U.S. House of Representatives
Committee on Transportation and Infrastructure
Washington, DC 20515

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May 4, 2007

SUMMARY OF SUBJECT MATTER

TO: Members of the Subcommittee on Aviation

FROM: Subcommittee on Aviation Staff

SUBJECT: Hearing on, "The Future Air Traffic Control (ATC) Modernization"

PURPOSE OF HEARING

At 10:00 a.m. on Wednesday, May 9, 2007, in Room 2167 Rayburn House Office Building, the Subcommittee on Aviation will hold a hearing to consider the Future of ATC Modernization.

BACKGROUND

The present-day national airspace system (NAS) consists of a network of en route[1] airways, much like an interstate highway grid in the sky, interconnected by ground-based navigation facilities that emit directional signals that aircraft track. Limits on the transmission distances of these signals prevent aircraft from flying direct routes on long distance flights and limit the utilization of airspace to predefined routes where aircraft can reliably transition from one navigational signal to the next.

In the terminal environment, near busy airports and metropolitan areas, aircraft follow arrival and departure routes by tracking ground-based navigational signals, much like navigation during the en route phase of flight, or by following the instructions of air traffic controllers, often referred to as receiving radar vectors.

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[1] The FAA uses three types of facilities to control traffic: *Airport towers* direct traffic to the ground before landing and after takeoff within 5 nautical miles of the airport and about 3,000 feet above the airport. *Terminal Radar Approach Control Facilities (TRACONs)* sequence and separate aircraft in terminal airspace – i.e., as they approach and leave airports, beginning about 5 nautical miles and ending about 50 nautical miles from the airport and generally up to 10,000 feet above the ground. *En route centers* control aircraft in high-altitude en route airspace – i.e., in transit and during approaches to some airports, generally controlling air space that extends above 18,000 feet for commercial aircraft.

Surveillance and separation of aircraft, both en route and in terminal airspace, is largely provided by an extensive network of radar sites, and air traffic controllers who are directly responsible for ensuring adequate separation between aircraft receiving radar services. Maintaining this separation is achieved through extensive use of voice communications between controllers and pilots over open two-way radio frequencies.

Under the current system, controller workload, radio frequency voice-communication congestion, and the coverage and accuracy of ground-based navigational signals impose practical limitations on the capacity and throughput of aircraft in the system, particularly in busy terminal areas near major airports and around certain choke-points in the en route airway infrastructure where many flight paths converge.

The Federal Aviation Administration (FAA) forecasts that airlines are expected to carry more than 1 billion passengers by 2015, increasing from approximately 740 million in 2006. The Department of Transportation (DOT) predicts up to a tripling of passengers, operations, and cargo by 2025. At the same time, the proliferation of regional jets, the emergence of low cost and new entrant carriers, more point-to-point service, and the anticipated influx of Very Light Jets (VLJs), as well as other new users such as unmanned aerial systems and commercial space vehicles, are placing new and different types of stresses on the system.

Both the FAA and independent experts have noted that tripling NAS capacity by 2025 would be extremely difficult, if not impossible, using existing infrastructure, technologies and operational procedures. According to the FAA, a MITRE-CAASD[2] ("MITRE") study done for the FAA concludes that the current system cannot handle the projected traffic demands expected by as early as 2015. Therefore, Congress created the Joint Planning and Development Office (JPDO) in Vision 100 – the Century of Aviation Reauthorization Act (P.L. 108-176), and tasked it with developing a Next Generation Air Transportation System (NextGen) that will meet anticipated traffic demands.

The NextGen plan that is under development will consist of new concepts and capabilities for air traffic management and communications, navigations and surveillance that rely on satellite-based capabilities; data communications; shared and distributed information technology architectures that will support strategic decisions;[3] and enhanced automation.

I. The FAA's Current Air Traffic Control (ATC) Modernization Effort

In 1981, the FAA initiated an ambitious effort to modernize the ATC system. According to the Government Accountability Office (GAO), the FAA initially estimated ATC modernization would cost $12 billion and could be completed over 10 years. At the time, the FAA viewed its ATC modernization effort as an end state with certain set capabilities that could be delivered in a finite period of time. Over the years, projects within this modernization program experienced cost

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[2] MITRE is a non-profit organization and the Center for Advanced Aviation System Development (CAASD) was established in 1990 within MITRE. MITRE-CAASD is sponsored by the FAA as a Federally Funded Research and Development Center (FFRDC). An FFRDC meets certain special long-term research or development needs that cannot be met as effectively by existing in-house or contractor resources.

