ongoing OMP construction. The FAA is committed to continuing discussions as the construction work progresses in pursuit of opportunities to establish RNAV SIDs.

- In addition, a required navigation performance (RNP) approach procedure at Midway (to RWY 13C) was published on April 13, 2006. Its curved path to the final approach course procedurally de-conflicts traffic from O'Hare. This RNP procedure provides a special aircraft and aircrew authorization required (SAAAR) alternative to the instrument landing system (ILS) or localizer (LOC) distance measuring equipment (DME) RWY 13C that conflicts with O'Hare RWY 22L departures, impacting departure and arrival rates in adverse weather on certain traffic flows. An RNAV departure for O'Hare (RWY 22L) is under initial development within the working group to complement the RNP approach to Midway RWY 13C. Another RNP SAAAR approach to Midway (RWY 22L), offering similar benefits, is undergoing preliminary environmental review.

"Air Traffic Control Modernization: The Present and Future"

Questions for the Record from Rep. Bill Pascrell

Question #1:

A vital part of our country's National Air System modernization is the Federal Aviation Administration's (FAA) National Airspace Redesign. This is needed to address the safety and efficiency of extreme air traffic congestion.

After eight years of considerable delay, followed by more delay, we finally have the FAA's Draft Environment Impact Statement for the redesign in the New York/New Jersey/Philadelphia Metropolitan Area.

Unfortunately, the results are underwhelming.

Since the inception of the redesign project, I have been pressing the FAA to make noise reduction an element of this redesign.

While some of the proposals may increase the capacity or reliability or efficiency of our area's airspace system, they each individually fail to address the safety and quality of life issues for thousands of New Jerseyans.

Regrettably, I submitted comments urging the FAA to take another look and produce a new set of solutions which address the airspace redesign in a more creative and environmentally friendly way for the benefit of residents and the aviation community.

I would appreciate hearing your take on what is happening with the New York/New Jersey Airspace Redesign.

A lot of time and funding has gone into this project. We need to keep progressing on the redesign with strong oversight from your office. I believe that if implemented properly, this redesign can play an important role in reducing congestion and delays in the national airspace.

Answer:

The Draft Environmental Impact Statement (DEIS) for the New York/New Jersey/Philadelphia (NY/NJ/PHL) Metropolitan Area Airspace Redesign project was published on December 20, 2005. We completed over 30 public meetings with affected communities and extended the comment period an additional 30 days to July 1, 2006.

We are reviewing all of the comments that we received on the DEIS. This information will help us determine which of the alternatives presented will be the Federal Aviation

Administration's preferred alternative. Once that determination has been made, we will then develop specific mitigation strategies for that selected alternative.

The preferred alternative and the proposed mitigation strategies and responses to comments will be published in the Final Environmental Impact Statement (FEIS). Following the FEIS, we will issue a formal Record of Decision (ROD) and implementation will follow the ROD.

The highest levels of safety and operational efficiencies are our goals in this effort. No alternative being considered will reduce safety. Noise and other environmental factors are also a significant consideration in developing airspace and procedural changes. We consider the potential environmental impacts, including noise, of each alternative before selecting the preferred alternative.

Background:

The NY/NJ/PHL Metropolitan Area Airspace Redesign project was initiated in April 1998 by former FAA Administrator, Jane Garvey. The environmental review phase of this project began in early 1999. This included over 80 meetings with the public as part of prescoping and scoping meetings. Significant noise analysis was completed and had been documented as part of the DEIS. Also included in the DEIS is analysis of 20 additional environmental factors.

Question #2: As one of the smaller steps toward modernization, Newark Liberty International Airport - after a long wait - received Remote ARTS Color Display System to replace the Digital Bright Radar Indicator Tower Equipment in December of 2005. However, these new systems have been sitting in their boxes ever since. Because of changes in the software, the FAA install date was delayed from December 2005 to March 2006. It is now late June and the systems remain unusable. What is the status of this installation project? When will the new color display systems be up and running at Newark Airport?

Answer:

The project is nearing completion. The software required to run the Remote ARTS Color Displays (RACDs) installed at Newark is part of a much larger, complex national ARTS software build (Revision 33). The FAA successfully completed a Revision 33 Operational "Re-Test" in June '06 and is currently conducting operational "Keysite" testing at Dallas-Fort Worth (DFW).

Revision 33 software must first be tested and approved for operations at the New York TRACON, which is currently scheduled for early August 2006. Upon completion of Newark's Air Traffic training (scheduled for mid-August, 2006) the FAA will begin operations and commission the new color display systems at Newark by the end of September, 2006.

Question #3: One of the factors contributing to the delay and cost overruns at the FAA in developing a successful Air Traffic Control System Modernization has been a lack of sufficient involvement by the project stakeholders such as air traffic controllers and maintenance technicians. Please describe the level of participation by these two groups so far, and why it may be lacking and what the FAA plans to do to remedy the situation.

Answer:

- GAO has expressed concerns about cancellation of the controller liaison program which provided operational input from controllers on a number of modernization programs.
- FAA canceled the liaison program because of the cost versus the benefits that we were getting from the program.
- Now we call on controllers and supervisors when they are needed. As we do with maintenance technicians for their valuable input. For example, this year we worked with supervisors (qualified on position) and controllers from Houston Center and Houston TRACON on airspace redesign. We also worked with supervisors from a number of Centers to get their operational input on productivity evaluation.
- Our experience over the past year indicates that tapping the expertise of active supervisors and controllers has been very productive in terms of moving forward with key initiatives in airspace design and productivity.

Question #4: In light of the agency's history of cost overruns and delays implementing programs: What assurances can you give the committee that the FAA will be able to implement the highly technical NGATS programs for an estimated $18 billion?

Answer: The JPDO is still in the process of developing an estimated cost for the NGATS initiative. The $18 billion, or numbers in that range, are the result of an analysis conducted by an FAA Research, Engineering and Development Advisory Committee (REDAC) sponsored working group. They looked at two scenarios for the future of the National Air Transportation System. One, the status quo and the other an NGATS based transformation. In the NGATS scenario, funding for FAA R&D, F&E, Operations and AIP is estimated to be $15 billion. This compares to the current level of FAA funding which is approximately $13.8. In the status quo scenario, FAA operations costs dominate these estimates, while in the NGATS scenario, funding for early investment in research and capital infrastructure results in lower out-year operating costs.

This estimate, however, has significant limitations. More development and analysis is needed before the JPDO can provide a more complete estimate of the short and long ranges costs. It is also important to note that one of the principal considerations in deriving these estimates must be the development of a common set of assumptions. These assumptions will cover such issues as the nature of operations, the state of the technology, procedure changes, and equipage. Recognizing this, the JPDO has begun a series of high level workshops with the various segments of the aviation industry to develop these assumptions. They will then serve as the basis of a much more accurate estimate of the costs of NGATS.

One of the important considerations with regard to NGATS is that it is a long term transformation of the National Air Transportation System. A transformation that Congress decided when it chartered the JPDO must cut across agency lines. In other words, we couldn't approach this issue through traditional means. That's why the focus of the JPDO in planning and developing this transformation is on aligning the programs of its member agencies, in research, new technology development, and actual implementation, towards one goal. This is a level of collaboration and program focus that's unprecedented in government and represents a totally new approach to managing change in the National Air Transportation System.

<u>Question #5:</u> $18 billion is a preliminary number. DOT, FAA and JPDO have not provided a detailed cost estimate and implementation schedule for NGATS due primarily to the fact that the NGATS operation requirements and architecture have not been finalized. What do you anticipate the final number to be – much higher? Much lower?

<u>Answer:</u> The $18 billion, or numbers in that range, was an estimate derived by an FAA Research Engineering and Development Advisory Committee work in their efforts to make a comparison between the costs of the continuing with the status quo and pursuing an NGATS transformation approach. In the NGATS scenario, developed using 2005 dollars, funding for FAA R&D, F&E, Operations and AIP is estimated to be approximately $15 billion. This compares with the current level of FAA funding which is $13.8. In the status quo scenario, FAA operations costs dominate these estimates, while in the NGATS scenario, early investment in research and capital infrastructure results in lower out-year operating costs.

However, that estimate, while useful to a point, can't be considered an accurate base for defining future funding requirements. For any investment number to have credibility, particularly on a concept as long term and complex as that of NGATS, requires considerable discussion regarding assumptions. These assumptions cover such issues as the nature of future operations, the current state of technology, procedure changes, and equipage. With that in mind, the JPDO has convened a series of high level workshops, with different segments of the aviation industry to discuss assumptions. This is a continuing dialog that has provided an invaluable input to the development of our cost estimates. When this is process is done the JPDO can provide the committee with a far better understanding of the short term and long term costs of NGATS.

Question #6: Would you agree that the vast majority of delays are caused by severe weather, limited airport capacity, and over scheduling? Then exactly how will the NGATS eliminate those delays that are not caused by the air traffic control system.

Answer: Delays in the National Airspace System can be traced to several causes. However, NGATS by its very nature is a broad transformation of the National Air Transportation System that affects a range of activities and capabilities. In the case of NGATS, one of principal objectives is focused on leveraging new technologies and capabilities to enhance capacity. It's this increase in capacity that will have the most profound and long term impact on delays. Some of these new technologies include ADS-B, which will, when deployed, involve new applications and procedure that will allow more aircraft to safely operate within the system. Additionally, improved network operations, the ability to rapidly and more easily share information in an air traffic environment will also facilitate improvements that will enhance the system's capabilities. However, one of the overarching strategies described in the NGATS Integrated Plan involves enhanced weather monitoring and forecast capabilities. This involves leveraging existing weather observation systems by applying improved networking capabilities that will allow controllers to have a better picture of weather patterns and how they affect traffic.

Question #7: It seems to me that there is as delicate balancing act taking place within the FAA. The long term ATC mission planning must build upon, and at the same time compete against, the existing smaller-scale more immediate modernization program.

Please describe the amount of the agency's efforts and resources allocated to each endeavor relative to each other.

Which modernization mission, in you opinion, is more feasible and the best use of tax payer dollars?

Answer:

- In accordance with guidance from the Office of Management and Budget, the totality of air traffic control modernization planning is embodied in the FAA's National Airspace System (NAS) Enterprise Architecture. Both short and long term modernization plans are integrated into this single plan for evolving the NAS to meet the Joint Planning and Development Office's vision for the Next Generation Air Transportation System. The NAS Enterprise Architecture is tightly coupled with the JPDO's still-evolving NGATS Enterprise Architecture. Further, the FAA is working closely with the JPDO to ensure the two Enterprise Architectures remain consistent.

- The FAA evaluates current investments, as well as all proposed future investments, against the Enterprise Architecture to ensure the agency is taking the most cost efficient approach to air traffic control modernization. Currently the majority of the effort has been on the near-term modernization although that shifts in FY08 and beyond to investments for the longer term. This nearer term focus has ensured that our service is sustained and meets near-term needs for service expansion. It has also established new modern baselines which can and are supporting the long term mission. Any evolution of service needs to sustain or improve the current level of service and performance as we move toward long term goals. By this incremental approach we achieve cost efficiencies while preserving safety and enabling a viable future for aviation. As a result, the FAA's near-term investments are complementary, and in fact - necessary, to the long term modernization vision of the JPDO.

June 21, 2006
Subcommittee on Aviation
HEARING on
"Air Traffic Control Modernization: The Present and Future"

Questions for the Record from Rep. Michael M. Honda to:

Mr. Russell L. Chew, Chief Operating Officer
Air Traffic Organization, Federal Aviation Administration

Question #1: Given that eliminating the CWO Program would have an impact on small businesses, force the FAA to train the large incoming numbers of new air traffic controllers how to perform weather observation duties, and potentially negatively impact public safety, how likely is it that the FAA would decide to eliminate this program?

Answer:

The FAA is reviewing the Contract Weather Observation (CWO) Program to determine whether or not we are using all our resource as efficiently as possible. We have made no decision to eliminate the CWO program.

Question #2: When can we expect to hear from the FAA about their decision on the Contract Weather Observation Program?

Answer:

The FAA is in the process of evaluating the program. Once we have completed a comprehensive analysis, any recommendations will be submitted to the ATO Executive Council and the Administrator for review and discussion. No decision has been made to eliminate the CWO program.

Question #3: Is there a reason that the FAA is not acting on the IG's findings about the FTI program? If you are acting on it, can you detail what steps the ATI has taken to address the issues raised in the report?

Answer: The ATO has taken prompt action on the recommendations in the IG report. One of the most significant recommendations in the report was for the FTI transition schedule to be validated. The FAA commissioned MITRE to validate the FTI transition schedule and assess it for completeness, realism, and achievability. The FAA has just received the findings of the MITRE validation activity and is assessing: (1) what revisions should be made to the schedule; and (2) the associated impact on the program's cost and benefits baselines. FAA and DOT senior management will be briefed in August of the proposed course of action.

Questions for the Record for Robert Pearce, Acting Director, Joint Planning and Development Office, Federal Aviation Administration
From the House Transportation and Infrastructure Committee, Subcommittee on Aviation hearing on Air Traffic Control System Modernization
Held June 21, 2006

Question #1

JPDO authority to Redirect Agency Resources

Mr. Mica. Although JPDO is tasked with planning the Next Generation Air Transport System (NGATS), it has no authority to redirect agency resources. What would be some of the pros and cons of establishing a JPDO program office within FAA with such authority?

[The information follows:]

In Public Law 108-176 Congress recognized the need to do business differently in directing the future of nation's air transportation system. It identified the essential federal agency partners and called for them to work together to leverage their efforts.

To ensure this change occurs, Congress created two key entities. First, an executive-level interagency team, called the Senior Policy Committee (SPC). This committee is composed of each agency Secretary/Administrator, or designee and is chaired by the Secretary of Transportation. Secondly, the legislation required the Secretary of Transportation to establish a Joint Planning and Development Office (JPDO) within the FAA to manage the work related to the Next Generation Air Transportation System (NGATS). The JPDO is ultimately accountable to the SPC and reports directly to the FAA Administrator.

One of the key responsibilities of the SPC is that they are required to identify resource needs and make recommendations to their respective agencies for the funding of planning, research, and development activities.

We believe the authority to direct agency resources lies where it should – with the agencies and can be influenced by the SPC.

Question #2

NGATS Institute and NGATS-related contracts.

Mr. Mica. DOT IG noted that industry is concerned that their participation in the NGATS Institute will preclude them from bidding on future NGATS-related contracts under FAA's existing acquisition management system. What is FAA doing to address this problem, which threatens to diminish the role of industry in developing NGATS?

[The information follows:]

Very early on, the JPDO shared your concern over conflict of interest with regard to the operations of the NGATS Institute. We recognized the need to promptly address the matter. Accordingly, the essential contracting language governing Institute participation has been modified to establish certain guidelines and procedures to minimize and address potential organizational conflicts of interest. This includes specific contractual language that states that an Institute member is not prohibited, as a result of their participation in a JPDO Integrated Product Team, from competing for a future award or related contract. Additionally, the revised language addresses concerns about the prompt release of IPT recommendations and proposals.

Question #3

Solutions Offered by NGATS Institute

Mr. Mica. JPDO created the NGATS Institute to tap into a broad base of system users, including the major airlines, general aviation and aircraft and avionics manufacturers. It's hard to imagine these groups agreeing on anything. What concrete proposals or solutions have emerged from the NGATS Institute to date?

[The information follows:]

Under the Institute Management Council and through the Other Transaction Agreement contract, the NGATS Institute has made several major contributions to the NGATS development and planning process. These contributions have been executed via the 200+ Institute participants working daily on the eight integrated product teams. These participants, representing over 70 different companies, corporations, university and other non-government organizations have been involved in the following major product development, process enhancement and collaborative activities:

- Supported the JPDO in developing future concepts of use and related scenarios that helped define the foundation for the initial concepts of operations developed in the early summer 2006.
- Collaborated with the JPDO and their government IPT members to generate over 1500 individual comments and nearly 50 major recommendations for the first release of the concept of operations.
- The IMC by consensus quickly approved the Institute's approach and support to the JPDO for the Administrator's request for private sector cost and investment analysis input. The Institute under the IMC guidance worked with the JPDO to develop a series of three workshops representing major civil aviation users to help develop these critically needed recommendations and input on economic, operational and regulatory cost factors and drivers. The first workshop was developed and conducted in less than four weeks. Subsequent workshops are scheduled for late August and mid September, all under direct involvement by the IMC through the Institute.
- The IMC directed the Executive Director to assess the early stages of private sector participation at the IPT levels in February 2006, covering the initial 90 days of private sector participation with JPDO. The resulting survey identified several key areas where collaboration was not progressing as planned. The IMC was briefed on these findings in April 2006 and established an IMC Action Team to work with JPDO to identify the key organizational and communication issues and propose joint solutions. In less than 60 days, the first of several major recommendations has been developed and is now being implemented.

- As of August 1, the IMC has met twice with the Administrator as a unified body to discuss key strategic and critical issues in which the IMC as a partner with the FAA and the other five federal agencies can better support the long term and key goals of the NGATS. Each of these meetings resulted in action items for both the public and private sector partners, with the IMC taking the lead to help resolve several of these expeditiously.
- After initial review of the original OTA revealed several areas where changes were needed, the IMC authorized the Institute to work with the FAA to make rapid and effective changes in order to facilitate the release of pending Task Requests by the JPDO.
- Throughout the summer, various teams of subject matter experts have been solicited by the Institute Management Council members to help the Institute address and support various ongoing JPDO activities and planning.
- The IMC as a single entity is now reviewing the CONOPS draft to provide a consensus recommendation on the major strategic areas and objectives. As such, this report back to the JPDO due in mid September 2006 will feature unanimity by the over 14 civil aviation organizations as to their assessment and guidance to the JPDO.
- The IMC and its various members representing the 14 leading civil aviation organizations are currently working with the Acting Director of JPDO to evaluate proposed FY07 work plans and provide additional recommendation on major objectives in the FY07 JPDO plans.

Question #4

JPDO Oversight of ADS-B and SWIM

MR. Mica. Then-DOT Secretary Mineta and Administrator Blakey have made strong statements about the first two enabling technologies for NGATS – ADS-B and SWIM – being implemented beginning in FY 2008. Can you explain what oversight the JPDO has to ensure that these FAA programs meet the objectives of NGATS?

[The information follows:]

The JPDO has significant oversight of the FAA's ADS-B and SWIM programs thereby ensuring that these two programs meet the objectives of NGATS.

The majority of our oversight is accomplished through regularly scheduled monthly meetings between FAA Chief Systems Engineers and JPDO's Chief Architect and the JPDO IPT Directors. At these monthly technical reviews, technical, operational, and schedule information is openly exchanged. In addition, there are linking members on both FAA Enterprise Architecture Council and the JPDO Enterprise Architecture Division, who focus on sharing information regarding the key enabling technologies.

By utilizing both venues the JPDO is very able to perform the required oversight on ADS-B and SWIM.

Question #5

Proliferation of New Air Vehicles and the JPDO

Mr. Mica. The future of aviation may be vastly different than it is today, with the proliferation of commercial space vehicles, unmanned aerial systems, very light jets, and vertical takeoff and landing vehicles. How is JPDO preparing for such innovations, which presumably will create major shifts in airspace usage?

[The information follows:]

Achieving the vision of a transformed air transportation system requires us to open our minds to new possibilities, embrace new approaches and create new ways to work together. To secure America's place as a global leader in aviation's second century, we need an air transportation system that supports a strong commercial capability, facilitates private-sector expansion, and creates jobs. For that purpose one of our strategies is centered on creating a responsive air traffic system by devising alternative concepts of airspace and airport operations to serve present and future aircraft – including commercial space vehicles, unmanned aerial systems, very light jets, and vertical takeoff and landing vehicles. As new vehicle classes and business models emerge the safe and efficient operation of all vehicles in the National Airspace System will be critical to creating new markets in aviation and beyond.

Of course all of the new concepts will be rigorously analyzed, evaluated, and modeled by the JPDO's Evaluation and Analysis Division. NGATS seamless integration of existing secondary airports into the system with the functional capacity of primary airports will help us in increasing future system capacity and aid our ability to safely manage these new classes of air vehicles.

Question #6

NRC and the JPDO's IPT Structure

Mr. Mica. The National Research Council (NRC) recently criticized the JPDO's Integrated Product Teams (IPTs) structure, concluding that the IPTs are functioning primarily as experts in specific disciplines rather than integrated, multi-disciplinary teams organized to deliver specific products. What can be done to improve the IPT structure in light of the NRC's findings?

[The information follows:]

In forming its critique of the JPDO, the National Research Council primarily focuses on one issue, the growth in air traffic. This is, without argument, an important issue, and a fundamental justification for the creation of the JPDO and NGATS, but it should not be the only issue we seek to resolve.

As you know, we currently have eight Integrated Product Teams (IPT) at the JPDO. They are: Airport Infrastructure – led by FAA; Security – led by Department of Homeland Security; Agile Air Traffic System – led by NASA; Shared Situational Awareness – led by Department of Defense; Safety Management – led by FAA; Environment – led by FAA; Weather – led by Department of Commerce; and, Global Harmonization – led by the FAA.

The NRC would rather we restructure into three IPTs (Airport Operations, Terminal Area Operations, and En Route and Oceanic Operations).

We believe that our structure is more inline with congressional intent and is much more inclusive of the vision described in Vision 100. Also, as called for in Vision100, our structure keeps the JPDO public and private partners fully involved.

June 21, 2006
Subcommittee on Aviation
HEARING on
"Air Traffic Control Modernization: The Present and Future"

Questions for the Record from Rep. James L. Oberstar to:

Mr. Robert Pearce, Acting Director, JPDO

Mr. Pearce, the Joint Planning and Development Office (JPDO) is planning to make fundamental changes in how the air traffic system operates and how controllers will manage traffic to accommodate three times more aircraft in the system. New automation is expected to increase capacity by having aircraft fly computer-driven 4-D trajectories while maintaining safety. It is my understanding that FAA expects the controller's role to change from direct, tactical control of aircraft to one of overall traffic management.

