

**Statement of
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before the

**Subcommittee on Space and Aeronautics
Committee on Science
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Mr. Chairman and Members of the Subcommittee:

Four months ago, on November 16, 2004, a B-52 that was designed in the early 1950's took-off from Edwards Air Force Base in Southern California and headed to a test range over the Pacific Ocean. Mounted underneath the starboard wing was a Pegasus rocket that was designed in the 1980's. Fitted onto the Pegasus in place of the nosecone was the X-43A, a small experimental scramjet (supersonic combustible ramjet)-powered vehicle designed at the Langley Research Center in the mid-1990's. Over the test range, the B-52 dropped the Pegasus, which propelled the X-43 into free flight. The X-43A scramjet ignited and flew at approximately Mach 10, nearly 7000 mph, setting a new world record for an air-breathing vehicle, as it flew at an altitude of approximately 110,000 feet.

This breakthrough provides a promise for the future. The talent and vision of the people at our NASA Research Centers, joining forces with our industry team, made this breakthrough a reality, turning visionary possibilities into incredible realities. As the President said last January, we are engaged in exploration and discovery, and breakthroughs such as this are needed to enable the President's vision for space exploration. Breakthroughs power the future. NASA's job is to envision the future and make it a reality. This is our history and it is our future.

I thank you for this opportunity to testify on aeronautics research at NASA. Our aeronautics research portfolio is a vital part of NASA's mission to pursue the President's Vision for Space Exploration, both in our continuing development of new technologies that improve aviation on this planet, and in our development of aeronautical science platforms to fly on this and other planets. We are developing technologies to improve safety, reduce environmental impact and improve the efficiency of aviation operations. We are developing technologies to permit long-endurance uninhabited aeronautical vehicles. It is an honor for me to explain how we are doing so.

The Importance of Aeronautics and Its Role at NASA

Aeronautics is critical to national military and economic security, transportation mobility and freedom, and quality of life. Air superiority and the ability to globally deploy our forces are vital to the national interest. Aviation is a unique, indispensable part of our Nation's transportation system, providing unequaled speed and distance, mobility and freedom of movement for our Nation. Air carriers enplane over 600 million passengers and fly over 600 billion passenger miles, accounting for 63 percent of individual one-way trips over 500 miles and 80 percent of trips over 1000 miles. Airfreight carries 29 percent of the value of the Nation's exports and imports and is growing at over six percent annually. Global communications, commerce and tourism have driven international growth in aviation five to six percent annually, well beyond annual Gross Domestic Product (GDP) growth. In many ways, the U.S. has only begun to tap what is possible in air transportation. The US has over 5,200 public-use airports, but the vast majority of passengers pass through a little more than one percent of those airports and only about 10 percent are used to any significant degree.

Aviation and the aerospace industry support over 15 million Americans in high-quality, high-paying jobs, second only to trucking in the transportation sector. Driven by technology, annual growth in aviation labor productivity over the past 40 years has averaged 3.6 percent, compared to two percent for U.S. industry as a whole. Aviation manufacturing is a consistent net exporter, adding \$30 billion dollars annually to the Nation's balance of trade. Aviation produces and uses a broad base of technologies—from computing and simulation to advanced materials—supporting the high technology industrial base of the country. Defense aviation provides fast, flexible force projection for the U.S. Our military aircraft are unparalleled globally because they employ the most advanced technology.

Technological advances in aeronautics over the past 40 years, many of them first pioneered by NASA, have enabled a ten-fold improvement in aviation safety, a doubling of fuel efficiency with reductions in emissions per operation, a 50 percent reduction in cost to travelers, and an order of magnitude reduction in noise generation. In large part, the gains we have enjoyed have been due to the efficient transfer of the benefits of technology to consumers via competitive air transportation markets.