[3] Strategic decisions are generally associated with larger scale movement of aircraft traffic flows, as opposed to tactical control and separation of individual aircraft.

overruns, schedule delays and performance shortfalls. Likewise, the FAA's conception of its ATC modernization evolved into that of an ongoing process in which new capabilities will be developed in perpetuity. Since 1995, the GAO has listed the ATC modernization program as "high risk," and noted that while progress has been made, it remains "high risk" today. In June 2005, the GAO reported that to date the FAA has spent $43.5 billion for ATC modernization.

In May 2005, the Department of Transportation Inspector General (DOT IG) reported that 11 major FAA acquisitions experienced cost growth totaling $5.6 billion, and 9 had schedule slips ranging from 2 to 12 years. Looking toward NextGen, the DOT IG has stated that the FAA needs to articulate a strategy for how it will mitigate past problems that led to massive cost growth.

At the same time, the GAO has also reported that the FAA has made efforts to control or reduce costs. For example, each FAA line of business – such as the FAA's Air Traffic Organization (ATO), which is responsible for managing and modernizing the ATC system - is annually required to propose at least one cost control initiative, and the FAA Administrator tracks and reviews progress on these initiatives monthly. These initiatives have reportedly yielded a total of $99.1 million in cost savings and $81.9 million in cost avoidance for FY 2005 and FY 2006.

Additional cost control efforts include outsourcing flight service stations, which the FAA estimates will save $2.2 billion over 10 years,[4] and restructuring of the FAA's administrative service areas from 9 separate offices to 3, which the FAA estimates will save up to $460 million over 10 years. Further, section 409 of the FAA's reauthorization proposal would allow the Secretary of Transportation to establish a "Realignment and Consolidation of Aviation Facilities and Services Commission" to conduct an independent review and analysis of the FAA's recommendations for realignment and consolidation of facilities or services (e.g., air traffic control towers, en route centers, TRACONS, etc).

FAA officials have also noted the agency's recent success at meeting its acquisition cost and schedule performance targets, stating that 2006 was the third straight year that the FAA has delivered at least 90 percent of its programs on time and within budget. However, some of the FAA's recent success may be due to the rebaselining of certain major modernization programs. "Baselining" refers to movement from research and development to deployment of a system. The FAA's Joint Resources Council (JRC)[5] makes a formal decision to invest in a technology and approves cost, schedule and/or performance targets. Rebaselining readjusts the cost and schedule milestones for a program, effectively resetting cost and schedule variances to zero. The FAA uses the current baseline schedule and costs for its performance measurement, rather than the baseline set at an acquisition's inception.

In addition, the FAA has cancelled or deferred decisions on a number of modernization programs that will need to be reevaluated or revived as part of the NextGen effort. In the last few years, the FAA cancelled its data communications effort, called Controller Pilot Datalink Communications (CPDLC), an email-like means for two-way exchange between controllers and flight crews. Data communications will be a core NextGen capability, and it will be a key FAA near-

[4] In May 2006, the DOT IG commenced a self-initiated audit to assess whether FAA has implemented effective plans and controls to: 1) transition flight service stations to contract operations; 2) achieve anticipated savings; and 3) ensure that the operational needs of users continue to be met.

[5] The FAA's senior decision making body for major acquisitions.

term NextGen investment. Further, the FAA's terminal automation modernization program, initially called Standard Terminal Automation Replacement System (STARS), has had a long history of cost overruns and delays. The FAA has broken down this acquisition into phases, renamed it the Terminal Automation Modernization and Replacement (TAMR) program, and deferred its decision whether to fully deploy the system it originally intended to deploy. Some amount of additional investment in terminal automation modernization will be necessary during the transition to NextGen.