Of particular interest to me is that JPDO envisions that air traffic might ultimately be "managed by exception," where computer automation will select and monitor conflict-free flight paths in real-time and controllers will simply be exception monitors/managers (i.e., controllers would step in if there is a problem). Management by exception was born out of the notion that much of what controllers do is routine, and therefore automatable. The hope is that management by exception will substantially reduce controller workload (and/or staffing) by requiring them to intervene only during exceptional or non-routine events. However, controllers may now be asked to solve problems that are too hard for the computer.

1. Is it valid to distinguish between controllers' routine and non-routine activities? Put another way, to what extent are routine and non-routine air traffic tasks interrelated and to what extent does this blur the distinction between routine and non-routine controller activities?

2. To what extent will the allocation of routine activities (however defined) to computer automation affect controllers' situational awareness, or make non-routine tasks more or less difficult?

3. To what extent will the allocation of routine activities add or reduce: the need for coordination, the likelihood of controller errors, or the likelihood for system failure?

4. In a "management by exception" paradigm, what should the relationship be between the controller/manager and computer automation? For example,

   (a) Who determines whether an exception exists? For example, does the controller wait for specified occurrences before he/she intervenes or is the recognition of what is an exception a more abstract judgment?

   (b) Who would be responsible for detecting the exception? If the controller must detect the exception, what information does he/she need, how should it be processed, and how should it be displayed?

   (c) To what extent does "management by exception" add new workload requirements; that is, should the controller be required to monitor overall system performance or merely observe the automation and judge how well it is dealing with system conditions, e.g., decisions about, if and when to intervene in automatic control.

   (d) What technologies are required to support the "management by exception" paradigm and what are the human factors issues?

   (e) What manual controls should be available to the controller either in parallel with, or as a backup to computer automation?

   (f) Should the controller have the capability to instruct the automation; e.g., to provide or change machine goals, add or change information the automation is using, or manipulate the attention or focus of the automation?

   (g) When intervention is deemed necessary should the controller revert to full control or are there ways in which the controller and the automation should share authority over the control process?

Question #1

Interrelation Between Routine and Non-Routine Controller Tasks

Mr. Oberstar. Is it valid to distinguish between controllers' routine and non-routine activities? Put another way, to what extent are routine and non-routine air traffic tasks interrelated and to what extent does this blur the distinction between routine and non-routine controller activities?

JPDO: The allocation of tasks for the next generation air transportation system (NGATS) has not been completed. But, the current paradigm of a controller looking at a radar display, providing separation analysis in the controller's mind and using VHF voice communications exclusively to communicate with aircraft, is a key limiting factor for system capacity in en route sectors and some terminal areas. Studies have shown that two major limitations to the number of aircraft the controller can handle are the VHF communications workload and the cognitive workload of tracking and analyzing separation among aircraft from the provided information. Therefore, an early realization of the JPDO was that this ATC paradigm needed to change to enable the safe growth of air traffic to 2X or 3X today's number of flights. However, having determined that the current paradigm will not work does not equate to a decision regarding what the new paradigm will be.

However, I think that it is safe to assume that much of the responsibility for separation assurance will move from the controller to the cockpit or the ground automation. This will be the subject of extensive research and safety analyses.

Question #2

Computer Automation Affect Controller's Situational Awareness

Mr. Oberstar. To what extent will the allocation to routine activities (however defined) to computer automation affect controllers' situational awareness, or make non-routine tasks more or less difficult?

JPDO: Based on studies to date, there is reason to believe that a new paradigm could involve transferring functions associated with aircraft separation to suitably-equipped aircraft. Also based on studies to date, there is reason to believe that it may be possible to rely exclusively on machines (automation/ground or airborne) to perform the "conflict detection and resolution" function for in-flight separation. However, these statements of vision and possibility do not imply any decision by either the JPDO or the FAA in these matters. To reiterate, research and study are required for these issues and the answer could be 5 to10 years away.

JPDO envisions a continuing human role in Air Navigation Service Provision for the foreseeable future.

The allocation of routine activities to computer automation could affect a controller's situational awareness. It can be remedied with a newer and more robust controller screen and a next generation training system for controllers. Such an allocation, however, should make the non-routine tasks less difficult since the automation will perform the "conflict detection and resolution" functions necessary in the future.

Question #3

Need For Coordination, etc.

Mr. Oberstar. To what extent will the allocation of routine activities add or reduce: the need for coordination, the likelihood of controller errors, or the likelihood for system failure?

JPDO: Although no one can look into the future and make claims with certainty, at the JPDO we are very comfortable with stating that NGATS will dramatically reduce the need for coordination and the likelihood of additional controller errors. Coordination will be reduced since all of the pertinent information will be available to all through shared situational awareness.

Also, collaboration between the air navigation service provider (ANSP) and airspace stakeholders accomplishes many of the objectives for capacity management, flow contingency management, and tactical trajectory management (TTM). Collaborative traffic flow management (C-TFM) will be the means by which operator objectives and system constraints are balanced with overall NAS performance. Therefore, since aircraft are provided the most optimal routing, altitude, etc., prior to takeoff the desire for en route changes will be diminished, further reducing the need for coordination.

The task of tactical separation assurance -- the conventional role of the air traffic controller -- will more often be delegated to pilots for various procedures or to ground-based automation. Pilots will be delegated responsibility for separation assurance for many procedures – from airborne self-separation, where the pilot will be responsible maintaining separation from all other aircraft to limited pair wise separation procedures at both high and low altitudes. For such procedures, the flight crew's role in operating becomes both tactical and strategic. Controllers and other ANSP employees will have a greater role in strategic flow management and will have less of a role in tactical assurance (or, perhaps no role at all because ground automation will monitor separation). Therefore, since much of the responsibility for separation assurance will move to the cockpit and ground automation, the controllers' responsibility for separation assurance will be reduced; thereby, reducing their exposure to controller errors.

Although system spec documents have yet to be written, it is safe to assume that the next generation air transportation system (NGATS) will use cutting-edge technology along with an integrated safety management system. The integrated safety management system ensures safety through use of an approach for identifying and managing potential problems in a system, organization, or operation. Specifically, we'll use a formal, top-down, businesslike approach to manage safety risk, which includes systematic procedures, practices, and policies for safety management, including but not limited to:

- **Safety Risk Management (SRM)** - - The formal process within the safety management system composed of describing the system, identifying the hazards, assessing the risk, analyzing the risk, and controlling the risk; the SRM process will be imbedded in the process used to the product or service - - it will not be a separate process; and,
- **Safety Assurance** - - Safety management system process management functions that systematically ensure organizational products or services meet or exceed safety requirements; this will include the processes used to ensure safety, including audits, evaluations and inspections and a data tracking and analysis.

The JPDO's more robust safety policy will ensure that the future likelihood of system failure will be driven even lower than the current enviable level.

Question #4a

Who Determines Whether An Exception Exists

Mr. Oberstar. Who determines whether an exception exists? For example, does the controller wait for specified occurrences before he/she intervenes or is the recognition of what is an exception a more abstract judgment?

JPDO: For a controller taking an active role in in-flight conflict resolution, the controller will be alerted by the automation that he/she needs to intervene. Like today, a red or yellow indication in an aircraft's flight data file alerts the controller when an impending situation *will* or *may* arise. The resolution for the situation will also be supplied to the controller at the same time. Once the resolution action is enacted, the color clue in the flight data will change from yellow or red to green (meaning that the action has taken care of the impending conflict).

Question #4b

Who Will Be Responsible for Detecting an Exception

Mr. Oberstar. Who will be responsible for detecting an exception? If the controller must detect the exception, what information does he/she need, how should it be processed, and how should it be displayed?

JPDO: The controller will be advised by the automation of the impending conflict in sufficient time to resolve the upcoming confliction. The automation will provide the controller with conflict detection and resolution. The information he/she needs will be processed along with the flight data and it will be displayed in the aircraft's file as part of the electronic flight data.

Question #4c

Management by Exception as a Workload Requirement

Mr. Oberstar. To what extent does "management by exception" add new workload requirements; that is, should the controller be required to monitor overall system performance or merely observe the automation and judge how well it is dealing with system conditions, e.g., decisions about, if and when to intervene in automated control?

JPDO: The *draft* JPDO Concept of Operations that is currently under stakeholder review, does not refer to air traffic "management by exception" since the JPDO has concluded that the terminology does not accurately convey our perspective on this aspect of our vision. But, it is fair to say that there will be a paradigm change in the future.

The new paradigm will keep controller workload about what it is today. What probably will occur is the FAA will receive a new training requirement. This new training will advise controllers, among other things, whether they will be required to monitor the overall system performance; or, merely observe the automation.

The automation will alert them in sufficient time to intervene and provide them with the proper resolution.

Question #4d

Technology Required for Management by Exception and Human Factors

Mr. Oberstar. What technologies are requires support the "management by exception" paradigm and what are the human factors issues?

JPDO: As previously indicated, the *draft* JPDO Concept of Operations that is currently under stakeholder review, does not refer to air traffic "management by exception" since the JPDO has concluded that the terminology does not accurately convey our perspective on this aspect of the NGATS vision.

To answer the basis of your question, however, there are certain technologies needed to support controllers during this change from providing tactical separation instructions to providing a more strategic separation management. The controller will need a conflict alert-like system, one that is constantly probing for conflicts and will also provide the controller with appropriate remedies for conflict resolution. In addition to that, a data link will be needed between the controller and the aircraft.

Much of the human factors work for the types of tools required to assist controllers in their new environment was completed during the FAA's successful Free Flight Phase 1 and Free Flight Phase 2 programs. Those tools are: User Request Evaluation Tool (URET); Problem Analysis, Resolution, and Ranking (PARR); and Controller Pilot Data Link Communications (CPDLC). The URET-like tool would provide controllers with a conflict probe tool identifies conflicts and possible conflicts; a tool similar to PARR may also be required to provide controllers with appropriate conflict remedies and provide them in a ranked order by appropriateness; and, CPDLC may require more human factors work, especially to determine how it would work with the other tools in the controllers' tool box.

Question #4e

What Manual Controls Should be Available

Mr. Oberstar. What manual controls should be available to the controller either in parallel with, or as a backup to the computer automation?

JPDO: Although the specifications for the computer automation tools have not yet been addressed, we expect they will they will have reliability requirements that will be guarantee their continuing operations and sufficient redundancy so that no manual back up required.

However, manual back up for data link communications may be required and that would be voice VHF radio.

Question #4f

Controller Capability to Instruct the Automation

Mr. Oberstar. Should the controller have the capability to instruct the automation; e.g., to provide or change machine goals, add or change information the automation is using, or manipulate the attention or focus of the automation?

JPDO: The goals for the Next Generation Air Transportation System (NGATS) are aimed at significantly increasing the capacity, safety, efficiency, and security of air transportation operations and thereby improving the overall economic well being of the country. These benefits are achieved through a combination of new procedures and advances in technology deployed to manage passenger, air cargo, general aviation, and air traffic operations. Eight capabilities will be required to achieve goals. They are:

- Network-Enabled Information Access
- Performance-Based Services
- Weather Assimilated into Decision Making
- Layered Adaptive Security
- Broad-Area Precision Navigation
- Aircraft Trajectory-Based Operations (4D)
- Equivalent Visual Operations
- Super Density Operations

In the JPDO vision, automation detects the conflicts and provides the resolution; therefore, we would not want anyone instructing the automation; changing machine goals; or changing the information, or manipulating the focus of the automation.

Question #4g

Intervention is Deemed Necessary

Mr. Oberstar. When intervention is deemed necessary should the controller revert to full control or are there ways in which the controller and the automation should share authority over the control process?

JPDO: When intervention is necessary, the controller should only resolve the conflict and not revert to full control or seek to share authority with the automation over the control process.

The automation will alert the controller of an impending conflict and offer the appropriate resolution. The sooner the conflict is resolved and the aircraft resumes normal flight - - the sooner the safety and efficiency of the flight can be assured.

June 21, 2006
Subcommittee on Aviation
HEARING on
"Air Traffic Control Modernization: The Present and Future"

Questions for the Record from Rep. Jerry F. Costello to:

Mr. Robert Pearce, Acting Director, JPDO

1. Mr. Pearce, what exactly is the NGATS "Enterprise Architecture" and when will it be complete?

2. Mr. Pearce, in the last few years the ATO has deferred several ATC modernization efforts such as Controller Pilot Data Link Communications (CPDLC), Next Generation Communications (NEXCOM) and the Local Area Augmentation System (LAAS). Which of these programs, or concepts, will need to be revived to accomplish the NGATS?

Enterprise Architecture

Mr. Costello. What exactly is the NGATS "Enterprise Architecture" and when will it be completed?

[The information follows:]

The Joint Program and Development Office (JPDO) was created to lead the necessary partnership between multiple government agencies and between the public and private sectors and to synchronize the goals and priorities that were mandated in VISION 100.

We can better manage these challenges by creating a high-level blueprint, or Enterprise Architecture (EA). It will help decision makers better understand the complexity of operations and allow us to successfully transition to the Next Generation Air Transportation System (NGATS) in a consistent, coordinated, cost-efficient, and integrated manner.

Enterprise Architecture is recognized almost universally as an important tool for reengineering business practices and the underlying information technology that supports them. It is key to achieving mission goals. The Government Accountability Office (GAO) recently observed, "Effective use of enterprise architectures, or modernization blueprints, is a trademark of successful private and public organizations. For more than a decade, we have promoted the use of architectures to guide and constrain systems modernization, recognizing them as crucial means to a challenging goal: agency organizational structures that are optimally defined in both business and technological environments."[1]

Our Enterprise Architecture brings an important and needed owner-operator-user perspective to both public and private sector NGATS activities. To this end, we will employ "use cases" that identify, clarify, and organize system requirements- - critical to the future system's success. For example, a use case might capture a dispatcher's interactions with security authorities, pilots, and air traffic personnel. Another might follow a passenger time line from flight planning activities, through security screening and airport transit, flights, connections, and right through the final destination terminal, We can even add unanticipated elements to the use cases, such as introducing bad weather or a security threat.

The next three years will be critical as we work to address the most significant Enterprise Architecture issues. We want to refine the future architecture in a way that addresses the majority of potential joint investment and requirement "disconnects." Creating an initial look at the 2025 NGATS future architecture will be our first priority.

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[1] GAO Report GAO-05-266, 29 April 2005, p.8.

Admittedly, this initial EA cut will likely offer more questions than specific answers, and certainly specific answers, and certainly not a specific architectural solution. However it will foster greater debate and drive research for finding answers with mutual benefits. This is an enormously important first step towards a robust and fully functional and vetted Enterprise Architecture.

The NGATS EA for "block to block" operations (the portion of the air transportation operation from when your departing flight "pushes back" from the gate until it arrives at your destination and parks at the gate) has been completed. This is only the first phase of the EA. The next phase for "curb to curb" operations (the fuller portion of the air transportation operation from when you arrive at your departure airport until you depart from the arrival airport) will be ready in January 2007.

Will FAA Have to Revive CPDLC, NEXCOM, and LAAS

Mr. Costello. In the last few years the ATO has deferred several ATC modernization efforts such as Controller Pilot Data Link Communications (CPDLC), Next Generation Communications (NEXCOM), and the Local Area Augmentation System (LAAS). Which of these programs, or concepts, will need to be revived to accomplish the NGATS?

[The information follows:]

- Data Communications (CPDLC): Yes. The ATO is currently developing the concept, business case and implementation strategy for a FY08 data communications initiative. This includes the capabilities of CPDLC but looks at the broader context to data communications including those additional capabilities required to meet the Next Generation Air Transportation System Concept. The FAA's data link efforts are currently focused on an imminent Investment Analysis Readiness Decision by the FAA's Executive Committee in September 2006, followed by a Joint Resource Council (JRC) scheduled for March 2007.
- NEXCOM: Eventually. NEXCOM Segment 1a contributes to both FAA current operations and NGATS. The ATO is completing the upgrade of the ground portion of the Next Generation Communications (NEXCOM) infrastructure. This sustains the air-ground infrastructure and will support the next phase of NEXCOM. That phase will be initiated when the forecast of spectrum depletion sets a target date for the need and supports the additional investment. Timing for future phases is based on spectrum completion. NEXCOM will contribute to NGATS by enabling and provisioning a digital air/ground communications infrastructure based on global standards, over which NGATS data communications applications can be network enable access to aircraft, and provision for agile and flexible airspace operations.
- LAAS: Potentially. LAAS is currently in research and a decision to move it from research to implementation will depend on the development and verification of a capability that supports Category II and III landings.

OPENING STATEMENT OF
THE HONORABLE JERRY F. COSTELLO
AVIATION SUBCOMMITTEE
AIR TRAFFIC CONTROL MODERNIZATION: PRESENT AND FUTURE
JUNE 21, 2006

- I want to thank Chairman Mica for calling today's hearing on *Air Traffic Control Modernization: Present and Future.* Mr. Chairman, our air traffic system today is still fundamentally based on radar tracking and ground-based infrastructure from the 1960's. Moreover, much of the Federal Aviation Administration's (FAA) infrastructure is well past its useful life.

- At the same time, the increase in regional jets, the growth of point-to-point service and the anticipated influx of Very Light Jets are placing new and different strains on the system. It has been estimated that consumers could lose as much as $30 billion annually if people and products cannot reach their destinations within the time periods expected today.

- Mr. Chairman, modernizing and transforming our air traffic control (ATC) system is a national priority. **Yet, despite its importance, there is a serious disconnect between the rhetoric and the resources being applied to this effort.**

- For example, funding for the FAA's ongoing airspace redesign efforts, which are key to enhancing capacity and reducing airline fuel costs, have been cut by almost 70% this fiscal year.

- Moreover, for a third consecutive year, the Administration is requesting to fund the FAA's capital account at $2.5 billion - well below the level authorized in Vision 100. At the same time, this Subcommittee has been informed of preliminary FAA data indicating that the initial capital cost of the Next Generation system could be approximately $4 billion more than the FAA's current five year capital plan. I am concerned that by starving the FAA's capital account, the Administration is slowly setting this ATC transformation effort up to fail.

- Mr. Chairman, while the JPDO is a multi-agency effort, coordination between the JPDO and the FAA is particularly important. However, both the Government Accountability Office (GAO) and DOT Inspector General will testify that the JPDO does not have authority to leverage key human and financial resources from the FAA.

- I would like to hear from our witnesses whether they believe the current level of coordination between the FAA and JPDO is adequate. If not, Congress should consider formally restructuring this relationship.

- Additionally, while restructuring is one option, some believe that only outsourcing of our transformation effort will guarantee success. In fact, the Europeans have opted for that approach, placing an industry consortium in charge of their *Single European Sky* initiative.

- Going forward, we will clearly need the talent, energy and know-how of the American air traffic industry to develop our next generation system. However, the government must maintain its ability to effectively manage and control its contracts. Given our long history of cost overruns on large-scale, highly complex air traffic acquisitions, I see the value in a phased, incremental approach.

- In fact, a phased, incremental approach to acquisitions has been a hallmark of FAA Chief Operating Officer Russ Chew's tenure, and I look forward to hearing his testimony.

- Mr. Chairman, for many years GAO has consistently reported that failing to involve air traffic controllers in the technology development process to resolve tricky "human factors" issues has led to costly reworks and delays.

- The IG notes in his testimony that the need for focused "human factors" research has important safety implications. It's common

sense that the people that will be using this new technology should be involved in its development.

- Therefore, I am very concerned that GAO is now reporting that no current controllers are involved in the Next Generation effort. I look forward to hearing from our witnesses on this issue.

- Additionally, the JPDO's success at transformation depends largely on its ability to forge consensus with system users. Increasingly, the aircraft itself is becoming a part of our critical infrastructure, and airlines will be asked to make costly investments in equipment to take advantage of our new system. It may be time for Congress and the Administration to engage in a discussion about providing incentives for airlines to equip.

- Again, thank you Mr. Chairman for holding this hearing. I look forward to hearing from our witnesses.

United States Government Accountability Office

GAO

Testimony

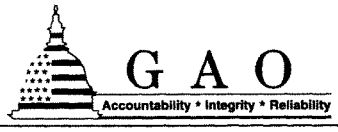
Before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

For Release on Delivery
Expected at 2:00 p.m. EDT
Wednesday, June 21, 2006

AIR TRAFFIC CONTROL MODERNIZATION

Status of the Current Program and Planning for the Next Generation Air Transportation System

Statement of Gerald L. Dillingham, Ph.D., Director
Physical Infrastructure Issues



GAO-06-653T

June 21, 2006

GAO
Accountability·Integrity·Reliability
Highlights

Highlights of GAO-06-653T, testimony before the Subcommittee on Aviation, Committee on Transportation and Infrastructure, House of Representatives

AIR TRAFFIC CONTROL MODERNIZATION

Status of the Current Program and Planning for the Next Generation Air Transportation System

Why GAO Did This Study

The Federal Aviation Administration's (FAA) effort to modernize the nation's air traffic control (ATC) system has been listed by GAO as a high risk program for more than a decade now, due to systemic management and acquisition problems. Two relatively new organizations housed within FAA—the Air Traffic Organization (ATO) and the Joint Planning and Development Office (JPDO)—have been given the bulk of the responsibility for planning and implementing these modernization efforts. Congress created ATO to be a performance-based organization that would improve the culture, structure, and processes and improve accountability in the ATC modernization program. Congress created JPDO, made up of seven partner agencies, to coordinate the federal and nonfederal stakeholders necessary to plan a transition from the current air transportation system to the "next generation air transportation system" (NGATS). This testimony is based on GAO's recently completed and ongoing studies of the ATC modernization program. GAO provides information on (1) the status of ATO's efforts to implement processes and other initiatives aimed at efficiently managing and modernizing the current ATC system and (2) the status of JPDO's planning efforts and the key challenges that JPDO faces in planning for NGATS.

www.gao.gov/cgi-bin/getrpt?GAO-06-653T.

