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FEDERAL AVIATION ADMINISTRATION MODERNIZATION

HEARING

BEFORE THE

SUBCOMMITTEE ON AVIATION OPERATIONS, SAFETY, AND SECURITY

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

March 22, 2007

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CONTENTS

	Page
Hearing held on March 22, 2007	1
Statement of Senator Carper	32
Statement of Senator Inouye	21
Prepared statement	43
Statement of Senator Lott	25
Prepared statement	25
Statement of Senator Rockefeller	1
Statement of Senator Snowe	30
Statement of Senator Stevens	23
Statement of Senator Thune	39

WITNESSES

Fleming, Susan, Director—Physical Infrastructure Issues, U.S. Government Accountability Office (GAO)	9
Prepared statement	11
Lee, Capt. Karen, Director of Operations, UPS Airlines	17
Prepared statement	19
Leader, Charles, Director, Joint Planning and Development Office	8
Prepared joint statement	3
Sturgell, Robert A., Deputy Administrator, Federal Aviation Administration	1
Prepared joint statement	3

APPENDIX

Cote, David M., Chairman and Chief Executive Officer, Honeywell, prepared statement	43
Response to written questions submitted by Hon. Daniel K. Inouye to:	
Charles Leader	56
Susan Fleming	57
Robert A. Sturgell	52
Response to written questions submitted by Hon. Mark Pryor to:	
Charles Leader	57
Susan Fleming	60
Robert Sturgell	54
Response to written questions submitted by Hon. John D. Rockefeller IV to Susan Fleming	60

FEDERAL AVIATION ADMINISTRATION MODERNIZATION

THURSDAY, MARCH 22, 2007

U.S. SENATE,
SUBCOMMITTEE ON AVIATION OPERATIONS, SAFETY, AND SECURITY,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met at 9:37 a.m., in room SR–253, Dirksen Senate Office Building, Hon. John D. Rockefeller IV, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF HON. JOHN D. ROCKEFELLER IV, U.S. SENATOR FROM WEST VIRGINIA

Senator ROCKEFELLER. I would like to welcome our witnesses today and our colleagues. I'm not going to be offering any remarks and they will not be offering any remarks either.

[Laughter.]

Senator ROCKEFELLER. And that is so that Mr. Sturgell and Mr. Leader will each give 5-minute remarks. We'll have a chance later. So our panel today includes the following: Bobby Sturgell, who is Deputy Administrator, FAA; Charlie Leader, Director, Joint Planning and Development Office; Ms. Susan Fleming, Director of Physical Infrastructure Issues, Government Accountability Office, GAO—that's a bad job.

[Laughter.]

Senator ROCKEFELLER. That's our job. Captain Karen Lee, Director of Operations, United Parcel Service, UPS Airlines. Mr. Sturgell, please begin.

STATEMENT OF ROBERT A. STURGELL, DEPUTY ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION

Mr. STURGELL. Good morning, Senator Rockefeller. My name is Bobby Sturgell. I'm the Deputy Administrator of the Federal Aviation Administration and the Acting Chief Operating Officer for the Air Traffic Organization. I'm glad to be here with you today to discuss a topic that is of utmost urgency—the FAA's plans to transform and modernize our air transportation system so that we can be better prepared to meet the significant traffic demands that we see in the future.

Of course, our NextGen Financing Reform proposal goes hand-in-hand with our plans to transform the air transportation system. We do need a more stable, predictable, and cost-based funding sys-

tem that will support the long term planning and investments necessary to bring about the Next Generation system.

Mr. Chairman, our case for change is compelling. You know civil aviation accounts for nearly $690 billion in direct and indirect contributions to the U.S. economy and is responsible for 10 million jobs and $343 billion in wages. No doubt, we all want all these benefits to continue and improve.

But our air transportation system is in many ways a victim of its own success. Even as we've created the most effective, efficient and safest system in the world, our current system is hitting the wall. Flight delays and cancellations have reached unacceptable levels and these problems won't go away in the future. We expect a billion passengers by the year 2015 and expect the doubling or even tripling of air traffic by 2025.

Moreover, we have to anticipate the unique challenges that come with a new generation of aircraft.

Senator ROCKEFELLER. This will not count from your time but if—you said doubling or tripling? Does that mean if we have about 36,000 planes in the air at any given time now, if I'm correct about that—that will be three times that?

Mr. STURGELL. Three times, certainly in specific locations. Across the board, maybe—you know, doubling, something perhaps a little less than triple.

Senator ROCKEFELLER. Right. Thank you.

Mr. STURGELL. So we do have to also anticipate the unique challenges coming at us—very light jets, unmanned aerial systems and commercial space launches. I think the exact quantity and composition of these vehicles is not fully predictable at this point and while all this growth is exciting, it does bring the problem of congestion. Congestion robs a family of precious time together, it limits the freedom of our citizens and puts a drag on our increasingly global economy. The delay in dollars—we're estimating that commercial aviation could see an annual loss of $500 million for every minute of scheduled "black time," which refers to the amount of time that airlines schedule from gate to gate and the cost to the whole country. Today's tab stands at $9.4 billion a year, due to commercial passenger delays and that number could climb as high as $20 billion by 2025.

Our current system simply isn't scaleable to handle these challenges. Research done by the FAA has shown that using our current air traffic systems, controllers could not handle 25 percent increases in traffic, which is the amount that the FAA projects for the 2016 time frame. That's why we need NextGen.

A full-scale transformation that takes into account every phase of the process—air traffic control, airports, the environment, military and homeland security requirements. The NextGen system will be a much more automated and flexible system than the one of today. Navigation and surveillance will be more precise, much more precise. Pilots and operators will know the location of other aircraft operating in the system. Air traffic control of individual airplanes will evolve to air traffic management and control by exception and aircraft flight paths will be trajectory-based to provide optimum routing.

To implement transformation, we are already moving ahead with Automatic Dependent Surveillance Broadcasts, ADS–B and System Wide Information Management—SWIM, two of NextGen's core backbone technologies. Of course, we recognize that many programs are only part—that these programs are only part of the process. NextGen encompasses many programs and components, all of which need to be properly integrated and aligned.

That's why we're turning to a proven management system. The Operational Evolution Partnership, the new OEP. In the past, the OEP successfully provided a mid-term, strategic roadmap for the FAA that extended 10 years into the future. The new OEP will include strategic milestones through 2025 and the FAA will use the OEP to plan, execute and implement NextGen in partnership with private industry.

Charles Leader will discuss more about our efforts toward NextGen but let me close by saying that at this moment, we have the breathing room that we need to plan for NextGen. But I think we all know, congestion is closing in. Even the world recognizes the problem. Europe is moving ahead with SESAR, their version of NextGen and they have the funding to do it. If we fail to act, the world will look to someone else for leadership and not us. Someone else's technologies and standards will pave the way if we don't.

But by funding and building NextGen, we can keep America at the forefront. Thank you, Mr. Chairman and I'd be happy to answer any questions.

[The prepared joint statement of Mr. Sturgell and Mr. Leader follows:]

PREPARED JOINT STATEMENT OF ROBERT A. STURGELL, DEPUTY ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION, AND CHARLES LEADER, DIRECTOR, JOINT PLANNING AND DEVELOPMENT OFFICE

Good morning Chairman Rockefeller, Senator Lott, and Members of the Subcommittee. I am Robert Sturgell, Deputy Administrator of the Federal Aviation Administration, and interim Chief Operating Officer for the Air Traffic Organization. With me is Charles Leader, Director of the multi-agency Joint Planning and Development Office (JPDO). We thank you for the opportunity to testify today about FAA modernization, and the work we are doing to develop and deploy the Next Generation Air Transportation System (NextGen) while providing operational and safety enhancements that deliver benefits to our customers today.

Modernization and moving to NextGen is inextricably linked to changes in the FAA's financing system. We need to establish the financing of our current and future operations based on actual costs and investment requirements that will realize tangible benefits and increasing efficiency. The NextGen Financing Act of 2007, as proposed by the Administration, provides the necessary reforms to our financing, and puts us on the path towards fully implementing the NextGen system.

And implementing that system is imperative. Our Nation's air transportation system has become a victim of its own success. Administrator Blakey and the FAA have taken many steps to delay this gridlock. Since FY 2000, 13 new runways have opened, and we've worked with operators—through forums like Growth Without Gridlock—to find ways to squeeze extra capacity from our system. In addition, we've kept our modernization projects on schedule—2006 is the third straight year that we produced good results—delivering 90 percent of our programs on time and within budget. In fact, in FY06, 97 percent of our projects met our schedule, and 100 percent were within 10 percent of budget.

An example of how we better use the airspace is our introduction of Domestic Reduce Vertical Separation Minimums (DRVSM) in 2005. We reduced separation minimums from 2,000 feet to 1,000 feet, effectively doubling the high altitude airspace, and saving airlines close to $400 million per year in fuel.

We have created the most effective, efficient and safest system in the world. But we now face a serious and impending problem: today's system is at capacity. While

the industry downturn following the attacks of September 11 temporarily slowed the growth in the aviation industry that began in the late 1990s, demand is growing rapidly. And we have to change if we a going to be ready to meet it.

The warning signs are everywhere. Flight delays and cancellations have reached unacceptable levels. Other issues, ranging from environmental concerns to the complexities of homeland security are placing additional stresses on the system. If we fail to address these issues, we will suffocate the great engine of economic growth that is civil aviation. A MITRE study done for FAA concludes that the current system cannot handle the projected traffic demands expected by 2015—absent modernization, the consequences will be a total system collapse.

NextGen is about a long-term transformation of our air transportation system. It focuses on leveraging new technologies, such as satellite-based navigation, surveillance and network-centric systems. However, the FAA is not waiting for 2025 to implement technologies to promote safer, more efficient operations, and increase capacity. The FAA is currently expanding the use of procedures like Area Navigation (RNAV) and Required Navigation Performance (RNP) which collectively result in improved safety, access, capacity, predictability, and operational efficiency, as well as reduced environmental impacts.

RNAV operations remove the requirement for a direct link between aircraft navigation and a navigational aid NAVAID, thereby allowing aircraft better access and permitting flexibility of point-to-point operations. By using more precise routes for take-offs and landings, RNAV enables reductions in fuel burn and emissions and increases in capacity. FAA is expanding the implementation of RNAV procedures to additional airports. The FAA has authorized 128 RNAV procedures at 38 airports for FY 2005 and FY 2006. We will publish at least 50 additional procedures in FY 2007.

Another FAA initiative is implementing Required Navigation Performance (RNP) on a greater scale. RNP is RNAV with the addition of an onboard monitoring and alerting function. This onboard capability enhances the pilot's situational awareness providing greater access to airports in challenging terrain. RNP takes advantage of an airplane's onboard navigation capability to fly a more precise flight path into an airport. It increases access during marginal weather, thereby reducing diversions to alternate airports. RNP reduces the overall noise footprint and aggregate emissions. The FAA has authorized a total of 40 RNP procedures at 18 airports. We plan to publish at least 25 RNP approach procedures in FY 2007.

Enabling any far-reaching, systematic and long-term transformation requires a vision of what you want and need to achieve, and plans for how to get there from here. For NextGen, the Concept of Operations, the Enterprise Architecture, and the Integrated Work Plan provide us with that picture and the plans for how to achieve it. I will be discussing the Concept of Operations and the Enterprise Architecture later in this statement. We are setting the stage for the long-term development of an air transportation system that will be scalable to a growing demand and the need for safer and more flexible aviation business models. It is a new approach to the way we view the future of the system, and it demands a new level of collaboration, planning and vision.

FAA and JPDO are beginning to move from planning to implementation. In fact, the FAA's FY 2008–2012 Capital Investment Plan (CIP) includes $4.6 billion in projects and activities that directly support NextGen. The CIP is a 5-year plan that describes the National Airspace System modernization costs aligned with the projects and activities that the agency intends to accomplish during that time. Several key NextGen technologies and programs have already been identified and are funded in the FAA's FY08 budget request. These technologies and programs are: Automatic Dependent Surveillance-Broadcast (ADS–B); System Wide Information Management (SWIM); NextGen Data Communications; NextGen Network Enabled Weather; NAS Voice Switch; and, NextGen Demonstrations and Infrastructure Development. FAA proposes to spend $173 million on these programs in FY08.

These technologies are essential to begin the transition from today's air traffic management system to the NextGen system of 2025. Perhaps the most significant of these transformational technologies is Automatic Dependent Surveillance-Broadcast or ADS–B. ADS–B is, quite simply, the future of air traffic control. A key element of the NextGen system, it uses GPS satellite signals to provide air traffic controllers and pilots with much more accurate information on aircraft position that will help keep aircraft safely separated in the sky and on runways. Aircraft transponders receive GPS signals and use them to determine the aircraft's precise position in the sky, which is combined with other data and broadcast out to other aircraft and controllers. When properly equipped with ADS–B, both pilots and controllers will, for the very first time, see the same real-time displays of air traffic; thereby substantially improving safety.

ADS–B has been successfully demonstrated through the FAA's Capstone program in Alaska, where GA accidents have been reduced by more than 40 percent for ADS–B equipped aircraft. And UPS has been working with us on a demonstration program in Louisville using ADS–B to conduct continuous descent arrivals, where they have been able to reduce noise by 30 percent and emissions by 34 percent as a result. One of the first uses of ADS–B technology outside of Alaska and Louisville will be in the Gulf of Mexico. The FAA signed a Memorandum of Agreement (MOA) with the Helicopter Association International (HAI), helicopter operators and oil and gas platform owners in the Gulf of Mexico to improve service in the Gulf. Using ADS–B technology, helicopter operators will transmit critical position information to the Houston Center, enabling enhanced Air Traffic Control services in the Gulf.

The FAA is looking at a rulemaking that would mandate the avionics necessary for implementing ADS–B in the National Airspace System, and is working closely with stakeholders to determine that timeline.

In today's NAS there are a myriad of systems with custom-designed, developed, and managed connections. The future, however, demands an infrastructure that is capable of flexible growth, and the cost of expanding today's point-to-point system is simply prohibitive. System Wide Information Management (SWIM) responds to that need. SWIM provides the infrastructure and services to deliver network-enabled information access across the NextGen air transportation operations. SWIM will provide high quality, timely data to many users and applications. By reducing the number and types of interfaces and systems, SWIM will reduce redundancy of information and better facilitate multi-agency information-sharing. When implemented, SWIM will contribute to expanded system capacity, improved predictability and operational decisionmaking, and reduced cost of service. In addition, SWIM will improve coordination to allow transition from tactical conflict management to strategic trajectory-based operations. It will also allow for better use of existing capacity en route.

The heart of the NextGen advanced airspace management concepts lies within the digital data communications infrastructure of the future. In the current system, all air traffic communications with airborne aircraft is by voice communications. NextGen transformation cannot be realized through today's voice-only communications, especially in the areas of aircraft trajectory-based operations, net-centric and net-enabled information access. Data communications enabled services, such as 4–D trajectories and conformance management, will shift air traffic operations from short-term, minute-by-minute tactical control to more predictable and planned strategic traffic management. Eventually, the majority of communications will be handled by data communications for appropriately equipped users. It is estimated that with 70 percent of aircraft data-link equipped, exchanging routine controller-pilot messages and clearances via data can enable controllers to safely handle approximately 30 percent more traffic.

The NextGen Network Enabled Weather will serve as the backbone of the NextGen weather support services, and provide a common weather picture across NextGen. Approximately 70 percent of annual National Airspace System delays are attributed to weather. The goal of this investment is to cut weather-related delays at least in half. The weather problem is about total weather information management, and not just the state of the scientific art in weather forecasting. The weather dissemination system today is inefficient to operate and maintain, and information gathered by one system is not easily shared with other systems. The benefits will be uniform real-time access to key common weather parameters, common situational awareness, improved utilization of airspace across all flight domains, and reduced flight delays.

The NAS Voice Switch will provide the foundation for all air/ground and ground/ground voice communications in the air traffic control environment. The switches today are very static, and our ability to adjust the airspace for contingencies is limited. Under the current system it is very difficult and time consuming to coordinate and redesign the airspace. In the future, the impacts of bad weather could be responded to in real-time, thereby minimizing its disruptions to air traffic. The new voice switch allows us to replace today's rigid, sector-based airspace design and support a dynamic flow of traffic. Voice communications capabilities and network flexibility provided by the NAS Voice Switch are essential to the FAA's ability to implement new NextGen services that are necessary to increase efficiency and improve performance.

At this early stage of NextGen, it is critical to better define operational concepts and the technologies that will support them. For the first time, FAA is requesting funding for these defining activities in the FY08 budget. This funding will support two demonstrations and a series of infrastructure development activities. The primary purposes of these demonstrations are to refine aspects of the trajectory-based

operations concept, while lowering risk by phasing in new technologies. One demonstration will test trajectory-based concepts in the oceanic environment. The ultimate goal is to increase predictability on long-duration international flights and improve fuel efficiency. The other demonstration will accelerate the first integrated test of super density operations. Procedures for increasing capacity at busy airports will be explored. The demonstration should achieve near-term benefits at the test airport, and give us the tools to implement the same procedures at other locations.

It is important to understand that NextGen is a portfolio program. The technologies described above, and those that will be defined over the next several years, are interdependent, creating a series of transformations that will truly modernize today's system. Let me provide a few examples of this.

In the future, trajectory-based operations will enable many pilots and dispatchers to select their own flight paths, rather than follow the existing system of flight paths, that are like a grid of interstate highways in the sky. In the high-performance airspace of the future, each airplane will transmit and receive precise information about the time at which it and others will cross key points along their paths. Pilots and air traffic managers on the ground will have the same precise information, transmitted via data communications. Investments in ADS–B, SWIM and Data Communications are critical to trajectory-based operations.

The NextGen system will enable collaborative air traffic management. The increased scope, volume, and widespread distribution of information that SWIM provides will improve the quality of the decisions by air traffic managers and flight operators to address major demand and capacity imbalances. SWIM and NAS Voice Switch are instrumental in achieving this collaborative air traffic management.

With NextGen the impact of weather is reduced through the use of improved information sharing, new technology to sense and mitigate the impacts of weather, improved weather forecasts, and the integration of weather into automation to improve decisionmaking. New capabilities in the aircraft and on the ground, coupled with better forecasts and new automation, will minimize airspace limitations and traffic restrictions. Network Enabled Weather and SWIM are vital investments for these improvements.

We recognize that there are many challenges in converting the JPDO's vision of the NextGen system into reality. Because the JPDO is not an implementing or executing agency, the FAA and the other JPDO partner agencies must work closely with the JPDO to develop an implementation schedule for the operational changes required as new technologies are deployed to realize the NextGen vision. The FAA is using the Operational Evolution Partnership, the new OEP, to guide their transformation to NextGen. In the past the Operational Evolution Plan successfully provided a mid-term strategic roadmap for the FAA that extended ten years into the future. The new OEP will include strategic milestones through 2025. JPDO representatives will participate along with the FAA in OEP development and execution.

FAA will use the OEP to plan, execute and implement NextGen in partnership with private industry. Required operational implementation schedules will be tracked, as well as dates by which initiatives must be funded in order to meet those schedules.

OEP will provide a single entry point for new NextGen initiatives, jointly developed by the JPDO and the FAA, to enter the FAA capital budget portfolio. It ties these initiatives directly to the FAA budget process.

The NAS and NextGen 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. This Operational Evolution Partnership will be the mechanism by which we hold ourselves accountable to our owners, customers, and the aviation community for the FAA's progress towards the JPDO vision, while assuring that the JPDO and the FAA are jointly on-track to deliver the NextGen system.