The FAA's budget request states that 30 existing capital programs serve as "platforms" for NextGen. The DOT IG has stated that the FAA needs to review ongoing modernization projects and make necessary cost, schedule, and performance adjustments. The DOT IG states that this is critical because NextGen planning documents suggest that billions of dollars will be needed to adjust ongoing programs, like En Route Automation Modernization (ERAM), the FAA's effort to modernize its en route airspace automation systems, and Traffic Flow Management – Modernization (TFM-M), the FAA's modernization of the Enhanced Traffic Management System (ETMS), which depicts traffic flows across the NAS and supports strategic decisions.

II. The JPDO

Pursuant to Vision 100, the JPDO was created within the FAA to leverage the expertise and resources of the DOT, Department of Defense (DOD), Department of Commerce (DOC), and Department of Homeland Security (DHS), as well as the National Aeronautics and Space Administration (NASA) and the White House Office of Science and Technology Policy, for the purpose of completely transforming the NAS by the year 2025 and developing NextGen. The JPDO organizational structure includes:

- A Director, who reports to the FAA Administrator and the FAA ATO's Chief Operating Officer;
- A federal interagency Senior Policy Committee headed by the Secretary of Transportation that includes senior-level officials from the JPDO's partner agencies;
- The NextGen Institute ("Institute"), which incorporates the expertise and views of stakeholders from private industry, state and local governments, and academia. The Institute's governing body is the Institute Management Council (IMC), composed of top officials and representatives from the aviation community;
- Eight integrated product teams (IPT), which is where the federal and nonfederal experts come together to plan for and coordinate the development of technologies for NextGen. The IPTs are headed by representatives of JPDO's partner agencies and include more than 200 nonfederal stakeholders from over 100 organizations.

Vision 100 requires the JPDO to produce an integrated NextGen plan. To fulfill this requirement, the JPDO is developing several key planning documents, which include a Concept of Operations, an Enterprise Architecture and an Integrated Work Plan.

The Concept of Operations provides written descriptions of how the NextGen system is envisioned to operate in 2025 and beyond. The Concept of Operations is posted on the JPDO website for review and comment. The JPDO plans to address the public comments it receives and issue a revised version of the Concept of Operations in June 2007.

The Enterprise Architecture is a technical blueprint for NextGen. When complete, it will provide a means for coordinating among the partner agencies the private sector, aligning relevant research and development activities, and integrating equipment. The JPDO plans to issue the Enterprise Architecture in June 2007, although, according to the GAO, it was originally scheduled for release in September 2006.

Finally, the JPDO is developing an Integrated Work Plan that will provide the research, policy and regulation, and schedules necessary to achieve NextGen by 2025. Whereas the Enterprise Architecture serves as a blueprint for NextGen, the Integrated Work Plan will outline specific steps required to achieve the blueprint. The JPDO intends to issue its initial draft of the Integrated Work Plan in July 2007.

Since August of 2005, the JPDO has been working on establishing a memorandum of understanding (MOU) with its partner agencies to broadly define those agencies' roles and responsibilities. FAA, DOT, NASA and DOC have signed the MOU. According to JPDO officials, DOD and DHS are in the final stages of reviewing the MOU.

According to the GAO, questions remain over which entities will fund and conduct some of the necessary research and development (R&D) and demonstration projects that will be key to achieving certain NextGen capabilities. In the past, a significant portion of aeronautics R&D, including intermediate technology development, has been performed by NASA. However, when President Bush announced his vision for space exploration, NASA shifted its focus toward space. Aeronautics R&D budgets declined and in January 2006, NASA reconfigured its Aeronautics Mission Directorate, focusing on fundamental aeronautics research. Though NASA still plans to perform JPDO research, it will perform only fundamental research and not developmental work and demonstration projects. NASA's focus on fundamental research leaves other agencies the job of transitional and applied research. The FAA's Research, Engineering, and Development Advisory Committee (REDAC) points out that placing a greater reliance on the FAA to perform R&D of this type would require FAA to establish additional infrastructure and that NASA's restructuring has the potential to delay NextGen implementation by five years. The JPDO Concept of Operations lists 167 research issues that need to be investigated.