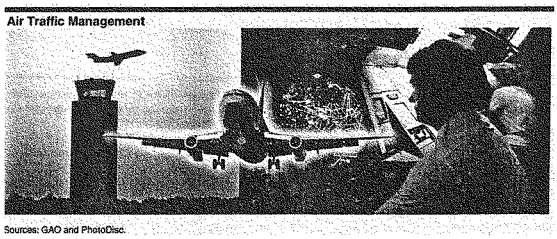
To view the full product, click on the link above. For more information, contact Dr. Gerald L. Dillingham, at (202) 512-2834 or dillinghamg@gao.gov.

What GAO Found

ATO has made significant progress toward the efficient management of the nation's ATC system, but faces several challenges. ATO has implemented organizational and business process changes, and has taken steps to increase scrutiny of its acquisition decisions. ATO has met its acquisition performance goal for the second consecutive year—that is, 80 percent of its system acquisitions are on schedule and within 10 percent of budget. ATO has identified cost savings opportunities through consolidation of administrative activities and outsourcing. However, ATO faces several challenges, including sustaining and institutionalizing its progress toward operating effectively as a performance-based organization, hiring and training thousands of air traffic controllers, ensuring stakeholder involvement in major system acquisitions, and keeping acquisitions on schedule and within budget.

JPDO is making progress in its planning for NGATS, but faces several challenges. JPDO is implementing a number of practices that our work has shown facilitates the federal interagency collaboration that is central to its mission and legislative mandate. However, JPDO is fundamentally a planning and coordinating body that lacks authority over the key human and technological resources needed to continue developing plans and system requirements for NGATS. Thus, a challenge may arise in leveraging the resources of the partner agencies. As part of its planning, JPDO is working to develop a cost estimate for NGATS through a series of workshops with various stakeholders. JPDO has taken several important first steps and is following effective practices in developing an NGATS enterprise architecture—a blueprint for NGATS and one of the most critical planning documents in the NGATS effort. JPDO faces several challenges, including maintaining stakeholder support over the long term, defining roles and responsibilities and deciding how to coordinate the implementation of NGATS, and addressing several critical policy issues, such as the extent to which NGATS will accommodate visual flights versus instrument-only flights.

Air Traffic Management



Sources: GAO and PhotoDisc.

Mr. Chairman and Members of the Subcommittee:

We appreciate the opportunity to participate in today's hearing to discuss the status of efforts by the Air Traffic Organization (ATO) and the Joint Planning and Development Office (JPDO) to modernize and transform the nation's air traffic control (ATC) system. Both organizations are within the Federal Aviation Administration (FAA) and represent recent efforts by Congress to, among others things, ensure a national airspace system that is safe, efficient, and capable of meeting a growing demand for air transportation—a demand that is expected to triple by 2025. ATO has responsibility for operating, maintaining, and modernizing the current ATC system. ATO was authorized as a performance-based organization (PBO)[1] in 2000 and includes 36,000 of FAA's roughly 46,000 employees. JPDO, authorized in 2003, is responsible for planning and coordinating the broader and longer-term transformation (through 2025) to the "next generation air transportation system" (NGATS). JPDO is conducting its work with the assistance of seven partner agencies: the Departments of Commerce, Defense, Homeland Security, and Transportation; FAA; the National Aeronautics and Space Administration (NASA); and the White House Office of Science and Technology Policy.

In 1981, FAA began a program to replace and upgrade ATC facilities and equipment, but encountered chronic cost, schedule, and performance problems, leading us to classify FAA's ATC modernization program as high risk in 1995.[2] We have issued a series of reports on these problems and made numerous recommendations over the years. Our reports focused on many aspects of the national airspace system, including the management of modernization projects; the management of the information technology that is at the heart of many modern ATC systems; the challenges FAA faces in increasing system capacity and reducing delays; and an acquisition workforce culture that lacked the mission focus, accountability, coordination, and adaptability needed for FAA to meet its cost, schedule, and performance targets. FAA has implemented many of our recommendations to varying degrees.

[1]PBOs are discrete units, led by a Chief Operating Officer, that commit to clear objectives, specific measurable goals, customer service standards, and targets for improved performance.

[2]ATC Modernization has remained on our high-risk list since 1995. See GAO, *High Risk Series: An Update*, GAO-05-207 (Washington, D.C.: January 2005).

System modernization, as envisioned in NGATS and being planned by JPDO, will be costly and will have to compete with other national priorities and demands for resources. ATO will be especially challenged to maintain the current ATC system while simultaneously developing and transitioning to the future system. These tasks will require ATO to make the best and most efficient use of increasingly scarce resources. Additionally, the transition also involves the recognition that other nations are upgrading their aviation systems, creating a need for global harmonization to support international travel and commerce.

My statement today focuses on two key questions. (1) What is the status of ATO's efforts to implement processes and other initiatives aimed at efficiently managing and modernizing the current ATC system? (2) What is the status of JPDO's planning efforts, and what are the key challenges that JPDO faces in planning for NGATS? My statement is based on our recently completed and ongoing studies of FAA's ATC modernization program, together with updated information from ATO and JPDO officials and aviation stakeholders.[3] Later this year, we expect to issue two detailed reports related to the issues discussed in this statement. One report will provide our assessment of the status of JPDO's efforts to plan for the development of NGATS. Another report will examine financial management issues at FAA, including options for cost savings and alternative funding mechanisms. We are performing our work in accordance with generally accepted government auditing standards.

The following is a summary of our findings to date:

- ATO has made significant progress toward the efficient management of the nation's ATC system, but faces several challenges. ATO has implemented organizational and business process changes to improve management of the ATC modernization program. ATO has taken several steps to increase its scrutiny of its acquisition decisions, in part by ensuring executive-level oversight of key decisions and improving understanding of system requirements to avoid delays and cost overruns. ATO has met its acquisition performance goal for the second consecutive year—that is, 80 percent of its system acquisitions are on schedule and within 10 percent of budget. ATO has identified cost savings opportunities through consolidation of administrative activities and outsourcing. However, ATO faces several challenges, including sustaining and institutionalizing ATO's

[3]Because ATO includes the majority of FAA employees, this statement will refer to ATO initiatives, even though some may apply FAA-wide.

progress toward operating effectively as a performance-based organization, hiring and training thousands of air traffic controllers, ensuring stakeholder involvement in major system acquisitions, and keeping acquisitions on schedule and within budget.

- JPDO is making progress in its planning for NGATS, but faces several challenges. JPDO is implementing a number of practices that our work has shown facilitates the federal interagency collaboration that is central to its mission and legislative mandate. However, JPDO is fundamentally a planning and coordinating body that lacks authority over the key human and technological resources needed to continue developing plans and system requirements for NGATS. Thus, a challenge may arise in leveraging the resources of the partner agencies—agencies with a variety of missions and priorities other than supporting NGATS. For example, NASA has reduced its aeronautics budget, raising questions about how the research and development efforts necessary for NGATS will be completed. As part of its planning, JPDO is working to develop a cost estimate for NGATS through a series of workshops with various stakeholders. JPDO has taken several important first steps and is following effective practices in developing an NGATS enterprise architecture—a blueprint for NGATS and one of the most critical planning documents in the NGATS effort. In addition to the challenge of leveraging resources noted above, JPDO faces several other challenges, including maintaining stakeholder support over the long term, defining roles and responsibilities and deciding how to coordinate the implementation of NGATS, and addressing several critical policy issues, such as the extent to which NGATS will accommodate visual flights versus instrument-only flights.

Background

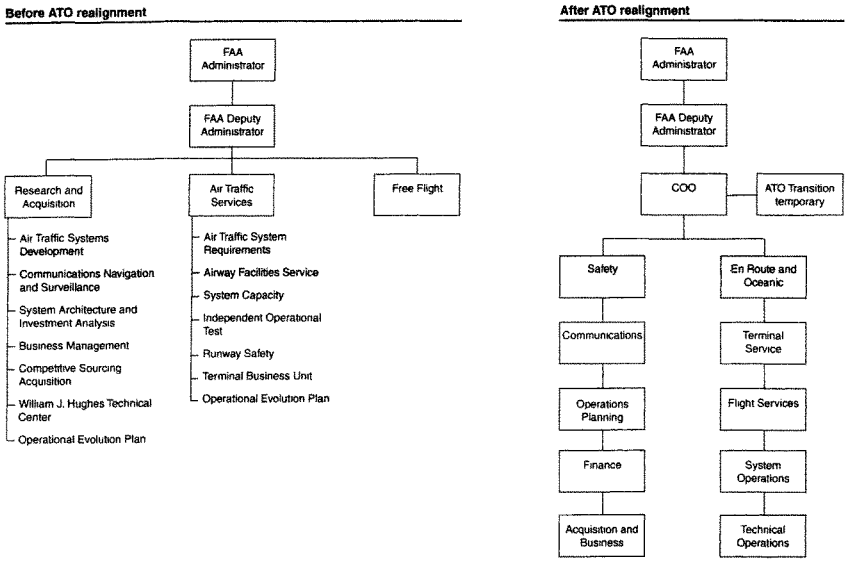
The ATC system is composed of an array of largely ground-based subsystems, including radars; automated data-processing, navigation, and communications equipment; and ATC facilities. These subsystems work together to support all phases of flight for aircraft operating in U.S. airspace. The ATC system also includes the FAA employees who manage, operate, and maintain ATC equipment and facilities.

In 1995, based on the premise that FAA would be better able to manage the ATC modernization if it were not constrained by federal personnel and acquisition laws, Congress passed legislation that exempted FAA from most federal personnel and acquisition laws and regulations.[4] In December

[4]Pub. L. No. 104-50, Fiscal Year 1996 Department of Transportation Appropriations Act.

2000, President Clinton signed an executive order and a few months later Congress passed supporting legislation that, together, provided FAA with the authority to create ATO as a PBO to control and improve FAA's management of the modernization effort. In February 2004, FAA reorganized, transferring 36,000 employees (most of who worked in air traffic services and research and acquisitions) to ATO. (See fig. 1.)

Figure 1. Prior and Current Structure of Research and Acquistions and Air Traffic Services, and Free Flight Organizations



Source: FAA.

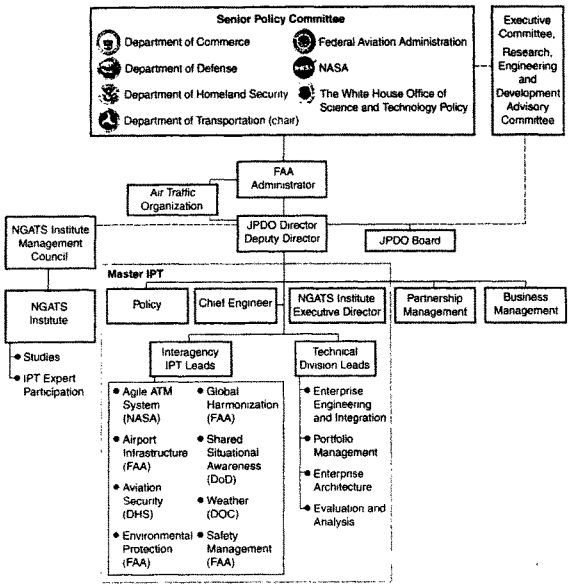
In late 2003, recognizing that the current approach to managing air transportation is becoming increasingly inefficient and operationally obsolete, Congress created JPDO[5] to plan NGATS, a system intended to accommodate what is expected to be three times more air traffic by 2025 than there is today. JPDO's scope is broader than traditional ATC modernization in that it is "airport curb to airport curb," encompassing such issues as security screening and environmental concerns. Additionally, JPDO's approach will require unprecedented collaboration and consensus among many stakeholders—federal and nonfederal—about necessary system capabilities, equipment, procedures, and regulations. Each of JPDO's partner agencies will play a role in creating NGATS. For example, the Department of Defense has deployed "network centric" systems,[6] originally developed for the battlefield, that are being considered as a framework to provide all users of the national airspace system—FAA and the Departments of Defense and Homeland Security—with a common view of that system. To incorporate the expertise and views of nonfederal stakeholders, the NGATS Institute was created by an agreement between the National Center for Advanced Technologies and FAA.

JPDO began its initial operations in early 2004. A Senior Policy Committee, chaired by the Secretary of Transportation and including senior representatives from each of the participating departments and agencies, provides oversight to JPDO. JPDO is located within FAA and reports to the FAA Administrator and to the Chief Operating Officer within ATO. (See figure 2.)

[5]Pub. L. No. 108-176, Vision 100—Century of Aviation Reauthorization Act, December 12, 2003.

[6]Network centric operations aim to exploit technical advances in information technology and telecommunications to improve situational awareness and the speed of decision making.

Figure 2: Organizational Chart of JPDO



Source: JPDO.

ATO Has Made Significant Progress Toward More Efficiently Managing ATC Modernization, but Challenges Remain

ATO has implemented organizational and business process changes to improve management of the ATC modernization program. ATO has taken several steps to increase its scrutiny of its acquisition decisions and has met its acquisition performance goal for the second consecutive year. ATO has identified cost savings opportunities through consolidation of administrative activities and outsourcing. However, ATO faces several challenges, including sustaining and institutionalizing ATO's progress toward operating effectively as a performance-based organization, hiring and training thousands of air traffic controllers, ensuring stakeholder involvement in major system acquisitions, and keeping acquisitions on schedule and within budget.

ATO Has Implemented Organizational and Business Process Changes to Improve Management of the ATC Modernization Program

In our past work, we noted that FAA's acquisitions workforce operated in an environment where accountability was not well defined or enforced and vertical lines of authority impaired productivity, communication, and decision-making across the organization. Our recent studies have shown that ATO is taking steps to break down those vertical lines of authority and organizational "stovepipes." ATO has become a flatter organization, with fewer management layers. Additionally, the Chief Operating Officer (COO), who heads ATO, is holding ATO's vice presidents collectively accountable for the organization's success, in addition to their areas of specific responsibility. The COO conducts daily meetings with the managers of ATO's departments to review operations. According to the COO, these meetings have provided a more holistic perspective on the organization since, formally, some managers were only focused on and responsible for their own departments.

ATO is also in the early stages of involving the line staff in the efforts aimed at increasing organizational effectiveness and efficiency. For example, ATO surveyed the workforce to determine the extent to which employees and managers believe the organization exhibits managerial accountability, customer focus, and transformational leadership. The first survey established a baseline against which ATO plans to measure progress through future annual surveys. By analyzing the results, ATO expects to determine the underlying assumptions that drive employee behavior and decide where to target efforts for change. According to an ATO official, such a root-cause level of analysis has never been done before in FAA. FAA is also undertaking an initiative that includes creating a training framework and measures for the effectiveness of that training. These initiatives mirror effective human capital practices that we have identified in previous reports.

In addition to organizational efforts, ATO is moving forward with an improvement to its business processes with the development of a cost accounting system, which will eventually be implemented throughout FAA to improve its financial management. Ultimately, ATO plans to routinely incorporate the cost information generated by the cost accounting system into its investment decision-making. When implemented, this cost accounting system will address a long-standing GAO concern that FAA has not had the needed cost accounting practices in place to effectively manage software-intensive investments, which characterize many of the agency's major ATC system acquisitions. This type of information can be used to improve future cost estimates for these acquisitions.

In another change to its business processes, FAA has stated that its management will provide additional information to decision makers to better illustrate the rationale behind its budget requests. This information is helpful to decision makers when budget constraints do not allow all system acquisitions to be fully funded at their planned and approved levels, leaving FAA to decide which programs to fund and which to cut, according to its priorities. Those that are cut may fall behind schedule, requiring FAA to continue operating and maintaining the older equipment and possibly delaying the realization of benefits from the new system. To address this issue, we recommended that FAA identify and annually report on programs that have had funding deferred, reduced, or eliminated, and the impact of those decisions on ATC modernization.[7] Such information would make clear how constrained budgets will affect modernization of the national airspace system and how FAA is working to live within its means. In its formal written response to our recommendation, FAA stated its intent to better inform Congress in the future by providing information in its capital investment plan, submitted to Congress annually with the President's Budget, that will identify changes from the preceding year. We have not yet verified whether FAA's action fully responds to our recommendation.

ATO Has Increased Scrutiny of Its Investment Decisions

ATO has taken several steps to increase its scrutiny of its acquisition decisions, both with initial investment decisions and as part of acquisition oversight. Since 2004, the ATO executive council has been reviewing the

[7] GAO, *The National Airspace System: FAA Has Made Progress but Continues to Face Challenges in Acquiring Major Air Traffic Control Systems*, GAO-05-331 (Washington, D.C.: June 10, 2005).

mission need and readiness for decisions for all proposed investments. Furthermore, to ensure executive-level oversight of all key decisions, FAA plans to incorporate key decision points in a knowledge-based product development process by June 2006, as we have recommended; however, we have not yet independently assessed the sufficiency of this change. FAA has also issued guidance on how to develop and use investment pricing, including guidelines for disclosing the levels of uncertainty and imprecision that are inherent in cost estimates for major ATC systems.

To improve its understanding of system requirements, FAA has developed a software acquisition process improvement model.[8] When a system's requirements are not fully understood at the start of an acquisition, requirements must often be redefined or unplanned work performed, which takes time and can be costly. In addition, unplanned work may occur when the agency misjudges the extent to which a commercial-off-the-shelf or nondevelopmental item, such as one procured by another agency, will meet the agency's needs. To address these issues, FAA has developed and applied a process improvement model that assesses the maturity of FAA's software and systems capabilities. As we reported, this approach has resulted in enhanced productivity, higher quality, greater ability to predict schedules and resources, better morale, and improved communication and teamwork.[9] However, FAA did not mandate the use of the model throughout the organization. In response to our recommendation that FAA institutionalize the model's use throughout the organization, FAA has begun developing a requirement that acquisition projects have process improvement activities in place before seeking approval from FAA's investment review board.

With regard to acquisition investment oversight, ATO has increased the use of an earned value approach to program oversight.[10] In fiscal year 2000, only 4 programs used an earned value approach, compared to 19 major active programs in fiscal year 2006. Going forward, all new acquisitions will use an earned value approach. ATO has also conducted business case

[8]FAA's process improvement model, titled "Integrated Capability Maturity Model," is a tool to assess the maturity of the agency's software acquisition capabilities.

[9]GAO, *Air Traffic Control: System Management Capabilities Improved, but More Can Be Done to Institutionalize Improvements*, GAO-04-901 (Washington, D.C.: Aug. 20, 2004).

[10]An earned valued management system measures performance by comparing the value of work accomplished with work scheduled and thereby provides early warning of schedule delays and cost overruns.

reviews for facilities and equipment- and operations-funded programs. Based on these reviews, ATO terminated funding for three projects. One was cancelled because the prototype lacked demonstrable benefits, another due to a poor business case, and the third due to weaknesses in its business case as well as schedule and performance issues.[11]

Additionally, FAA has implemented, or is in the process of implementing, a number of recommendations that we have made to improve acquisition investment management. For example, FAA is now considering all information technology investments as a complete portfolio. In 2004, we pointed out that FAA was not evaluating projects beyond the first 2 years of service to ensure alignment with organizational goals.[12] Consequently, the agency could not ensure that projects with a longer service history (which at the time totaled about $1.3 billion per year) were still aligned with FAA's strategic plans and business goals and objectives. We recommended that FAA include these projects in its investment portfolio management for review. In response to this and other recommendations we have made, FAA is making revisions to its Acquisition Management System. FAA has modified its Acquisition Management Policy to require periodic monitoring of in-service systems to collect and analyze performance data to use as the basis for sustained deployment. In a similar vein, ATO has committed to basing future funding decisions for system acquisitions on their contribution to reducing the agency's operating costs while maintaining safety. ATO is also requiring that acquisition planning documents be prepared in a format consistent with that prescribed by the Office of Management and Budget for use in justifying all major capital investments.

[11]The Medium Intensity Airport Weather System (MIAWS), intended to provide a real time display of storm positions and estimated storm tracks, was terminated for lack of demonstrable benefit. The Mode Select (Mode S) program, intended to provide enhanced radar surveillance information, was terminated due to a poor business case. The Asset and Supply Chain Management Program, intended to assist in asset and logistics management, was terminated due to business case weaknesses and schedule and performance issues.

[12]GAO, *Information Technology: FAA Has Many Investment Management Capabilities in Place, but More Oversight of Operational Systems Is Needed*, GAO-04-822 (Washington, D.C.: Aug. 20, 2004).

FAA Met Its Acquisition Performance Goal for the Second Consecutive Year, but Use of Revised Milestones Does Not Provide Consistent Benchmarks

FAA has met its acquisitions performance goal 2 years in a row. The goal for fiscal years 2004 and 2005 was to have 80 percent of its system acquisitions on schedule and within 10 percent of budget. The goal gradually increases to 90 percent by fiscal year 2008. The increase will make FAA's acquisition performance goal consistent with targets set in the Department of Transportation's strategic plan and will comply with the Federal Acquisition Streamlining Act of 1994.[13]

Having such a goal is also consistent with the President's *Management Agenda*, which calls for a commitment to achieve immediate, concrete, and measurable results in the near term, and meeting this goal shows progress toward better acquisition management. However, because the milestones for certain acquisitions have changed over the years to reflect changes in cost and schedule, using those revised milestones may not provide a complete picture of the acquisition's progress over time. For example, the milestones for 3 of the 16 major system acquisitions that we reviewed in detail during 2004 and 2005 were being revised to reflect cost or schedule changes during 2005. These revised milestones, together with revised targets for meeting them, will become the new milestones for fiscal year 2006. While revising milestones and targets that are no longer valid is an appropriate management action, using revised targets for measuring performance does not provide a consistent benchmark over time. The extent to which an acquisition meets its annual performance targets is one measure of its performance and should be viewed together with other measures, such as its progress against original and revised baselines. The variance reports provided to the FAA Administrator and to Congress may also be useful in evaluating an acquisition's performance.[14]

Since fiscal year 2003, the number of acquisition programs measured by FAA has varied from 31 to 42. According to FAA, the number varies from year to year, in part, because some programs reach completion and others are initiated. The programs that are selected each fiscal year represent a cross section of ATO programs, including investments in new capabilities and others that are ready for use without modification. FAA's Portfolio of Goals, which provides supplementary information on the agency's performance goals, asserts that no bias exists in the selection of

[13]Pub. L. No. 103-355.