Cost will be a vital factor: we cannot create a NextGen system that is not affordable. Requirements for the first ten years range from $8 billion to $10 billion. Preliminary estimates suggest that the investments necessary to achieve the end state NextGen system range from $15 billion to $22 billion in FAA funding. We are working to continuously refine these estimates, particularly with our users as we implement new cost-based financing mechanisms, as proposed in the NextGen Financing Act, the FAA's reauthorization proposal.

MITRE, working with FAA, has developed a preliminary estimate of the NextGen avionics costs. It concludes that a wide range of costs are possible, depending on the bundling of avionics and the alignment of equipage schedules. The most probable range of total avionics costs to system users is $14 billion to $20 billion. This range reflects uncertainty about equipage costs for individual aircraft, the number of very

light jets that will operate in high-performance airspace, and the amount of time out of service required for equipage installation.

The importance of developing this system of the future is also quite clear to policymakers in Europe, where a comparable effort known as Single European Sky Air Traffic Management Research (SESAR) 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 while creating jobs and delivering substantial 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.

Last year, Administrator Blakey signed a Memorandum of Understanding with her European counterpart that formalizes cooperation between the NextGen initiative and the SESAR program. The FAA and the EC are identifying opportunities and establishing time-lines to implement, where appropriate, common, interoperable, performance-based air traffic management systems and technologies. This coordination will address policy issues and facilitate global agreement within international standards organizations such as ICAO, RTCA and Eurocontrol, and contribute greatly to the success of this critical initiative.

Our European counterparts have released a preliminary cost estimate for SESAR. SESAR is conceived as a system that, while smaller in scope and size, has similar air traffic management goals as NextGen. They consider different system scenarios and a range of total costs of $25 billion to $37 billion in U.S. dollars through the year 2020. SESAR, like NextGen, has a lot of work remaining to refine assumptions and better define the system. However, there is an important difference in scope between SESAR and NextGen. While SESAR focuses almost exclusively on air traffic management, NextGen takes what's called a "curb-to-curb" approach, and includes not only air traffic control, but also airports, airport operations, security and passenger management, and DOD and DHS NAS requirements.

One of the major products for the JPDO, and indeed, one of the critical elements in defining the NextGen initiative itself, is the development of the Concept of Operations, the Enterprise Architecture, and the Integrated Work Plan. These documents define each NextGen transformed state and how to evolve to it. They are absolutely essential to the future development of the NextGen system.

The Concept of Operations is a text description of the transformed state of NextGen. This kind of explanation, offered in one document, is critical to developing the specific requirements and capabilities that will be necessary for our national air transportation system in 2025. In a sense, the Concept of Operations is like an architect's blueprints.

However, to adequately lay the groundwork and basic plans for the NextGen system requires another step in the process, developed concurrently with the Concept of Operations, and that's the Enterprise Architecture. The Enterprise Architecture provides the technical details of the transformed NextGen system, much like a builder's plumbing and wiring diagrams, specifying how the house will get its power, water, sewage, cable, and Internet connections to the rest of the community. The Integrated Work Plan is the equivalent of the general contractor's work plan. It specifies the timing and interdependencies of the research, demonstrations, and development required to achieve the NexGen system vision.

These documents, the Concept of Operations, the Enterprise Architecture, and the Integrated Work Plan are essential to defining the NextGen system and will guide the future investment and capabilities, both in terms of research and systems development. The JPDO released the NextGen Concept of Operations for public comment on February 28. It is now available on the JPDO website for review and comment by our stakeholders, and we are anxious to receive their feedback. The NextGen Enterprise Architecture and the Integrated Work Plan should be released within the next few months.

Our overarching goal in the NextGen 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 aircraft, small airports and large, business and vacation travelers alike, while handling a significantly increased number of operations with a commensurate improvement in safety, security and efficiency. Research will continue to help us find the right balance between a centralized satellite and ground system and a totally distributed system, where aircraft "self-manage" their flight with full knowledge of their environment.

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

Senator ROCKEFELLER. Thank you. I'd just say to the Chairman of the Committee and the Vice Chairman, if either of you have statements you want to give please let me know. Senator Klobuchar, you and I aren't allowed to give statements, so that we can get right to the questioning. So, Mr. Leader, you can now be on.

STATEMENT OF CHARLES LEADER, DIRECTOR, JOINT PLANNING AND DEVELOPMENT OFFICE

Mr. LEADER. Thank you, Mr. Chairman. My name is Charles Leader and I am the Director of the multi-agency Joint Planning and Development Office. With your permission, I'd like to submit my formal statement for the record and take this opportunity to make a few opening remarks.

I think you'll agree that the United States has the safest and most efficient air traffic control system in the world. It handles a staggering amount of traffic every day. This includes passenger flights, air cargo, military operations, unmanned aerial vehicles and space launches.

But as capable as it is, we are already seeing the limits of the current system. Delays and cancellations are growing and unless we begin to transform the system now, the problems are only going to get worse. The issues concerning the future capacity and flexibility of the national air transportation system are matters that the Senate and this Committee understand very well.

In 2003, Vision 100, the FAA reauthorization, chartered the Next Generation Air Transportation System Initiative and established the Joint Planning and Development Office. The scope of this undertaking as well as the length of the commitment, which reaches out 20 years, is almost unprecedented in government. It involves the joint efforts of the Departments of Homeland Security, Commerce, Defense and Transportation, as well as NASA and the FAA.

But it is far more than a large government program. It also represents an important collaboration, a partnership if you will, with the aviation industry as we develop our plans and begin implementation.

NextGen can be summed up as a long-term transformation of our Nation's air transportation system. We are leveraging new technologies in the areas of satellite navigation and networking. These are technologies that in one form or another, already exist and we are using these capabilities and further developing them to change our entire approach to managing the air transportation system.

Often, one of the challenges in explaining NextGen is putting what we're doing into context. With that in mind, an approach I like to take in explaining NextGen is to relate the technology and procedural improvements we're making to the Nation's air transportation system to applications of these same capabilities people are already familiar with in their everyday lives. One good example of the day-to-day application of this kind of technology, one that relates to NextGen, is the General Motors product that comes with many of their new cars called OnStar. Though applied to automobiles and operating in the two-dimensional environment of roads and vehicles, it uses GPS technology as well as voice and data communications to help drivers find out where they are and to provide

them assistance. OnStar uses the same type of voice and data links that we will be using in the NextGen system.

Drivers who use OnStar can use it to speak to the GM Command Center, receive wireless telephone calls or request services through an operator. The OnStar data link can receive messages from the GM Command Center sent directly to the automobile's computer to do such things as unlock the doors, report problems with the vehicle or in an emergency, report an automobile accident.

We envision using the same sort of existing technology in NextGen that would allow flight crews to communicate, navigate and report their positions while operating within the National Airspace System.

Implementation of NextGen has already begun. Two programs, which might be described as the foundational technologies of NextGen are the Automatic Dependent Surveillance Broadcast system, ADS–B and System Wide Information Management, SWIM. Both of these programs are funded and already underway. ADS–B is GPS-based and it is a critical component in developing NextGen's satellite based navigation and control capabilities. SWIM is developing our key networking technologies and establishing that critical infrastructure.

The FAA is also supporting other key NextGen programs in its 2008 budget, to include NextGen Data Communications, NextGen Network-Enabled Weather, the NAS Voice Switch and NextGen Demonstrations and Infrastructure Development. The FAA proposes to spend $173 million on these programs in 2008 and $1.3 billion over 5 years. Each of these programs and the capabilities they represent are essential in beginning the transformation of our current air traffic control system, from one that relies on voice communication and ground-based surveillance and navigation to one that is satellite-based, network-enabled and uses advanced, non-voice digital communications.

One of the most important products for the JPDO has been its planning tools and we have released at the end of last month, our Concept of Operations, which is available on our website and provides a description of the state of the NextGen that we anticipate to be achieved by 2025. Thank you very much.

Senator ROCKEFELLER. Thank you very much. Ms. Fleming?

STATEMENT OF SUSAN FLEMING, DIRECTOR—PHYSICAL INFRASTRUCTURE ISSUES, U.S. GOVERNMENT ACCOUNTABILITY OFFICE (GAO)

Ms. FLEMING. Good morning, Chairman Rockefeller and Chairman Inouye and members of the Subcommittee. Thank you for the opportunity to discuss efforts to transform the current National Airspace System to the Next Generation Air Transportation System.

The skies over America are becoming more crowded every day. Over 740 million passengers flew last year and FAA estimates that almost one billion passengers will be flying per year in 2015. Everyone agrees—the current aviation system cannot be expanded to meet this projected growth.

My testimony has two parts. JPDO's progress in planning NextGen and the continuing challenges it faces and FAA's challenges in transitioning from the current system to NextGen.

First, JPDO has made substantial progress in planning NextGen. It was designed as an inter-agency effort and JPDO has taken several actions that facilitate collaboration with its partner agencies and the private sector. It has begun leveraging the resources of its partner agencies and finalizing several critical documents that form a framework for NextGen.

Having these kinds of planning tools is essential for an initiative of this scope. Progress has also been made in strengthening the collaboration between JPDO and FAA, the chief implementer of NextGen. FAA has revised some of its plans and created a NextGen Review Board to better ensure that current FAA initiatives meet NextGen requirements.

I'll now turn to JPDO's challenges. To leverage funding for NextGen, JPDO will need to ensure that the collaborative framework it has developed among its partner agencies remains intact. Other challenges include researching human factors issues and addressing gaps in research and development for NextGen.

I'd like to briefly touch on the last point. NASA's cuts to aeronautical research funding and expanded requirements for NextGen have led to potential research gaps. This raises questions about who will conduct necessary R&D for NextGen and who will pay for it.

Moving on to my second point, FAA has taken several actions to improve its management of ATC modernization efforts.

Senator ROCKEFELLER. Ma'am, could you move that microphone just a little bit closer to you?

Ms. FLEMING. Sure.

Senator ROCKEFELLER. Thank you.

Ms. FLEMING. By creating ATO, it established a new management structure and adapted more leading practices of private sector businesses. However, realization of NextGen goals could be severely compromised if these improved practices are not institutionalized and carried over into the implementation of NextGen. Reinforcing these changes will require continued strong leadership, particularly since the agency will have lost two of its significant agents for change—the Administrator and Chief Operating Officer by September 2007.

Costs are another challenge facing FAA. NextGen will likely pose substantial demands for resources, yet FAA will need to maintain its current air traffic system simultaneously.

Finally, FAA needs to determine whether it has the technical and contract management expertise necessary to implement NextGen.

In conclusion, transforming the National Airspace System to accommodate much greater demand is an enormously complex undertaking. If these agencies can build on their recent achievements and overcome the many challenges they face, the promise of NextGen stands a much better chance of becoming reality.

Mr. Chairman, this concludes my statement. I would be pleased to answer any questions you or members of the Subcommittee might have.

[The prepared statement of Ms. Fleming follows:]

PREPARED STATEMENT OF SUSAN FLEMING, DIRECTOR—PHYSICAL INFRASTRUCTURE ISSUES, U.S. GOVERNMENT ACCOUNTABILITY OFFICE (GAO)

Mr. Chairman and members of the Subcommittee:

I appreciate the opportunity to testify before you today on efforts to transform the current National Airspace System to the Next Generation Air Transportation System (NextGen). The skies over America are becoming more crowded every day. Demand for air travel has increased in recent years, with over 740 million passengers flying in Fiscal Year 2006, climbing toward an estimated 1 billion passengers per year in 2015, according to FAA estimates. The consensus of opinion is that the current aviation system cannot be expanded to meet this projected growth. In 2003, recognizing the need for system transformation, Congress authorized the creation of the Joint Planning and Development Office (JPDO) and required the office to operate in conjunction with multiple Federal agencies, including the Departments of Transportation, Commerce, Defense, and Homeland Security; the Federal Aviation Administration (FAA); the National Aeronautics and Space Administration (NASA); and the White House Office of Science and Technology Policy.[1] JPDO is responsible for coordinating the related efforts of these partner agencies to plan the transformation to NextGen: a fundamental redesign of the air transportation system that will entail precision satellite navigation; digital, networked communications; an integrated weather system; layered, adaptive security; and more. FAA will be largely responsible for implementing the policies and systems necessary for NextGen, while safely operating the current air traffic control system 24 hours a day, 7 days a week.

My testimony today addresses issues concerning both JPDO and FAA as the NextGen effort begins to move from conceptualization and planning to implementation of systems and procedures. Specifically, my testimony focuses on: (1) the progress that JPDO has made in planning the NextGen system and some challenges it continues to face; and (2) the challenges that FAA faces in transitioning to NextGen. My statement is based on our recent reports as well as ongoing work for this subcommittee. We conducted this work in accordance with generally accepted government auditing standards.

In Summary:

JPDO has made substantial progress in planning NextGen, but continues to face several challenges. JPDO has established a framework to facilitate the Federal interagency collaboration that is central to its mission, and involves non-federal stakeholders in its planning efforts. JPDO has begun leveraging the resources of its partner agencies and finalizing several key documents that form the fundamental plan for NextGen, including a Concept of Operations and an Enterprise Architecture. The draft Concept of Operations has been posted to JPDO's Website for public comment and the Enterprise Architecture is expected to be completed in the next few months. JPDO and FAA have improved their collaboration and coordination by developing an expanded and revamped Operational Evolution Plan intended to provide a NextGen implementation plan for FAA. JPDO has faced a continuing challenge in institutionalizing interagency collaboration. JPDO also faces challenges in developing a comprehensive cost estimate, exploring potential gaps in research and development for NextGen, incorporating the expertise of all major stakeholders, researching human factors issues, and establishing credibility among stakeholders.

FAA faces challenges in institutionalizing recent management improvements and controlling costs as it begins the transition to NextGen. By creating the Air Traffic Organization (ATO) in 2003, and appointing a Chief Operating Officer (COO) to head ATO, FAA established a new management structure and adopted more leading practices of private sector businesses to address the cost, schedule, and performance shortfalls that have plagued its air traffic control modernization efforts. For example, FAA has taken steps to improve its acquisition workforce culture and work toward a results-oriented, high-performance organization. However, institutionalizing these changes will require continued strong leadership, particularly since the agency will have lost two of its significant agents for change—the FAA Administrator and the COO—by September 2007. Additionally, the costs of operating and maintaining the current air traffic control system while implementing NextGen will be another important challenge for FAA, as will having the technical and contract management expertise needed to implement a system as complex as NextGen.

[1] Pub. L. 108–176, Vision 100—Century of Aviation Reauthorization Act, December 12, 2003.

JPDO Has Made Progress in Planning NextGen, But Faces Several Challenges

JPDO has made progress in planning NextGen by facilitating collaboration among its partner agencies, working to finalize key planning documents, and improving its collaboration and coordination with FAA. Among the challenges JPDO faces are institutionalizing collaboration among the partner agencies, and identifying and exploring questions related to which entity will fund and conduct the research and development needed to meet NextGen requirements.

JPDO Has Made Progress in Planning NextGen By Facilitating Collaboration Among Partner Agencies, Working To Finalize Key Planning Documents, and Improving Coordination With FAA

JPDO has made progress in many areas in planning NextGen, as we reported in November 2006.[2] I will highlight just a few of those areas in this testimony. First, JPDO has taken several actions that are consistent with practices that facilitate interagency collaboration—an important point given how critical such collaboration is to the success of JPDO's mission. For example, the JPDO partner agencies worked together to develop a high level plan for NextGen along with eight strategies that broadly address the goals and objectives for NextGen.[3] JPDO has since issued two annual updates to this plan, as required by Congress. Also, JPDO's organizational structure involves Federal and nonFederal stakeholders throughout. This structure includes a Federal interagency senior policy committee, an institute for nonFederal stakeholders, and eight integrated product teams that bring together Federal and nonFederal experts to plan for and coordinate the development of technologies that will address JPDO's eight broad strategies. JPDO has also begun leveraging the resources of its partner agencies in part by reviewing their research and development programs, identifying work to support NextGen, and working to minimize duplication of research programs across the agencies. For example, one opportunity for coordination involves aligning aviation weather research across FAA, NASA, and the Departments of Commerce and Defense, developing a common weather capability, and integrating weather information into NextGen.

In addition to developing and updating its high-level integrated plan, first published in December 2004, JPDO has been working to develop several critical documents that form the foundation of NextGen planning, including a draft Concept of Operations and an Enterprise Architecture. The Concept of Operations describes how the transformational elements of NextGen will operate in 2025. It is intended to establish general stakeholder buy-in to the NextGen end state, a transition path, and a business case. The Enterprise Architecture follows from the Concept of Operations and will describe the system in more detail (using the Federal Enterprise Architecture framework). It will be used to integrate NextGen efforts of the partner agencies. The draft Concept of Operations has been posted to JPDO's website for stakeholder review and comment. According to JPDO, an expanded version of the Enterprise Architecture is expected in mid-2007.

Progress has also been made in improving the collaboration and coordination between JPDO and FAA—the agency largely responsible for the implementation of NextGen systems and capabilities. FAA has expanded and revamped its Operational Evolution Plan (OEP)—renamed the Operational Evolution Partnership—to become FAA's implementation plan for NextGen.[4] The OEP is being expanded to apply to all of FAA and is intended to become a comprehensive description of how the agency will implement NextGen, including the required technologies, procedures, and resources. An ATO official told us that the new OEP is to be consistent with JPDO's key planning documents and partner agency budget guidance. According to FAA, the new OEP will allow it to demonstrate appropriate budget control and linkage to NextGen plans and will force FAA's research and development to be relevant to

[2] GAO, *Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System,* GAO–07–25 (Washington, D.C.: Nov. 13, 2006).

[3] The eight strategies are: (1) Develop airport infrastructure to meet future demand; (2) establish an effective security system without limiting mobility or civil liberties; (3) establish an agile air traffic system that quickly responds to shifts in demand; (4) establish shared situational awareness—where all users share the same information; (5) establish a comprehensive and proactive approach to safety; (6) develop environmental protection that allows sustained aviation growth; (7) develop a systemwide capability to reduce weather impacts; and (8) harmonize equipage and operations globally.

[4] Prior to expansion of the OEP, the document centered around plans for increasing capacity and efficiency at 35 major airports.

NextGen's requirements. According to FAA documents, the agency plans to publish the new OEP in June 2007.

In an effort to further align FAA's efforts with JPDO's plans for NextGen, FAA has created a NextGen Review Board to oversee the OEP. This Review Board will be co-chaired by JPDO's Director and ATO's Vice President of Operations Planning. Initiatives, such as concept demonstrations or research, proposed for inclusion in the OEP, will now need to go through the Review Board for approval. Initiatives are to be assessed for relation to NextGen requirements, concept maturity, and risk. An ATO official told us that the new OEP process should also help identify some smaller programs that might be inconsistent with NextGen and which could be discontinued. Additionally, as a further step toward integrating ATO and JPDO, the Administration's reauthorization proposal calls for the JPDO Director to be a voting member of FAA's Joint Resources Council and ATO's Executive Council.

Challenges for JPDO Include Institutionalizing Interagency Collaboration and Exploring Potential Gaps in Research and Development Needs for NextGen

Although JPDO has established a framework for collaboration, it has faced a challenge in institutionalizing this framework. As JPDO is a coordinating body, it has no authority over its partner agencies' key human and technological resources needed to continue developing plans and system requirements for NextGen. For example, JPDO has been working to establish a memorandum of understanding (MOU) with its partner agencies to more clearly define partner agencies' roles and responsibilities since at least August 2005. As of March 16, 2007, however, the MOU remained unsigned. Another key activity for strengthening the collaborative effort will be synchronizing the NextGen Enterprise Architecture with the partner agencies' Enterprise Architectures. These types of efforts, which would better institutionalize JPDO's collaborative framework throughout the partner agencies, will be critical to JPDO's ability to leverage the necessary funding for developing NextGen. Institutionalization would help ensure that, as administrations and staffing within JPDO change over the years, those coming into JPDO will have a clear understanding of their roles and responsibilities and of the time and resource commitments entailed.