III. The FAA

While the JPDO's ability to coordinate with its partner agencies is critical, coordination between the FAA and the JPDO is particularly important. The JPDO's planning must build upon the FAA's existing ATC modernization program, and the FAA's near-term planning horizon and investments must be aligned with the JPDO's longer-term mission to transform the NAS. Moreover, the implementation of the ATC component of NextGen will be financed primarily by the FAA's capital budget, and the JPDO needs to draw heavily upon the FAA's expertise to support its mission.

The FAA is making efforts to improve its coordination with the JPDO. For example, the FAA is aligning key planning documents with the JPDO's NextGen plans. Specifically, the FAA has expanded and revamped its Operational Evolution Plan – renamed the Operational Evolution Partnership (OEP) – to become FAA's implementation plan for NextGen. The OEP will be a comprehensive description of how the FAA will implement NextGen, including the required technologies, procedures, and resources. The FAA plans to publish a new OEP in June 2007. The FAA is also creating a NextGen Review Board to oversee the OEP. This Board will be co-chaired by JPDO's Director and ATO's Vice President of Operations Planning.

In addition, section 415 of the FAA reauthorization proposal calls for the JPDO Director to be a voting member of FAA's JRC and ATO's Executive Council. It would also require the FAA to develop and publish each year a consolidated OEP that gives a detailed description of how the FAA is implementing NextGen and also include in the annual report to Congress how the JPDO agencies respective budgets support specific operational improvements for NextGen.

Over the next 5 years, the FAA plans to spend $4.6 billion on NextGen capital and research, engineering and development programs. Some key near-term NextGen investments include:

- **Automatic Dependant Surveillance – Broadcast (ADS-B)**: ADS-B is the FAA's flagship program to transition to satellite-based surveillance. Equipped aircraft receive Global Positioning System (GPS) signals and use them to transmit the aircraft's precise position (along with identification and other information) to automation systems, air traffic controllers and other pilots with properly equipped aircraft. For the last few years, the FAA has piloted ADS-B in Alaska (the "Capstone Program") and the Ohio River Valley ("Safe Flight 21"). The "Segment One" rollout currently underway will include key sites in Juneau (AK), Louisville (KY), Philadelphia (PA), and in the Gulf of Mexico for testing both airplane and helicopter capabilities. The FAA will award a contract for nationwide service in September 2007. The FAA plans to spend approximately $564 million on ADS-B between FY 2008 and FY 2012.

- **System Wide Information Management (SWIM):** The FAA has described SWIM as "an internet-like network, making information accessible, secure and usable in real time for all stakeholders. . . ." SWIM is an information technology platform that will provide common situational awareness between the FAA, other agencies and NAS users regarding weather, traffic flows and other information to support strategic decision making. The FAA plans to spend $173 million on SWIM between FY 2008 and FY 2012.

- **NextGen Networked Enabled Weather (NNEW):** According to the FAA, approximately 70 percent of annual NAS delays are attributed to weather. The FAA believes that NNEW will help it cut weather-related delays at least in half. FAA officials have stated that the weather problem is about total weather information management, and not just the state of the scientific art in weather forecasting. In addition, FAA officials state that weather dissemination system today is inefficient to operate and maintain, and information gathered by one system is not easily shared with other systems.

  If SWIM will function as an internet-like network for NAS users, the FAA and other agencies, then NNEW will manage the weather information content of that network. In

other words, NNEW will integrate weather information from multiple weather sources and package that information for dissemination on the SWIM network to meet the specific needs of individual NAS users. The FAA plans to spend $102 million on NNEW between FY 2008 and FY 2012.

- **Data Communications:** Initially, data communications will provide an email-like means for two-way exchange between controllers and flight crews for air traffic control clearances, instructions, advisories, flight crew requests and reports. This will alleviate air-to-ground voice frequency congestion and reduce communications errors. The FAA estimates that with 70 percent of aircraft data-link equipped, exchanging routine controller-pilot messages and clearances via data will enable controllers to safely handle approximately 30 percent more traffic.

  In the future, data communications will facilitate exchanges directly between aircraft and ground-based automation systems. In other words, aircraft flight management computers will communicate intent data (i.e., route and flight trajectory information) directly to ground-based automation systems, and in turn ground-based automation will communicate aircraft reroutes, clearances and other necessary information back to aircraft computers. The FAA plans to spend $126 million on data communications between FY 2008 and FY 2012.

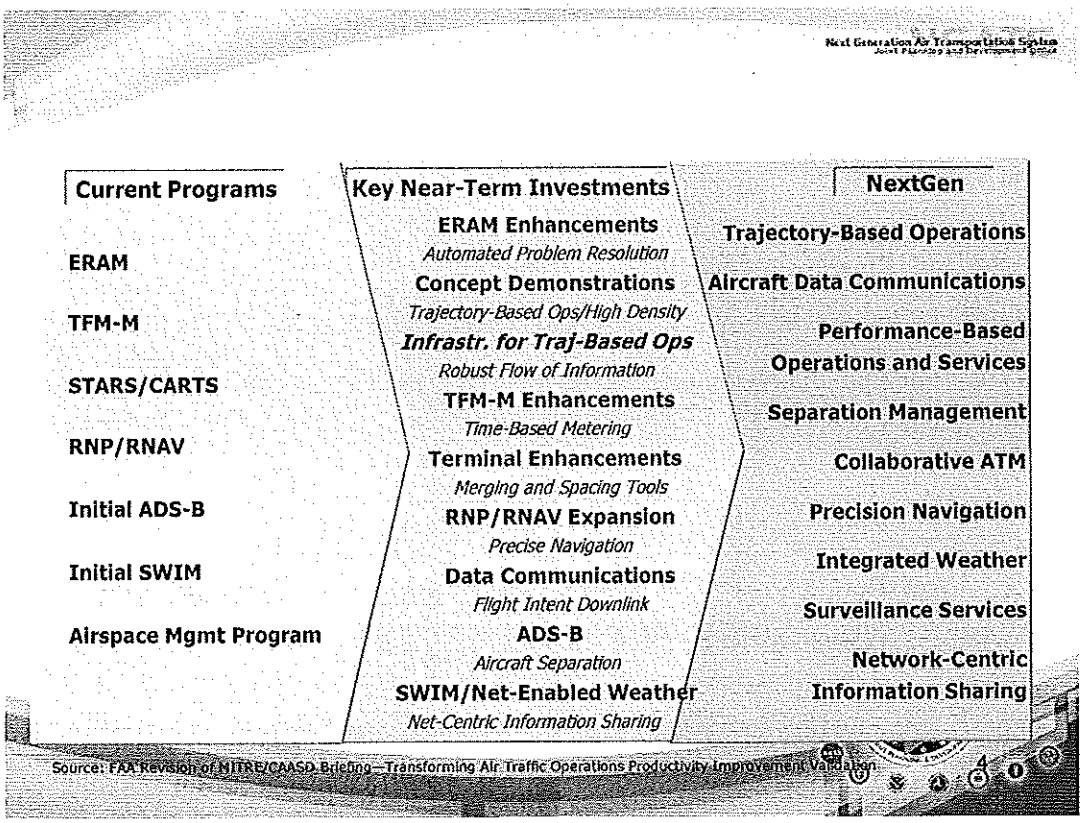
- **NAS Voice Switch (NVS):** In the NAS, the voice communication architecture consists of ground telecommunication lines that connect facilities, radios that allow for conversations with aircraft providing the air-to-ground connection, and voice switches that direct the controller's voice either across the ground lines to other facilities, or across the ground lines to the radios for talking to the planes. The connections between the voice switches and the radios and between voice switches in adjacent facilities are all "hard-wired" and cannot be easily changed.

  The existing FAA voice switches are aging and a number are over 20 years old and in need of replacement. However, a simple replacement of the existing switches will not meet the future NextGen requirements. In the future, controllers in one facility will need to talk with aircraft that can only be reached today by another facility. Therefore, the NVS must be able to let each controller utilize a wide array of radio and communications equipment to talk to airplanes outside their current facility's area of control. The FAA plans to spend $157 million on NVS between FY 2008 and FY 2012.

In addition, FAA officials recently testified that NextGen funding requirements for the first ten years range from $8 billion to $10 billion, and that preliminary estimates suggest that the investments necessary to achieve the end state NextGen system range from $15 billion to $22 billion. However, in February 2007, the DOT IG reported that there are still considerable unknowns, and costs will depend on, among other things, performance requirements for new automation, weather initiatives, and the extent to which FAA intends to consolidate facilities.

IV. NextGen

The chart below depicts current NextGen-related FAA programs, key near-term investments and NextGen capabilities.



Source: JPDO

While more details about the specific NextGen technologies and capabilities will be forthcoming in the JPDO's Enterprise Architecture and Integrated Work Plan, it is expected that major NextGen capabilities will include:

- <u>Trajectory-based Operations/Data Communications/Enhanced Automation</u>: In the future, NAS users will be able to select their own more direct flight paths, rather than following the existing interstate-like grid in the sky. Trajectory-based operations will enable this by providing shared situational awareness about the current location and predicted path of each aircraft in the NAS in three dimensions and at specific points in time. Each aircraft will transmit and receive precise information about the time at which it and others will cross key points along their paths.

  Pilots, controllers, aircraft and ground-based automation systems will have the same precise intent data (and other information), transmitted via data communications. This direct exchange of information via data communications will increase the precision of flight trajectory management.

In addition, in certain domains of flight, such as en route, tactical control and separation of aircraft will increasingly become the function of computer automation, not air traffic controllers. This will reduce both controller workload and FAA costs.

When complete, these capabilities will allow for NAS-wide coordination and tactical de-confliction of each aircraft flight path trajectory from takeoff to landing, resulting in less aircraft maneuvering and more direct and fuel efficient routing for NAS users. It will also provide assurance of conflict free aircraft flight profiles, increasing capacity and safety.

Some current or near-term related FAA investments include: ERAM, STARS/TAMR, Area Navigation/Required Navigation Performance (RNAV/RNP) procedures, ADS-B, SWIM and Data Communications.

- **Collaborative Traffic Flow Management/Net-Centric Information Sharing/Integrated Weather:** These are strategic decision support tools that will provide NAS-wide common situational awareness regarding traffic flow, weather, etc. between the FAA, other agencies and NAS users. This will enable the FAA to work with NAS users to strategically coordinate traffic flows throughout the NAS, enabling users to avoid weather and mitigate delays. In addition, weather information will be integrated into a common picture available to all NAS users and air traffic controllers. Some current or near-term related FAA investments include: SWIM, TFM-M and NNEW.

- **Performance-based Operations and Services:** To fly certain beneficial procedures and routes (e.g., narrow and precise RNAV/RNP approach and departure paths that save airlines fuel), NAS users will be able to demonstrate to the FAA that they have aircraft, avionics (including flight management systems and software that will enable aircraft to self-pilot certain procedures) and training that will meet required performance tolerances, as opposed to FAA prescribing specific equipment and training. This approach will theoretically enhance innovation and international harmonization. Some current or near-term related FAA investments include: RNAV/RNP procedures and airspace redesign efforts to support those procedures.

- **Satellite-based Surveillance/Reduced Aircraft Separation:** Satellite-based surveillance will result in cost savings for the FAA because it requires less ground-based infrastructure for the FAA to acquire and maintain. It will also enhance surveillance coverage in areas that are not radar accessible. Moreover, satellite-based navigation may offer greater precision and accuracy than radar, which could contribute to reduced aircraft separation. Reduced aircraft separation will provide greater system capacity and fuel savings for NAS users. At some point in the future, satellite-based surveillance and aircraft equipage may also enable aircraft and pilots to self-separate, which could further contribute to reduced aircraft separation. Some current or near-term related FAA investments include: ADS-B and RNAV/RNP.

V. User Costs and Benefits

To take advantage of NextGen capabilities and services, NAS users will need to acquire or upgrade aircraft avionics and other equipment. In many instances, the FAA will need to mandate certain aircraft equipage. MITRE, working with FAA, has developed a preliminary estimate of the

NextGen avionics costs, which concludes that the most probable range of total avionics costs to system users is $14 billion to $20 billion. The FAA estimates that the equipage costs for general aviation users will range from $7,000 - $30,000, whereas equipage costs for commercial users will range from $32,000 - $670,000, depending on the type and age of the aircraft, and desired level of capability. These ranges in cost account for the various vintage aircraft that would be retrofitted.

While NextGen will require considerable investment by NAS users, it should also provide substantial benefits in terms of reduced costs. For example, airlines stand to benefit from greater reliability of block times,[6] reduced time in each phase of flight and associated fuel savings, and better information about weather, traffic and other factors for improved decision making. JPDO preliminary analysis indicates that NextGen annual user cost savings and benefits could range from $12.3 billion to $32.1 billion.

VI. Human Factors and Stakeholder Involvement

NextGen contemplates an increased reliance on automation, which raises questions about the role of the air traffic controllers in such an automated environment. More specifically, the controller's role is expected to change from direct, tactical control of aircraft to one of overall traffic management. Therefore, the DOT IG has stated that need for focused human factors research extends well beyond the traditional computer-machine interface (such as new controller displays) and has important workforce and safety implications.

Similarly, NextGen envisions that at some point in the future pilots will take on a greater share of the responsibility for maintaining aircraft separation and will rely more on data communications. This raises human factors questions about whether pilots can safely perform these additional duties.

According to the GAO, the evolving roles of pilots and controllers is the NextGen initiative's most important human factors issue, but will be difficult to research because data on pilot behavior is not readily available for use in creating models. Moreover, the GAO reports that the JPDO has not yet studied the training implications of various systems or solutions proposed for NextGen. For example, new air traffic controllers may need to be trained to operate both the old and the new equipment as NextGen technologies mature.

In addition to safety implications, the GAO has reported that the lack of stakeholder or expert involvement early and throughout the development and implementation of ATC modernization projects has been a key factor leading to cost overruns and delays. In November 2006, GAO reported that active air traffic controllers were not currently involved in the NextGen planning effort and recommended that JPDO determine whether any key stakeholders and expertise were not represented on its IPTs, divisions, or elsewhere within the office. According to the GAO, in July 2005, the FAA terminated the controller liaison program, wherein active controllers were assigned to, among other things, provide input on modernization projects. The FAA determined that the program was not providing sufficient benefit compared to the program's cost. GAO also reports that, at that time, the controllers union disengaged from participating on all FAA

[6] The total time it takes to taxi, take off, fly, land, and taxi to the gate at the destination airport. The more reliable the block times, the more efficiently airlines can schedule their crews and other resources.

workgroups and technological projects, including the JPDO. Since then, the head of the controllers' union has resumed participation on the IMC. However, according to the GAO, no active controllers are yet participating at the IPT planning level.

The GAO also states that aviation technicians do not participate in NextGen efforts. The GAO further states that input from current air traffic controllers who have recent experience controlling aircraft and current technicians who will maintain NextGen equipment is important when considering human factors and safety issues.

VII. SESAR: The European Air Traffic Modernization Initiative

The Single European Sky Air Traffic Research Project, commonly known as SESAR, is essentially the European equivalent of the NextGen. The SESAR Consortium, consisting of representatives from a wide-range of industry groups, is the organization tasked by the European Commission (EC) and Eurocontrol with planning the future European air traffic management system.

The Consortium, which began work in March 2006, is currently developing a technological road map for the future European air traffic management system. This road map is part of the project definition phase - the first of SESAR's 15-year, three-phase air traffic management modernization program. The two-year project definition phase will conclude in March 2008. The EC and Eurocontrol have provided 60 million euros (approximately $81 million) for research and study on the project definition phase, which is being conducted by Consortium members.

The second phase of SESAR will be the development phase (2008-2013), which will focus on research, development and prototyping of the key system components. The EC has agreed to a proposal to use a Joint Undertaking (JU), a legal instrument that allows public-private partnership, to govern the development phase. The JU will have an estimated budget of 300 million euros (approximately $407million) annually, committed evenly by the EC, Eurocontrol and industry.

The third and final phase is the deployment phase, lasting from 2014 to 2020. This will be executed by industry.

SESAR faces somewhat different implementation challenges than NextGen, most notably, forging a consensus between air navigation service providers representing nearly 40 countries, as opposed to working with a single government. The SESAR Consortium has also adopted a different governance structure than the JPDO. For the definition phase, the SESAR Consortium is a bottom-up organization, meaning that the aviation industry is essentially developing the air traffic management road map for final approval by Eurocontrol and the EC. In the U.S., the Federal government is developing the NextGen plans, with input from the aviation industry via the Institute. U.S. members of the SESAR Consortium include Boeing, Honeywell, and Rockwell Collins.

VIII. The Role of Private Industry

Some of the FAA's recent actions, combined with provisions in the FAA's reauthorization proposal, indicate that the FAA may look increasingly at private industry to play a major role in the development and implementation of NextGen. For example, the FAA intends to structure its ADS-B acquisition, which the agency has described as the "backbone of NextGen," as a service contract

or lease. Specifically, the FAA plans to let vendors install, own and maintain the ground-based infrastructure (which could include as many as 400 ground-based ADS-B transceivers), while the FAA will own the design specifications, surveillance and flight data transmitted and received between aircraft and ground-based equipment.

FAA officials believe that a service contract approach for ADS-B will reduce FAA costs by allowing the FAA to forego the expense of acquiring or leasing the land (and to forego associated environmental due diligence requirements) necessary to deploy the ADS-B ground-based infrastructure, as well as potentially foregoing other acquisition, operating and maintenance costs. However, given the large scale of the acquisition – ADS-B will be the primary ATC surveillance system for the entire NAS - this approach may also raise management and oversight challenges. For example, ensuring adequate safeguards are in place if the vendor is acquired by another firm, a foreign firm, enters bankruptcy, or experiences performance problems.

In addition, while Congress debates the FAA's hybrid cost-based user fee financing proposal, FAA officials believe that the agency currently has the authority to enter into agreements with private vendors to provide both the FAA and NAS users with communications, navigation and surveillance services, and to allow those vendors to charge fees to users for those services. For example, FAA officials have suggested that once the ADS-B infrastructure is in place, the vendor might provide the same service it provides the FAA, or additional services, to NAS users and other customers for a fee. The FAA plans for a portion of the vendor's profits from the secondary sale of the air traffic data will act as a rebate against the FAA's subscription fee, thus offering the potential for cost savings for the agency. However, this approach may raise management and oversight issues; for example, establishing the appropriate role for the FAA and Congress in controlling fee rates. Section 402 of the FAA reauthorization proposal enumerates some broad guidelines for the FAA to consider when using this authority, including: the effect on the safety and efficiency of the NAS; competition; the role of general aviation; and the widespread use of such services at affordable rates.

Similarly, it has been reported that the FAA recently approved the first third-party provider to design RNP procedures.[7] FAA officials state that NAS users have expressed concern that the FAA will not be able to quickly satisfy the demand for new fuel saving RNP procedures, and that users might be willing to pay private vendors to get faster development of these procedures rather than wait for the FAA. Therefore, the FAA will enter into agreements with vendors capable of developing these procedures, which the FAA will publish if they are correctly done. NAS users would pay select vendors directly. Section 410 of the FAA's reauthorization proposal would expand the FAA's authority to delegate to non-government third-parties the ability to develop aircraft operating procedures.

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[7] "In a move expected to speed the adoption of Required Navigation Performance approaches and departures by U.S. airlines, the FAA has approved the first third-party provider to design these custom procedures. . . While the FAA is publishing RNP procedures on its own for "public use" at the rate of 25 a year, Naverus will now be able to contract with U.S. airlines and airports (as it already does with Asia-Pacific carriers) to develop customized procedures. This could cost a few hundred thousand dollars or more for procedures at one airport, depending on the complexity." David Hughes, FAA OKs Outsourcing of RNP Design, *Aviation Week*, Apr 15, 2007.

FAA officials believe that there may also be other instances when, as new technologies are developed, it might be more efficient for communication, navigation or surveillance service to be provided directly to users. The FAA would retain its regulatory and inspection authority to assure the continued safe operation of the NAS, as opposed to inserting itself as a middleman in the procurement of these services. However, last month, the president of the union representing technicians and specialists that certify and maintain FAA equipment and procedures expressed doubts about the FAA's ability to adequately supervise third-party design initiatives.

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