[14]According to FAA, the agency tracks acquisition program performance from its original baseline or any subsequently approved baselines approved by the Joint Resource Council and reports variances to the Administrator and to Congress as required.

milestones for performance review, but does not state the basis for this conclusion. The portfolio also states that the milestones selected represent the program office's determination of the efforts that are "critical" or important enough to warrant inclusion in the acquisition performance goal for the year. However, we have not conducted a detailed examination of the reliability and validity of FAA's metrics for its acquisition program performance.

ATO Is Reviewing Its Infrastructure and Operations for Cost Savings, but Lacks Consistent Processes for Determining Savings

ATO is seeking cost savings by reviewing its operations and infrastructure. It has begun to decommission ground-based navigational aids, such as compass locators, outer markers and nondirectional radio beacons, as it begins to transition to a satellite-based navigation system. In fiscal year 2005, ATO decommissioned 177 navigational aids, claiming a savings of $2.9 million. In addition to the savings generated from decommissioning, one expert with whom we spoke noted that these sites could be converted to revenue-generating uses, such as leasing the sites for warehouses or cell phone towers. ATO also expects to reduce costs through streamlining its operations. For example, it is consolidating its administrative activities, currently decentralized across its nine regions, into three regions, and anticipates an annual savings of up to $460 million over the next 10 years. Our work analyzing international air navigation service providers has shown that additional cost savings may be possible by further consolidating ATC facilities such as terminal radar approach control (TRACON) facilities and air traffic control centers. According to one estimate, consolidating the existing 21 air route traffic control centers into 6 centers could save approximately $600 million per year.

ATO also expects to reduce costs through outsourcing. For example, it reduced costs by outsourcing its automated flight service stations to a private contractor and expects to achieve savings of $1.7 billion over ten years. Additionally, $0.5 billion in savings are expected to be realized by staffing reductions of 400 that occurred between the time the outsourcing began and the new contract was actually implemented. The agency expects to receive $66 million—the first installment of these cost savings—in fiscal year 2007.

However, we have found that ATO lacks a consistent process for identifying the costs and benefits associated with some of its cost control efforts. For example, ATO did not offset its reported savings from decommissioning navigational aids with the costs likely to accompany such activities, such as real property disposition (including buildings or real property leases, standby power systems, and fuel storage tanks), site

cleanup, and restoration. Without a transparent and verifiable process for determining the savings, as well as the offsetting costs, the true savings remain unclear. As ATO proceeds with these efforts, stakeholders also caution that decommissioning navigational aids should entail comprehensive risk mitigation to ensure that ATO retains adequate safety levels.

However, while facility consolidations could offer additional savings, an FAA official noted that there are practical limits to these efforts. For example, consolidated facilities would need to handle higher volumes of communication, but as the volume of communication increases, so does "latency"—the delay in transmission that occurs between sending and receiving messages. According to FAA, studies of telecommunications centers in the private sector suggest that 15 facilities that combine the approximately 180 existing en route and oceanic air traffic control centers and terminal radar approach control facilities might be appropriate. Security concerns, such as the need for redundancy, also come into play in consolidation decisions. Consequently, if FAA decides to procede with facility closures, it is important that it do so within the context of a logical, well-documented, and risk-based process in consultation with congressional oversight committees.

ATO Faces Human Capital Challenges in Institutionalizing Its Performance-based Organization and Hiring and Training Thousands of Air Traffic Controllers

ATO faces a challenge in sustaining and institutionalizing its efforts to operate as a PBO. Our work has shown that successful transformations and the institutionalization of change in large public and private organizations can take 5 to 7 years or more to fully implement.[15] Long-term, high-level management attention will be needed to assess ATO's transformation on a continuing basis.

FAA also faces the challenge of hiring and training thousands of air traffic controllers during the coming decade. According to its controller staffing plan, FAA expects to lose about 11,000 air traffic controllers due to voluntary retirements or mandatory retirements at age 56, as well as other reasons.[16] These retirements stem from the 1981 controller strike, when President Ronald Reagan fired over 10,000 air traffic controllers, and FAA then had to quickly rebuild the controller workforce. From 1982 through

[15]GAO-03-669.

[16]Federal Aviation Administration, *A Plan for the Future: The Federal Aviation Administration's 10-Year Strategy for the Air Traffic Control Workforce* (Dec. 21, 2004).

1991, FAA hired an average of 2,655 controllers per year. These controllers will become eligible for retirement during the next decade.

To replace these controllers, as well as those who will leave for other reasons, and to accommodate forecasted changes in air traffic, FAA plans to issue annual air traffic controller staffing plans based on the agency's air traffic forecast. FAA's December 2004 Air Traffic Controller Work Force Plan called for hiring 12,500 new controllers over 10 years, based on the agency's 2004 air traffic forecast.[17] FAA informed us that its 2006 staffing plan update, which it expects to issue shortly, will reflect the need to hire fewer controllers over the next few years, compared to the 2004 plan, because FAA's 2006 air traffic forecast predicts less air traffic during this time frame. In fiscal year 2005, FAA hired 438 controllers—three more than its target, which was constrained that year due to budget considerations. According to an FAA official, FAA plans to hire 930 controllers in fiscal year 2006 (FAA had hired 637 controllers through May 2006).

FAA Faces Challenges in Ensuring Stakeholder Involvement in Major System Acquisitions

Adequately involving stakeholders in a system's development is important to ensure that the system meets users' needs. In the past, air traffic controllers were permanently assigned to FAA's major system acquisition program offices and provided input into air traffic control modernization projects. In June 2005, FAA terminated this arrangement because of budget constraints and other reasons. According to FAA, it now plans to obtain the subject-matter expertise of air traffic controllers or other stakeholders as needed in major system acquisitions. It remains to be seen whether this approach will suffice for stakeholder involvement. Our past work has indicated that a lack of stakeholder involvement both early on and throughout a system's development was a systemic factor contributing to acquisitions missing their cost, schedule, and performance targets.

FAA Faces Challenges in Keeping Acquisitions on Schedule and within Budget

Three systems—all communications-related—missed their fiscal year 2005 acquisition performance goals for schedule. According to FAA, the $310 million FAA Telecommunications Infrastructure (FTI) acquisition, which is replacing costly existing networks of separately managed systems and services by integrating advanced telecommunications services, was behind

[17]According to FAA, since issuing its controller staffing plan, it has achieved productivity gains that have reduced the need to hire about 460 air traffic controllers.

schedule because the program was unable to ramp up its activities to the level specified in its plan. To complete the installations in the first quarter of fiscal year 2008 as originally scheduled, FAA initiated a plan to put the program back on schedule and has met the plan's milestones since August 2005.

To the extent that delays in FTI persist, FAA will not accrue the full extent of the $672 million in cost savings that the program was expected to produce. The Department of Transportation's Office of the Inspector General has reported that FAA did not realize $32.6 million in anticipated operating cost savings in fiscal year 2005 because of the limited progress made in disconnecting legacy circuits. The office also reported that without a nearly tenfold increase in its rate of transferring service to FTI and disconnecting legacy circuits, FAA stands to miss out on an additional $102 million in cost savings in fiscal year 2006. FAA has informed us that since the Inspector General made this assessment, the program has achieved a significant increase in the rates of transferring over services and disconnecting legacy circuits. As an alternative to continuing the current FTI program, some experts have suggested that FAA consider outsourcing this activity, as it did for its flight service stations.[18]

Two other communications acquisition programs also missed their acquisition performance goals for schedule in 2005—the $325 million Next Generation Air-to-Ground Communication system, segment 1A, which replaces analog communication systems with digital systems, and the $85 million Ultra High Frequency Radio Replacement, which replaces aging equipment used to communicate with Department of Defense aircraft. According to an FAA official, as the agency assessed its priorities for fiscal year 2005, a decision was made that these programs would receive fewer resources. The resources that were then available were not sufficient to allow the programs to meet established milestones.

In summary, ATO has made a number of promising moves toward operating effectively as a PBO, and we view ATO's efforts to improve its management and acquisitions processes as positive steps. However, ATO has been established for only slightly more than 2 years. Work remains to ensure that these processes become institutionalized and that continuing challenges are addressed. Although it is still too early to evaluate the effectiveness of many of these steps, we are monitoring ATO's progress.

[18]In February 2005, FAA awarded a contract for the operation of its flight service stations.

Moving forward, ATO will play a key role in implementing NGATS, as planned by JPDO. I will now discuss the status of JPDO's planning efforts.

JPDO Has Made Progress in Planning for NGATS, but Faces Challenges in Several Areas

JPDO has implemented several effective practices to facilitate collaboration among its partner agencies, but faces challenges in continuing to leverage resources. JPDO is working to develop a cost estimate for NGATS through a series of workshops with various stakeholders. JPDO is taking a reasonable approach to technical planning, but some key tasks are yet to be completed. However, JPDO faces several challenges, including maintaining stakeholder support over the long term, defining roles and responsibilities as well as deciding how to coordinate the implementation of NGATS, and addressing several critical policy issues.

JPDO Is Working to Facilitate Collaboration among Federal Agencies, but Faces Challenges in Continuing to Leverage Resources

Our work to date shows that JPDO is implementing a number of practices that our work has shown facilitates the federal interagency collaboration that is central to its mission and legislative mandate. According to our research, agencies must have a clear and compelling rationale for working together to overcome significant differences in their missions, cultures, and established ways of doing business. In developing JPDO's integrated plan,[19] the partner agencies agreed to a vision statement and eight strategies that broadly address the goals and objectives for NGATS. These strategies formed the basis for JPDO's eight integrated product teams (IPT), and various partner agencies have taken the lead on specific strategies. Our research has also shown that it is important for collaborating agencies to leverage the human, technological, and physical resources needed to initiate or sustain their collaborative effort. To leverage human resources, JPDO has staffed the various levels of its organization with partner-agency employees, many of whom work part time for JPDO. To leverage technological resources, JPDO conducted an interagency program review of its partner agencies' research and development programs to identify work that could support NGATS. Through this process, JPDO identified early opportunities that could be pursued during fiscal year 2007 to produce tangible results for NGATS,

[19]The Vision 100 Act called for JPDO to create and carry out an integrated plan for NGATS. This integrated plan was developed by the partner agencies and submitted to Congress on December 12, 2004.

such as the Automatic Dependent Surveillance-Broadcast (ADS-B)[20] program at FAA.

However, while JPDO's legislation, integrated plan, and governance structure[21] provide the framework for collaboration among multiple federal agencies, JPDO is fundamentally a planning and coordinating body that lacks authority over the key human and technological resources needed to continue developing plans and system requirements for NGATS. Consequently, the ability to continue leveraging resources of the partner agencies will be critical to JPDO's success. Beginning around 2008, JPDO expects a significant increase in its IPTs' workloads. JPDO officials told us that although the partner agencies have not yet expressed concerns over the time that their employees spend on JPDO work, it remains to be seen whether agencies will be willing to allow their staff to devote more of their time to JPDO. In addition, JPDO anticipates needing more agency resources to plan and coordinate demonstrations of potential technologies to illustrate some of the early benefits that could be achieved from the transformation to NGATS.

This challenge of leveraging resources arises, in part, because the partner agencies have a variety of missions and priorities other than supporting NGATS. NASA, for example, while conducting key aeronautical and safety research and development relevant to NGATS, nonetheless has other competing missions. NASA has recently reduced its aeronautics budget and plans to focus its efforts on foundational research.[22] This decision raises two important questions. First, what research needed for NGATS will NASA perform or not perform? Second, for the foundational research that will be performed, who will perform the development steps—the validation and demonstration of new technology—that must take place

[20]ADS-B is a surveillance technology that transmits an aircraft's identity, position, velocity, and intent to other aircraft and to ATC systems on the ground, thereby enabling pilots and controllers to have a common picture of airspace and traffic. By providing pilots with a display that shows the location of nearby aircraft, the system enables pilots to collaborate in decision making with controllers, safely allowing reduced aircraft separation and thereby increasing capacity within the national airspace system.

[21]Some of JPDO's governance structure was determined by Vision 100, which directed the Secretary of Transportation to establish a Senior Policy Committee and set forth the membership of this committee. In addition, JPDO has established a Board of Directors, a Master IPT, and several divisions.

[22]NASA uses the term foundational to refer to research that explores core science, but does so with a view toward how the research will be applied.

before a new technology can be transferred to industry and incorporated into a product? JPDO and FAA officials told us that not enough is understood about what NASA plans to do and not do and, therefore, the impact of NASA's action on NGATS remains unclear at present.

However, many experts with whom we spoke believe that NASA's new focus on foundational research creates a gap in the technology development continuum. Some believe that FAA has neither the research and development infrastructure nor the funding to do this work. FAA's Research, Engineering and Development Advisory Committee (REDAC),[23] in a draft report, estimates that FAA would need at least $100 million annually in increased funding to perform this research and development work, and that reestablishing the infrastructure within FAA to accomplish this work could delay NGATS implementation by 5 years. An official of the working group that produced the draft report stated that a significant amount of research and development is needed to create NGATS. For example, the official stated that more research is needed to understand wake vortex, which could be a limiting factor in airspace capacity and would impact aircraft sequencing for landing or departure.[24] The official also stated that intermediate-level technology development is important in establishing "product proof," meaning that technology needs to be validated, demonstrated, and certified before beginning the systems acquisition process.

JPDO officials view leveraging partner agency resources as one of their most significant near-term challenges. JPDO officials stated that they feel the process has worked sufficiently well so far. For example, JPDO successfully requested that FAA pursue funding in its fiscal year 2007 budget request to accelerate development of ADS-B and System Wide Information Management (SWIM),[25] which are two key systems identified

[23]FAA's Research, Engineering and Development Advisory Committee, established in 1989, advises the FAA Administrator on research and development issues and coordinates FAA's research, engineering, and development activities with industry and other government agencies. The committee considers aviation research needs in air traffic services, airport technology, aircraft safety, aviation security, human factors, and environment and energy.

[24]Wake vortex is air turbulence that occurs behind an aircraft and was a cause in the 2001 American Airlines accident in which 265 people died.

[25]SWIM is expected to help in the transition to network-centric operations by providing the infrastructure and associated policies and standards to enable information sharing among all authorized system users, such as the airlines, other government agencies, and the military.

for NGATS. However, as noted, our past work on FAA's national airspace modernization program has shown that receiving fewer resources than planned was one factor that contributed to delays in implementing technologies and significant cost increases. Thus, continuing success in leveraging partner agencies' resources will help avoid program delays and reduction in the benefits-to-cost ratio.

To further leverage resources for NGATS, JPDO has issued guidance to its partner agencies identifying areas that JPDO would like to see emphasized in the agencies' fiscal year 2008 budget requests and expects to follow this process annually in the years to come. JPDO officials have informed us that they have held face-to-face discussions with partner agency managers about the guidance and are currently in the process of reviewing partner agency responses to the guidance and identifying whether gaps exist. Such gaps will be presented to the Senior Policy Committee for discussion at its July meeting, according to these officials.

JPDO is currently working with the Office of Management and Budget to develop a systematic means of reviewing partner agency budget requests so that the NGATS-related funding in each request is easily identified. This includes a review of budgets submitted by the Department of Homeland Security for efforts by the Transportation Security Administration and the Department of Commerce for efforts by the National Oceanic and Atmospheric Administration. Such a process would help the Office of Management and Budget consider NGATS as a unified federal investment, rather than as disparate line items distributed across several agencies' budget requests.

JPDO Is Working to Develop a Cost Estimate for NGATS

Important to the planning of NGATS is the development of realistic cost estimates for the entire NGATS. To assist in developing such estimates, JPDO is holding a series of investment analysis workshops with stakeholders to obtain their input. The first workshop, held in April 2006, was for commercial and business aviation, equipment manufacturers, and systems developers. The second workshop is planned for early July for operators of lower performance aircraft used in both commercial and non-commercial operations, including general aviation personal and business flying, flight training, piston and turbine rotorcraft as well as public users of the system including civil and military aircraft operated by local, state, and federal governments. The third workshop, planned for late July or early August, will focus on airports and other local, state, and regional planning bodies. JPDO plans to use the combined information from these

three workshops to begin to develop a range of the potential costs of NGATS.

Preliminary estimates of NGATS' cost, developed by REDAC and ATO, could also provide input into JPDO's cost estimate. REDAC and ATO officials emphasized that their estimates are preliminary and not yet endorsed by any agency. A draft study by REDAC's Financing the NGATS Working Group estimated that to implement NGATS and continue operating the national airspace system through 2025, the combined costs of FAA's four appropriation accounts—operations, facilities and equipment, research, engineering and development—and grants-in-aid for airports (commonly known as the Airport Improvement Program)—would average about $15 billion per year, or about $900 million more than FAA's fiscal year 2006 appropriation. The estimate assumes that (1) the general fund contribution will be 20 percent, using the current trust fund revenue model and (2) between 2011 and 2025, productivity increases will offset the increased operating costs of additional demand.[26]

ATO has developed a preliminary estimate of the increased facilities and equipment cost that NGATS would require. ATO estimates that the cumulative additional facilities and equipment cost between fiscal years 2006 and 2025 would be about $15.3 billion, or about $800 million per year, on average, from fiscal year 2007 through 2025. According to an ATO official, the ATO facilities and equipment cost estimate is the same as the facilities and equipment component of REDAC's cost estimate. The only difference is that ATO's estimate accounts for inflation, while REDAC expresses its estimate in constant 2005 dollars.

In addition to being preliminary, it is important to note the limitations of these estimates. First, ATO's estimate does not include any costs other than those for facilities and equipment. However, an ATO official acknowledged that there would likely be additional costs within FAA, such as for safety certification or making operational changes to respond to NGATS' new technologies. Additionally, ATO's facilities and equipment cost estimate assumes that the intermediate technology development work, which NASA has historically performed, has been completed. As I

[26]The $15 billion estimate is based on the working group's "base case" scenario. The working group also calculated a lower cost "best case" scenario, in which FAA achieves an annual 2 percent productivity increase beyond the cost of increased demand; and a higher cost "worst case" scenario, in which costs grow with the increase in operations with no productivity increases.

previously stated, REDAC believes that the cost of intermediate technology development could be substantial. Furthermore, neither estimate includes other partner agencies' costs to implement NGATS, such as those that the Department of Homeland Security might incur to develop and implement new security procedures. Also, these estimates treat NGATS' development and implementation period as an isolated event. Consequently, the costs drop dramatically toward 2025. In reality, officials who developed these estimates acknowledge that planning for the subsequent "next generation" system will likely be underway as 2025 approaches and that actual operations and modernization costs could be higher in this time frame than these estimates indicate.

In addition, several unknown factors will drive the cost of NGATS. According to JPDO, one of these drivers is the technologies expected to be included in NGATS. Some of these are more complex and thus more expensive to implement than others. A second driver is the sequence in which NGATS technologies will replace the technologies now in use. A third driver is the length of time required to transition to NGATS, since a longer transition period would impose higher costs. Later this year, JPDO expects to issue a first draft of its enterprise architecture, or blueprint for the NGATS, which could reduce these variables, thereby allowing improved, albeit still preliminary, estimates of NGATS' cost.

JPDO Is Taking a Reasonable Approach to Technical Planning, but Some Key Tasks are Yet to Be Completed

To conduct the technical planning for NGATS, JPDO has formed separate divisions to perform system modeling and create the NGATS enterprise architecture, but has not yet completed key activities. JPDO has formed an Evaluation and Analysis Division (EAD), composed of FAA and NASA employees and contractors, to assemble a suite of models that will help JPDO refine its plans for NGATS and iteratively narrow the range of potential solutions. For example, EAD has used modeling to begin studying how possible changes in the duties of key individuals, such as air traffic controllers, could affect the workload and performance of others, such as airport ground personnel.

As I previously noted, NGATS could shift some tasks now done by air traffic controllers to pilots. According to JPDO officials, the change in roles of pilots and controllers is the most important human factors issue involved in creating the NGATS. JPDO officials noted that the Agile Airspace and Safety IPTs contain human factors specialists and that JPDO's chief architect has a background in human factors. However, EAD has not yet begun to model the effect of the shift in roles on pilots' performance because, according to an EAD official, a suitable model has

not yet been incorporated into the modeling tool suite. According to EAD, addressing this issue is necessary, but will be difficult because data on pilot behavior are not readily available to use in creating such models. Furthermore, EAD has not yet studied the training implications of various NGATS-proposed solutions because further definition of the concept of operations for these solutions has not been completed. As the concept of operations matures, it will be important for air traffic controllers and other affected stakeholders to provide their perspectives on these modeling efforts. In addition, as the concept of operations and plans for sequencing equipment matures, EAD will be able to study the extent to which new air traffic controllers will have to be trained to operate both the old and the new equipment.

To develop an enterprise architecture—a blueprint for NGATS and one of the most critical planning documents in the NGATS effort—JPDO has taken several important first steps and is following several effective practices that we have identified for enterprise architecture development. However, JPDO's enterprise architecture is currently a work in progress and many of JPDO's future activities will depend on the robustness and timeliness of its architecture development. The enterprise architecture will describe FAA's operation of the current national airspace system, JPDO's plans for the NGATS, and the sequence of steps needed to transition between them. The enterprise architecture will provide the means for coordinating among the partner agencies and private sector manufacturers, aligning relevant research and development activities, and integrating equipment. And as I noted earlier, the enterprise architecture will also be a key tool in developing cost estimates for NGATS.