JPDO faces a challenge in developing a comprehensive cost estimate for the NextGen effort. In its recent 2006 Progress Report,[5] JPDO reported some cost estimates related to FAA's NextGen investment portfolio, which I will discuss in more detail later in this statement. However, JPDO is still working to develop an understanding of the future requirements of its other partner agencies and the users of the system. JPDO stated that it sees its work in estimating costs as an ongoing process. The office notes that it will gain additional insight into the business, management, and technical issues and alternatives that will go into the long-term process of implementing NextGen as it continues to work with industry, and that it expects its cost estimates to continue to evolve.

Another challenge facing JPDO is exploring potential gaps in the research and development necessary to achieve some key NextGen capabilities and to keep the development of new systems on schedule. In the past, a significant portion of aeronautics research and development, including intermediate technology development, has been performed by NASA. However, our analysis of NASA's aeronautics research budget and proposed funding shows a 30 percent decline, in constant 2005 dollars, from Fiscal Year 2005 to Fiscal Year 2011. To its credit, NASA plans to focus its research on the needs of NextGen. However, NASA is also moving toward a focus on fundamental research and away from developmental work and demonstration projects. FAA is currently assessing its capacity to address these issues. Currently it is unknown how all of the significant research and development activities inherent in the transition to NextGen will be conducted or funded.

Still another challenge facing JPDO is ensuring that all relevant stakeholders are involved in the effort. Some stakeholders, such as current air traffic controllers and technicians, will play critical roles in NextGen, and their involvement in planning for and deploying the new technology will be important to the success of NextGen. In November 2006, we reported that air traffic controllers were not involved in the NextGen planning effort.[6] Controllers are beginning to become involved as the controllers' union is now represented on a key planning body. However, technicians are currently not participating in NextGen efforts. Input from current air traffic controllers who have recent experience controlling aircraft and current technicians who will maintain the new equipment is important is considering human factors and safety issues. Our work on past air traffic control modernization projects has shown

[5] JPDO, *Making the NextGen Vision a Reality: 2006 Progress Report to the Next Generation Air Transportation System Integrated Plan,* (Washington, D.C.; March 2007).

[6] GAO–07–25.

that a lack of stakeholder or expert involvement early and throughout a project can lead to cost increases and delays.

Addressing human factors issues is another key challenge for JPDO. For example, the NextGen Concept of Operations envisions that pilots will take on a greater share of the responsibility for maintaining safe separation and other tasks currently performed by controllers—raising human factors questions about whether pilots can safely perform these additional duties. According to JPDO, the change in the roles of controllers and pilots is the most important human factors issue involved in creating NextGen but will be difficult to research because data on pilot behavior are not readily available for use in creating models.

Finally, we reported in November 2006 that establishing credibility was viewed by the majority of the expert panelists we consulted as a challenge facing JPDO. This view partially stems from past experiences in which the government has stopped some modernization efforts after industry invested in supporting technologies. Stakeholders' belief that the government is fully committed to NextGen will be important as efforts to implement NextGen technologies move forward. Another credibility challenge for JPDO is convincing stakeholders that the collaborative effort is making progress toward facilitating implementation. To address this challenge, the new Director of JPDO is planning to implement some structural and procedural changes to the office. For example, the Director has proposed changing JPDO's integrated product teams into "working groups" that would task small teams with exploring specific issues and delivering discrete work products. These changes have not yet been implemented at JPDO and it will take some time before the effectiveness of these changes can be evaluated.

FAA Faces Challenges in Transitioning to NextGen

FAA is a principal player in JPDO's efforts and will be the chief implementer of NextGen. Successful implementation will depend, in part, on how well FAA addresses its challenges of institutionalizing its recent improvement in managing air traffic control modernization efforts, addressing the cost challenges of implementing NextGen while safely maintaining the current air traffic control system, and obtaining the expertise needed to implement a system as complex as NextGen. I turn now to these challenges.

FAA Faces the Challenge of Institutionalizing Recent Progress in Managing Air Traffic Control Modernization Efforts

A successful transition to NextGen will depend, to a great extent, on FAA's ability to manage the acquisition and integration of multiple NextGen systems. Since 1995, we have designated FAA's air traffic control modernization program as high risk because of systemic management and acquisition problems. In recent years, FAA has taken a number of actions to improve its management of acquisitions. Realization of NextGen goals could be severely compromised if FAA's improved processes are not institutionalized and carried over into the implementation of NextGen, which is an even more complex and ambitious undertaking than past modernization efforts.

To its credit, FAA has taken a number of actions to improve its acquisition management. By creating the Air Traffic Organization (ATO) in 2003, and appointing a Chief Operating Officer (COO) to head ATO, FAA established a new management structure and adopted more leading practices of private sector businesses to address the cost, schedule, and performance shortfalls that have plagued air traffic control acquisitions. ATO has worked to create a flatter organization, with fewer management layers, and has reported reducing executive staffing by 20 percent and total management by 16 percent. In addition, FAA uses a performance management system to hold managers responsible for the success of ATO. More specifically, to better manage its acquisitions and address problems we have identified,[7] FAA has:

- established strategic goals to improve its acquisition workforce culture and build toward a results-oriented, high-performing organization;
- developed and applied a process improvement model to assess the maturity of its software and systems acquisitions capabilities resulting in, among other things, enhanced productivity and greater ability to predict schedules and resources; and

[7] GAO, *Federal Aviation Administration: Stronger Architecture Program Needed to Guide Systems Modernization Efforts,* GAO–05–266 (Washington, D.C.: Apr. 29, 2005); *Air Traffic Control: System Management Capabilities Improved, but More can be Done to Institutionalize Improvements,* GAO–04–901 (Washington, D.C.: Aug. 20, 2004); and *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).

- reported that it has established a policy and guidance on using Earned Value Management (EVM) in its acquisition management system and that 19 of its major programs are currently using EVM.[8]

Institutionalizing these improvements throughout the agency (*i.e.,* providing for their duration beyond the current leadership by ensuring that reforms are fully integrated into the agency's structure and processes and have become part of its organizational culture) will continue to be a challenge for FAA. For example, the agency has yet to implement its cost estimating methodology, although, according to the agency, it has provided training on the methodology to employees. Furthermore, FAA has not established a policy to require use of its process improvement model on all major acquisitions for the National Airspace System. Until the agency fully addresses these legacy issues, it will continue to risk program management problems affecting cost, schedule, and performance. With a multi-billion dollar acquisition budget, addressing these issues is as important as ever.

Institutionalizing Change Within FAA Will Require Continued Strong Leadership

While FAA has implemented many positive changes to its management processes, it currently faces the loss of key leaders. We have reported that the experiences of successful transformations and change management initiatives in large public and private organizations suggest that it can take 5 to 7 years or more until such initiatives are fully implemented and cultures are transformed in a sustainable manner. Such changes require focused, full-time attention from senior leadership and a dedicated team.[9] FAA's management improvements are relatively recent developments, and the agency will have lost two of its significant agents for change—the Administrator and the COO—by the end of September. The Administrator's term ends in September 2007; the COO left in February 2007, after serving 3 years. This situation is exacerbated by the fact that the current Director of JPDO is also new, having assumed that position in August 2006. For the management and acquisition improvements to further permeate the agency, and thus provide a firm foundation upon which to implement NextGen, FAA's new leaders will need to demonstrate the same commitment to improvement as the outgoing leaders. This continued commitment to change is critical over the next few years, as foundational NextGen systems begin to be implemented. Expeditiously moving to find a new COO will help sustain this momentum.

FAA Faces a Cost Challenge of Implementing NextGen While Sustaining the Current Air Traffic Control System

JPDO recently reported some estimated costs for NextGen, including specifics on some early NextGen programs.[10] JPDO believes the total Federal cost for NextGen infrastructure through 2025 will range between $15 billion and $22 billion. JPDO also reported that a preliminary estimate of the corresponding cost to system users, who will have to equip with the advanced avionics that are necessary to realize the full benefits of some NextGen technologies, ranges between $14 and $20 billion. JPDO noted that this range of avionics costs reflects uncertainty about equipage costs for individual aircraft, the number of very light jets that will operate in high-performance airspace, and the amount of out-of-service time required for installation.

In its Capital Investment Plan for Fiscal Years 2008–2012, FAA includes estimated expenditures for eleven line items that are considered NextGen capital programs.[11] The total 5-year estimated expenditures for these programs are $4.3 billion. In Fiscal Year 2008, only six of the line items are funded for a total of roughly $174 million; funding for the remaining five programs would begin with the Fiscal Year 2009 budget. According to FAA, in addition to capital spending for NextGen,

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[8] EVM is a project management technique that combines measurements of technical performance, schedule performance, and cost performance with the intent of providing an early warning of problems while there is time for corrective action.

[9] GAO, *National Airspace System: Transformation will Require Cultural Change, Balanced Funding Priorities, and Use of All Available Management Tools,* GAO–06–154 (Washington, D.C.: Oct. 14, 2005).

[10] JPDO, *Making the NextGen Vision a Reality: 2006 Progress Report to the Next Generation Air Transportation System Integrated Plan,* (Washington, D.C.: March 2007).

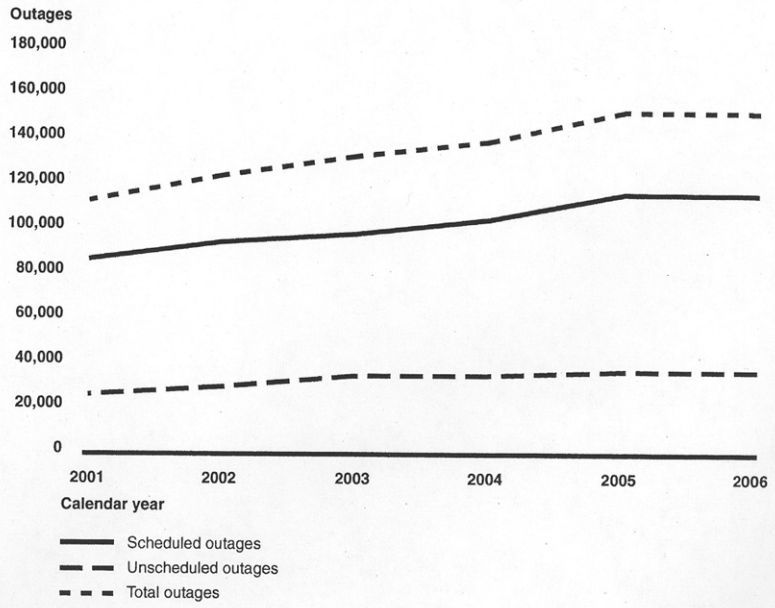
[11] FAA has six capital investment programs that it considers transformational NextGen programs slated to receive funding in Fiscal Year 2008: ADS–B nationwide implementation, System Wide Information Management (SWIM), NextGen Data Communications, NextGen Network Enabled Weather, National Airspace System Voice Switch, and NextGen Technology Demonstration. In addition, five other programs are slated to begin funding in 2009: NextGen System Development, NextGen High Altitude Trajectory Based Operations, NextGen High Density Airports, NextGen Networked Facilities, and NextGen Cross-Cutting Infrastructure.

the agency will also spend an estimated $300 million on NextGen-related research and development from Fiscal Years 2008 through 2012. Also, the Administration's budget for Fiscal Year 2008 for FAA includes $17.8 million to support the activities of JPDO.

It is important to note that while FAA must manage the costs associated with the NextGen transformation, it must simultaneously continue to fund and operate the current National Airspace System. In fact, the Department of Transportation's Inspector General has reported that the majority of FAA's capital funds go toward the sustainment of current air traffic systems and that, over the last several years, increasing operating costs have crowded out funds for the capital account. Efforts to sustain the current system are particularly important given the safety concerns that could be involved with system outages—the number of which has increased steadily over the last few years as the system continues to age.

For example, the adequacy of FAA's maintenance of existing systems was raised following a power outage and equipment failures in Southern California that caused hundreds of flight delays during the Summer of 2006. Investigations by the DOT Inspector General into these incidents identified a number of underlying issues, including the age and condition of equipment. Nationwide, the number of scheduled and unscheduled outages of air traffic control equipment and ancillary support systems has been increasing (see *Fig. 1*). According to FAA, increases in the number of unscheduled outages indicate that systems are failing more frequently. FAA also notes that the duration of unscheduled equipment outages has also been increasing in recent years from an average of about 21 hours in 2001 to about 40 hours in 2006, which may indicate, in part, that maintenance and troubleshooting activities are requiring more effort and longer periods of time. However, the agency considers user impact and resource efficiency when planning and responding to equipment outages, according to an FAA official. As a result, although some outages will have longer restoration times, FAA believes that they do not adversely affect air traffic control operations. It will be important for FAA to monitor and address equipment outages to ensure the safety and efficiency of the legacy systems and a smooth transition to NextGen.

Figure 1: Number of Scheduled and Unscheduled Equipment Outages, Calendar Years 2001-2006



Source: GAO analysis of FAA's NASPAS data.

As part of managing the costs of system sustainment and system modernization, FAA is seeking ways to reduce costs by introducing infrastructure and operational efficiencies. For example, FAA plans to produce cost savings through outsourcing and facility consolidations. FAA is outsourcing flight service stations and estimates a $2.2 billion savings over 12 years. Similarly, FAA is seeking savings through outsourcing its planned nationwide deployment of Automatic Dependent Surveillance-Broadcast (ADS–B), a critical surveillance technology for NextGen. FAA is planning to implement ADS–B through a performance-based contract in which FAA will pay "subscription" charges for the ADS–B services and the vendor will be responsible for building and maintaining the infrastructure. (FAA also reports that the ADS–B rollout will allow the agency to remove 50 percent of its current secondary radars, saving money in the ADS–B program's baseline.) As for consolidating facilities, FAA is currently restructuring its administrative service areas from nine offices to three offices, which FAA estimates will save up to $460 million over 10 years.

We have previously reported that FAA should pursue further cost control options, such as exploring additional opportunities for contracting out services and consolidating facilities. However, we recognize that FAA faces challenges with consolidating facilities, an action that can be politically sensitive. In recognition of this sensitivity, the Administration has proposed in FAA's reauthorization proposal that the Secretary of Transportation be authorized to establish an independent, five-member Commission, known as the Realignment and Consolidation of Aviation Facilities and Services Commission, to independently analyze FAA's recommendations to realign facilities or services. The Commission would then send its own recommendations to the President and to Congress. In the past, we have noted the importance of potential cost savings through facility consolidations; however, it must also be noted that any such consolidations must be handled through a process that solicits and considers stakeholder input throughout, and fully considers the safety implications of any proposed facility closures or consolidations.

FAA Needs To Explore Whether It Has the Technical and Contract Management Expertise Necessary To Implement NextGen

In the past, a lack of expertise contributed to weaknesses in FAA's management of air traffic control modernization efforts, and industry experts with whom we spoke questioned whether FAA will have the technical expertise needed to implement NextGen. In addition to technical expertise, FAA will need contract management expertise to oversee the systems acquisitions and integration involved in NextGen. In November, we recommended that FAA examine its strengths and weaknesses with regard to the technical expertise and contract management expertise that will be required to define, implement, and integrate the numerous complex programs inherent in the transition to NextGen.[12] In response to our recommendation, FAA is considering convening a blue ribbon panel to study the issue and make recommendations to the agency about how to best proceed with its management and oversight of the implementation of NextGen. We believe that such a panel could help FAA begin to address this challenge.

To conclude, transforming the National Airspace System to accommodate much greater demand for air transportation services in the years ahead will be an enormously complex undertaking. JPDO has made strides in meeting its planning and coordination role as set forth by Congress, and FAA has taken several steps in recent years that better position it to successfully implement NextGen. If JPDO and FAA can build on their recent achievements and overcome the many challenges they face, the transition to NextGen stands a much better chance for success.

Mr. Chairman, this concludes my statement. I am pleased to answer any questions you or members of the Subcommittee might have.

Senator ROCKEFELLER. Thank you very much, Ms. Fleming. The next is Captain Lee.

STATEMENT OF CAPT. KAREN LEE, DIRECTOR OF OPERATIONS, UPS AIRLINES

Captain LEE. Good morning, Chairman Rockefeller and members of the Committee. My name is Karen Lee and I'm the Director of Operations for the UPS Airlines.

Is that OK?

[12] GAO–07–25.

Senator ROCKEFELLER. I don't think it's on, is it?

Captain LEE. Thank you for the opportunity to testify this morning on air traffic modernization and what UPS is doing with Automatic Dependent Surveillance-Broadcast—ADS–B, in demonstrating the benefits of technology for airspace modernization. ADS–B is now recognized as the foundation for the Next Generation Air Transportation System. Administrator Blakey has been a strong proponent of ADS–B and has been very supportive of our efforts to improve capacity and efficiency at our international air hub in Louisville, Kentucky.

During the UPS rush hour from 11 at night until 1:30 in the morning, we typically land 47 to 52 aircraft per hour and less than that when the weather is not perfect. We should be able to land almost 60 aircraft per hour in most weather conditions. The fact that we cannot do that costs us millions of dollars every year because our flights end up driving around at low altitudes in highly inefficient altitudes while waiting for their turn for landing, sometimes flying 60 or 70 miles to travel the last 40 miles of the flight.

In addition, our flights arrive at the runways with uneven spacing. If you were to stand at the end of the runway and measure the time between landing aircraft, you would find a high level of variation—90 seconds, 105 seconds, 80 seconds, 180 seconds and so on. And if in tonight's operation, the optimal interval should be 95 seconds, what we really want to see is 95 seconds, 95 seconds, 95 seconds. Anything more than 95 seconds between aircraft on that night would represent a loss of capacity. And it's very, very similar at every busy airport in the world.

This summer, the aviation community is on the verge of a major milestone on the path to modernization. In August, we are going to fly the world's first Next Generation Continuous Descent Arrivals using an ADS–B application called "merging and spacing." This will mark the first time that pilots will be given responsibility for spacing their aircraft at very accurate time intervals from cruise altitude all the way to the runway. The goal is to consistently and precisely deliver our Louisville arriving flights to the end of the runways in the most efficient way possible in almost all weather conditions, night after night after night.

When we accomplish this, we anticipate we will save over 800 thousand gallons of fuel per year, reduce our noise footprint by 30 percent, reduce our emissions by 34 percent below 3,000 feet and increase the capacity of our airport 10 to 15 percent.

We are confident of success for several reasons. ADS–B and RNAV technology is maturing rapidly. Our air traffic controllers are willing partners and they've enjoyed benefits from working with us. We have a wide base of industry support and have worked very closely with the FAA and others throughout this whole project. Our pilots have enjoyed the early benefits of enhanced situational awareness and traffic displays in the cockpit, and they are very actively involved in the preparations for the steps we'll take this summer.

Although aircraft equipage is always seen as an obstacle to progress, we believe that the architecture we are implementing is very practical and portable to other aircraft types. We are using one set of hardware to house several different applications. The

electronic flight bag provided by Boeing will allow us to provide electronic charts and manuals for our pilots as well as other operational functions.

The same display used for the electronic flight bag functions will also be used for the ADS–B applications under development by ACSS, a subsidiary of L–3Com and Thales. In addition—and I can't emphasize this one too much—this installation is also going to house a very important safety enhancement, which is a moving surface map with traffic for ground operations in the cockpit. Studies show that the threat of most runway incursions and potential ground collisions could be prevented or solved using the surface map with traffic.

In summary, I'd like to make these observations about the future. Modernization must be an evolution not a revolution. We can provide dramatic improvements in efficiency, capacity, noise and emissions sooner rather than later. Technology is ready. Implementation is a political issue and we need to move forward quickly in an incremental way so we can learn and evolve toward the end state while minimizing risk, solving the problems of today and preparing for the challenges of tomorrow. Thank you and I'll be pleased to take any questions.