At NASA our aeronautics program is pioneering and validating high-value technologies that enable discovery and improve the quality of life through practical applications. We are investing in the revolutionary technologies that will ensure the success of our mission. To ensure maximum benefit to the taxpayer, and to embrace the Vision for Space Exploration, we are transforming our investment in Aeronautics Research in order to more sharply focus our investment on revolutionary, high-risk, "barrier breaking" technologies. Toward this end, the NASA Aeronautics Vehicle Systems Program (VSP) has been refocused away from research and technology development in multiple areas toward four specific revolutionary technology demonstration projects for which there is a clear government research role. These projects will address critical public needs related to reduction of aircraft noise and emissions, and enable new science missions. The revolutionary technologies developed by NASA within the next decade

will form the basis for a new generation of environmentally friendly aircraft and will enhance U.S. competitiveness 20 years from now.

To fulfill our mission we must also identify the National facilities that are required to support our programs. Our transformed aeronautics program will rely on a more focused set of facilities than exists today. Over the past several years many reviews have been performed relative to our National aeronautical facilities. There have been closures and changes. However, more needs to be done to avoid the perpetuation of marginal facilities through small, evolutionary change. We are optimistic that looking to the future will provide the framework necessary to define the facilities, new and existing, that will enable success in aeronautics.

Roadmapping and the Strategic Plan

NASA is working toward the aeronautics R&D goals as published in *The New Age of Exploration: NASA's Direction for 2005 and Beyond*. In Strategic Objective 12 of this document, we commit to “provide advanced aeronautical technologies to meet the challenges of next generation systems in aviation, for civilian and scientific purposes, in our atmosphere and in atmospheres of other worlds.” These aeronautics R&D goals are based on the NASA Aeronautics Blueprint, published in 2002. The Aeronautics Blueprint articulates goals for aeronautics that we believe can achieve the objectives set out in our Strategic Plan. As we looked forward and examined the issues facing aviation, we recognized a need for new concepts and new technologies to break through the current plateau facing aviation. Achieving big increases in capacity and mobility, while improving safety and reducing environmental impacts, was not feasible within today’s construct and technology baseline. What we found was that emerging technologies, when combined with advances in traditional aerospace disciplines, can enable new system concepts that operate at levels of performance that eclipse current systems.

We use the Blueprint to help guide and prioritize our investments. The process we began in 2002 with the publication of the Blueprint—the framework and emphasis of the Blueprint—is reflected in our current program restructuring. Next steps include more detailed systems analysis and technology roadmapping. We are also exploring a way to use the National Research Council to perform a decadal survey to help us better understand the Nation’s future needs in aeronautics.

NASA has initiated a new roadmapping endeavor to better define all of our activities. One of these roadmaps is focused on aeronautics. To this end we have developed a Federal Advisory Committee Act (FACA) team, consisting of industry, academia, government, military, and local government planning representatives, to evaluate and draft strategic roadmaps that will help guide our long-range goals, capabilities, and enabling technologies. We intend to deliver the aeronautics roadmap this fall, and invite you to participate by providing input and comment. This interaction will help direct future investment decisions represented in the integrated NASA Strategic Roadmap.

As we begin this process, a broader national dialog on the aeronautics R&D goals for this roadmap may be appropriate as we enter the second century of aviation. These discussions should include a range of stakeholders and customers, including the Congress. This process could lead to a national consensus for aeronautics R&D goals.

Joint Planning and Development Office

Last year's FAA Reauthorization Bill, VISION-100 (P.L. 108-176), created the Next Generation Air Transportation System Joint Planning and Development Office (JPDO) with the goal to develop an integrated, multi-agency "National Plan" to transform the nation's air transportation system to meet the needs of the year 2025 while providing substantial near-term benefits. The National Plan—in essence, a roadmap for the Next Generation Air Transportation System—has six overarching goals: (1) Promote economic growth and create jobs; (2) Expand system flexibility and deliver capacity to meet future demands; (3) Tailor services to customer needs; (4) Ensure national defense readiness; (5) Promote aviation safety and environmental stewardship; and (6) Retain and enhance U.S. leadership and economic competitiveness in global aviation.

The JPDO—composed of NASA, the FAA, the Office of Science and Technology Policy (OSTP), and the Departments of Transportation, Commerce, Defense, and Homeland Security—working in close collaboration with other public and private sector experts, created and published the National Plan, entitled *Next Generation Air Transportation System Integrated Plan*, referred to as NGATS, that was delivered to Congress in December 2004.

The NGATS goals and objectives broadly address eight major strategies. A series of eight Integrated Product Teams (IPT's) are developing executable roadmaps for each strategy to transform the National Airspace System. The eight IPT's are focused on such activities as developing alternative airport concepts and infrastructure to meet future demand, establishing a more effective and less intrusive airport security system without limiting mobility or infringing on civil liberties, creating a more responsive air traffic system that can accommodate new and changing aircraft vehicle classes and business models, reducing the impact of weather on air travel, and harmonizing equipage and operations globally.

NASA has a major role in the JPDO and the Next Generation Air Transportation System. While NASA is performing aeronautics research that provides the foundation to enable NGATS and the right strategies, we are also providing civil servants and direct support to the JPDO. NASA is providing civil service employees to serve as the JPDO Deputy Director (SES), Agile Air Traffic System IPT Lead (SES), and a Board member (SES), as well as 11 other full or part time civil servants. NASA financial support to the JPDO was \$5.4M in FY 2004. This has increased to \$5.6M in FY 2005 and will increase to \$10M in FY 2006. We are also conducting a network-enabled operations (NEO) demonstration of security and capacity related technologies. This demonstration, jointly sponsored by NASA, DoD, DHS, and DOT, could prove to be valuable in integrating government-wide intelligence operations, providing significant aid to our national security.

In aviation there has never been a transformation effort similar to this one with as many stakeholders and as broad in scope. The objective of this plan is to provide the opportunity for creative solutions for the future of air transportation, our security, and our hope for a vibrant future. Its success is the first priority of our aeronautics portfolio.

Aeronautics Research Programs

The research in the Aeronautics Research Mission Directorate programs supports the NASA Strategic Plan, as formulated with your input and the input of Federal agencies, industry and academia. The President's FY 2006 Budget fully supports the Aeronautics program's vital research, especially in the areas of reducing aircraft noise, increasing the aviation safety and security and increasing the capacity and efficiency of the National Airspace System. The budget request also supports the activities that have been identified by the Joint Planning and Development Office. NASA's FY 2006 request for the Aeronautics Research Mission Directorate is \$852.3 million, which is \$54 million less than the FY 2005 budget.

Protecting air travelers and the public is the focus of the **Aviation Safety and Security Program (AvSSP)** which develops technologies for both the National Aviation System and aircraft that are aimed at preventing both intentional and unintentional events that could cause damage, harm, and loss of life; and minimizing the consequences when these types of events occur. Aviation safety focuses on technologies that can reduce aircraft accident rates and reduce aviation injuries and fatalities. Aviation security focuses on technologies that can reduce the vulnerability of the National Aviation System to terrorist attacks while improving the efficiency of security measures. The AvSSP Program also develops and integrates information technologies needed to assess situations and trends that might indicate unsafe or insecure conditions before they lead to fatalities or damage. The goal, in short, is to reduce the potential for loss of life in the National Aviation System. The President's FY 2006 Budget for AvSSP is \$192.9 million, an increase of 4% over the FY 2005 program.

Last year AvSSP demonstrated aviation safety breakthrough technology that has enormous potential to eliminate the leading cause of world-wide commercial and general aviation fatalities, Controlled Flight Into Terrain (commonly referred to as CFIT). Synthetic Visions Systems performed simulation and flight-test evaluations of low-cost forward-fit and retrofit technologies for General Aviation aircraft. Synthetic Vision Systems create an artificial, "virtual view," of an area based on a detailed terrain database. Although the pilot may not be able to see the ground through the fog, a computer screen presents the landing site accurately based on map and terrain information. Evaluations included technical and operational performance assessments of improved pilot situational awareness with regard to terrain portrayal, loss of control prevention, and display symbology. Results from our demonstration show the efficacy of synthetic vision displays to eliminate CFIT and greatly improve pilot situational awareness.

Turbulence is a leading cause of in-flight injuries and costs the airlines at least \$100 million per year. To address this issue, AvSSP has designed and is performing in-service evaluations of a turbulence prediction and warning system with a major airline that gives flight crews the advanced warning needed to avoid turbulence or advise passengers to sit down and buckle up to avoid injury. AvSSP is also developing safety design and maintenance tools to design safer aircraft that can, for example, operate more safely in icing conditions, and new techniques for industry to improve aviation maintenance procedures that can improve safety and reduce maintenance-related accidents.

Working in concert with other government agencies that have mission requirements in aviation safety and security, such as the Federal Aviation Administration and the Transportation Security Administration, as well as in cooperation with the U.S. aviation industry and universities, NASA actively pursues technology transfer with these partners by identifying and addressing user needs and by demonstrating key attributes of the technologies in relevant user environments, making use of both NASA and partner facilities and capabilities.

Last year at the Ft. Worth, Texas, and Washington, D.C., Air Traffic Control Centers, AvSSP demonstrated a prototype of the Rogue Evaluation And Coordination Tool (REACT), using a live traffic feed over 8 hours. REACT demonstrated the ability to detect aircraft that are deviating from their expected flight paths using 4 detection algorithms. It also predicted incursions into restricted airspace, with countdown timers. These capabilities will enhance the public safety by mitigating the potential for catastrophic harm that might otherwise result from a rogue aircraft.

Transferring technology to enable major increases in the capacity and mobility of the US air transportation system is the focus of the **Airspace Systems Program (ASP)**. For example, the Small Aircraft Transportation System (SATS) has demonstrated the feasibility of pilots safely landing at non-radar equipped airports under low visibility conditions. Also, SATS has demonstrated the use of automation to increase flight-path accuracy and situational awareness, precluding the need for expensive, ground-based systems. In 2005, we are conducting a number of SATS demonstrations validating technologies that promote routine and easy access of general aviation aircraft to the Nation's under utilized small airports. SATS technologies can help to relieve the current excessive demands on the nation's National Airspace System. We will conduct a public demonstration of our accomplishments in Danville, Virginia, during June 5-7, 2005. I extend a personal invitation to all the members on this Committee to attend this SATS demonstration. The President's FY 2006 Budget for ASP is \$200.3 million, an increase of 22% over the FY 2005 program.

The Airspace Systems Program has become an essential provider of the FAA's air traffic management long-term research. The FAA long-term forecast indicates a steady growth in air travel demand that will culminate in a doubling of that demand over roughly the next two decades. NASA's ASP research objectives are planned to meet the FAA's needs in 2025 though some priority is being given to meet the FAA's near-term operational support needs.

The Virtual Airspace Modeling and Simulation System, developed by the ASP, provides a unique and critical capability that is used to perform simulations and trade-off assessments of future air transportation system concepts, models, and technologies. This capability will allow an air traffic management tool concept to be tested in a non-operational environment before major development dollars are invested. The JPDO currently is using this capability to assess the impact of new technologies and to establish the requirements leading to a transformed national air transportation system.

Last year we successfully completed the Advanced Air Transportation Technologies (AATT) project that developed Air Traffic Management decision-making technologies and procedures to enable greater flexibility and efficiencies of the National Airspace System. In congested airspace with interdependent traffic flows, a delay at one center often creates a domino effect that spreads quickly

to multiple centers. Over its five-year life, the AATT project developed and demonstrated several active decision support tools that would enable improvements in NAS throughput, user flexibility, predictability, and overall system efficiency while maintaining safety.

The **Vehicle Systems Program (VSP)** is developing and demonstrating barrier-breaking vehicle concepts and technologies, beyond the scope of conventional air vehicles that protect the Earth's environment and enable science missions. In FY 2005, the VSP was transformed into a goal-driven technology development program aimed at the maturation of technologies to flight. By developing well-defined technological metrics and goals, the diverse technology development effort was refocused in over seven different vehicle classes. Considering our current constrained budget environment, the program will be undergoing a second stage of transformation in 2006. Three basic tenets govern this transformation: barrier-breaking demonstrations, sharp focus on fewer goals, and fully competed awards. The 2004 record-breaking Hyper-X demonstrations, which I described at the beginning of my testimony, illustrated that many barriers remain in the second century of flight. The transformed Vehicle Systems investment will be focused on achieving these demonstrations through the use of increased competition through merit-based research selection. The President's FY 2006 Budget for VSP is \$459.1 million.

As part of the transformation of the VSP, we have consolidated our research to four specific "barrier-breaking" technology demonstration projects:

- *Subsonic Noise Reduction*: Continues the barrier breaking research for reducing airport noise, a demonstration of noise reduction technologies for large transport aircraft will put us halfway to the goal of keeping objectionable noise within airport boundaries. This demonstration will include advanced engine and airframe noise reduction approaches as well as the innovative continuous descent approach to avoid the objectionable changes in engine speed as an aircraft approaches the airport.
- *Sonic Boom Reduction*: if nothing is done to break the barrier of supersonic flight over land, it will take just as long to fly across the country in the third century of flight as it did halfway through the first century. The barrier to high-speed flight is defining a sonic boom level that is acceptable to the general public, and designing an aircraft to reach that level. Building on our recent successful flight validation of the theory that by altering the contours of a supersonic aircraft, the shockwave and its accompanying sonic boom can be shaped resulting in a greatly reduced sonic boom signature on the ground, we plan to demonstrate an innovative air vehicle that will break the barrier of acceptable supersonic flight.
- *Zero Emissions Aircraft*: conventional turbo machinery powered by fossil fuels can only incrementally address the need to reduce harmful NOx and CO2 emissions from aircraft. A breakthrough demonstration of an all-electric aircraft propulsion system will be the first step towards a truly emission-less aircraft.
- *High-Altitude, Long-Endurance, Remotely Operated Aircraft (HALE ROA)*: NASA opened the door to high altitude flight when it successfully demonstrated the Helios. This legacy will be extended through a series of high-altitude long-endurance aircraft that will extend duration, range, and payload capacity. The first breakthrough will be a 14-day duration aircraft that flies at over 50 thousand feet.

NASA Aeronautics Research Centers: Issues & Implications

Significant NASA organizational and programmatic transformation, based upon the recommendations of the President's Commission on the Implementation of United States Space Exploration Policy, is essential for NASA. As discussed above, the transformation of NASA's Aeronautics Research programs encompasses not only the technical content of those programs, but also the mechanisms by which those programs will be conducted. These changes are having major impacts on the people and facilities at NASA's four centers that perform aeronautics research for the agency. NASA is taking proactive steps to manage the impact of these changes on our people and facilities. In particular, we are actively involved with several ongoing Agency initiatives, including the Core Competency Assessment and the Transformation Action Team, to ensure that we have identified the workforce skill sets that are critical to our future success. We have also established viable mechanisms for addressing areas where we anticipate having too many, or too few, of these skills. The NASA Organizational Model Assessment Team, established in response to a recommendation of the Aldridge Commission, identified potential alternate organizational models for NASA Centers. The Agency is evaluating the possible implementation of alternate organizational models including: Hybrid organizations, combining a Government component with an FFRDC, University Affiliated Research Center, Institute or Government Corporation.

Additionally, the Agency is examining a range of actions to address our workforce issues. These include: voluntary separations-buyouts; job fairs and perhaps directed inter-Center workforce rebalancing; acceleration of Center transformation strategies; preparation of requests for demonstration personnel authorities; and as a last resort, preparation for involuntary measures.

Regarding our facilities, we are instituting a "corporate approach" to the management of these key assets, beginning with our major wind tunnels. NASA, and its predecessor the National Advisory Committee for Aeronautics, has long used a variety of wind tunnels to support research, development, and related activities in both its aeronautics and space endeavors. External users, particularly DoD and the aerospace industry, have also used these facilities to meet their own research and development objectives. During the past decade, however, the level of demand for most, if not all, of these facilities has decreased substantially. The reduction in demand within NASA has been the result of a gradual change in programmatic direction toward areas such as airspace operations, aircraft safety, and aircraft security that by and large do not require significant wind tunnel usage. The reduction in demand external to NASA has paralleled the decreasing number of new aircraft development projects, both commercial and military.

As a result, NASA has considerably more wind tunnels than the Agency's programs require. In an effort to match program requirements with supporting infrastructure, NASA has, within the last ten years, closed about half of its wind tunnels. Decisions regarding the operation, and closure, of specific facilities were made primarily by the Research Center that operated each respective facility. Recently, however, the nature and pace of change within and external to the Agency has made it increasingly difficult for the Centers to manage and operate such facilities, particularly those with large fixed costs and uncertain levels of utilization.

Accordingly, on February 4, 2005, ARMD, operating as the Headquarters Center Executive responsible for the Dryden Flight Research Center, the Glenn Research Center, and the Langley Research Center, instituted a new “corporate management of facilities” approach, effective immediately. Under this approach, a new Headquarters office will be responsible for the integrated, strategic management of all the major wind tunnels within the Agency. Specifically, this office has been tasked with establishing an overall strategy for this suite of facilities; for setting cost, pricing, and top-level facility access policies; for coordinating overall marketing efforts; for approving test assignments; assessing program and facility performance; for sponsoring initiatives for improved operational effectiveness and efficiency; and—with respect to this set of facilities—for serving as the primary integrated interface with industry, DoD, and other customers and stakeholders.

In particular, this new approach will enable us to better address many of the challenges facing the management of these facilities, including those highlighted by the RAND Corporation in their recently concluded examination of NASA’s wind tunnel and propulsion test facilities, such as the need for an aeronautics test technology vision, selective consolidation and modernization of existing facilities, common management and accounting practices, and a renewed reliance between NASA and the Department of Defense.

Summary

Thank you, Mr. Chairman and members of the Subcommittee. I appreciate the opportunity to testify today to share our accomplishments and the actions we are taking for the future of this Nation in aeronautics research. We are transforming aeronautics at NASA to emphasize innovations in addressing barriers through high-risk, high-payoff technologies. Our transformed aeronautics program will create challenges and opportunities as we pursue the Vision for Space Exploration. We are excited about this future, and we are anxious to get on with it.

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Dr. Lebacqz is the Associate Administrator for Aeronautics Research, one of four Mission Directorates within the National Aeronautics and Space Administration (NASA), a position he has held since July 2003. In this position, he has overall technical, programmatic, and personnel management responsibility for all aeronautics technology research and development within the Agency. The programmatic activities are funded by a \$1.0 Billion/year budget that supports three major NASA programs, which are performed at the four Aeronautics research centers of Ames, Dryden, Glenn, and Langley. Personnel oversight of approximately 6200 civil servants at the four Aeronautics centers is a concomitant responsibility.

Prior to this appointment, Dr. Lebacqz was the Associate Center Director for Aerospace Programs at the NASA Ames Research Center, a position he held since June 2002. In this position, he had overall management responsibility for the conduct of programs led by Ames for the Office of Aerospace Technology within NASA. These programs included Airspace Systems; Rotorcraft; Computing, Information, and Communications Technology; and Engineering for Complex Systems. They had a combined value of approximately \$250M per year.

Between May 2000 and May 2002, Dr. Lebacqz was Deputy Director of the Office of Aerospace at the NASA Ames Research Center. The Aerospace Directorate's research and technology development efforts include advanced aerospace projects, space transportation and thermal protection systems, aviation operations systems, nanotechnology, acoustics, basic and applied aerodynamics, and rotorcraft. The work is performed in seven subordinate Divisions or Offices comprised of approximately 280 civil servant employees and 235 contractors, with an annual budget on the order of \$75M. Dr. Lebacqz independently, or in partnership with the Director, was responsible for all personnel and financial management activities associated with the Directorate, as well as the development and transfer to industry and/or other government organizations of advanced air traffic management and flight systems technology, and of rotorcraft, low-speed aeromechanics, and hypersonic aerothermodynamic technologies.

Prior to this position, Dr. Lebacqz was Director of the Aviation System Capacity Program and the Aerospace Operations Systems Programs, for the National Aeronautics and Space Administration (NASA), a position he held since December 1997. He was responsible for the technical and programmatic conduct of three systems technology projects (Advanced Air Transportation Technologies, Terminal Area Productivity, and Short Haul Civil Tiltrotor) and one base research and technology program (Aerospace Operations Systems) for NASA. These programs have a combined value of approximately \$725M over five years, and are conducted at three of the NASA Centers: Ames Research Center in California, