

STATEMENT OF VICTORIA COX, VICE-PRESIDENT FOR OPERATIONS
PLANNING SERVICES, AIR TRAFFIC ORGANIZATION, FEDERAL AVIATION
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SUBCOMMITTEE ON SPACE AND AERONAUTICS, ON THE FAA'S FY 2008
BUDGET REQUEST FOR RESEARCH AND DEVELOPMENT, MARCH 22, 2007

Good morning, Chairman Udall, Congressman Calvert and Members of the Subcommittee. I am Victoria Cox, Vice-President for Operations Planning Services in the Air Traffic Organization of the Federal Aviation Administration. I am honored to be here this morning to testify on the FAA's FY08 budget request for Research and Development (R&D) activities.

Aviation is a vital national resource for the United States. It provides support for business, jobs, economic development, law enforcement, emergency response, and personal travel and leisure. It attracts investment to local communities, and opens up new domestic and international markets and supply chains. As a result, the United States must have an aviation system that is second to none – a system that can respond quickly to its changing and expanding transportation needs. This can only be achieved through the introduction of new technologies and procedures, innovative policies, and advanced management practices.

Our nation's air transportation system has become a victim of its own success. We 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 and demand for air services is growing rapidly.

The FAA is committed to reducing congestion in our nation's air transportation system and thereby maintaining and facilitating increases in the economic benefits afforded by the system. Future congestion can only be alleviated by transforming the system we have today -- our current system is not capable of being "scaled up" to meet future demand. We must transform the current system to the system envisioned by the Joint Planning and Development Office (JPDO) - the Next Generation Air Transportation System or NextGen. NextGen includes performance targets for the year 2025 that, if achieved, will reduce congestion by providing far greater capacity than our current system with higher efficiency levels than we have today, while maintaining safety.

The FAA is integrating NextGen into its planning activities, including its five-year strategic *Flight Plan*. In addition, the FAA is using the Operational Evolution Partnership, the new OEP, to guide our 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, and its participants will include representatives from JPDO.

OEP is the FAA's way to plan, execute and implement NextGen in partnership with private industry. Through OEP we are seeking stakeholder input, evaluating available technologies, defining and prioritizing research and development requirements, establishing milestones and commitments, and providing status, context and guidance for initiatives related to NextGen.

OEP will provide a single entry point for new NextGen initiatives to enter the FAA capital budget portfolio. It ties these initiatives directly to our budget process, and it is the way that the FAA will implement the JPDO's vision of the future system. It will provide an integrated view of the programs, systems and procedures that are critical to transforming the system; and it will let us see them in the framework of the steps that must be taken by all FAA lines of business in order to achieve timely implementation. It also allows us to understand the near-term steps and mid-term goals that we must accomplish to sustain and improve the National Airspace System (NAS) on our way to the NextGen system of 2025.

Research is absolutely critical to FAA operations today and for NextGen. FAA has recognized this fact by proposing funding increases in R&D totaling \$280 million over the next five years. These funding increases are enabled by the financing reforms contained in the Administration's proposal to reauthorize the FAA. Among other reforms, H.R. 1356, the NextGen Financing Reform Act of 2007, adopts cost-based user fees (or offsetting collections) for the costs of air traffic control services for commercial aviation users. FAA's annual spending of these user fees would be fully offset by the user fee collections. Therefore, FAA's spending would rise or fall based on FAA's costs and would not compete with any other discretionary budget priorities (as spending Trust Fund revenues do today).

The FAA uses R&D to achieve its near- and long-term goals and objectives. In the past, the R&D program was driven by the near-term operational needs of the aviation system,

and a large share of the agency's R&D was focused on specific near-term safety and capacity issues. The FAA's R&D program is being adapted to be more flexible, balanced, and dynamic so we can respond simultaneously to the critical near-term needs of the system while providing for the NextGen system. The OEP is the mechanism by which the FAA will assess R&D requirements for supporting NextGen, and new initiatives will be reviewed and prioritized before inclusion in Agency budget planning.