To date, JPDO has formed an Enterprise Architecture Division and has established and filled a chief architect position. JPDO has also established an NGATS Architecture Council composed of representatives from each partner agency's chief architect office to provide the organizational structure and oversight needed to develop the enterprise architecture. JPDO is using a phased "build a little, test a little" approach for developing and refining its enterprise architecture that is similar to a process that we have advocated for FAA's major system acquisition programs. In addition, this phased development process will allow JPDO to incorporate evolving market forces and technologies in its architecture and thus better manage change. JPDO plans to have an early version of the architecture by the end of fiscal year 2006.

Maintaining Stakeholder Support Will Be a Long-Term Challenge for JPDO

JPDO has structured itself to involve federal and nonfederal stakeholders throughout its organization, but maintaining their long-term support will be a challenge. Our work has shown that involving stakeholders can, among other things, increase their support for a collaborative effort. Federal stakeholders from the partner agencies serve on JPDO's Senior Policy Committee, board, and IPTs. Nonfederal stakeholders may participate through the NGATS Institute (the Institute). Through the Institute, JPDO obtained the participation of over 180 stakeholders from over 70 organizations for the IPTs. The NGATS Institute Management Council, composed of top officials and representatives from the aviation community, oversees the policy and recommendations of the Institute and provides a means for advancing consensus positions on critical NGATS issues.

Although JPDO has developed the mechanisms for involving stakeholders and brought stakeholders into the process, it faces challenges in sustaining nonfederal stakeholders' participation over the long term. Much as with the federal partner agencies, JPDO has no direct authority over the human, technical, or financial resources of its nonfederal stakeholders. To date, these stakeholders' investment in NGATS has been through their part-time, pro bono participation on the IPTs and the NGATS Institute Management Council.[27] The challenge for JPDO is to maintain the interest and enthusiasm of these nonfederal stakeholders, which will have to juggle their own multiple priorities and resource demands, even though some of the tangible benefits of NGATS may not be realized for several years. For example, stakeholders' support will be important for programs such as SWIM, which is a prerequisite to future benefits, but may not produce tangible benefits in the near term.

In the wake of past national airspace modernization efforts, JPDO also faces the challenge of convincing nonfederal stakeholders that the government is financially committed to NGATS. While most of FAA's major ATC acquisition programs are currently on track, earlier attempts at modernizing the national airspace system encountered many difficulties. In one instance, for example, FAA developed a datalink communications system that transmitted scripted e-mail-like messages between controllers and pilots. One airline equipped some of its aircraft with this new

[27]Nonfederal stakeholders' participation varies from approximately 10 percent to 25 percent of their time per week on the IPTs and involves approximately one meeting per month for members of the council.

technology, but because of funding cuts, among other things, FAA ended up canceling the program. In a similar vein, we have reported that some aviation stakeholders expressed concern that FAA may not follow through with its airspace redesign efforts and are hesitant to invest in equipment unless they are sure that FAA's efforts will continue. One expert suggested to us that the government might mitigate this issue by making an initial investment in a specific technology before requesting that airlines or other industry stakeholders purchase equipment.

In addition to maintaining stakeholder involvement, JPDO faces challenges in obtaining the participation of all stakeholders. In particular, JPDO does not involve current air traffic controllers, who will play a key role in NGATS. The current air traffic control system is based primarily on the premise that air traffic controllers direct pilots to maintain safe separation between aircraft. In NGATS, this premise could change and, accordingly, JPDO has recognized the need to conduct human factors research on such issues, including how tasks should be allocated between humans and automated systems and how the existing allocation of responsibilities between pilots and air traffic controllers might change. The input of current air traffic controllers who have recent experience controlling aircraft is important in considering human factors and safety issues.

However, as mentioned, no current air traffic controllers are involved in NGATS. In June 2005, FAA terminated its labor liaison program based on its determination that program was not providing sufficient benefit compared to the program's cost. The liaison program assigned air traffic controllers to major system acquisition program offices, as well as to JPDO. Since that time, the National Air Traffic Controllers Association (NATCA), the labor union that represents air traffic controllers, has not been a participant in planning NGATS. Although the NGATS Institute Management Council includes a seat for the union, a NATCA official told us that the union's head had been unable to attend the council's meetings. According to JPDO officials, the council has left a seat open in hopes that the controllers will participate in NGATS as the new labor-management agreement between NATCA and FAA is implemented.

Finally, some of the benefits of NGATS' are contingent on users of the system—airlines and general aviation—equipping their aircraft with NGATS-compatible technologies. This is particularly important concerning ADS-B, a new air traffic surveillance system that JPDO has determined will be one of the early core technologies for NGATS. The first phase of ADS-B implementation, known as "ADS-B out," will allow FAA to replace many

ground radars that currently provide aircraft surveillance with less costly ground-based transceivers. Aircraft would be equipped with ADS-B out, which broadcasts a signal to these transceivers. FAA anticipates significant cost savings from this phase and, according to trade association officials, regional and large commercial airlines are largely supportive of this initial phase. But implementing ADS-B out is just the first step to achieving the larger benefits of ADS-B, which would be provided by "ADS-B in." ADS-B in would allow aircraft to receive signals from ground-based transceivers or directly from other ADS-B equipped aircraft—this could allow pilots to "see" nearby traffic and, consequently, take on some responsibility for maintaining safe separation from those aircraft.

However, before airlines can establish a business case that supports an investment, several unknowns concerning ADS-B in must be resolved. For example, the cost of installing ADS-B in must be determined. Also, human factors considerations need further exploration to determine whether pilots can safely use ADS-B in to maintain separation of aircraft. Finally, it is unclear whether air carriers will be willing to equip with the second frequency that ADS-B would require.[28] How these issues are resolved will be an important factor in airlines' decisions on whether to equip with ADS-B in. Given the breadth and complexity of NGATS, issues involving equipage decisions by nonfederal stakeholders are likely to arise again and can impact the extent and speed to which the benefits envisioned by NGATS will be realized.

As NGATS Moves Toward Implementation, Defining Roles and Responsibilities and Deciding How to Coordinate Implementation Are Challenges

JPDO also faces the challenge of clearly defining its partner agencies' roles and responsibilities. Our work has shown that collaborating agencies should work together to define and agree on their respective roles and responsibilities, including how the collaboration will be led. JPDO has operated thus far with no formal, long-term agreement on partner agencies' roles and responsibilities in creating NGATS. JPDO officials informed us that they are working to establish a memorandum of understanding (MOU) signed by the heads of the partner agencies that will broadly define partner agency roles and responsibilities at a high level. JPDO officials said they hope to have the MOU signed and released next

[28]In 2002, FAA established a policy whereby commercial air transport, regional, and military fleets operating in the nation's higher airspace would use the 1090 MHz frequency. The policy also prescribed the use of 978 MHz, known as the "universal access transceiver" or UAT, for general aviation operating in lower airspace. Uplinking weather and national airspace status information is only possible on the 978 MHz frequency.

month. JPDO is also developing more specific MOUs with partner agencies that lay out expectations for support on NGATS components, such as information sharing through network-enabled operations.

Defining roles and responsibilities is particularly important between JPDO and ATO, because both organizations have responsibilities related to planning the national airspace system's modernization. ATO has primary responsibility for the ATC system's current and near-term modernization, while JPDO has responsibility for planning and coordinating a transformation to NGATS over the next 20 years. The roles and responsibilities of each office are currently being worked out. ATO now plans to expand its Operational Evolution Plan so that it applies FAA-wide and represents FAA's piece of JPDO's overall NGATS plan.[29] ATO is also prioritizing its facilities and equipment investments to support the NGATS. As the roles and responsibilities of the two offices become more clearly defined, there is also a need to better communicate these decisions to stakeholders.

As NGATS moves forward, JPDO and FAA must address how to define roles and responsibilities for managing its implementation. JPDO, FAA, and other aviation experts consider NGATS to be a task of unprecedented complexity, with each partner agency having responsibility for developing and implementing portions of NGATS, while JPDO maintains a coordinating role. Recognizing the complexity involved in implementing NGATS, FAA and JPDO officials are considering several different approaches, one of which is to contract with a lead systems integrator (LSI). Generally, an LSI is a prime contractor that would help to ensure that the discrete systems used in NGATS will operate together and whose responsibilities may include designing system solutions, developing requirements, and selecting major system and subsystem contractors.

The government has used LSIs before for complex programs that require system-of-systems integration. Our research indicates that, while LSIs provide certain advantages, such as the ability to know, understand, and integrate functions across various systems, they also entail certain risks. For example, because the degree of responsibility held by the LSI may be significantly greater than that usually held by a prime contractor, careful

[29]Currently, FAA's Operational Evolution Plan monitors how NAS capacity will change over a rolling 10-year planning horizon depending on numerous variables, such as the demand for air travel, the completion of new runways, and the availability of new ATC systems.

oversight may be necessary to ensure that the government's interests are protected and that conflicts of interest are avoided. Consequently, selecting, assigning responsibilities, and managing an LSI could pose significant challenges for JPDO and FAA.

JPDO Must Address a Variety of Policy Issues

JPDO also faces critical policy issues as NGATS moves toward implementation. Some stakeholders have noted that addressing the policy issues needed to implement NGATS technologies will be even more of a challenge for JPDO than determining the technologies for NGATS. JPDO's Concept of Operations—a document that provides a textual operational description of the transformations needed to achieve NGATS' overall goals—has been used to identify key research and policy issues for NGATS. For example, the Concept of Operations identifies several issues surrounding the automation of the air traffic control system, including the need for a backup plan in the event that automation fails, the responsibilities and liabilities of different stakeholders in the event of automation failure, and the level of monitoring needed by pilots when automation is ensuring safe separation from surrounding aircraft.

JPDO officials said that most policy decisions, when they occur, will be tied to the requirements of the enterprise architecture. However, some decisions will involve input from several entities and stakeholders. For example, it is likely that decisions on concepts and policies relating to general aviation would be made in concert among FAA, JPDO, and the Senior Policy Committee, with significant input from the general aviation community, to address concerns such as visual flight rules versus instrument flight rules. Flowing from broad policy decisions, FAA or other partner agencies would have to start developing regulations to implement the new technologies so that they would be ready at the appropriate time.

In addition, JPDO has limited control over some of the factors affecting NGATS-related policy issues. For example, the consolidation of ATC facilities could provide cost savings that could in turn be used for NGATS technologies. However, facility consolidations can often run into political hurdles that are outside of JPDO's control. Similarly, while JPDO's Airport IPT is considering how airport capacity can be expanded, a JPDO official told us that the ability of JPDO to enhance airport capacity is still limited because enhancement decisions are made at the state and local level. The official also noted that JPDO cannot channel federal funds from the Airport Improvement Program to airports where capacity expansion is most needed to achieve the goals of NGATS.

Another key policy area is how JPDO will work toward global harmonization. For example, concurrent with JPDO's efforts, the European Commission[30] is conducting a project to harmonize and modernize the European air traffic management systems. Known as the Single European Sky Air Traffic Management Research Programme (SESAR), the project is overseen by the European Organization for the Safety of Air Navigation (Eurocontrol).[31] Eurocontrol has contracted out the work of SESAR to a 30-member consortium of airlines, air navigation service providers, airports, manufacturers, and others. The consortium is receiving 60 million euros ($73 million)[32] to conduct a 2-year definition phase and produce a master plan for SESAR.

JPDO officials said they recognize the need for global harmonization of systems and have met with officials from various parts of the world—including Europe, China, and East Asia—to assess the potential for cooperative NGATS demonstrations. JPDO has a Global Harmonization IPT, led by managers from ATO's International Operations Planning Services International and FAA's Office of International Aviation. The IPT's mission is to harmonize equipment and operations globally and advocate the adoption of U.S.-preferred transformation concepts, technologies, procedures, and standards. The Harmonization IPT finalized its charter in March 2006 and is working to develop an international strategy and outreach plan. In addition to external efforts, the Harmonization IPT plans to work as a crosscutting IPT that will raise awareness of global interoperability and standards issues within the other IPTs as they consider system performance requirements.

According to several European officials with whom we spoke, global harmonization (and harmonization with the U.S. system specifically) is considered to be a key ingredient for the success of SESAR. Several of these officials said that although the European organization invited JPDO to participate as a full member in SESAR and the organization has indicated its willingness to have reciprocal participation with the United

[30]The European Commission is a politically independent institution that prepares and implements legislative instruments.

[31]Eurocontrol is an autonomous organization established in 1963 with the intention of creating a single upper airspace in Europe.

[32]A portion of this funding is in-kind services from Eurocontrol. To convert euros to U.S. dollars, we used 1.2098, the foreign exchange rate for March 21, 2006, as published in *The Washington Post*.

States, personnel exchanges are just beginning to occur. JPDO officials recognize the importance of cooperative efforts and noted that if Europe and the United States were to implement different and incompatible standards and technologies, there could be a major adverse impact on airlines that serve international markets. Nonetheless, these officials point out that JPDO, as a U.S. government entity, could not participate as a member in a private industry effort like the SESAR consortium. FAA is, however, a member of the European Commission's Industry Consultation Body, which provides advice to SESAR.

According to an FAA official, negotiations are currently underway to complete an MOU between FAA and the European Commission that will commit both parties to cooperation in information sharing and the development of a seamless air traffic management system. JPDO officials noted that personnel exchanges and other cooperative activities, such as information exchanges and a joint working group on technical standards, are already occurring under a memorandum of cooperation between FAA and Eurocontrol.

While FAA and JPDO's Harmonization IPT are planning cooperative activities, our research has identified several other areas where cooperation does not appear to be fully developed. For example, the SESAR and NGATS initiatives, despite their similarities, do not have coordination activities such as peer reviews of relevant research, cooperation on safety analysis (such as through the pooling of accident data), or validation of technologies. It is possible that greater cooperation and exchange between NGATS and SESAR might develop once planning has progressed to the development and validation stage.

Concluding Observations

Transforming the national airspace system to accommodate what is expected to be three times the current amount of traffic by 2025, providing adequate security and environmental safeguards—and doing these things seamlessly while the current system continues to operate—will be an enormously complex undertaking. Both ATO and JPDO have been given difficult tasks in a difficult budgetary environment. Going forward, efforts to control costs and leverage resources will become ever more critical. Success also depends on the ability of ATO and JPDO to define their roles and form a collaborative environment for planning and implementing the next generation system.

This concludes my statement. I would be pleased to respond to any questions that you or other Members of the Subcommittee may have at this time.

Contact and Staff Acknowledgments

For further information on this statement for the record, please contact Gerald Dillingham at (202) 512-2834 or dillinghamg@gao.gov. Individuals making key contributions to this statement include Nabajyoti Barkakati, Christine Bonham, Colin Fallon, Carol Henn, David Hooper, Heather Krause, Elizabeth Marchak, Edmond Menoche, Faye Morrison, Richard Scott, Sarah Veale, and Matthew Zisman.

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STATEMENT OF AMR A. ELSAWY
BEFORE THE HOUSE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE: SUBCOMMITTEE ON AVIATION – HEARING ON JOINT PLANNING AND DEVELOPMENT OFFICE (JPDO) AND THE NEXT GENERATION AIR TRANSPORTATION SYSTEM
21 June 2006

Mr. Chairman, thank you for inviting me to appear before your Committee. My name is Amr ElSawy and I am a Senior Vice President at the MITRE Corporation. I am also the General Manager of MITRE's Center for Advanced Aviation System Development (CAASD), which is the FAA's Federally Funded Research and Development Center (FFRDC). I would ask that my statement be included in the record.

In addressing the committee today, I will focus on the opportunities that lie ahead for the JPDO efforts and how they have the potential for changing the way that air traffic management services are provided in the United States and around the world. Specifically, I want to address how those changes will be reflected in the architecture of today's system and what we must do ***now*** to plan for the ***transition*** to the next-generation air transportation system.

Any updates we make to the architecture of an operational system require coordination and synchronization of changes that involve people, procedures, and systems. We must have a clear understanding of the capital and operating costs related to the implementation of those changes. Today, in an era of limited resources and increasing demand – we must understand the resultant productivity, cost, safety, capacity, and efficiency benefits.

The changes that are needed to address the projected future demands on the air transportation system cannot all happen at once. History has taught us that "big bang" approaches to the planning and development of systems do not succeed, and that those responsible for the operation must drive the change to the future. For example, NASA's aviation research programs and results will need to be ready to transition into an FAA development program that is adequately funded to mature the research and work with industry on operational integration. The FAA must have a clear understanding of the readiness of the research results and a serious, funded, plan for the inclusion of the research results into an operational, safety-critical system. Any gaps in the handoff between research and implementation will significantly undermine the success of the JPDO initiative.

Today, traffic levels and delays have returned to levels seen prior to September 11, 2001 in many areas of the country. These areas include airports in Chicago, Atlanta, the Washington area, the New York area, Las Vegas, and south Florida. There also have been increases in traffic in smaller airports in many areas of the country. Examples include Scottsdale, Teterboro, and West Palm Beach. Traffic in major en route corridors is also generating congestion not just due to higher traffic volume, but also as a result of increasing traffic pattern complexity.

The following factors have created challenges that are different than those experienced in 1999 and 2000. For example:

- Regional jets have replaced larger jets and turboprop aircraft, resulting in different traffic flows and mix which require changes in operational techniques and strategies.
- North/south traffic flows have increased in the winter months changing how traffic flows must be managed around ceiling and visibility constraints. Traffic has grown in south Florida and the Southwest.
- For the coming summer season, traffic growth is expected at Houston, and the NAS will face its usual severe convective weather challenges.
- Traffic increases in areas such as New York and Washington with airports in close proximity to each other has resulted in greater complexity due to traffic climbing, descending, and crossing other traffic in the same airspace.
- Denser overhead traffic streams in areas such as the Chicago/New York corridor have created challenges in merging the departing aircraft into already full traffic streams.
- Also, increased security operations (such as Combat Air Patrol and Temporary Flight Restrictions) have generated challenges in accommodating higher volume and more complex traffic patterns around restricted areas such as within the New York and Washington airspace, as well as during major events.

Beyond this year, commercial and general aviation will continue to see changes. The NAS will likely continue to see traffic growth, changes in the traffic patterns between major airports and metropolitan areas, and changes in the mix of aircraft that make up the traffic. In addition, unmanned aerial vehicles (UAV), very light jets (VLJ), and commercial space launches will need to be accommodated in the NAS, each bringing its own challenges for the operation of airspace, controller workload, and system complexity. Projections developed by DOT, FAA and MITRE (and documented in the *Capacity Needs in the National Airspace System)* indicate that by 2013, 16 airports and 7 metropolitan areas will need additional capacity to meet the expected demand.

In order to meet the needs of a dynamic marketplace, the FAA and the aviation community need to reach ***rapid*** consensus on the key enabling capabilities and to ***implement*** changes in technology, procedures, avionics, and policy that can - together - increase operational efficiency and productivity.

I would like to cite two specific examples where the US has created a global market place through 1) the implementation of the global positioning system (GPS), and 2) the pursuit and adoption of internet protocols. The worldwide change that has resulted from the availability of GPS is staggering. The impact of the availability of precise navigation information to aircraft, and the dramatic progress made by airframe manufacturers in

flight management systems and avionics that allow aircraft to fly precise routes are central to the progress we are making towards the next-generation system.

We believe that the following actions are the ***foundation*** for the next-generation system, and should be funded and started ***now***, not in 25 years:

- **Take advantage of aircraft capabilities and avionics to implement the FAA's *Roadmap for Performance-based Navigation*.** This is a significant change because it is equivalent to **adding** precise navigation lanes in the sky without requiring additional ground-based equipment. Moving to a performance-based system will transform the way the National Airspace System (NAS) operates. By taking advantage of the aircraft's flight management systems and avionics, Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures lead to safety, efficiency and capacity improvements, especially in complex and congested airspace such as Atlanta and the eastern United States. This will provide direct operating benefits to customers and will enable the FAA to reduce the size, complexity, and cost of its infrastructure through selective divestments of ground-based navigation aids.

- **Accelerate the implementation of airspace changes** to be more flexible, and to accommodate the expected growth in traffic and new airspace users such as unmanned aerial vehicles (UAV). Again this has the real effect of streamlining traffic flows into congested areas and providing more efficient arrival and departure paths for all users. Small investments by the FAA, result in a significant benefit for the users and the system as a whole.

- **Emphasize enhancement of automation and decision support tools** to enable controllers to handle more traffic by presenting them with automated conflict-free problem resolutions, thereby increasing system capacity and productivity and improving safety and the quality of service provided to customers. With the on-schedule completion of the software development of the En route Automation System (ERAM), **now** is the time to plan and fund the next increment of automation capabilities and NGATS extensions.

- **Develop a firm plan for the implementation of air/ground data link** that will enable controllers and pilots, and their respective ground and onboard aircraft automation systems, to exchange digital messages that yield efficiency, productivity, and safety improvements. A digital link between the aircraft and the ground is a central element of the System Wide Information Management (SWIM) architecture; without it, we will be unable to exchange aircraft intent or trajectory information. Without data link we will be unable to realize the benefits of efficient rerouting of aircraft during severe weather events. Without data link we will be unable to reduce the complexity of the controllers' tasks.

- **Improve traffic flow management capabilities**, such as access to more timely and accurate information (especially for unscheduled flights), will permit the FAA and the

user community to identify and solve congestion problems more quickly and efficiently.

- **Transition to Automatic Dependent Surveillance–Broadcast**. This is equivalent to providing pilots with electronic eyes in the sky and will permit the FAA to migrate to a less costly and more accurate surveillance system. By relying on aircraft avionics and the power of satellite navigation, we can improve situational awareness for pilots, allowing better access and effective communication about weather and traffic. We also can achieve capacity and performance under instrument flight rules (IFR) that are only possible today under visual flight rules (VFR).
- **Use advanced simulation technologies to train the new controller workforce.** This will reduce the time and cost needed to train controllers, and will improve trainee proficiency and readiness to implement advanced concepts of operation.
- **Maintain a strategic view of investments in airport infrastructure and runways,** by continuing to build runways and improve taxiways to stay ahead of the increasing demand.
- **Develop and implement policies that enable enhanced access to airports through the use of modern and improved avionics and procedures instead of ground-based infrastructure.**

These actions will position us to meet increasing demands and have the potential for improving overall productivity between 20 and 40 percent while reducing future operating costs by several hundred million dollars per year. Over the next year, MITRE will be working with FAA's ATO and JPDO to simulate and validate the productivity and cost saving estimates.

Implementing these changes will keep the United States as innovators and leaders of the global aviation community. We have a lot of opportunities ahead.

Thank you Mr. Chairman. I would be happy to answer any questions.

June 21, 2006
Subcommittee on Aviation
HEARING on
"Air Traffic Control Modernization: The Present and Future"

Questions for the Record from Rep. Jerry F. Costello to:

Dr. Amr A. ElSawy, Senior Vice President and General Manager Center for Advanced Aviation System Development, the MITRE Corporation

1. Dr. ElSawy, MITRE has analyzed the potential use of a lead systems integrator (LSI) to support the government's Next Generation Air Transportation System (NGATS) efforts. Given your analysis, what specific and concrete recommendations, or "best practices," would you make should the government seek to use a lead systems integrator for the NGATS?

2. Dr. ElSawy, in your written statement, you refer to MITRE CAASD as the FAA's Federally Funded Research and Development Center (FFRDC). What exactly is an FFRDC? How is this different from a regular contractor? Is it authorized by statute, and if so, what specific statute? Is it non-profit?

3. Dr. ElSawy, in your written testimony, you state that "History has taught us that 'big bang' approaches to planning and development of systems do not succeed." Please explain what you mean and, if possible, provide examples.

4. Dr. ElSawy, in your written testimony you state that "those responsible for the operation [of the system] must drive the change to the future." Please explain exactly what you mean. Who else would potentially drive change if not those responsible for operation?

Amr ElSawy, Senior Vice President and General Manager – MITRE/CAASD 8/7/2006

1. Based on MITRE's experience and analysis, the following recommendations reflect best practices that help the Government successfully manage large complex programs: a) developing a clear understanding of "what capabilities" are needed by when; b) create a strong program office that has the ability to manage the contractors and the technical program risk; and c) establish an "architect function" that is able to conduct tradeoffs based on proposed changes in cost, schedule, capability or technology.

a) **Use an acquisition approach that delivers capability in well-bounded increments with "time-certain" delivery:**
   - Define capability increments by considering and balancing user priorities, technology maturity, and development risk.
   - Develop a stable technical framework (e.g., architecture, standards selection, design tenets) as a "backplane" on which to integrate capabilities.
   - Develop an agile integration process and stimulate a robust "feeder economy" of contractors and suppliers.

b) **Strengthen Government Program Offices to improve ability to manage risk**
   - Develop technical frameworks, build prototypes of critical components, and increase insight and understanding of contractor approaches.
   - Assess contractor capability and prior performance on similar programs.
   - Include company visits and interviews as part of a rigorous contractor evaluation process.
   - Contractor selection should be influenced heavily by past performance.
   - Establish large incentives for contractors who perform and deliver capability.

c) **Establish strong "Architect" function to advise the program manager:**
   - Define user requirements and program capability increments that are relevant to the operational needs of the mission.
   - Develop transparent, well communicated, processes to evaluate risk and uncertainty in programs.
   - Clearly communicate program risks and uncertainty to users, decision makers and stakeholders.

2. Federally Funded Research and Development Centers (FFRDCs) are described in the Federal Acquisition Regulation (FAR) 35.017. The following are key distinguishing characteristics of FFRDCs:

A. FFRDCs can take a variety of forms including, but not limited to those that perform systems engineering, conduct studies and analyses, or operate a national laboratory. FFRDCs provide a unique service to the government and include organizations such as national laboratories associated with federal agencies.
B. An FFRDC meets certain special long-term research or development needs that cannot be met as effectively by existing in-house or contractor resources. In addition to meeting long-term and intermediate-term needs of sponsor(s) and users, FFRDCs enable agencies to use private sector resources to accomplish tasks that are integral to the mission and operations of their sponsor(s).
C. FFRDCs are outside the government to permit the management flexibility necessary to attract and retain high-quality scientific, technical, and analytic expertise and to provide an independent perspective on the critical issues that they address for their sponsor(s) and users.
D. Long-term relationships between the government and FFRDCs are desirable in order to provide the continuity that will attract high-quality personnel to the FFRDC. This relationship should be of a type to encourage the FFRDC to maintain currency in its field(s) of expertise, maintain its objectivity and independence, preserve its familiarity with the need(s) of its sponsor(s), develop institutional DHS memory, and provide a quick response capability.
E. An FFRDC has access, beyond that which is common to the normal contractual relationship, to government and supplier data, including sensitive and proprietary data, and to government employees and facilities. The FFRDC is required to conduct its business in a manner befitting its special relationship with the government, to operate in the public interest with objectivity and independence, to be free from organizational conflicts of interest, and to have full disclosure of its affairs to the sponsoring agency. An FFRDC may not use its privileged information or access to facilities to compete with the private sector. With few exceptions, FFRDCs may not participate in competitive procurements by the U.S. government.
F. FFRDCs may be operated, managed or administered by a university or consortium of universities, other not-for-profit or nonprofit organization, an industrial firm as an autonomous organization or as an identifiable separate operating unit of a parent organization under a strict conflict of interest regime to prevent the influence of shareholders of the for-profit board, which could undermine the objectivity of the FFRDC organization.

MITRE is a non-profit organization and the Center for Advanced Aviation System Development (CAASD) was established in 1990 as the identifiable business unit within MITRE that is sponsored by the FAA as an FFRDC.

CAASD uses its unique qualifications, its unparalleled operational knowledge, its institutional memory, its state-of-the-art technological sophistication, and its perspective on issues that require objectivity, independence, and the application of many disciplines and functional specialties—to solve broad and complex problems for the FAA.

Specifically, CAASD performs the following functions:

1) the assessment of NAS operational needs and the identification of user services, including global ATM system capabilities;
2) the development and evaluation of NAS advanced ATM system concepts and requirements, and the assessment of alternatives and technological approaches to meeting the requirements in cost-effective ways;
3) the analyses of the operations of the current and eventual NAS ATM system, emphasizing the operational effectiveness, efficiency, and safety implications of transitions;
4) the research, conceptual formulation, feasibility determination, modeling, simulation, and development of prototypes of technical and operational enhancements to the ATM system;
5) the development and evaluation of plans for the evolution and integration of ATM system capabilities;
6) the development of NAS operational scenarios and the evaluation of test results (procedures, requirements, and performance) to ensure the operational acceptability of each capability as it is added to the ATM system; and
7) the facilitation of early fielding of new technology through active support of the FAA's technology transfer program, aimed at moving CAASD's concepts, prototypes, and technologies to the private sector.

Amr ElSawy, Senior Vice President and General Manager – MITRE/CAASD 8/7/2006

3. "Big Bang" refers to the old practice of specifying, acquiring, developing and implementing large, complex systems as a ***single monolithic*** product. As contrasted with today's best practice of identifying smaller capabilities that can be developed and implemented in phased steps or increments. The FAA's Advanced Automation System (AAS) was an example of a failed major system acquisition that used the "big bang" strategy. The FAA's Free Flight Phase I program, the Enroute Automation Program (ERAM), and the newly created ADS-B program are examples of more incremental, risk-managed acquisitions that are structured to deliver early capability to the users.

4. Changing and modernizing a system as large and complex as the Air Traffic System, requires the implementation of technology, the adaptation or creation of procedures, and the training of people to use the new capabilities and to integrate them with their job functions. Some people are expecting the JPDO to "develop and implement," capabilities into the operational National Airspace System (NAS). I do not believe that is feasible, desirable or practical. The JPDO should be focused on joint planning and coordination of interagency direction and investments. The FAA Air Traffic Organization (ATO) should be responsible for development and implementation of new capabilities into the operational system.

The Honorable Bill Pascrell, Jr.
Opening Statement
Subcommittee on Aviation
Traffic Control System Modernization
June 21, 2006

- Good afternoon. Chairman Mica, Ranking Member Costello, I appreciate your decision to hold a hearing on the problems associated with modernizing our nation's air traffic control systems.

- The skies over New Jersey and New York are the busiest in the world and are expected to grow even more crowded over the coming years.

- By 2015, less than a decade, domestic passenger traffic will nearly double to 1 billion passengers annually.

- With little room to increase capacity on the ground, it is imperative that we use new technology to streamline and fully utilize our capacity in the air.

- The National Airspace Modernization effort, launched by the Reagan Administration in 1981, was supposed be completed by 1996 at a cost of $2.5 billion.

- However, $43.5 billion later we have little to show. This effort has been fraught with significant cost overruns and delays and has had numerous high-profile program failures; the first of which was the $2.6 billion Advanced Automation System.

- A full 10 years after the original completion date, we are still awaiting modernization of our airspace system.

- The GAO, in a review of the FAA's work on this project reported that: "FAA did not recognize the technical complexity of the effort, realistically estimate the resources required, adequately oversee its contractors' activities, or effectively control system requirements."

- In addition to poor planning, the FAA has failed to gain appropriate cooperation and involvement by the private sector; nor have major stakeholders sufficiently involved in the process.

- Aside from the major system development, it is my understanding that some of our nation's major air traffic control centers do not yet have even some of the most basic upgrades.

- Last April, the Air Traffic Organization released a preliminary cost estimate that found that the latest projects would cost a total of $18 billion. This is in addition to the $50 billion needed just to sustain the existing Air Traffic Control System between 2008 and 2025.

- This Subcommittee has shown consistent support for the goal of modernization. Yet our task is made more difficult by the fact that a lot of time and funding has gone into this project and the results are sorely lacking.

- I am eager to hear from our panel members this afternoon on the ways they intend to work together to improve their process and practices to ensure we successfully bring air traffic control system modernization to fruition.

- I look forward to a very interesting hearing.

- Thank you Mr. Chairman and I yield back the balance of my time.

MAXINE WATERS
MEMBER OF CONGRESS
35TH DISTRICT, CALIFORNIA

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Hearing on Air Traffic Control Modernization
Subcommittee on Aviation
Committee on Transportation

Statement by Rep. Maxine Waters

June 21, 2006

Introduction

Chairman Mica, Congressman Costello, distinguished members of the Subcommittee on Aviation: thank you for allowing me to testify during this hearing on "Air Traffic Control Modernization: The Present and the Future."

My congressional district is home to Los Angeles International Airport (LAX), the fifth busiest airport in the world. It is also home to the Western Pacific Regional Office of the Federal Aviation Administration's (FAA) Air Traffic Organization (ATO). The modernization of our nation's air traffic control system is of tremendous importance to me and my constituents, as well as the millions of travelers who fly into and out of my district every year.

Background

The FAA is proposing to restructure the ATO into three service areas: Eastern, Central, and Western. Under the FAA's proposed plan, the Eastern Service Area Office would be in Atlanta; the Central Office would be in Fort Worth; and the Western Office would be in Seattle. The six regional offices that would be adversely affected by this reorganization are in Anchorage, Boston, Chicago, Kansas City, New York, and Los Angeles. I believe that this plan represents a step backward in the agency's mission to provide the safest, most efficient airspace system in the world.

Costs

The FAA maintains that the restructure will yield savings of $360 million to $460 million over ten years. I question these optimistic projections. Despite requests, the FAA has failed to disclose the analysis that support these projections.

Congress cannot assess the agency's estimates without being given access to the full report of the ATO Structure and Process Evaluation and the proper time to review it. I would also recommend a third party review or audit of the projected savings.

Under the proposed restructure, the relocated ATO employees would spend more time in travel and less time doing their jobs. More air travel by the ATO employees themselves would be needed to support and administer California, Arizona, New Mexico, and Nevada projects and facilities from a Seattle office. That will result in less work, more travel expenses, and diminished safety margins.

Allow me to note that the FAA recently adjusted downward by $500 million the anticipated savings from last year's privatization of the Flight Service Stations. This sudden and significant restatement of projected savings has provoked a GAO audit, and appropriately so. Needless to say, this development does not bolster confidence in the FAA's unaudited projections.

It bears pointing out here that the cost-saving rationale does not appear to apply to certain parts of the country. I have been informed that the FAA has seen fit to create exceptions to directed reassignments for employees of the Anchorage and Kansas City regional offices. Thus, loyal FAA employees who happen to work in the Boston, Chicago, New York, and Los Angeles offices will have to move or lose their jobs. For some reason, employees in Anchorage and Kansas City may keep their current stations.

The Customer

The pending reorganization removes ATO engineers and managers away from the customers they service. Let's be clear who we mean by "customers": Airports and the state and local governments that sponsor airports. Under the reorganization plan, the FAA points of contact relied on by the customers are moving to remote Service Centers. Much of the business performed by these ATO engineers and managers is performed in the field and in face to face contact. It cannot all be replaced by the telephone. So, under the reorganization, a lot of the customer service won't be done as well, or it won't be done at all.

If there were to be reorganization, the ATO's original proposal made far more sense than its later pronouncement. Originally, the Western Service Area Office was placed in Los Angeles, minutes from LAX, where it would be centrally located to serve the busy and growing air traffic spaces and facilities of the Western Pacific Region.

The Employees

Although I have seen varying estimates, approximately 400 ATO employees nationwide would be reassigned to the three new Service Area Offices. At last count, about 86 employees in the Los Angeles Regional Office will be given directed reassignments to an office 1500 miles away. Their choice will be to leave LA, or leave the FAA.

The reorganization plan affects highly trained and qualified employees the FAA needs to make the national air system as safe and efficient as possible. It's not just secretaries and bookkeepers affected by the restructure. Civil and electrical engineers are being given the ultimatum. These engineers are the men and women of our government's air traffic system who work with radars, navigation equipment, communication systems, and other technology that keep planes in the air moving safely to their destinations.

Under the plan, there would be a dramatic loss of intellectual capital from the FAA. The loss of civil and electrical engineers who would choose early retirement or resignation rather than relocation would strain the administration of air traffic, airspace and engineering activities in the Western Pacific Region. This brain drain would adversely affect the safety of the flying public.

Large numbers of Los Angeles employees may decline their administrative reassignments to Seattle. Yet, the FAA's announced policy is to treat a refusal to accept an administrative reassignment as a "separation." Hence, the planned restructure will have the same staff thinning effect as a reduction in force (RIF) but without the protections afforded by a RIF, especially priority consideration for other openings.

A move to Seattle presents employees with the Hobson's choice of either losing careers or being torn from families and friends. The move would also place a disproportionately heavy burden on the backs of single parents who rely on family for child care.

Racial and ethnic diversity existing in the current Western Pacific Regional Office will be lost if the Service Area Office is moved out of Los Angeles. The Western Pacific region has the highest percentage of minority employees of any region in the country.

The Office Should Remain in Los Angeles

If the three western regional offices *were* to be consolidated, Los Angeles is the superior location for the Western Service Area Office.

LAX has Better Access to Major Airports: LAX offers vastly more domestic flights than SeaTac, the airport serving Seattle. In 2005, LAX offered 92,000 more domestic passenger flight departures than SeaTac and 11,000,000 more domestic departing seats.

Los Angeles has Better Commute Times: According to U.S. Census Bureau data, the Los Angeles Regional Office in Hawthorne enjoys shorter commute times than Renton, the location of the Seattle Regional Office.

Los Angeles has More Economical Employee Relocation Costs: Los Angeles is again the most cost-effective site. According to the ATO relocation study, based on permanent change of station (PCS) costs, "the most cost effective site for the restructuring of ATO Service Area Offices in the ... Western Service Area [is] Los Angeles." The PCS cost associated with a Seattle move is $1,440,000 greater than Los Angeles.

Los Angeles has More Available Office Space: The Los Angeles Regional Office can fully accommodate a transfer of operations *to* Los Angeles. In contrast, the Seattle office is so congested that FAA staff are housed outside of the Regional Office in outlying office buildings.

Los Angeles has More Clement Weather: I am informed that the Seattle office was forced to close last winter because of icy conditions. Meanwhile, the Los Angeles Office was open for business. Climatic conditions have never been known to interfere with the operation of the Los Angeles Office.

Los Angeles has Better Public Transportation: Los Angeles' public transportation surpasses Seattle's. Los Angeles has a subway system, which Seattle lacks. Los Angeles also has an extensive and growing light rail system. In fact, the Hawthorne office building is one block from a commuter rail station..

Los Angeles has a Rich Cultural Life: When considering such factors as access to cultural life, the quality of museums, nearby local and natural parks, water views, city vibrancy, restaurants, sports and entertainment, Los Angeles stands out, rivaled only by such world cities as New York and London.

The point, of course, is not that Seattle is not a nice place to live. The point is that Seattle is no place for an ATO Service Center serving Southern California and the Western Pacific States.

Safety

Southern California is among the world's busiest airspaces and serves more passengers than any other region in the United States. Southern California Terminal Radar Approach Control, which provides radar air traffic approach control services to all arriving and departing aircraft for most airports in Southern California, is the busiest approach control in the world.

Phoenix, Las Vegas, Albuquerque, Oakland, and Southern California are among the fastest growing sites of air travel in the United States. All of these airspaces and facilities are currently served by the Los Angeles Regional Office. Under the proposed restructure, they would all be served from Seattle.

In the years ahead, LAX is scheduled for major modernization and safety enhancements worth billions of dollars, programs with which the FAA will play a key role.

An ATO Service Area Office needs to be close to Southern California Facilities to provide immediate and expert attention. A Service Area Office 1500 miles away will result in neglect of these huge and critical facilities. Experience tells us that facilities located near headquarters and regional offices receive better programs and quicker service than outlying facilities. Distancing the service operations away from Los Angeles is folly.

When a controller in a tower flips a switch to turn on a radar, that radar had better turn on. If it doesn't, someone from the regional office had better respond quickly. Neither the controller, the pilot, nor the air passengers will find solace that a repair has been delayed because the closest Service Area Office is over 1500 miles away.

Conclusion

We all know that our nation's need for air travel will continue to grow in the coming decades. This growth in air traffic will require trained and experienced FAA employees. These employees will be able to provide the best possible service if they are located near important air travel hubs like LAX.

Modernizing the FAA should not be done at the expense of FAA employees or those who depend on their services. If the Subcommittee believes that the FAA should invest more resources in modernizing facilities and equipment, then the Subcommittee should seek an increase in resources for the FAA. Cutting FAA administrative services in order to increase funding for modernization is robbing Peter to pay Paul.

I urge the members of this subcommittee to support the existing nine regional offices of the ATO and exercise your oversight responsibilities to ensure that the FAA does not implement this reduction in force. I look forward to working with the Subcommittee on Aviation to ensure the continuing safety and efficiency of air travel at LAX and throughout the United States.

Before the Committee on Transportation and Infrastructure
Subcommittee on Aviation
U.S. House of Representatives

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CC-2006-031

Observations on Current and Future Efforts to Modernize the National Airspace System

Statement of
Todd J. Zinser
Acting Inspector General
U.S. Department of Transportation

Mr. Chairman and members of the Subcommittee:

We appreciate the opportunity to testify on the Federal Aviation Administration's (FAA) *Joint Planning and Development Office* (JPDO) and the plans for the next generation air transportation system. Secretary Mineta has made these efforts a top priority.

The JPDO was mandated by Congress to develop a vision for the next generation air transportation system (NGATS) in the 2025 timeframe and coordinate diverse agency research efforts. This office was established within FAA; also participating are the National Aeronautics and Space Administration (NASA), the Department of Commerce, the Department of Defense (DOD), and the Department of Homeland Security. Thus far, we have focused primarily on the JPDO's air traffic management efforts that involve NASA, DOD, and Commerce.

There are a number of compelling reasons for moving toward the next generation air transportation system. The current air transportation system has served the nation well, but FAA reports that the current system (or business as usual) will not be sufficient to meet the anticipated demand for air travel. Last year, over 700 million passengers used the system, and this number is forecasted to grow to over 1 billion by 2015.

Because of the forecasted growth in air travel, the JPDO needs to continue to work on what can be done much sooner than the 2025 timeframe. Moreover, it will be important for the JPDO to show tangible benefits to airspace users from its efforts. We have made this point before, and it was a key theme from the JPDO/industry workshop on costs in April.

Moreover, the JPDO's mission is critical given that FAA conducts little long-term air traffic management research and the fact the most of the Agency's current $2.5 billion capital account goes for keeping things running. However, the cost of NGATS remains uncertain and much work remains to refine costs, align diverse agency budgets, and set expectations for airspace users with respect to milestones, equipage, and anticipated benefits. In addition, we have identified a range of actions that will help FAA and JPDO transition from planning to implementation.

As requested by this Subcommittee, my remarks today will focus on three points:

- FAA's fiscal year (FY) 2007 budget request for its Facilities and Equipment (F&E) account and progress and challenges with key modernization projects,

- JPDO progress to date in aligning agency budgets and plans, and

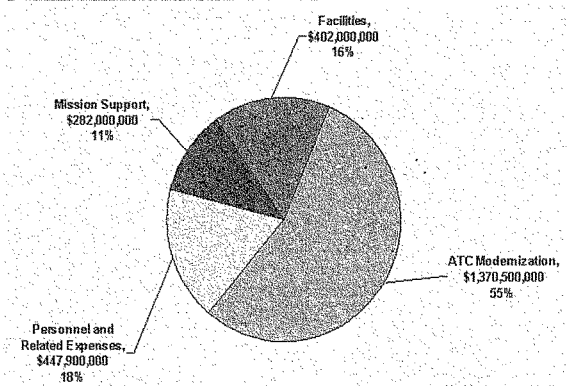
- actions that will help the JPDO keep moving forward in both the short and long term and shift from planning to implementation.

Perspectives on FAA's Capital Account and Progress and Challenges with Key Modernization Projects

FAA's capital account—or the F&E account—is the principal vehicle for modernizing the National Airspace System. It represents about 18 percent of the Agency's FY 2007 budget request of $13.7 billion. For FY 2007, FAA is requesting $2.5 billion for the F&E account, which is $50 million less than last year's appropriation. This is the fourth consecutive year that funding requests for the capital account are below authorized levels called for in Vision 100. We understand that the House Appropriations Committee has recommended $3.1 billion in FY 2007 for FAA's capital account, which would represent an increase of about $600 million from last year's funding and is the same as the authorized level.

As we have noted in previous reports and testimonies, FAA's increasing operating costs have crowded out funds for modernization. Further, only about 55 percent of FAA's FY 2007 request for F&E (or $1.4 billion) will actually go for acquiring air traffic control systems, while the remainder will be spent on personnel, mission support, and facilities. This is illustrated in Figure 1.

Figure 1: FAA's FY 2007 Facilities and Equipment Budget Request



As we have noted in the past, the majority of FAA's capital account now goes for keeping things running (i.e., sustainment), not new initiatives. A review of the top 10 projects by dollar amount in the FY 2007 request shows that while some

projects will form the platforms for future initiatives, the bulk of funds are requested for projects that have been delayed for years and for efforts to improve or maintain FAA facilities or replace existing radars.

Over the last several years, FAA has deferred or cancelled a number of projects as funding for the capital account has remained essentially flat. This includes efforts for a new air-to-ground communication system, controller-pilot data link communications, and a new satellite-based precision landing system. FAA has also postponed making decisions on projects like the billion-dollar *Standard Terminal Automation Replacement System.*

In spite of a lack of clarity about the next generation system, FAA is requesting F&E funds for two projects that are considered "building blocks" for the next generation system. These are not new programs and have been under development or been funded in previous budgets.

- Automatic Dependent Surveillance-Broadcast (ADS-B) is a satellite-based technology that allows aircraft to broadcast their position to others. In FY 2007, FAA is requesting $80 million for this. In prior budgets, ADS-B was funded under the *Safe Flight 21 Initiative*, which demonstrated the potential of ADS-B and cockpit displays in Alaska and the Ohio River Valley. FAA expects to make a decision about how quickly to implement ADS-B nationwide and at what cost later this year. Airspace users will have to equip with new avionics to get benefits, and FAA may have to rely on a rulemaking initiative to help speed equipage. This illustrates why the JPDO must address complex policy issues as well as research.

- System Wide Information Management (SWIM) is a new information architecture that will allow airspace users to access securely and seamlessly a wide range of information on the status of the National Airspace System and weather conditions. It is analogous to an internet system for all airspace users. FAA is requesting $24 million for this program in FY 2007.

Progress and Challenges with Key Air Traffic Control Modernization Projects. We are not seeing the massive cost growth and schedule delays we have seen with FAA major acquisitions in the past. This is the result of this Administration's more incremental approach to major acquisitions and decisions to defer several complex and challenging efforts.

Last year, we reported that 11 of 16 major acquisitions accounted for cost growth of $5.6 billion.[1] Most of this cost growth occurred before the establishment of the Air Traffic Organization. The cost growth was also a reflection of efforts to re-baseline programs, which identified costs that had been pent up for years and not reflected in prior cost estimates. At the request of this Subcommittee, we are updating our work on the 16 major acquisitions and the challenges they face.

Many efforts are maturing, and completing them within existing cost and schedule parameters is critical to allow room for future initiatives. Only one ongoing modernization project, *FAA Telecommunications Infrastructure*, has the potential to reduce FAA's operating costs, which is a top priority within the Agency. We would like to highlight two multi-billion-dollar programs that require attention.

- En Route Automation Modernization (ERAM) is intended to replace the Host computer network—the central nervous system for facilities that manage high-altitude traffic. FAA is requesting $375.7 million for ERAM, which is this program's peak single-year funding level according to FAA's Capital Investment Plan. With an acquisition cost of $2.1 billion, this program continues to be one of the most expensive and complex acquisitions in FAA's modernization portfolio. The monthly burn rate for ERAM will increase from $28 million a month in FY 2006 to $31 million per month in FY 2007. This year is critical for ERAM because the system is scheduled to begin real-world testing. Should ERAM experience cost increases or schedule slips, the problems would have a cascading impact on other capital programs and directly affect the pace of efforts to transition to the next generation system.

- FAA Telecommunications Infrastructure (FTI). FAA is requesting $28 million in FY 2007 for its effort to replace its entire telecommunications system for air traffic control. In a recently issued report to FAA, we concluded that FTI is a high-risk program—with a lifecycle cost estimate of $2.4 billion ($310 million estimated acquisition costs and $2.1 billion estimated operations costs) through 2017, 5 years longer than originally planned.[2] We also concluded that FAA is unlikely to meet its December 2007 revised completion date. In fact, only months after being re-baselined in December 2004, the program began falling behind its site acceptance schedule and has not recovered.

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[1] OIG Report Number AV-2005-061, "Report on the Status of FAA's Major Acquisitions: Cost Growth and Schedule Delays Continue To Stall Air Traffic Modernization," May 26, 2005. OIG reports and testimonies can be found on our website: www.oig.dot.gov.

[2] OIG Report Number AV-2006-047, "FAA Telecommunications Infrastructure Program: FAA Needs To Take Steps To Improve Management Controls and Reduce Schedule Risks," April 27, 2006.

After site acceptance, three other critical steps are required to transition FTI services into the National Airspace System and begin achieving cost savings. We concluded that FTI is not likely to be completed on time because FAA has not developed a detailed, realistic master schedule for all critical steps, including identifying when each service will be accepted, when services will be cut over to FTI, and when existing (legacy) services will be disconnected. Further, until FAA develops a realistic master schedule, it will be difficult to obtain a binding commitment from the FTI contractor to complete the transition by December 2007.

The primary purpose of the FTI program is to lower operating costs, which depends on deploying the system on schedule. However, expected benefits from reducing operating costs are eroding because of schedule problems. For example, FAA did not realize $32.6 million in expected reduced operating costs in FY 2005 due to the limited progress made in disconnecting legacy circuits. Additionally, unless FAA accelerates FTI service cutover and legacy circuit disconnect rates substantially (almost 10-fold over FY 2005), the Agency will not realize about $102 million in estimated cost savings for FY 2006.

We recommended, among other things, that FAA develop a master schedule and an effective FTI transition plan and validate FTI cost, schedule, and benefits. FAA agreed with our recommendations and has commissioned the MITRE Corporation[3] to conduct an independent assessment of FTI's schedule and transition performance to date. We are conducting a follow-up review to assess FAA's response to our recommendations and efforts to get FTI on track.

It is important to recognize that FAA's existing investments will heavily influence NGATS requirements and schedules. In fact, ongoing projects, like ERAM and FTI, will form important platforms for JPDO initiatives. Enclosure A provides details on selected modernization projects that will likely play a key role in moving toward the next generation system. *FAA will have to assess how JPDO plans affect ongoing projects and determine which ones need to be accelerated or re-scoped.*

Progress Is Being Made in Coordinating Diverse Agency Efforts but Considerable Work Remains To Align Agency Budgets and Plans

The law requires the JPDO to coordinate and oversee research that could play a role in NGATS. Central to the JPDO's mission—and making it an effective multi-agency vehicle—is alignment of agency resources. This is a complex task, and the

[3] The MITRE Corporation functions as FAA's federally funded research and development center.

law provides no authority for the JPDO to redirect agency resources. Enclosure B provides information on potential agency contributions to the JPDO and each agency's area of expertise.

The Secretary of Transportation has played an important role in coordinating various efforts by chairing the Senior Policy Committee. This committee was established by Vision 100 and includes, among others, deputy secretary level representatives from the Departments of Commerce and Homeland Security, as well as the Secretary of the Air Force. It also includes the FAA and NASA Administrators. This committee provides high-level guidance, resolves policy issues, and identifies resource needs. Each participating agency conducts research tailored for its specific mission.

The JPDO's March 2006 progress report to Congress outlined various accomplishments to date, including the establishment of multi-agency teams and the NGATS institute (a mechanism for interfacing with the private sector) as well as a demonstration of network-enabled operations for security purposes. However, the report did not provide details on specific ongoing research projects at FAA or funding that the JPDO expects to leverage at other agencies. Without this information, it is difficult to assess progress with alignment of budgets.

The majority of JPDO's work is done through eight Integrated Product Teams (IPTs) that focus on eight strategies, such as how to use weather information to improve the performance of the National Airspace System. The teams are composed of members from FAA, other Federal agencies, and the private sector. Attachment C provides information on the JPDO's IPTs.

The National Research Council recently examined JPDO plans and was critical of the IPT structure. The Council's report found that even though the teams have multi-agency participation, they are functioning primarily as experts in specific disciplines rather than as cross-functional, integrated, multidisciplinary teams organized to deliver specific products. One of the report's recommendations was that the IPTs be reduced in number and made more "product driven." Although we have not reached any conclusions on how to best structure the IPTs, we do agree that a more product-driven focus would be an important step forward.

Our audit work on three IPTs shows that there is considerable coordination but little alignment of agency budgets to date. Moreover, the IPT leaders have no authority to commit agency resources to JPDO efforts and often have no products other than plans. The following illustrates progress and challenges to date with the three IPTs we examined in detail.

- The Weather IPT is led by the National Oceanic Atmospheric Administration (NOAA), an agency of the Department of Commerce. FAA, NASA, DOD, and NOAA are all conducting weather research tailored for their specific missions. Thus far, this team's efforts have focused on contributions to FAA's *Traffic Flow Management Program* (which assists traffic managers to optimize air traffic by working with airlines). NOAA is also helping the JPDO refine its concept of a fully automated system. Integrating new, up-to-date weather forecast systems into planned automation efforts will be challenging.

  We note that JPDO has not yet determined if a considerable amount of applied research and development conducted by NOAA at the Office of Atmospheric Research and the National Environmental Satellite Data and Information Service could be leveraged for next generation initiatives. We have shared our concerns about taking full advantage of weather research conducted by others with the JPDO, which recognizes it can do a better job.

- The Shared Situational Awareness IPT is led by DOD. All participating agencies are adopting network-centric systems.[4] As noted earlier, FAA is developing its own network system called SWIM. While there are considerable opportunities for leveraging net-centric efforts, there is also potential for duplication of effort. Challenges here focus on taking an approach pioneered by DOD and applying it specifically to air traffic control to get benefits in terms of enhanced capacity and delay reduction.

  An active role by DOD is vital because it is both a provider and a consumer of air traffic services. Thus far, work with this IPT has focused almost exclusively on maximizing agency network capabilities in DOD, such as the *Global Information Grid*, which is a net-centric communication system DOD is developing for global use. Moreover, DOD's real-world experiences and lessons it has learned in sharing data (from air and ground systems) in actual operations and in real-time have not been fully tapped and will prove invaluable in reducing cost and technical risks in developing the next generation system.

- The Air Traffic Management IPT is led by NASA. It is expected to play a key role by helping develop the automated systems to boost controller productivity. The bulk of this work will be funded by NASA, which has conducted the majority of long-term air traffic management research over

[4] A net-centric system uses internet protocols to transfer data.

the last few years.[5] FAA has neither planned nor budgeted for this type of research. Major challenges focus on establishing requirements and gaining a full understanding of the risks associated with developing and acquiring these new software-intensive systems before making financial commitments. This is important because future automation efforts will be a major cost driver for the next generation system.

We see potential for the most progress with coordination and alignment between the JPDO and NASA. Even though NASA is restructuring its aeronautical research program and spending less than in the past, the JPDO and NASA are working on several complex concepts for new automation systems (for monitoring multiple aircraft trajectories, tracking separation minima, and responding to weather events) and the timing of research efforts. This work will be funded via NASA efforts on "airspace systems" (with a FY 2007 requested funding level of $120 million). However, experience shows that NASA will need a much clearer picture of FAA's requirements to better support the next generation system.

Several Actions Are Critical for the JPDO To Make Progress in Both the Short and Long Term and Make the Transition From Planning to Implementation

Key questions for FAA and the JPDO focus on what the new office can deliver, when, and how much this transition will cost. They are central questions in the discussion about how to best finance FAA and will shape the size, requirements, and direction of the capital program for the next decade.

Moving to the next generation system is important to meet the demand for air travel, change the way FAA provides services, and help control operating costs. However, it is also a high-risk effort.

To make progress and successfully shift from planning to actual implementation, several steps are needed. We been reviewing progress to date with the JPDO at the request of this Committee since last fall, and we have not seen substantial progress in a number of areas.

- Leadership. The position of the JPDO Director is currently vacant—FAA needs to find the right person to lead this effort. Leadership will be important to align diverse agency efforts and bridge the gap between the

[5] For additional details on the FAA/NASA relationship and funding profiles, see our testimony entitled "Observations on the Progress and Actions Needed To Address the Next Generation Air Transportation System," (CC-2006-032, March 29, 2006).

Air Traffic Organization's (ATO) near-term planning horizon and the JPDO's longer-term mission to transform the National Airspace System.

- Finalizing Cost Estimates, Quantifying Expected Benefits, and Developing a Roadmap for Industry. The JPDO's progress report to Congress was silent on funding requirements and complex transition issues. Moving to the next generation system will require significant investments from FAA (new ground systems) and airspace users (new avionics). FAA is conducting workshops with industry to develop program costs.

  We have seen some preliminary estimates developed by the ATO and a working group of FAA's Research, Engineering, and Development Advisory Committee (REDAC), but they have not been finalized or approved by senior FAA management. There are considerable unknowns, and costs depend on, among other things, performance requirements for new automation and weather initiatives and to what extent FAA intends to consolidate facilities.

  A key short-term cost factor for NGATS is the level of development funding that will be required to take efforts from other agencies (like NASA) and successfully transition them into the National Airspace System and meet FAA's safety and certification requirements. The REDAC working group is raising concerns about this in light of NASA's restructuring of its aeronautics research portfolio and plans to focus on more basic research. To accommodate changes in NASA investments, the REDAC working group estimated in its draft report that approximately $100 million annually for development funding will be needed.

  FAA will have to analyze information from the JPDO/industry workshops and the REDAC working group and provide Congress with expected funding requirements and when the funding will be needed. When transmitting this information to Congress, FAA should clearly differentiate between funding adjustments for existing projects and funds specifically for NGATS initiatives. This will give decision makers a clear understanding of NGATS costs.

  An important theme from the recent JPDO workshop focuses on need for FAA to clearly define the *expected benefits* from NGATS initiatives, particularly for projects that require airspace users to install and equip with new avionics, such as ADS-B. Airspace users have a much shorter horizon for the return on investment from new systems than FAA, and incentives (i.e., tax incentives, financing options, or targeted deployments for users that equip early) will likely be needed to spur equipage.

At the April workshop, industry participants asked FAA for a "service roadmap" that (1) specifies required equipage in specific time increments, (2) bundles capabilities with clearly defined benefits and needed investments, and (3) uses a 4- to 5-year equipage cycle that links with aircraft maintenance schedules. It will be important for FAA to provide industry with this information.

- Establishing Connectivity Between JPDO Plans and ATO Efforts. This is important because the JPDO, as currently structured, is a planning and coordinating organization—not an implementation or program-execution office. At the April JPDO/industry workshop, industry asked for a much stronger link between ATO and JPDO plans.

  Although the JPDO's progress report discusses new capabilities such as ADS-B and SWIM, the ATO is responsible for managing those efforts as well as establishing funding levels, schedule, and performance parameters. The ADS-B and SWIM projects are not yet integrated into ongoing communications and automation efforts but need to be. If the JPDO and ATO are not sufficiently linked and clear lines of accountability are not established, cost and schedules for NGATS will not be reliable and expected benefits will be diminished or postponed.

  Linking JPDO and ATO efforts is challenging because NGATS projects, like SWIM and ADS-B, cut across the ATO's different lines of business (i.e., terminal and en route) and will require adjustments to ongoing projects managed by different ATO vice presidents.

  For example, SWIM is envisioned as an Agency-wide effort, and planning documents show that SWIM will interface with at least 12 ongoing projects, including FTI which is managed by the Vice President for Technical Operations. Also, SWIM will need to be integrated with ongoing projects to revamp systems for controlling high-altitude traffic managed by the Vice President for En Route and Oceanic Services. Projects managed by the Vice President for Terminal Services (to modernize controller displays used in the vicinity of airports and weather systems) will also be affected. It will be important to establish clear lines of accountability for linking JPDO efforts to ATO programs and resolving differences between the two organizations.

  We shared our concerns about effectively linking the JPDO and ATO and establishing clear lines of accountability with the Chief Operating Officer and the Acting Director for ATO Planning. They recognize the need for

close coordination and are examining ways to better link the two organizations. One step that is underway is to adjust the *Operational Evolution Plan* (the Agency's capacity blueprint) to reflect JPDO efforts. This is an important matter that will require sustained management attention.

- Developing and Implementing Mechanisms for Alignment. As noted earlier, there is considerable coordination among JPDO participating agencies but little alignment of budgets and plans. There is a need for mechanisms to help the JPDO align different agency efforts over the long haul. This will help identify the full range of research that can be leveraged by the JPDO—not how much NGATS will cost to implement.

  The JPDO recognizes that more needs to be done and is working with the Office of Management and Budget (OMB) to develop an integrated budget document that provides a single business case (a document similar to the "OMB Exhibit 300") to make sure efforts are indeed aligned.[6] As part of this, the JPDO has promised to provide OMB this summer with an architecture for the next generation system, as well as a specific list of programs in other agency budgets it intends to leverage.

  The JPDO's ongoing efforts to develop an enterprise architecture,[7] or overall blueprint for the next generation system, will help in setting goals, supporting decisions, adjusting plans, and tracking agency commitments. The architecture will also show requirements from FAA and the Departments of Defense and Homeland Security and where various agency efforts fit in the next generation system. It will prove helpful in the future in resolving difficult policy decisions, including who pays for what elements of the system.

  The JPDO is taking an incremental approach to architecture development and plans to have an initial version this summer. However, considerable work remains to link current systems with future capabilities and develop technical requirements, particularly for new concepts for automation.

  Until these actions are taken, it will be difficult for the Congress and aviation stakeholders to determine if the JPDO is leveraging the right research, if funding is adequate for specific efforts, or how projects will

[6] OMB Exhibit 300 was established by OMB as a source of information on which budgetary decisions could be based so that they are consistent with Administration and OMB policy and guidance.

[7] Enterprise Architecture links an organizations strategic plan to the programs and supporting systems in terms of interrelated business processes, rules, and information needs. This includes the transition from the "as-is" to the "to-be" environment.

improve the U.S. air transportation system and at what cost. Therefore, we think the JPDO should include in its periodic reports to Congress a table of specific research projects with budget data for FAA developmental efforts as well as budget data of other agencies it is leveraging and how that ongoing research is supporting the JPDO.

- Developing Approaches for Risk Management and Systems Integration. Given that the transition to NGATS is a high-risk effort potentially involving billions of dollars, the JPDO and FAA need to articulate how problems that affected past modernization efforts will be mitigated and what specific skill sets will be required. The JPDO's recent progress report did not address this issue.

  The central issue focuses on what will be done differently from past modernization efforts with NGATS initiatives (other than conducting demonstration projects) to ensure success and deliver much needed benefits to FAA and airspace users. FAA faces a wide range of risks, such as complex software development and complex systems integration and engineering challenges with NGATS initiatives (such as SWIM and ADS-B) and existing FAA projects.

  To help manage the transition to the next generation system, FAA is considering whether or not a *lead systems integrator*—a private contractor who would help link new and existing systems and help manage other contractors—will be required. DOD has relied on this approach for complex weapon systems. Models for using a lead system integrator throughout the Government differ with respect to roles and responsibilities. We note that FAA has relied on systems engineering and integration contractor in the past to help integrate modernization projects, but questions about the roles, responsibilities, and expected costs will need to be examined.

- Clarifying Approaches for Industry Participation. The JPDO established the NGATS institute specifically to allow for industry participation in shaping the next generation air traffic management system. Currently, industry representatives are participating in JPDO IPTs. For example, the JPDO's progress report noted that over 140 industry and private sector participants (from 66 organizations) are involved in IPT planning efforts.

  Industry has expressed concern that participation in JPDO activities might preclude them from bidding on future FAA acquisitions related to NGATS because it may create an organizational conflict of interest. Generally speaking, FAA's Acquisition Management System (AMS) precludes

contractors from competing on production contracts if the contractor either participated in or materially influenced the drafting of specifications to be used in future acquisitions for production contracts or had advanced knowledge of the requirements.

FAA is aware of industry's concern and is working to ensure that industry participation does not result in organizational conflicts of interest. Last week, the JPDO revised the contracting mechanism with the institute to address this issue. Specifically, the JPDO and the institute have committed to develop procedures to (1) identify information that might later give rise to organizational conflict of interest concerns, (2) mitigate or eliminate resultant concerns, and (3) foster continued awareness of conflicts of interest and methods to avoid them. Putting these procedures in place will help get and sustain the desired expertise from industry and help prevent problems in the future.

- Examining and Overcoming Barriers to Transforming the National Airspace System That Have Affected Past FAA Programs. Our work on many major acquisitions shows the importance of clearly defined transition paths, expected costs (for both FAA and airspace users), and benefits in terms of reduced delays. This is particularly the case for initiatives that require airspace users to equip with new avionics.

  For example, FAA cancelled the controller-pilot data link communications program specifically because of uncertain benefits, concerns about user equipage, cost growth, and the impact on the Agency's operations account. The inability to synchronize data link with other modernization efforts, such as the multi-billion-dollar ERAM program, was also a factor.

  Other critical barriers to be overcome include how to ensure new systems are certified as safe for pilots to use and getting the critical expertise in place at the right time. Problems with FAA's multi-billion-dollar *Wide Area Augmentation System* (a new satellite navigation system) were directly traceable to problems in certifying the new satellite-based system. FAA's certification workforce has participated in IPT meetings, but considerable work remains to determine how air and ground components will be certified and the corresponding impact on requirements. This is a complex task. *We agree with industry that FAA's certification workforce needs to be actively engaged with JPDO initiatives.*

- Developing a Strategy for Technology Transfer. Technology transfer—the movement of technology from one organization to another—is a central issue for the JPDO because the law envisions new capabilities developed

by other Federal agencies (or the private sector) being transitioned into the National Airspace System. The JPDO will have to pay greater attention to this matter as it moves forward to reduce development times with NGATS initiatives.

Our past work shows that FAA has experienced mixed results in transitioning systems developed by others into the National Airspace System. For example, FAA ultimately abandoned work on a new controller tool developed by NASA (the Passive Final Approach and Spacing Tool) for sequencing and assigning runways to aircraft because of complex software development and cost issues.

As we noted in our review of FAA's Free Flight Phase 1 Program, the use of "technology readiness levels" could be useful to help assess maturity of systems and ease issues associated with the transfer of technology.[8] Both NASA and DOD have experience with categorizing technical maturity. This could help reduce cost, schedule, and technical risk with implementing JPDO initiatives.

- Conducting Sufficient Human Factors Research To Support Anticipated Changes. The JPDO is planning to make fundamental changes in how the system operates and how controllers manage traffic to accommodate three times more aircraft in the system. Currently, the union that represents controllers is not yet participating in JPDO efforts for a variety of reasons but needs to be.

  History has shown that insufficient attention to human factors can increase the cost of acquisition and delay much needed benefits. For example, problems in the late 1990s with FAA's *Standard Terminal Automation Replacement System* were directly traceable to not involving users early enough in the process.

  The need for focused human factors research extends well beyond the traditional computer-machine interface (such as new controller displays) and has important workforce and safety implications. For example, FAA expects the controller's role to change from direct, tactical control of aircraft to one of overall traffic management. There also will be significant human factors concerns for pilots, who will be expected to rely more on data link communications. It will be important to have sufficient human

[8] OIG Report Number AV-2002-067, "Free Flight Phase 1 Technologies: Progress to Date and Future Challenges," December 14, 2001.

factors analysis and studies to ensure that the changes envisioned by the JPDO can be safely accommodated.

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Mr. Chairman, that concludes my statement. I would be happy to answer any questions you or other members of this Subcommittee might have.

Enclosure A

Key Platforms

System	Status and Key Issues
Terminal Modernization: Standard Terminal Automation Replacement System (STARS), Common Automated Radar Terminal System (Common ARTS): Controller work-stations that process surveillance data and display it on the screen to manage air traffic in the terminal environment.	FAA has struggled with how to complete terminal modernization. STARS, which so far has cost $1.3 billion for only 47 sites, was envisioned as the centerpiece of terminal modernization. Because of technical problems and schedule delays with STARS, FAA decided to deploy another system, Common ARTS, as an interim solution at over 140 facilities in several configurations. FAA is rethinking its approach to terminal modernization and recently decided to field STARS to only five additional sites. A decision affecting the remaining 100-plus sites has been postponed for over a year. FAA needs to resolve how it will complete terminal modernization and what additional capabilities will be needed as it works with the JPDO.
En Route Automation Modernization (ERAM): Replaces the Host computer hardware and software (including the Host backup system) and associated support infrastructure at 20 En Route Centers.	With an estimated cost of $2.1 billion, ERAM is one of the largest and most complex acquisitions in FAA's modernization portfolio. Progress is being made with the first ERAM deliverable—a backup system for the Host computer. However, the bulk of the work focuses on development of the first major ERAM software release, which involves developing over 1 million lines of code. A number of new capabilities (e.g., dynamic airspace management and data link) depend on future enhancements to ERAM that have yet to be defined or priced.

Enclosure A

Key Platforms (continued)

System	Status and Key Issues
FAA Telecommunications Infrastructure (FTI): replaces existing telecommunications networks with one new network through a phased process. A single provider is responsible for acquiring, operating, and maintaining the new telecommunications infrastructure.	FTI is FAA's effort to transition from multiple telecommunication networks to a single new network for the purpose of reducing operating costs. FTI is expected to replace about 25,000 existing telecommunications services and circuits at more than 4,400 facilities. FAA re-baselined FTI in December 2004, increasing lifecycle costs from $1.9 billion to $2.4 billion and adding 5 years to the life of the program. However, FTI is not likely to be completed on schedule in December 2007 because FAA does not have a realistic master schedule or effective transition plan identifying when each site and service will be accepted, when services will be cut over to FTI, and when existing services will be disconnected. Through the end of FY 2005, FTI equipment was installed at about 700 sites, and only about 3 percent of the 25,000 FTI services were operational, leaving a vast amount of costly existing equipment still being sustained. As a result, expected FTI cost reduction benefits are eroding. To address the schedule risk, FAA needs to develop a realistic master schedule and incorporate it into the FTI contract to hold the prime contractor accountable. Successful FTI implementation is critical to many other programs such as SWIM and ERAM.
Traffic Flow Management (TFM) modernizes the hardware and software used to manage the flow of air traffic.	Traffic Flow Management Infrastructure products and services are designed to support the Traffic Management Specialists and Traffic Management Coordinators to optimize air traffic flow across the National Air Space System. The specialists and coordinators analyze, plan, and coordinate air traffic flow through continuous coordination with the airlines and the use of surveillance sources, weather, automation, and display subsystems.

Enclosure B

Potential Agency Contributions

The following table provides perspectives on the wide range of research being conducted at agencies that participate in the JDPO for their specific missions. We note that only some of the ongoing research will be applicable to the JPDO's efforts.

Agency	Key Area of Leverage
DOD	DOD has an extensive and diverse Research and Development (R&D) base, including research in new aircraft, composites, imaging systems, and data exchange systems for all services. DOD has requested $73 billion overall for R&D in FY 2007. The JPDO is particularly interested in DOD's broadband communication networks, such as the *Global Information Grid*. DOD planned upgrades to the Global Positioning System Constellation will be critical to civil aviation.
Commerce / NOAA	Commerce is requesting $1.1 billion for research in FY 2007. NOAA is a part of Commerce and is responsible for the National Weather Service; the National Environmental Satellite, Data and Information Service; and Oceanic and Atmospheric Research. NOAA requested $533 million in FY 2007 for R&D. The JPDO is seeking from NOAA probability weighted forecast capabilities, a national uniform weather database of forecasts and observations, and transparent automatic adjusted traffic management for weather.
NASA	For years, NASA has conducted the majority of long-term Air Traffic Management research, including automated controller tools and human factors work. NASA has requested $724 million for aeronautical R&D in FY 2007. The JPDO is looking to NASA to develop automated aircraft metering and sequencing and dynamic airspace reconfiguration.
Department of Homeland Security (DHS)	DHS contributes expertise in the areas of security and net-centric initiatives. The Agency has requested $1 billion in FY 2007 for Science and Technology R&D. FAA is looking to DHS to develop automated passenger and cargo screening, hardened aircraft security, and flight control overrides.

Enclosure C

Integrated Product Teams

IPTs are multi-agency teams that are defining the specific concepts and capabilities and are coordinating the actions necessary to make possible the transformation in each of the eight strategies articulated in the NGATS Integrated Plan. The following provides a listing of the JPDO's IPTs and the agency responsible for leading each team.

1. Develop Airport Infrastructure To Meet the Future Demand – led by FAA
2. Establish an Effective Security System Without Limiting Mobility or Civil Liberties – led by DHS
3. Establish an Agile Air Traffic System – led by NASA
4. Establish User-Specific Situational Awareness – led by DOD
5. Establish a Comprehensive Proactive Safety Management Approach – led by FAA
6. Develop Environmental Protection That Allows Sustained Aviation Growth – led by FAA
7. Develop a System-Wide Capability To Reduce Weather Impacts – led by Commerce/NOAA
8. Harmonize Equipage and Operations Globally – led by FAA

Testimony of Gerald L. Thompson before the House Committee On Transportation And Infrastructure, Subcommittee On Aviation hearing on "Air Traffic Control Modernization: The Present And Future". Testimony is based on the work of the: "Financing The Next Generation Air Transportation Working Group".

The Federal Aviation Administration (FAA) Research, Engineering and Development Advisory Committee (REDAC) established the Financing the Next Generation Air Transportation System Working Group (FNGATSWG) to investigate options for financing Next Generation ATS as outlined by the National Plan and defined by the Joint Planning and Development Office (JPDO) of the FAA, TSA, and NOAA, their parent departments, NASA, DoD, and OSTP. The goal is to identify and develop the available options for funding and financing research and development, capital projects, and operations cost of the Next Generation ATS. The effort focused on the FY2006 through 2025 time frame. The working group considered the levels of funding required, possible revenue sources, and techniques for financing. It considered opportunities to reduce costs through introduction of advanced technologies and techniques or outsourcing, but did not consider issues such as labor contracts, privatization or major structural changes in the FAA organization.

The working group:

1. Established in cooperation with the JPDO and other elements:
   - A 2006-2025 baseline cost estimate and projected funding estimate for developing, implementing, and operating the planned NAS if the NGATS is not implemented (Status Quo option) and the current revenue scheme were continued.
   - A corresponding 2006-2025 cost estimate for developing, implementing and operating the NAS 2006 through 2010 and then converting to NGATS between 2010 through 2025 (NGATS Option).
2. Identified the options for funding the resulting system costs through user fees or user taxes supplemented by a general fund contribution.
3. Developed a set of criteria for assessing these options.
4. Defined financing options to be used in the event that the modernization funding requirements vary significantly from year to year.
5. Considered approaches to implementing the NGATS that the industry and Congress would support.

The following findings summarize our efforts:

1. In both the Status Quo and NGATS scenarios, funding the FAA R&D, F&E, Operations, and AIP activities is estimated to require about $15 billion annually in 2005 dollars. FAA operations costs dominate these figures -- an increase of about $1B over FAA's current annual budget.

2. The Status Quo scenario will provide insufficient increases in capacity to meet the growing demand. The Status Quo scenario is therefore not an acceptable option, other than for analysis purposes. The NGATS provides the needed capacity and reduces total funding requirements by inserting technologies that provide the required increase in capacity with lower operations cost.

3. The continued use of the current FAA trust fund revenue rates will lead to approximately a $1 billion shortfall over the next several years without an increase in the General Fund contribution. This projection assumes a General Fund contribution to the FAA budget on the order of 20%.

4. The FAA relies on the current NASA aeronautics R&D program as the principal source of the technologies needed to provide the nearer-term NGATS aviation system capacity and operations cost reductions. The current restructuring of the NASA program raises very serious questions about the wisdom of this reliance. Refocusing NASA efforts on lower Technology Readiness Levels (TRL 1,

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2, & 3) is a particular source of concern because it shifts a greater R&D transition burden to the FAA. To accommodate this reduction in NASA support for transition will require an additional approximately $100 million annually in FAA R&D funds. If the current NASA effort were abandoned completely, the FAA would require a further $100-150 million annually in FAA research and development funds for added technical personnel expertise. More importantly, NGATS implementation would be delayed, probably by five years, while the FAA reestablishes the personnel skill levels and infrastructure needed to accomplish the work. This delay in NGATS would have a severe long-term impact on the FAA operations budget.

5. The alternatives for closing the near term funding gap are to:
   - Significantly reduce Operations, F&E, R&D, and/or AIP costs,
   - Increase user taxes and fees,
   - Increase the General Fund contribution,
   - Introduce some sort of financing (borrowing) that bridges the near term gap and repays it with longer term surpluses, or
   - Some combination of these.

6. The FAA is pursuing substantial cost reductions in operations and other costs, for example, the outsourcing of Flight Service operations. The working group identified other cost saving opportunities. A composite annual cost savings on the order of $500 million is a reasonable objective for these cost reduction activities.

7. The distribution of taxes/fees between user groups and the level of the general fund contribution are the basic problems to be solved. Each user group has a different model for determining the share of FAA costs it should pay. Once the shares are determined, the method of tax or fee collection may vary from user to user at a level to meet their allocated share.

8. There are an infinite number of user fee/tax options with or without a General Fund contribution. The working group has identified the four basic options:
   - Current revenue approach with rate adjustments
   - Fuel tax or fee only
   - Weight/distance fee
   - Distance fee

   These have been analyzed against a set of developed criteria. No one of them is expected to be acceptable by itself to the entire community. Defining a hybrid to create an approach that is acceptable to aviation industry groups will be required.

9. Successfully transforming the NAS into a Next Generation Air Transportation System (NGATS) that meets America's future aviation needs is a demanding project that will require twenty years of increased, consistent and stable funding, management, and oversight to be successfully and efficiently completed. All the while, the system must safely and efficiently provide services every day to satisfy an ever-expanding demand for air transportation.

10. On the financial side, the operation and transformation of the NAS into the NGATS will require about $300 billion or $15 billion each year in constant 2005 dollars. While the budget will be managed to minimize year-to-year variations in revenue and expenses, some will occur. Hence, a flywheel is required to overcome these variations.

11. On the program side, a process must be employed that ensures successful and cost effective development and implementation of the NGATS. It must provide a consistent management and oversight mechanism and a mechanism for measuring ongoing cost, performance, and progress toward transformation of NAS to NGATS

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12. The Working Group has identified **Six Engines for Success** needed to meet these objectives:
   - First is the **Leader**. The twenty-year NGATS implementation period will require three to five leaders over the life of the project. The selection and development of these leaders is probably the most important element to NGATS success. In addition to being smart and hard working people, the leadership must know the NAS and the NGATS and the transformation between them. They must be innately people of vision and public purpose.
   - A **Revenue Engine** that raises the required $15 billion each year through collection of user fees/taxes and a contribution from the General Fund. It is assumed that this engine is a variant of one or more of the funding approaches discussed in this report.
   - A **Financial Stability Engine** that accommodates year-to-year variations in the revenue or expenses. The selected Financial Stability Engine could be any one of an infinite set of variations but will always be some combination of either reserve accounts (e.g. The Aviation Trust Fund) or borrowing authority or both.
   - A **Program Engine** that provides the mechanism for consistent, stable program management of development, production, implementation, and initial operation of the sub-systems that transform the NAS into the NGATS.
   - A **Planning, Management, And Oversight Engine** that provides the mechanism for maintaining the NGATS implementation plan, managing its accomplishment, providing for its oversight by the FAA, the aviation community, the Congress and the Administration.
   - A **Metrics Engine** that facilitates the measurement of the on-going performance of the NAS and the progress toward its transformation to the NGATS. It should provide transparent measurements of specific metrics at any given time and the incremental change in that metric. It should include measurements of Safety, Capacity, Environmental Impact, FAA Costs, FAA Productivity, and User Benefits as a minimum.

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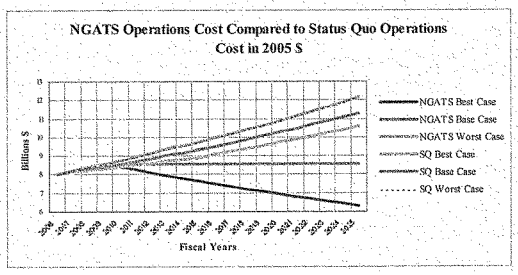

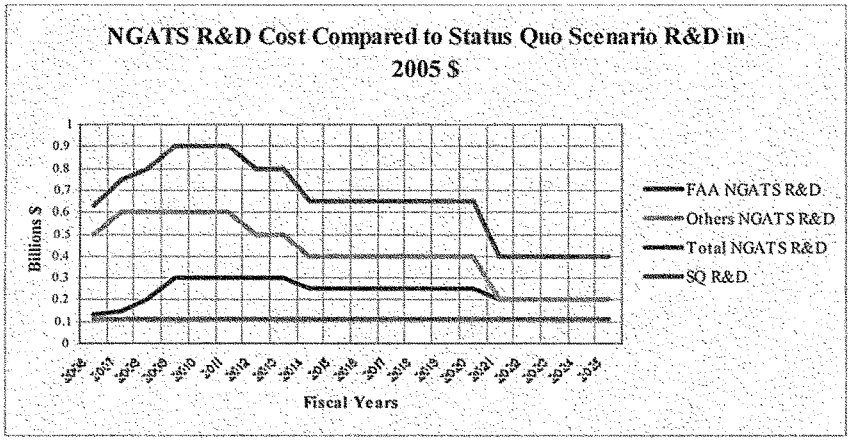
NGATS R&D Cost Compared to Status Quo Scenario R&D in 2005 $
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FAA NGATS R&D
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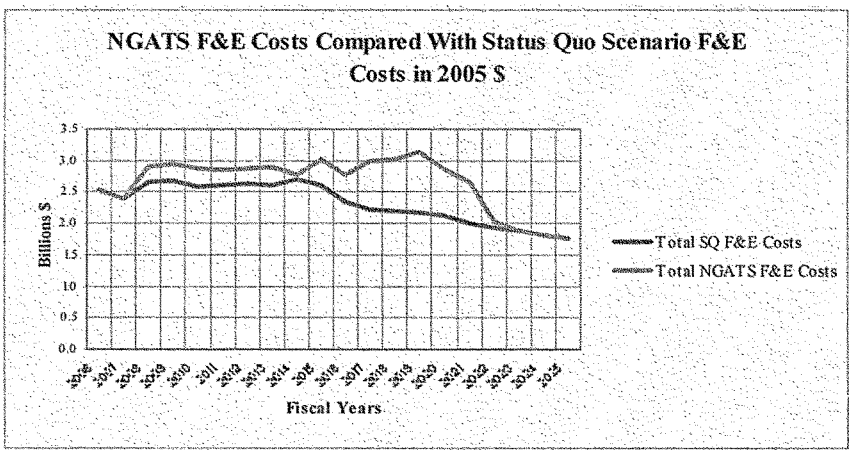
NGATS F&E Costs Compared With Status Quo Scenario F&E Costs in 2005 $
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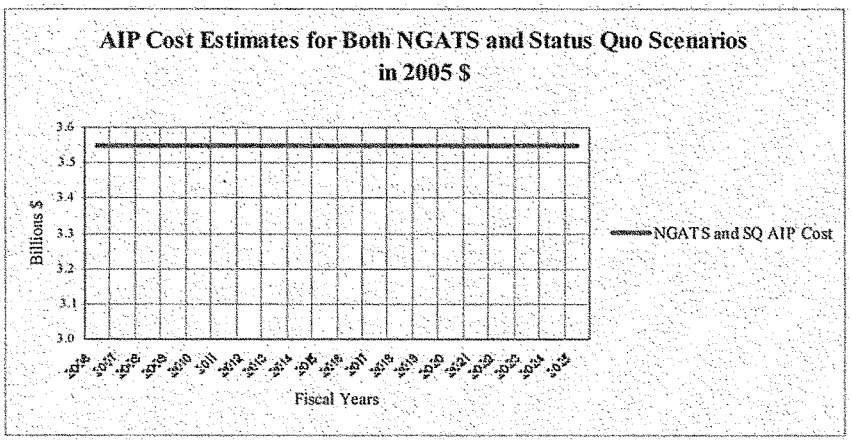
AIP Cost Estimates for Both NGATS and Status Quo Scenarios in 2005 $
Billions $
Fiscal Years
NGATS and SQ AIP Cost

June 21, 2006
Subcommittee on Aviation
HEARING on
"Air Traffic Control Modernization: The Present and Future"

Questions for the Record from Rep. Jerry F. Costello to:

Mr. Gerald M. Thompson, FAA Research, Engineering and Development Advisory Committee (REDAC)

Mr. Thompson, a draft study by REDAC's Financing the NGATS Working Group estimated that to implement NGATS and continue operating the NAS through 2025, the combined costs of FAA's four appropriations accounts – operations; facilities and equipment; research, engineering and development; and grants-in-aid for airports – would average about $15 billion per year, or about $900 million more than FAA's fiscal year 2006 appropriation. This estimate assumes a general fund contribution of 20%, using the current trust fund revenue model. According to REDAC's work, would a 25% general fund contribution largely cover the cost of the NGATS? How about a 30% general fund contribution?

The Honorable Jerry F. Costello
Ranking Democratic Member
House Aviation Sub Committee
2251 Rayburn House Office Building
Washington, DC 20515

Dear Sir,

Response to your questions of the June 21, 2006 Aviation Subcommittee Hearing on "Air Traffic Control Modernization: The Present and Future." are herewith provided. Table one below outlines the expected General Fund contribution required to cover the total FAA cost given that the system on Trust Fund charges remains unchanged.

The difference between the cases is the variance in expected revenue and the expected FAA productivity in cost per operation. Note that the required level decreases over time since revenues are expected to rise faster than costs.

Specifically, according to the REDAC model:

- 25% won't likely cover the near term needs,
- 30% will cover the need in all but the Worst Case.

Table 1 - General Fund Contribution Required to Meet Expected Expense.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Best Case	26 7%	24 4%	25 0%	23.9%	21 7%	18 3%	14 5%	11 1%	5 8%	3.4%	0.0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0 0%	0 0%	0 0%
Base Case	29 6%	27 6%	28.4%	27 5%	25 6%	23 2%	20 4%	18 1%	14.1%	12 8%	8.6%	6.9%	4 0%	1 7%	0 0%	0 0%	0 0%	0.0%	0 0%	0 0%
Worst Case	34 0%	32.3%	33 2%	32 6%	31 0%	29 6%	28 0%	27.1%	24.2%	23 9%	21.4%	20 9%	19 5%	18 5%	15 6%	11 8%	6 8%	4 3%	2 2%	0 2%