[The prepared statement of Captain Lee follows:]

PREPARED STATEMENT OF CAPT. KAREN LEE, DIRECTOR OF OPERATIONS, UPS AIRLINES

Chairman Rockefeller, Senator Lott and members of the Committee, my name is Karen Lee and I am Director of Operations at UPS Airlines. Thank you for the opportunity to testify this morning on air traffic modernization and what we at UPS have been doing over the last 10 years with Automatic Dependent Surveillance-Broadcast (ADS–B). We believe that modernization of our current aviation system should be the major priority in the FAA reauthorization this year. Our efforts on ADS–B demonstrate the benefits that modernization will provide.

UPS has been committed to the development and implementation of ADS–B systems and applications for over 10 years. ADS–B is a satellite-based surveillance technology that allows each aircraft to broadcast information about itself such as position, speed and altitude. It does this continuously, as often as once per second, and this surveillance information is available to any user equipped to receive and display it.

UPS, along with the Cargo Airline Association, first became involved with ADS–B in 1996, as a potential means of meeting collision avoidance requirements. Although we ultimately installed T–CAS in order to meet those requirements, our early work with ADS–B demonstrated many potential benefits, such as improved efficiency and safety, as well as environmental benefits. As a result, UPS continued its work on the technology.

Use of ADS–B technology creates a new level of safety and redundancy in our airspace system since pilots will now be able to see the traffic around them and controllers will have surveillance data that is much more accurate and timely than they have today. There are many applications that are enabled when aircraft are equipped to see other aircraft. Many of those applications create opportunities to make aircraft operations safer and more efficient while reducing noise and emissions.

ADS–B is now recognized as the foundation of the Next Generation Air Traffic System. Administrator Blakey has been a strong proponent of ADS–B and has been very supportive of the efforts we have undertaken at our international air hub in Louisville, Kentucky.

There are two basic scenarios in which ADS–B surveillance can be very beneficial. The first is in geographic areas that do not have radar surveillance. ADS–B surveillance information can be provided from the aircraft to air traffic controllers through inexpensive ground receiving stations and shown on a display that looks exactly like a radar display. Controllers use the ADS–B surveillance data exactly the same way they would use radar information; it just comes to them directly from the aircraft.

You are probably familiar with the FAA Capstone project in Alaska where more than 250 light aircraft are equipped to broadcast ADS–B position information. Using ADS–B, Alaska has reduced its accident rate by 47 percent and has done so in areas that radar could not be installed because of rugged terrain.

The second scenario is in high-density airspace. Let's use Louisville as an example. During the UPS rush hour, from 11 at night until 1:30 in the morning, we can land 47–52 aircraft per hour. We should be able to land 60–62 aircraft per hour in most weather conditions. Our inability to do so represents a loss of capacity and efficiency that costs us millions of dollars every year.

Our traffic arrives somewhat randomly and the flow and sequence of arriving aircraft is unpredictable. The en route center directs our aircraft into the terminal area as they arrive from all directions and the approach controllers then must organize and sequence the aircraft to line up for final approach. Our flights end up "driving" around at low, highly inefficient altitudes while waiting for their turn for landing—sometimes flying 60 or 70 miles to travel the last 40 miles of flight.

In addition, due to high controller workload and lack of shared traffic information with our pilots, our flights arrive at the runways with very uneven spacing. If you were to stand at the end of the runway and measure the time between landing aircraft, you would find a high level of variation—90 seconds, then 105 seconds, then 80 seconds, then 180 seconds and so on. What we really need is 95 seconds, 95 seconds, 95 seconds (or the appropriate time interval for the night's conditions—it is variable). Anything more than that interval is loss of capacity. And because our aircraft arrive somewhat randomly and unpredictably and all under radar vectors, they are scattered over a wide area as they enter the terminal area—making the controller's job that much more difficult to get us organized and lined up.

This is very similar to every busy airport in the world. Some are worse than others, but all capacity and efficiency losses are driven by the same factors: less than perfect surveillance information, each aircraft handled individually by a controller to be sequenced, each aircraft spaced and vectored to final approach and pilots who are blind to traffic around them. This results in wide variations in spacing on final approach and much higher fuel burns.

We are on the verge of a major milestone in the effort to become more efficient and to optimize the airspace capacity available to us. There is a wonderful convergence of emerging technologies and procedures that have created the dawn of a new era in aviation—indeed created the dawn of the Next Generation Air Transportation System.

In July, we will fly the world's first NextGen RNAV Continuous Descent Arrival procedures using an ADS–B application called "merging and spacing." This will mark the first time that pilots will be given responsibility for spacing their aircraft, at very accurate time intervals, using ADS–B surveillance information in the cockpit from cruise altitude all the way to the runway. The goal is to accurately, consistently and precisely deliver our aircraft to the end of the runways, in the most efficient way possible, in almost all weather conditions, night after night. When we accomplish this, we anticipate we will save over 800,000 gallons of fuel annually, reduce our noise footprint by 30 percent and our emissions by 34 percent below 3,000 feet, and increase the capacity of our airport by 15–20 percent or more.

We are confident of our success for several reasons. ADS–B technology is maturing rapidly. In fact, UPS has 107 Boeing 757 and 767 aircraft equipped with a first generation system and has accumulated thousands of hours of experience using the simple, but powerful application of Enhanced See and Avoid. We have seen significant improvements in our operations at Louisville as a result of this implementation and have gathered enough experience to validate our next implementation this year.

Our air traffic controllers are willing partners in our ADS–B work and have enjoyed benefits by working with us. We have a wide base of industry support and have worked closely with FAA and others throughout this project. Our pilots have enjoyed the early benefits of enhanced situational awareness and traffic displays in the cockpit for several years now and are actively involved in the preparation for the next steps in 2007. And, as I have mentioned, Administrator Blakey and the FAA are moving forward with ADS–B plans in the United States and are a strong ally in this effort.

Although aircraft equipage is always seen as an obstacle to progress, we believe that the architecture we are implementing is very practical. We are using one set of hardware to house several different applications. The electronic flight bag provided by Boeing will allow us to provide electronic charts and manuals for our pilots, electronic logbooks for maintenance, graphic satellite weather for inflight use, and a display for CPDLC for datalink communications with ATC in the future. The same display used for all of those applications will also be used for ADS–B applica-

tions, the first of which is the Continuous Descent Arrivals using merging and spacing.

It will also house a very important safety enhancement: a moving surface map with traffic for ground operations. Studies show that the threat of most runway incursions and potential ground collisions will be solved by using the surface map with traffic.

We all have a major challenge ahead in transforming and modernizing the best aviation system in the world. We must do this in order to provide the capacity needed to accommodate future growth, to provide an additional margin of safety and to achieve the environmental improvement that is required. We believe that ADS–B will be the foundation for the modernized system.

Thank you and I am pleased to answer any questions you may have.

Senator ROCKEFELLER. Thank you very much. You've all, I think, broken all records. In my 23 years in the Senate, you've all ended exactly at 5 minutes. The first question will go to the Chairman of the Full Committee, Senator Inouye.

STATMENT OF HON. DANIEL K. INOUYE, U.S. SENATOR FROM HAWAII

The CHAIRMAN. Thank you very much. Mr. Sturgell, the cost for the next 5 years would $4.6 billion, I believe you testified. What would be the total cost of transition? What do you estimate it to be?

Mr. STURGELL. The total cost that we're estimating between now and 2025 ranges from $15 to $22 billion for the Federal Government. That's in line with what we see of cost projections coming out of Europe with their SESAR program as well. And you are correct. Our estimates for the next 5 years are $4.6 billion, $300 million of that is R&D side, the research side.

The CHAIRMAN. Mr. Leader, are you involving air traffic controllers in your planning?

Mr. LEADER. We are involving air traffic controllers in our planning. I think Charlie can talk more about that, specifically with the JPDO but as Captain Lee stated, projects like ADS–B, which are beginning implementation projects, the workforce is heavily involved.

The CHAIRMAN. With the increase in air passenger travel, what is the capacity limit under the present system?

Mr. STURGELL. It's hard to give a number for the system overall. We generally look at capacity levels based on specific airports and their configurations, for example, how many aircraft we could land an hour at certain locations. We do run about 55,000 operations per day, IFR operations currently, with the existing level of delay about 18 minutes or so per airplane.

The CHAIRMAN. Under the NextGen system, what will be the air capacity?

Mr. STURGELL. Well, the goal of the system is to be able to accommodate two to three times the growth in traffic that we see going through 2025, largely through more automation into the system and the benefits we're seeing, again, in early projects like the Louisville effort.

The CHAIRMAN. We've been advised that you're looking into the system carried out now by UPS. Does the UPS system have any promise?

Mr. STURGELL. I'm sorry, I missed part of that for the noise but I'll just say that we are progressing at Louisville with the current

system. We've had some great success as Senator Stevens knows, up in Alaska, with a similar effort with Capstone. As we move this ADS–B program forward, we'll be looking also at the Gulf of Mexico. We have an agreement signed with the Helicopters Association to implement ADS–B there and then our other test bed will be Philadelphia.

The CHAIRMAN. Ms. Fleming, do you believe that the JPDO is moving along in the right path?

Ms. FLEMING. Sir, given the complexity of NextGen, we believe that a solid framework is in place. The key stakeholders of the seven partner agencies have been involved but we also want to highlight that there are some key steps that need to probably be taken as we move forward from planning to early implementation.

Just to give you a key example, it's very important that JPDO institutionalize many of its inter-agency collaboration efforts. An example of that would be that the MOU between the partner agencies has been in the works for about 2 years now. It's really critical that it be finalized to clarify and define the key roles of the partner agencies. It will be particularly important as we move forward to try to make sure everybody is on the same page.

The CHAIRMAN. Have you come forth with any estimates as to the cost of the transition?

Ms. FLEMING. We have not developed estimates for that, no sir.

The CHAIRMAN. And Captain Lee, I believe it is, Your system is working in Louisville. Is it working?

Captain LEE. Yes, sir. We have 107 aircraft currently equipped with ADS–B and traffic displays for the pilots. We use it for enhanced situational awareness. The system that we're going to employ starting in——

Senator ROCKEFELLER. Will you pull your microphone a little bit closer, please?

Captain LEE. I'm sorry. The system that we're going to employ in August is an upgrade of the existing system and it will provide us with greater functionality so that the pilots can do the spacing task on the arrival procedure.

The CHAIRMAN. It's mind boggling to think that aircraft can be landing every 90 seconds or so but you've indicated that it will depend upon the pilot. Is human error an important factor in this?

Captain LEE. Like everything we do in aviation, the human factor is very much a consideration and could be a weak link if we don't plan properly and the equipment is being certified to take into account many of the human factors. In fact, FAA Tiger Team has an entire group of people working on the human factors aspect of this. The fact that we're going to ask the pilots to do a task of spacing at an accurate interval, one behind the other, is relatively benign from the perspective of they have much more information today than they did yesterday, moving forward.

The CHAIRMAN. Mr. Chairman, I have a whole bunch of questions I'd like to submit.

Senator ROCKEFELLER. That will be done and I thank the Chairman of the Full Committee and now the Vice Chairman of the Full Committee, Vice Chairman Stevens.

STATEMENT OF HON. TED STEVENS,
U.S. SENATOR FROM ALASKA

Senator STEVENS. Thank you very much. You're a very generous Co-Chair. Mr. Sturgell, you're right. We tried, we tested both the Capstone and ADS–B in Alaska. I might say that I flew in the first sort of modified Capstone system, at least five Christmases ago. It's a very interesting system and we're pleased to see it spread out into what we call the "South 48 and the world" but Ms. Lee, as a pilot, I sat here thinking about a plane landing every 90 seconds. That just must assume you've got about—a whole series of planes stacked up behind the one that's landing, right? What do you do if someone has a single engine? What do you do if someone just has a heart attack? That's too close for safety in my opinion. How do you handle that?

Captain LEE. Well sir, we're switching from distance-based separation to time-based separation, which actually is a more rational way to approach the problem and at altitude, if the aircraft are spaced 105 seconds apart, at 35,000 feet, that's roughly equivalent to 14 miles and that's about what we fly in trail today, coming across in the end-route environment.

As you go to the lower altitudes and on final approach, that same 95 seconds or 100 seconds translates into roughly three and a half to four miles on final approach, which is about what we do today.

Senator STEVENS. I understand the mileage because you're going faster than I did when I flew but as a practical matter, you've still got the reaction time for an individual pilot or the aircraft itself. What do you do on that system if you've got all these people coming at the same time and something goes wrong?

Captain LEE. Sir, I was just pointing out that we are not going to be flying any closer together, one behind the other, than we do today. The only thing that we have done is give the pilots a tool so that they know how far behind they are. Right now, the pilot is out of the loop and the only party in this whole scenario that knows how far the airplanes are apart is the controller.

Senator STEVENS. I understand that and I applaud the system. I just wonder if the system is really accident safe. Have you examined this, Ms. Fleming? The safety side of this spacing at this speed?

Ms. FLEMING. No, we have not.

Senator STEVENS. Or the human reaction time?

Ms. FLEMING. No, we have not, sir.

Senator STEVENS. Mr. Leader, are you examining that at JDPO?

Mr. LEADER. No sir, we are not.

Senator STEVENS. Who is going to do it?

Captain LEE. Sir, that happens in our—in the certification process. The FAA certification branch, under Mr. Sabatini, is responsible for ensuring the safety of the system before it is certified and we are doing extensive flight testing under the auspices of the certification program.

Senator STEVENS. I'd just like to see what happens when something goes wrong. You know, stuff does go wrong once in a while and when it goes wrong, it is the pilot that's in charge now. Who tells him where to go and what to do under those circumstances?

Because you've got other planes coming into the same airport, I assume, under another runway, right?

Captain LEE. Yes, sir. May I speak to that very quickly? One of the reasons why it is going to be very easily accepted by the controllers is that the role of the controller will not change in this whole implementation. The controllers are still responsible for separation and safety, just the way they are today. The only thing that is going to change is that we will now fly a published arrival procedure instead of arriving at Louisville Airport under radar vectors. So the workload of the controller actually is reduced and they are allowed to step back and be more of a manager of our flow as opposed to controlling each individual aircraft by vectors and speed changes.

Senator STEVENS. Are you telling me that controllers at Louisville now bring people in every 90 seconds?

Captain LEE. No sir.

Senator STEVENS. I didn't think so, but you're planning a system that does.

Captain LEE. OK. Perhaps I used a bad example but on any given night, for a wake turbulence separation, the time interval between the aircraft will vary, depending on wind conditions and other atmospheric conditions and so on tonight's operation, 120 seconds may be the right time interval. On a very perfect night, with the right wind conditions, we could get down to 90 seconds or 95 seconds. But you have to also take into account the type of aircraft—which one is following another. If you have a heavy aircraft in the lead and a light aircraft behind it, the interval is going to be probably more around 180 seconds. So it will vary by the aircraft type and the atmospheric conditions that night.

Senator STEVENS. All right. I'm just saying someone ought to look into this. Maybe times have changed. I remember running out of fuel on the runway, just seconds after I landed. I remember landing and having a flat tire. You know, those things happen.

Captain LEE. Yes, sir.

Senator STEVENS. And someone is right behind, 90 seconds?

Captain LEE. Yes, sir. That happens today and in the event that somebody has a flat tire and can't get off the runway, we'll do exactly what we do today. The controller will direct a missed approach.

Senator STEVENS. But you tell me the pilots are in charge.

Captain LEE. No sir. No, sir. The flight—the air traffic controllers are in charge. The only thing the pilots are doing now that they previously didn't do was a spacing task and they will have a tool in the cockpit that will allow them to maintain a precise time interval behind the aircraft that they're following. That's really the only thing that's changing.

Senator STEVENS. All right. Well, I thank you very much. I'm not going to belabor it. As a pilot, I do know that you've got two great systems, Capstone and ADS–B. I just hope we don't plan to take too much advantage of it before we really understand it in terms of the emergency operations that may have to take place. Thank you very much.

Senator ROCKEFELLER. Thank you, Senator Stevens. Senator Lott.

STATMENT OF HON. TRENT LOTT,
U.S. SENATOR FROM MISSISSIPPI

Senator LOTT. Thank you, Mr. Chairman. Thank you for having this hearing and I ask consent that my statement be placed in the record at the opening of the session after your remarks.

[The prepared statement of Senator Lott follows:]

PREPARED STATEMENT OF HON. TRENT LOTT, U.S. SENATOR FROM MISSISSIPPI

I am pleased that Senator Rockefeller has called this morning's hearing on the need to modernize our air traffic control system.

We have been talking about modernization for many years but frankly there hasn't been much action. The most recent forecasts show that unless we take some very aggressive actions soon we may face serious gridlock in the sky by 2015. Just like we shouldn't wait for a road to become fully congested before adding more lanes, we can't wait for chaos in the air before taking action.

The case of air traffic control is complicated by the fact that the experts tell us that meeting future capacity isn't as simple as adding another lane. The current system isn't scalable—we need a totally new system to replace the existing one. We don't just need another highway lane—we need a whole new highway or perhaps the better analogy is that we need a whole new high-speed rail line to relieve the congestion on the highway. The problem, of course, is that we don't have much time.

In the last reauthorization bill in 2003, Congress recognized the looming crisis and created the Joint Program Development Office (JPDO) to coordinate the modernization effort. Today I hope to hear what has been accomplished over the last 3 years. I hope to hear about real concrete results, not just descriptions of bureaucratic processes.

I look forward to hearing from the witnesses.

Senator ROCKEFELLER. It will be done.

Senator LOTT. Thank you to the panel for being here this morning. I found it very interesting and informative. Mr. Leader, is that your real name or is that a performance name?

[Laughter.]

Senator LOTT. When I looked up there, I thought maybe it was Senator Harry Reid or Senator Mitch McConnell. We refer to them as Mr. Leader.

Mr. LEADER. Senator, I'm fortunate enough that that is my real name.

Senator LOTT. That's really impressive, I'll tell you.

I think we all agree that we need to modernize our air traffic control system. We're all in unison on that. But we're still trying to get a fix on exactly what does that mean, what is it going to be, how much is it going to cost and how is it going to be paid for? This is a little detail that we're going to have to do a lot of work on. Senator Rockefeller and our Chairman and Vice Chairman are going to be trying to go forward and actually begin to make some decisions on that.

But as a part of that process, we need some things like, Mr. Sturgell and I think somebody asked, Ms. Fleming. We still don't really have reliable information about what is going to be the cost, the estimated cost? Now, at one point, I was told over the next 5 years, it was going to be $1.3 billion and then it became $4.3 billion and we still don't quite know what all that is and realize you can't always estimate the cost until you know what you're actually going to be doing. So it's a chicken and egg. But if we're going to make sure that we get this job done, we have to have some reliable esti-

mates based on something that's tangible that we can look at. Mr. Sturgell, when can we expect some reliable numbers on that?

Mr. STURGELL. Well, you're correct, Senator. There were some earlier estimates that varied. I think where we are today, we're fairly comfortable with our current estimates for the long term and again, they match up pretty well with what the Europeans have projected.

Senator LOTT. Do we have that information?

Mr. STURGELL. We do have that information.

Senator LOTT. Do we have the formula of how some of these things will work? On the funding?

Mr. STURGELL. Well, the long terms are estimates. We do have very specific numbers, programs that are laid out in our 5-year Capital Investment Program and laid out in the budget as well. So I think at this point, we do know where we're going down this road to NextGen. And certainly, our estimates for the next 5 years are very concrete.

I will say, it's very tough for a corporation to be projecting out 20 years with precision as to what it's going to spend for this type of transformation program.

Senator LOTT. One thing I wondered about is that there is not now enough money in the system that has not been used properly or maybe not even being used to cover these additional costs. I've had difficulty clarifying that point, too. Everybody seemed to be agreed that we were going to need more money. But I'm still trying to find out exactly how much money is now in this system, how much is in AIP that is not now being expended or what are the projections of what we're going to have in AIP, for instance, in the future that's not going to be or not planned to be budgeted or expended? I have a tendency not to want to spend trust funds to make the deficit look better so they can spend money in other places. I don't like that at all. I think that's dishonest when you do that sort of thing.

Do we know how much money really is going to be in the system over the next 5 years and is it enough to cover the needs that we have, if we used it differently?

Mr. STURGELL. I think we have trust fund projections, revenue projections that go out for that length of time that do show revenues growing. I mean, what we are—we are not really asking for more money here. What we're asking for in our proposal is a more reliable, predictable funding stream that is cost-based——

Senator LOTT. And a fair one.

Mr. STURGELL. And a fair one and that also ensures that that money is available for aviation related purposes, which I know has been a concern of this committee for a long time.

Senator LOTT. Yes, I've found out over the years that a lot of committees, a lot of different programs dip into aviation money to do everything in the world. We ought to stop that. We ought to take that money and say this money can only be used on a mandatory basis for air traffic control modernization.

Ms. Fleming, do you want to comment on any of these issues, the projected estimated costs and is there enough money now in the system to cover at least the initial costs associated with this?

Ms. FLEMING. Well, we haven't developed an estimate. We have highlighted in our work the importance—and it's a continuing challenge for JPDO and FAA—the importance of developing a solid cost estimate for not only FAA's role but for all the other partner agencies. It's critical, particularly as you move from the planning to the initial implementation stage.

Senator LOTT. Mr. Leader, I think the goal of your organization is a worthy one. I'm a little troubled that it's taken 2 years and we still don't have the MOU but that's—maybe it's complicated. You have a lot of different people involved and it is, after all, the Federal Government. But an agreement like that should probably take until next Friday, if somebody would really get behind it and kick a few fannies and make it happen.

But I'm also, in spite of the importance of your coordination role, I presume that FAA is actually going to be in charge of modernization, not JPDO, right?

Mr. LEADER. That's correct, sir. The JPDO is a joint agency planning office. The actual execution of the system will be done by the departments and the agencies involved, of which FAA has the lion's share of the developmental responsibility.

Senator LOTT. Well, thank you all. Captain Lee, thank you for what you do. I have no doubt that you can do it at 95 seconds or less.

[Laughter.]

Senator LOTT. And I'm sure you fly your planes like you give your testimony and it instills confidence, so we thank you for your time.

Senator ROCKEFELLER. Thank you, Senator Lott, very much. It's interesting to me when I just sort of look at this. The JPDO's most recent report in 2007, they estimated they will need $4.6 billion over the next 5 years for modernization. JPDO continues to estimate that the Next Generation Air Traffic Control System will eventually cost $15 to 22 billion.

Now, the FAA's fiscal year 2008 budget proposes less money for capital improvements, in those terms. Ms. Fleming, would you agree with that?

Ms. FLEMING. We haven't looked at the number. We haven't gotten behind the number yet.

Senator ROCKEFELLER. Mr. Sturgell?

Mr. STURGELL. In terms of overall capital programs, I think it is slightly below the previous year. I would point out that there are $173 million in new NextGen programs that are a part of that budget request.

Senator ROCKEFELLER. My point, nevertheless, I think stands. I think Senator Lott, Senator Snowe, Senator Carper, and myself agree that it's very embarrassing although we have the safest system in the world, to have an analog air traffic control system. It's very embarrassing for our Nation. It's way, way behind and extremely expensive. And it's a change, which can't be at once because you've got to phase it in because people have to be flying in the meantime.

Now, Mr. Sturgell, the JPDO officials have indicated that they will take a phased, incremental approach to doing that. Your testimony outlines some of the technologies such as the ADS–B, sat-

ellite based tracking system that you're developing now. I know that you outlined in your testimony, in a very broad manner, the specific technologies the FAA is currently developing. I think what Senator Lott and I both feel is that there is too much broadness and generalization and not enough specifics in this whole thing. I mean, Administrator Blakey, who I think is superb is probably going to be leaving. Any time you come to an end of any administration, Republican or Democratic, there is always kind of a letdown, less concentration on budget and more concentration on things that may have to do specifically with your line of work, which is very complicated. There are not an enormous number of Senators here today because it's that kind of a subject. It's a discrete kind of "inside the beltway" discussion with very high consequences.

So I want to ask you, what is the FAA going to do over the next 3 to 5 years, to bring these systems online? How you phase it in? How do you do that? I'm not sure that you really do have the money. You've got a potential union system, which if it were to work out, would cost $200 or $300 million. I'm told that you wouldn't have the money to pay for that. That may be in a different category so I may be off-base but I'm just trying to make my point.

The Government has systematically under-funded aviation. Exactly the same thing we've done to veterans. And we're going to pay a price for it one of these days. Now, for example, is the FAA expanding demonstration projects or do you plan on requiring the installation of specific avionic equipment in planes? Also, what steps will the FAA have to take to make sure that various stakeholders, that being the controllers, the airlines and general aviation, et cetera, are in fact taking the necessary steps to use the new air traffic control systems as they head up toward the sky? Will general aviation be fully incorporated into the NextGen system, general aviation specifically or will they be permitted to opt out?

Mr. STURGELL. Just broadly, I think from a management perspective, we're going to be using our Operational Evolution Partnership to implement these programs as we transform to the Next Generation system. The OEP, we've been using for the past half dozen years or so, to help us track and implement capacity projects and it has been a very successful management tool for us that involves all the senior level executives at the FAA.

So over the next several years, we'll be using that to implement. We are also standing up program offices for SWIM. We have a very robust ADS–B program office that is moving forward. We do expect a contract decision this summer for the ADS–B program and we do expect a Notice of Proposed Rulemaking to go out in September, relating to aircraft equipage and ADS–B.

So I think what the Administrator is trying to do or has done is really to institutionalize the processes, programs and the management tools necessary to keep this transformation and the modernization going and ingrained in the agency itself. On the industry side, we are involving the industry at all levels and certainly we do have carriers like UPS that are equipping early and equipping in large numbers. We have some new——

Senator ROCKEFELLER. I'd like to ask one more question.

Mr. STURGELL. I'm sorry?

Senator ROCKEFELLER. I'd like to ask one more question before my time runs out.

Mr. STURGELL. Yes sir.

Senator ROCKEFELLER. Senator Lott and I both serve on the Intelligence Committee and one of the staggering facts in that whole endeavor are how billions and billions of dollars can be wasted, simply because people tried to do the wrong thing at the wrong time or they tried to do the right thing at the wrong time or vice versa. It's staggering. We all know that in government that whatever people say—we have enough money for this year, et cetera, et cetera, we can take this over the next two or 3 years and efficiencies, coordination, losing a lot of leadership, being able to replace that leadership, which is hard to do. All these things are much more the reality, it seems to me, of government programs than what it is that you, in particular, have been describing to us or like Ted Stevens, what if I blow a tire? I mean, that's a very—it's a very fair question and your answer was a very good answer.

Now just let me just ask you this. We had a coal mine disaster in West Virginia recently in which we couldn't communicate with miners by any technology that was available to the mining industry from above ground. Two miners were trapped 2,000 feet below. That is a tragedy and a disgrace. Now you are authorized to borrow, to take used technology from other folks. The DOD, for example, is a rich—all the rest of it—that has a lot of recent iterations, has a lot of technology. Are you so certain that your technology, as you go away from analog, in fact, is exactly as it should be? Are you using only your own resources? Is that all you need to use or are you using resources that are available elsewhere by statute?

Mr. STURGELL. I think we're using the technology that has been developed and largely proven to be successful, both in the Department of Defense and at NASA. We've transitioned several NASA-related programs into FAA systems and the technologies we're talking about here with the JPDO—you know, I think largely, these are not unproven or unknown technologies we're talking about for the Next Generation system.

Network-centric operations, trajectory based flight paths, a lot of this and the communications especially and information management, are being used by the Department of Defense today and certainly we will plan on incorporating their efforts and also security——

Senator ROCKEFELLER. And will the stakeholders, the commercial, general aviation planes, all the rest of it, will they—the avionics will go right into those planes? That's part of your plan or it is only up to a certain weight level on GA or what?

Mr. STURGELL. I think the specifics of that have not been fleshed out specifically but I would say generally, there will be equipage for the operators of the system, both GA and commercial, over the long run.

Senator ROCKEFELLER. That didn't answer my question. There will be—what?

Mr. STURGELL. There will probably be equipage requirements, definitely on the commercial side——

Senator ROCKEFELLER. Requirements. So they will have to use them.

Mr. STURGELL. Right.

Senator ROCKEFELLER. Up to a certain weight?

Mr. STURGELL. Well, I don't think the specifics have been——

Senator ROCKEFELLER. Not settled yet.

Mr. STURGELL.—have been settled yet on that.

Senator ROCKEFELLER. Not been settled. OK, my time is up and more than that, Senator Snowe.

STATMENT OF HON. OLYMPIA J. SNOWE, U.S. SENATOR FROM MAINE

Senator SNOWE. Thank you, Mr. Chairman. I guess one of the areas that I would like to focus on here this morning is the retirement of air traffic controllers, which obviously is going to have a tremendous impact on the system in the future, in the Next Generation system that we're attempting to employ. Mr. Sturgell, can you address how the FAA is going to go about recruiting, training air traffic controllers when I understand there was an estimate that was published recently in the *Philadelphia Enquirer* that said that a startling number of our controllers, 25 percent, will be eligible to retire by the end of this year at O'Hare. It's up to 50 percent. That's staggering, given where we are today in trying to advance this Next Generation and also the hemorrhaging of air traffic controllers in the system over this next decade, let alone what's going to occur this year.

Mr. STURGELL. Senator Snowe, we just recently released our third annual update of our controller workforce hiring plan, which lays out for everybody to see, what we plan to do over the next 10 years in terms of hiring new controllers into our workforce and certainly we are concerned about the retirements. I think the agency did a lot of hiring back in the early and mid-1980s and the fact of the matter is, controllers can retire as early as 50 years old with 20 years of service and mandatory retirement at age 56. So this is a wave that we have planned for, that we have laid out in our hiring plan and this year we're planning on hiring nearly 1,400 and we have most of those slots already filled for this fiscal year.

Senator SNOWE. So what does that mean in terms of addressing the gap this year? I mean, I think that—have you submitted that plan to the Committee? That's something that we obviously, Mr. Chairman, should have because that's going to have a tremendous impact on——

Mr. STURGELL. We will make sure it is delivered to the Committee and specifically to your office. It is publicly available.

Senator SNOWE. But you know, controllers continue to retire at a rate far above the forecasts that were advanced by the FAA.

Mr. STURGELL. We did see this last——

Senator SNOWE. Well, can I just ask it. So what does 1,400 mean for this year? So how many are remaining?

Mr. STURGELL. Fourteen hundred means for this year, based on our projections of our losses, that we'll have a net gain of about 189 controllers. Our goal at the end of the year is 14,807. If we see additional retirements, we will increase our hiring to meet that end

of the year goal of 14,807. Right now, we are planning for 700 retirements, total loss——

Senator SNOWE. Over what period of time?

Mr. STURGELL. For this year.

Senator SNOWE. For this year alone?

Mr. STURGELL. For Fiscal Year 2007. We're tracking pretty good right now with those retirements. We're planning on total losses of about 1,200 or so because we don't just have retirements, we have promotions, we have transfers, we have resignations, other things that add to the loss numbers besides retirements.

Senator SNOWE. Do you have a plan between the implementation of the Next Generation system and the retirements? I mean, over the course of this timetable for the new system?

Mr. STURGELL. The controller workforce is certainly going to be a part of the Next Generation system and the 10-year plan that we have laid out, incorporates our vision of where the transformation of this system is going.

Senator SNOWE. And also a plan for training these controllers on the Next Generation system?

Mr. STURGELL. Yes.

Senator SNOWE. Is there a plan in place for that as well?

Mr. STURGELL. Yes and we're getting some great new hires from some great universities and a lot of new hires from the military as well. It's a new generation, a very computer-savvy group.

Senator SNOWE. What happens then—hopefully this is not the case because the Next Generation should be on time. You should meet the timetable, at the very least, at 2025. A former FAA operator indicated the tipping point for air traffic is not 2025 but 2016.

Mr. STURGELL. Yes, 2016 is where we see about a 25 percent increase in where we are today and certainly if we don't do anything, that will become kind of the wall, if you will. Today, in pockets, things are very tough. We've done a study with Mitre. We know of several—a portfolio of changes we need to make to the current systems to be able to get to that 2016 requirement. This cannot be seen as just develop the system, and put it in place in 2025. We have to make some changes as we go along, year to year, to keep up with the growth that we're seeing and the traffic demand that is forecast.

Senator SNOWE. So I guess the question is, then, the Administration's budget—is that sufficient for infusion of resources that are necessary to meet that timetable and in particular, that wall in 2016?

Mr. STURGELL. It does and as we're going through the 2009 planning process right now for the budget, we'll be incorporating some of these requirements that we will need in the 2015 to 2026 timeframe.

Senator SNOWE. OK. And finally, have you prepared for any contingency in the event that you can't find a sufficient number of air traffic controllers?

Mr. STURGELL. Well, I think our hiring plan, our recruitment efforts are going well and I think the plan we laid out is certainly going to meet the retirements and allow us to staff the system safety and efficiently.

Senator SNOWE. Well, I would ask that you submit that to the Committee so that we have a chance to evaluate it.

Mr. STURGELL. You bet.

Senator SNOWE. Thank you. Thank you, Mr. Chairman.

Senator ROCKEFELLER. Thank you, Senator Snowe. Senator Carper?

STATMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM DELAWARE

Senator CARPER. Thanks, Mr. Chairman. Welcome. It's good for you to be here and thanks for your testimony and for responding to our questions.

For some reason, we didn't get the testimony of at least a couple of you and I've tried to skim the testimony of the rest.

What I'm going to ask you to do is just start off by taking maybe a minute a piece and just tell me what you would like for us, most importantly, what would you like for us to take away from your testimony today and Mr. Sturgell, why don't we start with you? Just take 1 minute, please.

Mr. STURGELL. Sure. I think the most important thing to take away today is that, from a broad perspective, our aviation system is hitting the wall and it does need a transformation, not just incremental changes but really bringing the automation, the technologies that we know into the system and transforming the way we do business today. And the only way we're going to do that is to have a stable, reliable funding source to ensure that the funds are going to be there to make these changes.

Senator CARPER. And in your testimony, do you talk about what form that funding source might take or forms?

Mr. STURGELL. We do have a financing reform proposal that we have released that outlines the revisions we are proposing for the current system. It is largely a financing system that moves to one that is more cost-based and that includes user fees as well as taxes.

Senator CARPER. OK, thank you. Mr. Leader?

Mr. LEADER. I would like to stress, Senator, the joint aspect of the Next Generation system. Although FAA bears the lion's share of the investment, this program will not be able to be successful without the active support and contribution of the other departments and agencies that are involved, particularly the Departments of Defense and Homeland Security, who are critical to providing an integrated air view and integrated National Airspace System.

Senator CARPER. How is this process going with all these different entities, trying to coordinate their efforts and get their input?

Mr. LEADER. I think we've made some important progress, Senator. We have a milestone in that we currently have a network enhanced operation demonstration, which is——

Senator CARPER. You have a what?

Mr. LEADER. It's a demonstration of joint capabilities between the FAA, the Department of Defense and Department of Homeland Security in merging and integrating the air pictures that those three entities have, which is not completely, smoothly done today. All three of the agencies involved have contributed the research

funding to conduct that demonstration and I think that's an important milestone in the JPDO's progress in moving things forward jointly.

Senator CARPER. How long has JPDO been around?

Mr. LEADER. I'm sorry, sir. I didn't hear the question.

Senator CARPER. How long has JPDO been around?

Mr. LEADER. Approximately 3 years, sir.

Senator CARPER. And how long have you been the Director?

Mr. LEADER. Simultaneously. And I've been here about 7 months, sir.

Senator CARPER. All right. Ms. Fleming, I understand you are from GAO?

Ms. FLEMING. Yes, I am.

Senator CARPER. I had a copy of your testimony and I had a chance to look it over. What would be the take-away for us that you'd have? To walk away from this hearing, just a couple things you'd really want us to take with us.

Ms. FLEMING. Just to emphasize that certainly both agencies have taken a lot of steps or actions to better position NextGen for success. But there are a number of things that we feel still need to be done. It's very important that FAA institutionalize the reforms that they've made in the past, make sure that they are carried over and integrated throughout the agencies and to make sure that it can be sustained over a long period of time. Another thing that we think FAA should do is to make sure that it has assessed whether or not it has the technical and contract management expertise to implement NextGen.

For JPDO, it's important that they ensure that the relevant stakeholders are involved early and throughout the process. NATCA has said that they——

Senator CARPER. What was that?

Ms. FLEMING. NATCA—the National Air Traffic Control Association.

Senator CARPER. Thank you.

Ms. FLEMING. It's very important that—they said that they are going to be starting to sit in on the Institute Management Council but it is very important that they are involved in the working groups as well.

We also think that JPDO—it's very important that they institutionalize their inter-agency collaboration.

Senator CARPER. All right. Thank you. Captain? I used to be a Captain in the Navy.

Captain LEE. Well, we have something in common then.

Senator CARPER. Yes, we do.

Captain LEE. It's nice to be in charge, isn't it?

Senator CARPER. Well—I rather remember it but I think it was.

[Laughter.]

Senator CARPER. When Governor Rockefeller and I were Governors, we were really in charge, weren't we?

[Laughter.]

Senator CARPER. Go ahead, Captain Lee. Take-aways, please.

Captain LEE. I'd like to leave you with the thought that this is very definitely an evolution not a revolution and as such, if we don't take small, incremental steps that are pragmatic toward the

end-state, we won't get there. We cannot do this in one big national program. We are going to have to do it from the bottom up. In order to do that though, we have to grapple with the idea of moving part of the infrastructure from the ground to the aircraft. And when we do that, it incurs considerable costs for the operators. GA, all the way up to the transport aircraft in the military; anybody who wants to use the airspace.

We are going to have to have some creative dialogue on how to fund that part of it. It is very difficult to reach consensus for the operators and the government in what steps we need to take to move forward; especially if one party to the consensus process feels that they are taking on the majority of the financial risk. So if we could leave you with the idea that we need to have that dialogue and figure out how to creatively do that, that would be my message.

Senator CARPER. This Automatic Dependent Surveillance-Broadcast—is that part of your efforts at UPS to migrate, if you will, from the ground to the aircraft?

Captain LEE. Yes, sir, it is. We're putting the surveillance onboard the aircraft, moving it from the ground.

Senator CARPER. OK, good. One last question, if I could, Mr. Chairman. Thanks. In my old job as Governor, when we were interested in trying to figure out how to grapple with and bring down the incidence of teenage pregnancy, we just brought in a lot of kids, seniors in high schools from all the high schools in our state, sort of like Noah's ark, male/female from each school and we said, you know this is not a good thing. What can you do to help us bring it down?

We are trying to put together welfare reform in our state. We find a lot folks who are on welfare and said, it's not a good idea to be on welfare for the rest of your life and how can we help you get off and make sure other people don't get on? When we were trying to figure out how to deal with—we had all this run-off from chickens—we raise a lot of chickens in my state and we had all this chicken litter left over, nutrients high in nitrates and phosphorous and we couldn't figure out what to do with it and we just invited the farmers to come in and say, well, you're creating this problem; help us figure out how to deal with it and they did. That's sort of the way that we deal with issues in my state.

I'd ask, sort of related to this, how is the experience and knowledge of the air traffic controllers and the knowledge and experience of say, pilots, how has that been utilized in the discussion that we're having here and the work that you're doing and how are they being involved in the discussion about how to implement NextGen?

Mr. LEADER. Well, Senator, we have involved air traffic control subject matter experts in the development and reviewing the Concept of Operations for the future state of the system. We have in place a process established with FAA where we can request air traffic control subject matter experts to come in and work with us on the specific issues that have relevance to their profession. And as was mentioned earlier, the President of the Air Traffic Controllers Union is a member of the Next Generation Institute Management Council.

Ms. FLEMING. May I add to that, please?

Senator CARPER. Yes, please. Please.

Ms. FLEMING. As I mentioned earlier, there have been some steps where air traffic controllers are going to be involved in kind of the over-arching planning body, however we believe that they should really be involved at the working group level. It's very important to utilize their expertise and our past work has shown that when this doesn't happen, projects could experience cost increases and schedule delays.

Senator CARPER. I appreciate you saying that. That seems to be just common sense to me. The folks that are going to be using these systems the most are the folks that are flying the planes and the people on the ground in charge of directing the air traffic. So I would urge you to take what Ms. Fleming has said to heart. Thank you very much. Thanks, Mr. Chairman.

Senator ROCKEFELLER. Thank you, Senator Carper. I'm stunned not by the question but I'm stunned by the two different approaches to the answer and I can't imagine—I'll go back to it since I'll be the only person here, I can talk as long as I want.

[Laughter.]

Senator ROCKEFELLER. When I—40 years ago in West Virginia, every time you picked up a newspaper, there was something called a temporary restraining order that had been brought against management of mines by unions because there was no communication. There was no communication. And that went on for years and then all of a sudden one day, so to speak, it stopped. And I was very interested in the whole field and I couldn't figure that out. So I asked around a little bit and there was a very simple answer. Some enlightened management folks had convinced others that from that point forward, they would take disputes that could turn into temporary restraining orders, which of course, closes down mines and all the rest of it. They would solve the problems at the face of the mine, where the coal was dug. Management would go there. Labor would go there. And it has worked and it continues to.

There have been a few exceptions but those have not have been based upon the failure of that system. It's incredible to me that those folks aren't involved, as you indicate, Ms. Fleming, in the overall planning. I don't care whether there is something going on which doesn't involve them directly or interest them directly and then they don't participate in the conversation but there is a symbolism in there, which is as deep and rich and important as the symbolism that I've just described in the coal mines. We went from strikes virtually all the time to a period where there were no strikes, which has lasted now several decades, with as I say, a few exceptions. So I'm very glad that Senator Carper asked that question.

I want to go—in your report, you made a very interesting observation. You said that there is considerable coordination among JPDO participating agencies but then you said this—but little alignment of budgets and plans. That is a huge statement and I'm going to ask you to explain it in a minute. You said also there's a general concern that the head of JPDO, who sits before us, does not have any "real" budget or management authority, which may result in the Office's inability to overcome bureaucratic resistance to implementing the Next Generation Air Traffic Control System.

Now I—just my last round of questions was asking about budgets and there was an effort made in 2000 to put some money, more money—FAA has always been like so many others, under-funded, very drastically so recently. But there was an effort in 2000 because people were beginning to realize you're going to have to get off analog and into something else and you're going to have run two systems at once. But the money allocated was insufficient to fund that effort and has increasingly become insufficient to fund that effort.

So my question is that there—one that I want you to answer, what I started out with—a lot of concerns have been raised that the JPDO Director does not have that sufficient authority to implement the agency's plans for the Next Generation Air Traffic System. Should Congress give the JPDO Director authority over funding in order to make sure that one office controls the implementation of the modernization efforts? The FAA did not offer any substantive organizational changes to the Office in its proposal for FAA reauthorization, that is, such as we have it. Are the panelists convinced that the current structure of JPDO is working? And—well, I'll just leave it at that. Those are two major questions I have and I'd like to have them answered. Why don't you start, Ms. Fleming?

Ms. FLEMING. As you know, JPDO was established as a coordinating body and as such, has no authority over its partner agencies' resources but we do believe that there are a number of things that could strengthen inter-agency collaboration.

As I mentioned earlier, the MOU has been in the works for a couple years now. We believe that should be finalized. It would really define and clarify the roles and responsibilities of the various entities involved in planning NextGen. JPDO has been working with OMB to develop a cross-cutting budget for NextGen. We believe that should be continued and again, could be a nice structure to make sure that everybody is on the same page in terms of what needs to be done and how much it will cost.

So even though it doesn't have the authority, we do believe that there are things that would strengthen the inter-agency collaboration and the framework that is in place.

Senator ROCKEFELLER. You seem to be backing off a little bit from what I thought I read.

Ms. FLEMING. Well, in terms of do they need to have their own budget? We don't—there is nothing for us to believe at this point, to believe that the framework that's in place wouldn't work. As everyone mentioned, there has been a lot of progress. I think the fact that FAA has now aligned it's OEP with JPDO's framework and processes is obviously a step in the right direction. It's still early. We just don't see any real red flags right now at this point.

Senator ROCKEFELLER. But you do because you've said you see little alignment of budgets and plans.

Ms. FLEMING. I would like to provide a written response for the record because I——

Senator ROCKEFELLER. That's fine. That's fine. Mr. Sturgell?

Mr. STURGELL. Mr. Chairman, I think those kinds of issues are progressing. We're making good progress in coordinating with other agencies involved. DOD just recently stood up a program office for

JPDO-related activities and we're also working with OMB, again because there are multiple agencies involved, to make sure the budgets are coordinated and the government's money is being spent appropriately. With respect——

Senator ROCKEFELLER. Let's stop right there.

Mr. STURGELL. Sure.

Senator ROCKEFELLER. Since there is no time running here—that you're aligned with OMB's plans—I mean, this is always sort of my favorite part of any engagement of this sort. You are under the control—you cannot say more than what OMB will allow you to say. So when I'm talking with you, Mr. Sturgell, or any of the rest of you, I think probably not, including you or you, Captain Lee. You are not really expressing your own thoughts or you may not be. You're expressing what you are allowed to express by the Office of Management and Budget, which my guess is—my guess is and probable knowledge is that they have, in fact, vetted your very testimony. If I'm wrong on that, please take me down very quickly. If I'm right on that, I'd like to know.

Mr. STURGELL. My point in——

Senator ROCKEFELLER. No, answer my question.

Mr. STURGELL. The Administration does review testimony.

Senator ROCKEFELLER. See and that is so important for people to understand and I wish there was more than one person sitting over at that press table.

Every single time we have the hearing on a basic subject, which involves the national future, you can only say—we come as if you are speaking your minds. We listen to you as if you speaking your minds. We question you as if you're speaking your minds. But the reality always is that you are speaking only what you are allowed to say. I don't say that to denigrate you and it happens under Democrats and under Republicans so it has nothing to do with politics.

I understand the need to keep a budget. I don't know that this Administration has sort of—you know, flattened out the budget and balanced it and all but neither did the last one. They went in different ways in the wrong direction.

It's just terribly important for the public to understand that and there almost ought to be a disclosure at the beginning, you know, that you have your own thoughts but this is what you're going to say. Obviously, that's not practicable but it's a very, very disconcerting and to me, profoundly upsetting part of this hearing process, which is shallow enough in and of itself. Six of us come, ask you some questions, get answers. Are you going to be ready if you don't get enough air traffic control people? Do you have a backup plan? All these kinds of things. But all of that has to be based upon what you really think.

Now, you work for the Administration and I understand that. That's stronger than the law of physics. But it is—it somewhat demeans this process and it greatly demeans the process of trying to get to the right answers. Because what I should have been hearing, it seems to me, from particularly you, Mr. Sturgell, you, Mr. Leader, was that you are vastly under-funded. You used the phrase, we're up against a wall. And when I heard that, I kind of opened up to that because I said, "Ah!" But you didn't take it further than

that because it's kind of a generic statement. You're up against a wall because you don't have the money. You say that you have sufficient money for this year and next year to do this and do that. I don't think you do and we don't have any budget for next year's plan.

I sat with the Administrator yesterday. I told her that I didn't think that her plan was—the FAA plan was going anywhere in particular in either branch of Congress, not just because of the user fees but because generally there wasn't—people hadn't been given information. They didn't have a plan. They didn't have anything in front of them. How are we meant to be having hearings on something when we simply don't know where you actually stand except as we ask you and then you can't tell us exactly what you, in fact, really feel and you're experts. You spent your life in this or part of this. You've been in 7 months. It's OK. You understand my point, my frustration. Just nod and I'll feel happy.

[Laughter.]

Mr. LEADER. Yes sir, I understand your point.

Senator ROCKEFELLER. OK. Now I'm going to go on to one other question and then we'll stop. And this is the whole sort of gaps in research and development, as you're trying to take down one system and put up another system and keep 36 or 50 or 90,000 planes in the air, wherever they're located over the next number of years.

It's my understanding that NASA plans to focus its research and I brought that up earlier—on the needs of the Next Generation Air Traffic Control System. But its budget for basic research continues to decline, surprise. That's also in this committee. In addition, NASA is moving toward a focus on fundamental research and far away from developmental work, which is what you want and demonstration projects, which is what you want. According to the GAO, the FAA is currently assessing its capacity to take over NASA's traditional role in developing technologies. Now I understand sort of what that means but I'd like to know a little bit more from you about that.

First, NASA is spending far less of its budget on aeronautic research. It's abandoning one of its core missions. Should we move NASA's aeronautics organization and mission to the FAA? You can't answer that because you're not authorized to, but I'd sure love to know what you feel, or make it a new agency within DOT. And let it fund its part of our air traffic control modernization, which is a disgrace to aviation in this Nation and we all know it, to be analog. It's embarrassing. So we're looking for help. And is there a place we can get it.

Senator Thune, I want to apologize to you. I did not know you'd come in.

Senator THUNE. That's OK.

Senator ROCKEFELLER. And I've been going on like I'm the only person sitting here so let me just get my answers and let me turn to you. Could you speak first?

Senator THUNE. That's fine.

Ms. FLEMING. Sure. Mr. Chairman, you have highlighted the problem. FAA is—it is our understanding FAA is currently assessing whether or not they have the capacity to do this research and development. FAA officials have told us that they feel that they

can. However in reviewing some of the documents, it appears that—the documents highlight that it would be most likely a combination of having to go out to industry and academia and get funding with some other partner agencies and in fact, a recent Council document, a REDAC document also highlights that. It would take a while for FAA to develop the infrastructure it would need, which would delay NextGen by as much as 5 years.

Senator ROCKEFELLER. So, it will delay process, then obviously the cost of doing both would also increase greatly. Mr. Sturgell?

Mr. STURGELL. Well, I'd just like to point out, Mr. Chairman, that our budget over the next 5 years increases R&D from $140 million to the $200 million level. To account for some of the gaps that we do see in the transformation to the NextGen system, specifically the human factors area, which has been focused on today.

Senator ROCKEFELLER. And you're telling me that that amount of money will be enough to overcome delay, indecision, lack of authority——

Mr. STURGELL. We also have a fair amount of money that is part of our capital budget that is devoted to research and development-related programs as well, including demonstration projects. So we're working hard to make sure that there are no gaps in the funding as we move this forward.

Senator ROCKEFELLER. OK. I thank you. Senator Thune?

Senator THUNE. Thank you, Mr. Chairman——

Senator ROCKEFELLER. And I apologize.

STATMENT OF HON. JOHN THUNE,
U.S. SENATOR FROM SOUTH DAKOTA

Senator THUNE. Oh, that's quite all right. I'm just glad you didn't adjourn before I got here. Actually, you may wish you had adjourned after I—but I do appreciate your leadership on moving the ball forward on the reauthorization process. Information gathering is obviously a critical part of this in getting a good product and a good outcome and these hearings are very helpful in that regard, so thank you for doing that and I would also mention that I've done some information gathering on my own, which I would encourage other Senators to do as we go through this process.

I met last week with the Airport Board and the Manager at the Aberdeen Airport back in my home State of South Dakota and it is always refreshing to get a local perspective on these issues and we talk about these things sometimes in the abstract but when you get out there and hear directly from people about the practical impact that many of these decisions we make and will be making have on them, it's very insightful. So that was very useful and I encourage all Senators to do that.

I have a question having to do with I think may be the greatest concern on many air traveler's minds today, is the weather and the delays that it can cause and we have many examples of that this year, some outrageous delays that have been caused by the weather that have made headlines in newspapers across the country and in fact, in late December, passengers on an American Airlines plane sat on the ground in Austin, Texas for 8 hours. More trouble came on Valentine's Day for JetBlue and some of the other airlines and I realize that I was going to ask the question, what the FAA

and the Joint Planning and Development Office were going to do about changing the weather? I realize you can't control the weather; but I would like to have you explain to us a little more on how the NextGen system will improve our air system's response to bad weather.

My understanding of the testimony that—from your testimony that 70 percent of the annual National Airspace System delays are attributable to weather and that the goal of some of these investments in NextGen is to cut weather related delays at least in half. So I guess my question for the panel would be, how do you—can you explain how we're going to see reductions in weather related delays?

Mr. LEADER. Senator, that is a critical dimension of the Next Generation system and one of the areas where I think the Joint Planning and Development Office is achieving the mission that it was assigned in the legislation that created it.

Specifically, there are, in the government now, next-generation weather systems being developed by the FAA, by the Department of Commerce and the National Weather Service and by the Department of Defense and both the Departments of the Air Force and the Navy. We have facilitated a meeting among those agencies and have achieved agreement that we'll move forward with a joint office that will be developing a single advance probabilistic-based weather forecasting system that will meet the needs of the whole government.

So it's a foundational part of us moving forward into the Next Generation system and having a degree of articulation in both improving the quality of the weather forecasts, but also, in providing a single system, a single view of the weather across the system that will allow the flow management approaches to be much better refined than they are today, to maximize the use of the airspace that is not constrained by the weather.

Senator Thune [presiding]. Anybody else care to comment on that? No. Mr. Sturgell?

Mr. STURGELL. I think Mr. Leader sums it up well. I mean, it's certainly one of the most difficult problems we face, is the weather and specifically convective activity. So you want a system in the end that is more flexible, that can adapt and redirect aircraft in a more timely manner than we can today.

Senator THUNE. In your testimony, you also described Automatic Dependent Surveillance Broadcast or ADS–B as perhaps one of the most significant advances in NextGen technology. I guess my question is, will this and other new avionics technology be affordable to general aviation? In other words, will the new technology price some general aviation pilots out of the cockpit?

Mr. STURGELL. I think a lot of the avionics technologies initially are expensive but as they become more mass produced in volume, that a lot of that price gets driven down over time, just by the nature of the market. We are looking at some—whether there are innovative ways where we can make the equipage problem easier. And again at this point, I think we're still discussing how long the implementation period will be, whether folks may or may not be excluded. So we're looking for ways to mitigate the equipage costs overall to people.

Senator THUNE. I hope that part of the proposal goes over better than the fuel tax increase with general aviation. You had an earful about that last week, too.

I also serve on the Armed Services Committee. We have a large Air Force base in South Dakota, in the western part of my state, Ellsworth Air Force Base and I know there is a lot of coordination between civilian and military with regard to the airspace in that part of the state and I'm sure, all over the country, wherever you have military installations. Can you describe what kind of involvement DOD and the Air Force have had in the Joint Planning and Development Office?

Mr. LEADER. We work very closely with our counterparts, not only on the weather issues that I mentioned earlier but on how to approach the issue of restricted airspace so that we achieve a balance that allows the Departments of Defense and Homeland Security to achieve their operational missions within the national airspace, while at the same time, maximizing access by the commercial and general aviation users of that same airspace so that both sides of that equation can achieve what they need to do within the airspace.

Senator THUNE. Well, I think I'm the last person to ask questions. I thank you for your responses and appreciate very much your participation in the hearing today and nobody else is going to show up evidently, I guess it's time to close the hearing. I don't have the gavel here in front of me but this hearing is adjourned. Thanks.

[Whereupon, at 11:10 a.m., the hearing was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF HON. DANIEL K. INOUYE, U.S. SENATOR FROM HAWAII

Modernization of our air traffic control system is one of the most important challenges Congress will face as we work to reauthorize the Federal Aviation Administration (FAA). While most attention has focused on reforming the FAA's funding mechanism, the primary goal of this reauthorization is to ensure the air traffic control system is updated and able to handle the expected growth in air travelers and air traffic.

In 2003, I cosponsored the legislation that created the Joint Planning and Development Office to spearhead the FAA modernization effort, and I have followed its work with interest. While the Planning Office and the FAA seem to be making progress, I am concerned that they have failed to meet the initial deadlines to create a blueprint for the Next Generation Air Transportation System known as "NextGen." This is a critical period for the FAA modernization and we must not let that effort fall further behind schedule.

While the FAA recently released the Concept of Operations for the new system, it has not issued the Enterprise Architecture, which is a significant milestone that the agency must achieve before moving forward with it's modernization plans. I hope this document will provide a pathway for moving the FAA from the planning phase to implementation of specific programs that improve system performance.

If properly implemented, the Enterprise Architecture will establish clear timelines and objectives that will allow the modernization process to be easily tracked and by which Congress can hold the FAA accountable.

Congress must ensure the modernization effort creates a safer and more efficient air traffic control system and that the changes benefit both the industry and the citizens who depend upon that system. We also must ensure that those affected by these changes are included in the process.

I look forward to working with the witnesses to make certain that the FAA and Joint Planning and Development Office receive the necessary support from the Administration and Congress to effectively modernize our air traffic control system and ensure the position of the Nation as world leader in air transportation in the 21st century.

PREPARED STATEMENT OF DAVID M. COTE,
CHAIRMAN AND CHIEF EXECUTIVE OFFICER, HONEYWELL

This year's reauthorization of the Federal Aviation Administration (FAA) programs provides a unique opportunity to reexamine our Nation's efforts on modernizing our air transportation system. Operating 24/7, 365 days a year, the FAA handles millions of flights annually at safety levels unsurpassed by any other transportation mode. Aging infrastructure, old technology, and ever-increasing demand in both passenger and cargo air transportation threatens the future growth and reliability of the system.

Air Traffic Modernization Is Key to the Future Growth of the U.S. Economy

Aviation accounts for over 9 million U.S. jobs and in excess of 5 percent of the U.S. GDP. A safe and efficient air transportation system is essential to support economic growth. Passenger and cargo demand are at all time highs and forecasts show continued growth. Operations at several key airports are already capped and traffic in high-demand airspace is routinely reaching its capacity. Actions that have been taken in the past, such as restructuring airspace to gain capacity, are reaching their practical limits in the most crowded airspace. If capacity is unable to stay ahead of demand, the result will be constrained economic growth.

A modern air traffic system will not only address the airspace capacity issues this country faces, but will offer opportunities to lessen the environmental impact of air

travel while also stimulating U.S. economic growth and retaining the U.S.'s historic role as the global leader in the aviation industry.

Greenhouse gases and their effect on the environment can be mitigated through a more efficient air traffic system that will also reduce energy consumption. While aviation's contribution to greenhouse gas emissions is relatively small in comparison to other sources (<3 percent), it is estimated that over 10 percent of those emissions could be eliminated through a modernized air traffic system. That's a reduction of over 20 million tons of CO_2 annually and a savings of over 2 billion gallons of fuel.

Without strong leadership from the U.S., the global standards for the Next Generation Air Traffic Systems and operations will be established elsewhere. Europe is experiencing congestion similar to the U.S. and is aggressively developing their next generation system that they call "SESAR" and a roadmap for its development and implementation. China, India and other rapidly growing regions are finding the need to dramatically expand their aviation infrastructure.

FAA Reauthorization Is Critical To Drive Modernization

This multi-year reauthorization is critical to the timely establishment of the architecture that will drive the deployment of the new system. In addition to authorizing the necessary funding, two issues are essential to its success. First, one person or entity needs to be given the authority, responsibility and accountability for deploying the modernized air traffic system. At the end of the day, everyone needs to know who will be driving the success of this project.

Second, given the many stakeholders—including civilian, military, and private-sector entities—there must be a strong public-private partnership established. The future system will require greater integration of air and ground systems and will rely heavily on information and displays in the cockpits. While the required technologies largely exist today, the ability to cost-effectively integrate these capabilities into new and existing aircraft is essential to gaining the support of all stakeholders. A strong role for the manufacturing industry in the fundamental design decisions will lead to an affordable, lower risk approach to modernization.

Summary

The modernization of the air transportation system is critical for continued economic growth, reduced environmental impact, and global competitiveness. The time for action is now. Honeywell is committed to the successful implementation of the next generation system and stands ready to support modernization efforts.

(Attached is further information addressing capacity, economic and environmental issues associated with air traffic modernization.)

Air Traffic Management Modernization

U.S. Senate - Commerce, Science and Transportation Committee
Aviation Subcommittee - Hearing on FAA Modernization
Statement for the Record
Dave Cote - Honeywell, Chief Executive Officer
March 22, 2007

Honeywell

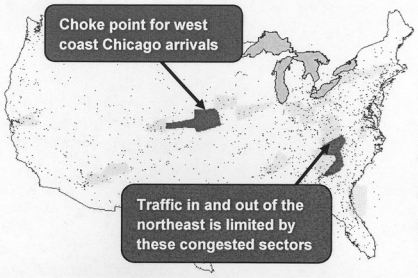
Summary

- Capacity Limits
  - The current ATC system is not scaleable to accommodate future demand
- Economic Impact
  - A healthy aviation system is essential to economic growth
- Energy & Environmental Benefits
  - New procedures significantly reduce noise and emissions
- Key Industry Technologies
  - Many technologies are available to support modernization
- International Initiatives
  - Global growth driving regional actions

Strong Action is Needed to Ensure Unimpeded Growth

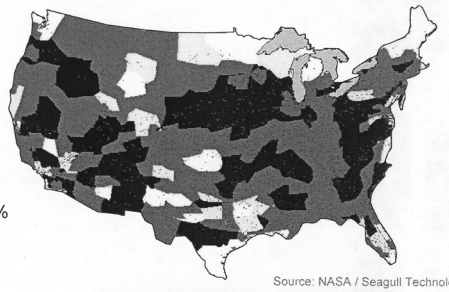
Capacity Limits

2004



Percent of Capacity
- 85-125%
- 125-200%
- >200%

~2024



Source: NASA / Seagull Technologies

- On a typical day in 2004, 1/3 of the traffic in the U.S. wants to pass through a congested (yellow or red) sector
- Current capacity limits result in non-optimal re-routing

Simulated sector congestion at twice today's traffic level

ATC sectors along the key enroute traffic corridors are operating at or near capacity today

With no changes, demand will be well beyond today's sector capacity nationwide

The Current ATC System is not Scaleable to Accommodate Future Demand

Economic Impact

$640B in Aviation Revenue

5.4% of U.S. GDP

More than 9 million aviation jobs

$52B Aerospace Trade Surplus

International Cargo Shipped by Air

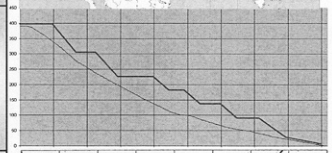
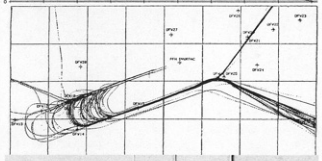
By Weight - 5%
By Value - 36%

$3.25 Trillion

$22B in lost economic activity from congestion by 2022

A Healthy Aviation System is Essential to Economic Growth

Energy & Environmental Benefits

Operation		Annual Fuel Savings	Annual Emissions Reduction
Direct Enroute Routing		3% reduction in flight time = $1B for U.S. airlines 19B gallons annual fuel burn $1.75/gal	3% reduction in flight time = 6.0M tons CO_2
Profile Descents		$650M at top 10 U.S. Airports >9000 arrivals/day 85-170 gallons per arrival	3.75M tons CO_2 at top 10 U.S. Airports
Area Navigation Arrivals & Departures		$350M at top 10 U.S. Airports >9000 departures/day 60 gallons per departure	2.0M tons CO_2 at top 10 U.S. Airports
Taxi and Takeoff Queue		$275M at top 10 U.S. Airports >18000 movements/day 4 minutes savings/operation 4-10 gallons per minute	>1.5M tons CO_2 at top 10 U.S. Airports

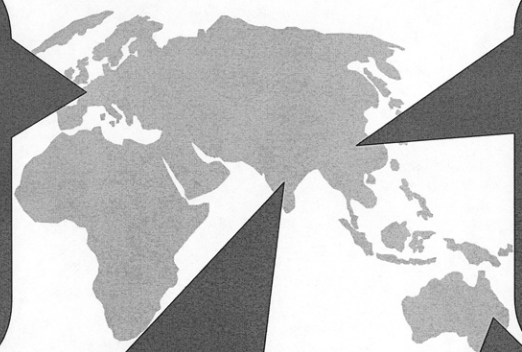
New Procedures Significantly Reduce Noise & Emissions

Key Industry Technologies

	Technology	Benefit
Existing	ATC Datalink	Decreases controller workload; Spectrum efficiency; Clearer communications
	GPS Area Navigation Systems	Accurate navigation enabling direct and optimized lateral routes
	Required Navigation Performance	Supports less protected airspace, increasing capacity and schedule reliability
	GPS Wide Area Augmentation System	Increases accuracy & integrity of GPS enabling improved approaches
	Traffic alert & Collision Avoidance System	Provides pilot awareness of other aircraft and guidance to avoid collisions
	Runway Awareness & Advisory System	Improves pilot situational awareness on or near airport surface
	Enhanced Ground Proximity Warning System	Provides pilot situational awareness of relevant terrain and obstacles
	Weather Radar with Predictive Windshear	Assists pilot in safely minimizing deviations around hazardous weather
	Automatic Dependent Surveillance	More robust data on aircraft position supporting reduced spacing
	Uplinked Graphical Weather	Helps pilot optimize routing to accommodate changing weather conditions
	User Request Evaluation Tool	Helps controllers coordinate direct routes across ATC sectors
Emerging	En-Route Automation Modernization ('09-'13)	Provides platform capable of hosting advanced controller tools
	Cockpit Display of Traffic Information ('07-'12)	Pilot awareness of other traffic minimizing spacing and maximizing capacity
	GPS Local Area Augmentation System ('08-'12)	Increased accuracy and integrity supporting all weather landing operations
	Assisted Recovery ('10-'15)	Can prevent aircraft collisions with buildings or other obstacles
	System Wide Information Management ('10-'15)	Network architecture for rapid stakeholder access to system information
	Airborne Separation Assurance System ('10-'15)	Air-to-air intent negotiations & resolutions supporting free flight operations

Many Technologies are Available to Support Modernization

International Initiatives



Europe

- Legislation to create a "Single European Sky"
- €60M project to develop a master plan for modernization
- *"Europe can win two great prizes: global leadership and a world class air transport system"*

"European Aeronautics – A Vision for 2020"

China

- 7.9% Annual Passenger Growth
- Plans for 28 New Regional Airports over next 5 years
- ATM Cooperation Agreement with EU
- Investing Partner in EU's Galileo
- *"Goal [to make China] a world leader in aviation by 2020"*

Yang Yuanyuan, Minister of the Civil Aviation Authority of China

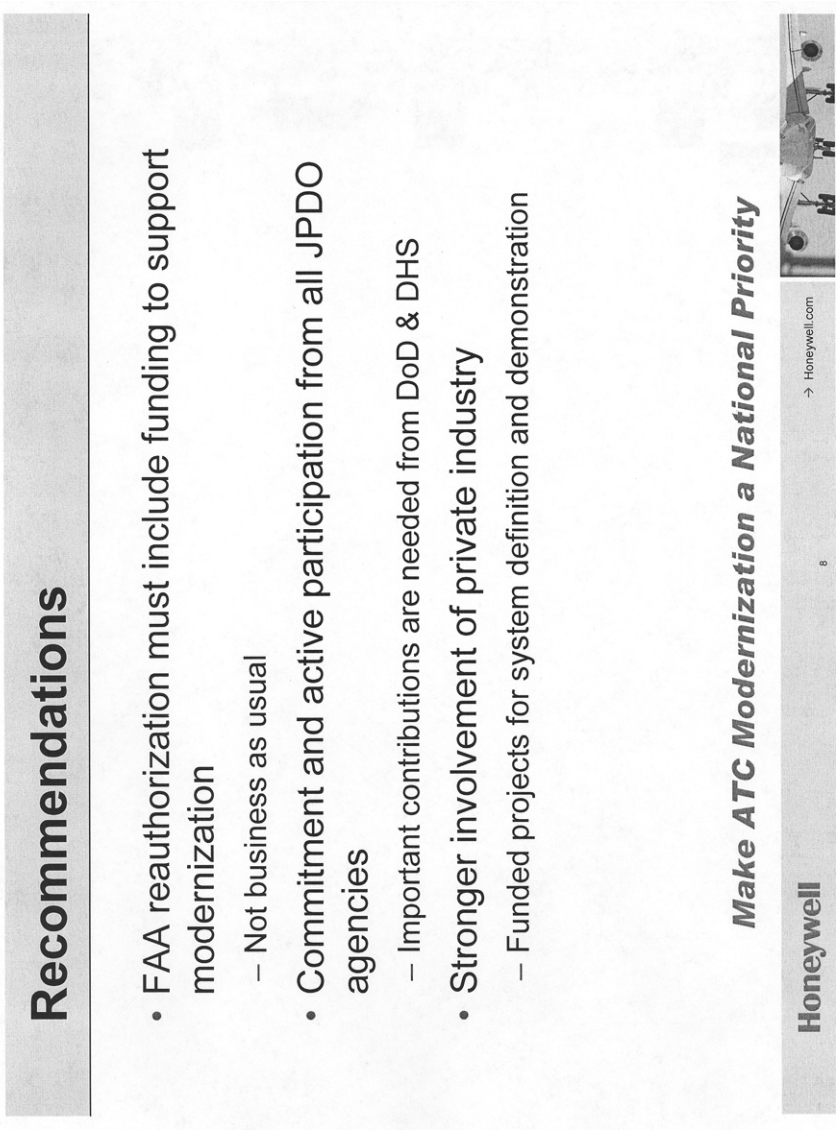
India

- 7.1% Annual Passenger Growth - 28% in 2006
- Present infrastructure capable of only a 20% increase in traffic
- GPS Augmentation System in Development (GAGAN)
- ATM Cooperation Agreement with EU
- Investing Partner in EU's Galileo

Australia

- ADS-B deployment supporting transcontinental surveillance
- Developing ground-based GPS augmentation systems for precision approach and regional operations

Global Growth Driving Regional Actions



RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUYE TO ROBERT STURGELL

Question 1. From a broad perspective, how much progress has the FAA made toward modernization?

Answer. The recent focus on modernization has been to ensure that our service is sustained and meets near-term service expansion needs. This modernization includes programs such as ERAM, TFM–M, STARS, TAMR, NEXCOM, and FTI. From an execution and staging perspective this modernization is going well. With the delivery of these programs major portions of the NAS infrastructure and operations are sustained.

From a longer term NextGen perspective we are just at the first stages of the transformation. Some of the modernization programs have established new baselines which can and are supporting the long-term mission. For example, ERAM and TFM–M are new automation systems for en route and strategic planning to sustain existing service by replacing aging and limited capabilities. In addition these systems are designed to provide for the easy implementation of enhancements to meet air transportation's future needs.

We have also initiated a series of programs that will provide for the operational transformation to meet the demand Efforts include ADS–B, SWIM and air-ground data communications.

- ADS–B is a modern satellite-based surveillance system that supports both FAA's and the aircraft flight deck's role in safe separation. It represents a shift away from the traditional ground-based surveillance systems (*e.g.,* radars) with their large infrastructure footprints.
- SWIM will provide Internet-like information management and dissemination required to meet the challenges of growing volume and complexity.
- Air-ground data communications increases the role of automated electronic data exchange, as opposed to today's manual, voice communications. This modernization effort will support the flexible management of airspace. It will enable increases in controller efficiency and productivity needed to meet growing demand.

From the transformational "modernization" perspective, we are only at the beginning.

Question 2. What has been the extent of air traffic controller involvement in the development of new ATC technology required for modernization?

Answer. The FAA understands the importance of utilizing air traffic controllers as subject matter experts. Based on our requirements and the needed level of experience we are and will continue to engage members of our workforce.

The President of the controllers' union (NATCA) is a member of the 2 air traffic advisory committees and is being offered a seat on the Operational Evolution Partnership (OEP) Associates Board. These groups involve key industry and labor stakeholders in determining direction for modernization of the National Airspace System.

Currently, we have air traffic controllers involved in all of the major modernization programs to include En Route and Oceanic modernization programs, Terminal automation, Traffic Management modernization to name a few.

Question 3. The FAA's reauthorization proposal suggests the FAA may lease some of these new systems. What do you believe are the advantages and disadvantages of this approach?

Answer. It is the policy of the Federal Government that agencies use performance-based contracting methods to the maximum extent practicable when acquiring services, and agencies carefully select acquisition and contract administration strategies, methods, and techniques that best accommodate the requirements. Performance-based service contracting allows vendors to compete and provides the vendors the freedom to develop innovative solutions, along with business models that will give incentives for performance. This approach will also give service providers/vendors the opportunity to leverage their assets by maximizing their use of Commercial Off-The-Shelf (COTS) solutions, and by using land or services they may already own. This affords the agency a smaller operation and maintenance bill and allows the FAA to consider divestiture from land intensive leases currently used for radar sites.

Finally, and perhaps most importantly, by purchasing services instead of equipment, the FAA can easily and quickly adapt to local increases or decreases in air traffic, with resultant increases or decreases in the needs for services.

The FAA's ADS–B procurement is not a lease but is a service contract. In this case, the services will be procured by the FAA in the same way that power and telecommunications services are accomplished today. The FAA will own the surveillance and flight data transmitted and received between aircraft and the ATC ground stations, but will not own the actual hardware and other components necessary to provide the services.

A service contract will allow for a partnership between the government and industry. This approach is intended to maximize competition by allowing the vendors the flexibility of developing solutions that fit into their current infrastructure, product line, and business models, thereby ensuring the most cost-effective and technically appropriate solution. The goal is to allow flexibility for industry to design a solution rather than the FAA outlining exactly how the service-providers/vendors need to design the system.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARK PRYOR TO ROBERT STURGELL

Question 1. A modern air transportation system for both passengers and air cargo is vital to the United States. Today's air traffic control system is based on 1960s technologies that rely upon ground-based radar, navigation beacons, and controllers. I think everyone agrees that the current system simply cannot absorb the anticipated doubling or tripling in air traffic demand projected by 2025.

NextGen is a revolutionary change in air traffic management. History has shown that implementing new technologies in complex systems such as our air traffic control system is not easy.

The FAA and JPDO must have strong technical and budgetary management, procedures and oversight in order to make sure that NextGen comes in on budget and schedule. The planning and technology development for NextGen has been the easy part. Demonstration and implementation of disruptive technologies is always more complicated than people expect.

All the stakeholders—the Federal Government, the airlines, and the public—are counting upon NextGen to solve the air traffic management problems. The FAA and JPDO cannot afford to make any management mistakes as you roll out NextGen.

Since Mr. Chew left, you have been serving as the Air Traffic Organization's Acting Chief Operation Officer. In the past, the GAO has commended the FAA for hiring a COO to stand up the Air Traffic Organization and provide long-term focus and attention to management issues.

What specific actions are the FAA doing to improve and institutionalize its technical and contract management organizations?

Answer. The FAA has institutionalized a number of management and oversight processes to improve technical and contract management.

Contract Management:

- Established procurement approval levels:
  - Chief Financial Officer approval required for proposed procurements over $10 million.
  - Chief Information Officer approval required for information technology procurements over $250,000.
  - Deputy Administrator approval required for support services over $1 million on a single source basis or when fewer than three offers were received.
- Improved contract oversight through expanded oversight staff.
- Created standard internal checklists; established procedures to improve contract management.
- Established a national contract evaluation program.
- Initiated necessary activities to achieve ISO certification.
- Institutionalized routine audits of cost reimbursement contracts.
- Increased acquisition workforce competencies and skills. For example, program managers for major investment programs are Project Management Institute-certified. FAA follows government-wide standards for mandatory training for contracting workforce and for contracting officer's representatives. And specialized procurement and ethics training is conducted for program officials and contracting personnel.

Technical Management:

- Established ATO business processes that bring together technical specialists and resources needed to plan, obtain, manage and operate the systems, services, and facilities for present and future service delivery.
- System safety processes established in the planning, development and deployment of systems and infrastructure improvement.
- Technical management organizations use evolutionary product development to produce lower-risk, incremental approaches to satisfying needs. Coupled with this are decision criteria and processes to capture product design and manufacturing knowledge to decide whether to proceed further with product development and production.
- Institutionalized additional checks and balances—technical management organizations must establish performance, cost, schedule, and benefit baselines that may not be breached by more than 10 percent unless approved by a corporate level investment decisionmaking body.

- Earned value management is required for investment programs involving development, modernization, or enhancement, to assess planned *versus* actual cost and schedule progress, and any needed corrective actions.
- Conduct post implementation reviews of deployed systems are conducted to compare actual *versus* expected technical performance, cost, schedule, and benefits.
- Conduct semi-annual service-level reviews to evaluate performance against quantified measures for the portfolio of programs and operational assets managed by each Air Traffic Organization service organization.

Question 1a. What experience and capabilities are the FAA looking for in a permanent COO?

Answer. Some of the key attributes that we are looking for in a permanent COO are:

- Broad based operating knowledge and managerial experience gained as an executive in the aviation world.
- Demonstrated and extensive senior management experience within a large, complex and geographically dispersed organization.
- A track record of consistent performance improvement and delivery.
- Experience in reducing operating costs.
- Exposure to public policy issues and to working in, or in close cooperation with, government agencies.
- Experience in representing the organization at senior levels and with a variety of internal and external constituent groups.

Question 1b. Has the FAA developed a short list of candidates and begun interviews?

Answer. We have hired a very well respected search firm to conduct the search for the new COO. The search firm is in the process of refining a list of candidates for our review.

Question 1c. When do you expect to hire a permanent COO?

Answer. We hope to have the COO selected this summer.

Question 2. FAA and JPDO are planning a nationwide implementation and deployment of various technologies and transformational programs beginning in Fiscal Year 2008 and continuing over the next 5 years. The Administration has proposed $175 million in funding for NextGen in their Fiscal Year 2008 budget request to implement key components of modernization.

Which technologies and programs will be deployed and what is the specific schedule for each technology or transformational program?

Do these technologies and programs require additional technology development before they can be demonstrated?

Should these infrastructure components be purchased by the Federal Government or would a lease arrangement enable the FAA to adapt to changes in technology?

What procedures will the FAA and JPDO use to determine that these technologies and transformational programs are working as expected and saving time and money while improving safety?

Answer. The Technologies to be deployed include: ADS–B, SWIM and the modernization of communications.

ADS–B is a modern satellite-based surveillance system that supports both FAA's and the aircraft flight deck's role in safe separation. It represents a shift away from the traditional ground-based surveillance systems (*e.g.,* radars) with their large infrastructure footprints. The initial capability for ADS–B is planned for 2010 with the full infrastructure in place by 2013.

SWIM will provide Internet-like information management and dissemination required to meet the challenges of growing volume and complexity. SWIM has still in the investment phase—the planned first implementation is for 2010, with additional services planned for the subsequent years.

The modernization air and ground communications increases the role of automated electronic data exchange, as opposed to today's manual, voice communications. This modernization effort will support the flexible management of airspace. It will enable increases in controller efficiency and productivity needed to meet growing demand.

The air-ground data communications programs is also investment planning—the initial plan is for first capability in 2012.

The NextGen Voice Switch is in investment analysis with the target date for first operating capability in 2015.

The underlying technologies for these systems are available; the application of these technologies for the proposed use in NAS systems will require development, demonstration, and test.

Lease *versus* buy has to be addressed on an individual implementation basis. While there is merit to the adaptability benefits, other issues such as uniqueness of the technology application, air traffic performance requirements, size of the procurement; all must be weighed. The FAA has experience in both strategies; for instance, the FAA does not own the ground communications infrastructure that supports its operations *i.e.* FTI.

Establishment of performance targets is a part of the FAA investment process. Performance targets are established both technically and operationally for each investment. The JPDO NextGen analysis sets operational targets to be met by FAA operational implementations. These targets are used to derive system as well as operational performance.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUYE TO CHARLES LEADER

Question 1. What is the FAA's current timeline for short-term and long-term modernization efforts? What specific modernization initiatives could be undertaken immediately? What types of initiatives would require a longer timeframe and why? Are there environmental benefits to modernization?

Answer. There are several critical environmental benefits to the modernization efforts involved in NextGen. For example, as NextGen matures, time spent at the airport, with engines running, and then in flight will be reduced. This will mean a lower output of emissions.

One of the most substantial NextGen related innovations, and one that is being used now in several locations on a test basis, is the ability of aircraft to make Continuous Descent Approaches.

This capability, made possible through ADS–B, allows an aircraft to avoid the more common step down approach used by most aircraft today. A step down style of approach requires more engine power, as the aircraft has to level off and power up on a repeated basis. This is avoided in a Continuous Descent Approach which allows a steady descent with a minimum of additional engine power. This reduces engine operations and in the process fuel usage and engine emissions.

Further, NextGen, by allowing more aircraft to function in closer spacing, along designated approach corridors will limit the amount of area impacted by aircraft noise.

Question 2. In calling for an integrated, multi-agency plan to transform the Nation's air transportation system to meet the anticipated air traffic capacity needs of the year 2025, the modernization effort, or NextGen, was also intended to provide substantial near-term benefits for the NAS while addressing critical safety and economic needs in civil aviation and fully integrating national defense and homeland security improvements. I would like to better understand the role that DHS is playing in these efforts. In particular, what steps are being taken to ensure the integrity and security of technology that will be integrated into the NextGen system such as ADS–B?

Answer. DHS involvement in integrating defense and security activities into NextGen planning:

The Department of Homeland Security is playing a critical role in the development of NextGen with a particular emphasis on technologies and capabilities that will assure tighter integration of security and defense requirements in the operations of the national air transportation system. A good example of this is in the development of our Network-Enabled Operations Initiative.

Network Enabled Operations refers to the integration, on an operational level, of key defense, security and aviation systems. This initiative is an important part of making sure that defense and security needs are addressed in the nearer term. As an illustration of DHS' involvement, they, along with DOD and the FAA will be providing $5 million each for the next phase of our Network Enabled Operations demonstration and development. We anticipate that the DHS will continue to support this initiative in the future.

Further, the Department of Homeland Security plays an important role in the functioning of the JPDO. They lead our security working group, and are members

of the Joint Planning and Development Organization's Board and its Senior Policy Council.

Systems Security Question: Security and the protection of key systems in the NAS are an essential component in the development of all FAA air traffic and air traffic-related operating systems. Protection of these systems from outside interference, or compromise at any level, is a guiding concern and a key consideration at all levels of development. All new systems, those funded, and those planned for the future, which include all NextGen-related systems, will require the same high standard in guaranteeing their secure operations.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARK PRYOR TO CHARLES LEADER

Question 1. JPDO estimates the total Federal cost for NextGen to be between $15 billion and $22 billion through 2025. JPDO also reported that a preliminary estimate of the corresponding cost to system users, who will have to equip their aircraft with the advanced avionics that are necessary to realize the full benefits of some NextGen technologies, ranges between $14 and $20 billion. Do these estimates include the costs to our military aircraft?

Answer. No, these estimates include only civilian aircraft.

Question 1a. If the estimates do not include military aircraft, what is the cost to the military to incorporate NextGen technology?

Answer. This is a complex estimate that must be jointly undertaken by the JPDO and the Department of Defense. The estimate should be based on realistic assumptions about NextGen operational concepts, their adoption within the military, and the likely timing of implementation. DOD is in the process of creating a program office to support NextGen. Once the program office is approved, JPDO intends to work with program office staff to analyze DOD costs associated with NextGen.

Question 2. The JPDO serves as a focal point for organizing and harmonizing the research related to air transportation for all of the participating agencies. It is jointly managed by the FAA and NASA and supported by staff from all the agencies involved. 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 NextGen.

JPDO's most recent progress report on March 2007 estimated that they will need $4.6 billion over the next 5 years for modernization of the National Airspace System. $4.3 billion will go to the Air Traffic Organization Capital appropriation, which includes an estimated $1.3 billion for programs that directly support NextGen. The remaining $300 million will go to Research, Engineering, and Development.

Last year, the FAA estimated there would be a funding gap of $500 million to $1.2 billion over the next 5 years between the capital account and the NextGen requirements. Does the requested $4.6 billion cover last year's predicted funding gap?

Answer. Yes. Over the next 5 years, $4.6 billion would adequately support the FAA investments required to support NextGen.

Question 2a. Is the Department of Defense providing its promised level of support to the JPDO program office?

Answer. DOD is in the process of establishing a program office to support NextGen. Once this office is established, we expect more active coordination and joint analysis to occur between JPDO and DOD.

Question 2b. Does the JPDO need stronger authority over the funding, personnel and resources necessary to implement NextGen?

Answer. As the NextGen initiative continues to develop, particularly with the implementation of our near-term programs and the requirement for research and development to support the mid-range and full deployment of NextGen capabilities it is reasonable to assume that JPDO will require additional funding. However, an important principal of NextGen is that JPDO facilitates and coordinates the work of the agencies. It is not an implementing office. This role, belongs to the JPDO partner agencies.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUYE TO SUSAN FLEMING

Question 1. What steps does GAO think need to be taken to ensure the FAA is able to implement modernization in an effective and efficient manner?

Answer. During the last few years, FAA has made significant progress in implementing business-like procedures for acquiring and managing air traffic control sys-

tems which have improved FAA's management of the current system and should better position the agency to manage the enormously complex transition to NextGen. However, further steps need to be taken to ensure that FAA is able to implement modernization in an effective and efficient manner. We believe that one of the most critical steps for ensuring future success is to find the right leadership for FAA going forward. The FAA Administrator's term ends in September 2007 and the Chief Operating Officer left in February 2007, after serving 3 years. Thus, FAA will have lost two of its significant agents for change by the end of September. FAA's new leaders will need to demonstrate the same commitment to improvement as the outgoing leaders. We believe that it could be beneficial for FAA's new Chief Operating Officer to have private sector experience that would support further implementation of business-like practices throughout FAA's Air Traffic Organization (ATO). In addition, a Chief Operating Officer who could commit to the current statutory 5-year term also would be useful in providing stable leadership at this critical time, as foundational NextGen systems are implemented.

Question 1a. Does the JPDO have the authority and resources needed to lead the ATC modernization effort effectively?

Answer. We believe that JPDO's current position within FAA and its dual reporting status hinders its ability to interact on an equal footing with ATO and its partner agencies. On one hand, JPDO must coordinate closely with ATO because ATO has the bulk of the responsibility for implementing NextGen systems. On the other hand, JPDO must counter the perception that it is not able to act as an honest broker with the other partner agencies, and is instead merely a proxy for ATO. Thus, it is desirable for JPDO to have some independence from ATO so that the office can better fulfill its coordinating role among the partner agencies and its oversight role with regard to the implementation of NextGen plans.

One possible way to address this issue would be to change JPDO's current reporting situation, in which the JPDO Director reports to both the FAA Administrator and the FAA Chief Operating Officer (head of FAA's ATO), by having the JPDO Director report directly to the FAA Administrator. As a part of any change in the dual reporting status of JPDO's Director, consideration could also be given to the possibility of creating a position of Associate Administrator of NextGen and elevating the JPDO Director to that post. This would give greater authority, credibility, and visibility to this important position.

In addition, JPDO has begun to reorganize itself internally to focus more on the facilitation of NextGen implementation. As it does so, adequate funding and staffing would allow it to play a more meaningful role in coordinating the efforts of its partner agencies and interfacing with the Office of Management and Budget as the NextGen point of contact. This could mean, for example, that JPDO would be given greater resources to conduct concept testing for proposed changes to the National Airspace System and conduct validation testing and demonstration projects. It could also mean that JPDO could acquire the staff with the skills needed to use any additional resources most effectively.

Question 2. The FAA has a history of mismanagement—cost overruns and delays—in handling modernization programs. Is the agency still experiencing problems with managing large modernization projects?

Answer. By creating the FAA Air Traffic Organization (ATO) and appointing a Chief Operating Officer to head ATO, FAA established a new management structure and adopted more leading practices of private sector businesses to address the cost, schedule, and performance shortfalls that have plagued air traffic control acquisitions. One outcome of these changes is that, for the past three fiscal years, FAA has reported exceeding system acquisition goals. FAA's goals for Fiscal Year 2006 were to have 85 percent of critical acquisition programs within 10 percent of budget, as reflected in its capital investment plan, and to have 85 percent of critical acquisition programs on schedule. For Fiscal Year 2006, FAA reported that its critical acquisitions were 100 percent on budget and over 97 percent on schedule.

We have an ongoing study that is examining how FAA measures and reports on its performance in acquiring major systems for incorporation into the National Airspace System. We are exploring FAA's use of the most recently approved cost and schedule baselines, which may have changed significantly since the start of an acquisition, to measure and report on program performance. Rebaselining acquisitions is an accepted practice and there can be valid reasons for doing so, such as when changes in a program's requirements fundamentally alter the acquisition and make the originally approved schedule unrealistic. Because rebaselining resets the cost and schedule variances to zero, however, we want to verify that FAA's practice is not masking acquisition performance problems and is providing full disclosure to the Congress. We expect to issue a report on these issues later this year.

Question 2a. Has the FAA made progress in its handling of modernization programs?

Answer. Yes, we believe that FAA has made progress in its handling of modernization programs. Implementation of more business-like operations has improved FAA's management of the current system and should better position the agency to manage the modernization programs of NextGen. We note, however, that FAA's air traffic control modernization program remains on GAO's high-risk list. In our 2007 high-risk report,[1] we recognized that. FAA had made progress in addressing our recommendations in this area, but, noted that more must be done to institutionalize system management improvements, develop and enforce an Enterprise Architecture, implement effective cost estimation practices and investment management processes, and improve human capital management.

Question 2b. What measures might need to be put into place to ensure the FAA handles the NextGen modernization appropriately/cost effectively?

Answer. Although FAA has initiated numerous financial, management, and acquisition process improvements, the agency must work to institutionalize these changes while at the same time finding new leadership that can continue to enforce an agency-wide commitment to change and continuous improvement. The realization of NextGen goals could be severely compromised if FAA's improved program management and outcomes are not institutionalized and carried over into the implementation of NextGen, which is an even more complex and ambitious undertaking than past modernization efforts. In addition, in 2005, FAA submitted a plan to the Office of Management and Budget for reducing the risks of cost overruns, schedule slippages, and performance shortfalls with goals and milestones for FAA to meet in further reducing acquisition risks. FAA expects to complete the risk mitigation plan by the end of calendar year 2008.

Also important to the cost-effective management of modernization efforts is FAA's ability to undertake actions to achieve cost savings, such as through outsourcing and consolidating facilities. For example, FAA is outsourcing flight service stations and estimates a $2.2 billion savings over 12 years. As for consolidating facilities, FAA is currently restructuring ATO's administrative service areas from nine offices to three offices, which FAA estimates will save up to $460 million over 10 years. We have previously reported that FAA should pursue further cost control options; however, we recognize that FAA faces challenges with consolidating facilities—an action that can be politically sensitive. In recognition of this sensitivity, the Administration's reauthorization proposal presents an initiative in which the Secretary of Transportation would be authorized to establish an independent, five-member commission, known as the Realignment and Consolidation of Aviation Facilities and Services Commission, to independently analyze FAA's recommendations to realign facilities or services. The Commission would then send its own recommendations to the President and Congress. In the past, we noted the importance of potential cost savings through facility consolidations; however, any such consolidations must be handled through a process that solicits and considers stakeholder input throughout and fully considers the safety implications of both proposed facility closures and consolidations.

Question 2c. Do they have the personnel to do this?

Answer. In the past, a lack of expertise contributed to weaknesses in FAA's management of air traffic control modernization efforts, and industry experts with whom we spoke questioned whether FAA will have the technical expertise needed to implement NextGen. In addition to technical expertise, FAA will need contract management expertise to oversee the systems acquisitions and integration involved in NextGen. In November 2006, we recommended that FAA examine its strengths and weaknesses with regard to the technical expertise and contract management expertise that will be required to define, implement, and integrate the numerous complex programs inherent in the transition to NextGen.[2] In response to our recommendation, FAA has contracted with the National Academy of Public Administration (NAPA) to determine the needed skill mix and the number of those skilled persons, such as technical personnel and program managers, necessary to implement FAA's Operational Evolution Partnership and to compare those requirements with current FAA staff resources. According to FAA, the next step in this process would be to contract with NAPA or another organization for advice on how best to fill any skill gaps and how to proceed with management and oversight, of the implementation

[1] GAO, *High Risk Series: An Update,* GA0–07–310 (Washington, D.C.: January 2007).

[2] GAO, *Next Generation Air Transportation System: Progress and Challenges Associated with the Transformation of the National Airspace System,* GAO–07–25 (Washington, D.C.: Nov. 13, 2006).

of NextGen. We believe this is a reasonable approach that should help FAA begin to address this challenge.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. JOHN D. ROCKEFELLER IV TO SUSAN FLEMING

Question. Is GAO convinced that the current structure of JPDO is working?

Answer. We believe that the current structure of JPDO is generally working toward the accomplishment of JPDO's mission, as set forth in *Vision 100,* but that there are actions that should be taken to strengthen the structure of JPDO. We have noted in our recent reports and testimonies that JPDO, while working to coordinate the activities of its partner agencies, nonetheless lacks authority over partner agency resources. Consequently, we believe that one of the most important actions JPDO can undertake, given its current authority, is to further institutionalize the collaborative process with its partner agencies.

For example, one important method for institutionalizing the collaborative effort is incorporating NextGen goals and activities into the partner agencies' key planning documents. Doing so will be critical to JPDO's ability to leverage its partner agency resources for continued JPDO planning efforts and the facilitation of NextGen implementation. JPDO is currently working with FAA to refocus one of FAA's key planning documents, FAA's Operational Evolution Partnership, to become FAA's implementation plan for NextGen. However, while progress is being made in incorporating NextGen initiatives into FAA's strategic and planning documents, more remains to be done with FAA and the other JPDO partner agencies. One critical activity that remains in this area will be synchronizing the NextGen Enterprise Architecture—once JPDO releases and further refines it—with the partner agencies' Enterprise Architectures. Doing so should help align agencies' current work with NextGen while simultaneously identifying gaps between agency plans and NextGen plans.

Also important to institutionalizing the collaborative effort of JPDO is the establishment of formal, long-term agreements among the partner agencies on their roles and responsibilities in creating NextGen. According to JPDO officials, they are working to establish a Memorandum of Understanding (MOU) between the partner agencies. However, JPDO first informed us of this MOU in August 2005; in November 2006 we recommended that JPDO finalize the MOU and present it to JPDO's senior policy committee. Nonetheless, according to a JPDO official, as of May 4, 2007, the MOU had been signed by the Departments of Transportation and Commerce and the National Aeronautics and Space Administration, but remained unsigned by the Departments of Defense and Homeland Security.

In addition to efforts to institutionalize the collaborative process, JPDO has recently taken action to implement several structural and operational changes to improve the efficiency of the Office. For example, JPDO recently converted its eight integrated product teams (IPTs) into "working groups." According to JPDO officials, the working groups will use small, ad hoc subgroups to explore specific issues and deliver discrete work products. JPDO believes that the working groups will be more efficient and output- or product-focused than the former IPTs. JPDO is also in the process of staffing a new, ninth working group to address aircraft and avionics issues. We believe that these organizational changes could help address some stakeholder concerns that we have heard about the productivity of JPDO and the pace of its efforts; however, the effectiveness of these changes will need to be monitored, evaluated, and linked to a policy of continuous improvement.

RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. MARK PRYOR TO SUSAN FLEMING

Question 1. The GAO recommends that the FAA and JPDO institutionalize the changes to their management. It appears that GAO has concerns over the ability of the FAA and JPDO to manage the acquisition of the NextGen technology and the implementation of the system. In November 2006, the GAO recommended that the FAA perform an assessment of the strengths and weaknesses of its technical and contract management.

Does the GAO still recommend that this assessment be performed?

Answer. Yes, we still recommend that FAA assess its strengths and weaknesses with regard to the technical expertise and contract management expertise that will be required to define, implement, and integrate the numerous complex programs inherent in the transition to NextGen.

Question 1a. Has the FAA begun this assessment?

Answer. Yes. As explained in our response above to a similar question from Chairman Inouye, FAA has contracted with the National Academy of Public Administration (NAPA) to determine the needed skill mix and the number of those skilled persons, such as technical personnel and program managers, that would be necessary to implement FAA's Operational Evolution Partnership and to compare those requirements with current FAA staff resources.

Question 1b. Should the assessment be performed by an outside organization?

Answer. Yes, we believe that having this assessment performed by an outside organization, such as NAPA, is appropriate.

Question 1c. Where does GAO think the greatest weaknesses are in the FAA's technical and contract management?

Answer. In our past work, concerns were expressed by a panel of experts that FAA sometimes lacked the technical proficiency to "scrub" project proposals early on for potential problems and to oversee the contractors who implemented its modernization projects. According to a 2005 study by the Merit Systems Protection Board, at least 50 percent of the government's contracting officer representatives—the government's technical experts who are responsible for developing and managing the technical aspects of contracts—reported needing training in areas such as contract law, developing requirements, requesting bids, developing bid selection criteria and price determinations, and monitoring contractor performance. We think that FAA is taking the right approach by undertaking a formal exploration of its strengths and weaknesses with regard to technical and contract management expertise.

Question 1d. What can the FAA do immediately to shore up these weaknesses?

Answer. Again, we believe that FAA is taking the right approach by contracting with NAPA to formally study the issue. FAA can best work to shore up its weaknesses after it gains a better understanding of its strengths and weaknesses, and which areas are most critical to address. As noted earlier in our response to Chairman Inouye, the next step in this process, according to FAA, will be to contract with NAPA or another organization for advice on how best to fill any skills gaps and how to proceed with management and oversight of the implementation of NextGen.

In addition, FAA can also work to address its weaknesses by continuing and expanding its efforts to introduce business-like operations and procedures to its management of its critical acquisitions. Continuation of procedures, such as those now used to monitor systems as they move through the Operational Evolution Partnership, help to bring greater executive review and other checks into the system for improved contract management.

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