Research and Development will help FAA achieve NextGen by identifying challenges, understanding barriers, and developing solutions across the parameters of safety, environment, air traffic management, human factors, systems integration and self-separation. To better manage our R&D program, we have developed the *National Aviation Research Plan (NARP)*, which describes the FAA R&D programs that support both the day-to-day operations of the National Airspace System and the vision for NextGen. The projects identified in the NARP enable the FAA to address the current challenges of operating the safest, most efficient air transportation system in the world while building a foundation for NextGen. Research makes known the unknown. It identifies constraints and barriers, separates solutions that are effective from those that are not, and will help transform our nation's air transportation system.

Even before NextGen and the new OEP, we have not been developing our R&D goals and portfolio in a vacuum. We continually assess our research program in conjunction with our stakeholders and customers to ensure we keep our R&D resources focused on the most critical tasks. The R&D program receives expert advice and guidance from the

Research, Engineering and Development Advisory Committee (REDAC). Established by Congress in 1989, the REDAC reports to the FAA Administrator on research and development issues, and provides a liaison between our R&D program and industry, academia, and other government agencies. The R&D program benefits significantly from the recommendations provided by the REDAC. The committee, its subcommittees and working groups work hand-in-hand with us to develop our R&D program. As our advisory committee members will probably tell you, one of our greatest challenges is our ability to define what the future system will look like. Of what technologies will it be comprised? JPDO has just within the last few weeks released the NextGen Concept of Operations, and in the next few months will publish the NextGen Enterprise Architecture. The significance of these documents should not be understated. They are essential to understanding the transformed operational environment; will allow us to more precisely develop a plan for achieving it; and will provide the basis for architecture-based, quantitative resource planning.

In fiscal year 2008, the FAA plans to invest a total of approximately \$259 million in Research and Development. \$140 million of this total is for Research, Engineering and Development (RED), which breaks down as \$123 million from the Airport and Airways Trust Fund, and \$17 million from the General Fund.

The RED budget request includes \$91.3 million in RED for continued research on aviation safety issues. This request supports critical safety research in the areas of: continued airworthiness of aging aircraft, fire safety, advanced aircraft materials and

structural safety, catastrophic failure prevention, atmospheric hazards, propulsion and fuel systems, and weather. Aviation safety research is essential to meeting FAA Flight Plan safety objectives and NextGen performance targets. The potential of the NextGen system to handle tremendous growth in air traffic compels us to maintain our vigilance in safety research. We must continue to invest in aircraft safety to reduce accident rates to insure that an increase in accidents does not accompany the increase in traffic.

An investment in safety R&D has and will continue to result in critical safety improvements for the flying public. Our scientists and engineers, for example, are developing a fire proof airline cabin, improving aviation maintenance programs, developing better weather forecasts, ensuring the safety of composite aircraft components, reducing runway incursions, and creating new, more effective ways to train pilots, controllers, dispatchers, and crews.

In addition to safety programs, RED funding includes environmental issues, wake turbulence projects, unmanned aircraft systems, and human factors studies.

As we look at the NextGen system we are working hard to ensure that we meet the increasing demand for flying in an environmentally sound manner. The focus of the environment and energy research program is making aviation quieter, cleaner, and more energy efficient – which has the added benefit of reducing climate impact. We are investing in research and development, and demonstration projects that will help us better understand aviation's environmental health and welfare impacts and bring new

technologies, operational innovations, and other capabilities on line to address and reduce these impacts. In FY08 we are requesting \$15.5 million in environment and energy research as well as \$3 million for environment projects under the Airports Cooperative Research Program, funded under the Airport Improvement Program.

The FAA is also requesting funds to support wake turbulence research, the results of which will help us increase capacity while maintaining safety. This program provides a better understanding of the swirling air masses, or wakes, trailing downstream from aircraft wingtips. It will help us to safely reduce separation distances between aircraft, support the efficient use of closely spaced parallel runways, and allow airports to operate closer to their design capacity. FAA is requesting an increase in funding for wake turbulence research from \$4 million in fiscal year 2007 to \$13.7 million in fiscal year 2008, including \$3 million in the ATO Capital request.

In addition, FAA is requesting funds to further research on unmanned aircraft systems. The program ensures the safe integration of unmanned aircraft systems into the National Airspace System. This research provides information to support certification procedures, airworthiness standards, operational requirements, maintenance procedures, and safety oversight activities of unmanned aircraft system civil applications and operations. FAA is requesting an increase in funds for unmanned aircraft systems research to \$3.3 million for fiscal year 2008.

Human Factors projects will develop procedures, training and decision support approaches that mitigate human error while exploiting the innovation and problem-solving capacity that is the hallmark of human behavior. We will also develop system performance metrics that include people as critical elements of system performance while evaluating the impact of new technologies and procedures on human decision-making through integrated demonstrations. In fiscal year 2008, FAA is requesting \$19.9M for human factors research and engineering efforts.

The R&D request includes \$18 million to continue supporting the JPDO (\$14.3M in RED and \$3.5M in ATO Capital). As the unit that spearheads NextGen for the federal government, JPDO will continue defining the future operating environment, identifying demonstration opportunities, and working with the relevant agencies who will implement the JPDO vision.

\$90 million in the ATO Capital account request is intended for research and development work. This includes \$23 million for the R&D work at the MITRE Center for Advanced Aviation System Development (CAASD). Other requests for Capital funding include the NextGen demonstration projects. We are requesting \$20 million to stage NextGen Demonstration projects that will be used to lower risk; identify early implementation opportunities; refine longer-term objectives; demonstrate compatibility with other JPDO agencies; and, if results dictate, eliminate certain concepts from further consideration.

We are requesting \$28 million for research and development under the Airport Improvement Program. The two key elements of the AIP program are increasing the capacity of our nation's airports and improving the safety of aircraft operating from these airports. As the tempo of operations at our airports continues to rise, AIP research projects include the development of technologies that insure safe transit of aircraft on taxiways and runways, improved runway designs that insure the safe control of aircraft landing in ice and snow conditions, and the development of state-of-the-art crash and rescue equipment to minimize the loss of life and injury in the event of an accident. In addition to our in-house airport research, the Airport Cooperative Research Program, funded through AIP, helps us leverage outside R&D expertise by providing grants to research institutions to help us solve real-world airport safety and capacity issues.

Given expected demand growth, it is important to improve operations well in advance of 2025 so we can avoid gridlock, especially since we expect one billion passengers per year traveling in the system by 2015. With that in mind, we are conducting research to support mid-term capabilities that must be in place to address demand forecasted for that time frame. The OEP is helping us to define projects that deliver mid-term results and also provide the stepping stones to NextGen.

We believe that a timely and efficient transition to NextGen requires us to participate in concept development and validation, prototyping and field demonstrations. Such involvement will give us in-depth understanding of required NextGen operational improvements and hasten our ability to implement NextGen systems in the National

Airspace System. The President's budget request for FY08 includes an estimated \$4.6 billion for NextGen investments over the next five years. That number includes increases in funding for SWIM from \$21 million to approximately \$52 million, while funding for NAS-wide implementation of ADS-B goes from \$86 million in FY08 to an estimated \$156 million in FY12.

We have been working closely with the JPDO on defining mid and long-term R&D activities that support seven solution sets that are key to NextGen: initiation of trajectory-based operations; increased arrivals/departures at high density airports; increased flexibility in the terminal environment; improved collaborative air traffic management; reduced weather impact; increased safety, security and environmental performance; and transformed/networked facilities.

Trajectory-based operations, or management by trajectory, will allow aircraft to fly trajectories negotiated with air traffic control as opposed to today's practice of managing aircraft sector by sector and requiring them to fly routes specified by air traffic control. NextGen demonstrations in fiscal year 2008 will test various aspects of trajectory-based management in the oceanic environment and demonstrate how oceanic flights using tailored routes can avoid congestion and take advantage of shorter routes.

High density airports are those where demand for runway capacity is high, there are multiple runways with airspace and taxiing interactions, or there are other airports in

close proximity that create the potential for airspace interference. Airspace redesign coupled with new concept validation work will support this solution set.

Flexible terminals and airports will apply technologies that enhance both pilot and controller situation awareness and improve service on the ground. Wake turbulence research will support reduced separation standards that will contribute to this theme.

Collaborative air traffic management will consist of strategic and tactical interactions between air traffic controllers and customers. It will include flow programs as well as collaboration on procedures to shift demand to other routings, altitudes, times, etc.

Enhanced weather forecasts as well as improved **use** of forecasts will contribute to a reduction in weather impacts. Weather plays a critical role in air traffic congestion and delays in today's system. As much as sixty percent of today's delays and cancellations for weather stem from potentially avoidable weather situations. For fiscal year 2008 and beyond, FAA is focusing on capabilities to help stakeholders at all levels make better decisions and better react to avoidable weather situations thus minimizing their impact.

Safety, security and environment enhancements will result from deployment of new procedures and systems that support NextGen objectives. The Runway Status Lights program, for example, under our Runway Incursion Reduction funding supports this safety theme. R&D funded environment and energy programs also contribute significantly here. The estimated \$4.6 billion in NextGen investments over the next 5

years also includes several initiatives to deal with aviation environmental issues. Historically, new technology accounts for 90 percent of environmental footprint reduction. Our prototype Continuous Descent Approach (CDA) has the double benefit of reducing noise and emissions. We are seeking to expand on this work in fiscal year 2008 and beyond to develop and prototype air traffic and ground procedures to reduce aircraft noise and fuel burn and emissions. And we are seeking to advance Environmental Management Systems by developing noise, local air quality and climate impacts metrics and decision support tools that will allow us to dynamically manage the environmental impacts of the NextGen system.

Human Factors considerations overlie all of these themes. NextGen systems will dramatically alter the roles and responsibilities of key players in the National Airspace System: pilots will take on more separation responsibilities; automation will enable air traffic controllers to manage larger numbers of aircraft while improving safety; network-enabled operations will provide broader situation awareness to stakeholders throughout the system and enable a new level of air-ground cooperation. Human factors research is needed to define the changing responsibilities of humans in the system, to allocate function to people or automation and to design automation so it serves the information needs of the people who are accountable for system performance. We are requesting funding increases in fiscal years 2008-2012 for human factors R&D in both the RE&D and ATO capital programs.

Proposed Research and Development in support of the seven NextGen solution sets will be outlined in the publication of OEP Version One in June 2007. The OEP will lay out

the path from concept development to implementation in the National Airspace System, ensuring that our R&D is indeed focused on achieving NextGen capabilities.

Our planning is also in line with the Administration's National Aeronautics Research and Development Policy published in December 2006. As outlined earlier in this testimony, we propose to conduct research in areas that support safety, the environment and air traffic management; we plan to conduct research to support certification of safety and environmental performance of aircraft systems; we are working and plan to continue to work to bring our requirements in line with NextGen; and through the OEP, we are aligning our efforts with NextGen.

To succeed in maintaining safety and ensuring sufficient capacity in the future, we do need a stable funding stream that will enable the FAA to launch the NextGen system. This is critical, as Secretary Peters stated "if we are to deploy the state-of-the-art technology that can safely handle the dramatic increases in the number and type of aircraft using our skies." As outlined in the H.R. 1356, the NextGen Financing Reform Act of 2007, research will be funded to allow critical safety and capacity R&D to continue at a pace necessary to field NextGen technologies by 2025. These increases in research funding are linked to and dependent on this proposal. We are enthusiastic about and focused on the opportunity to direct our R&D efforts toward the realization of the Next Generation Air Transportation System, and look forward to working with this committee to make the NextGen vision a reality.

This concludes my testimony, and I thank you for the opportunity to appear before the committee. I would be happy to answer any questions the committee may have.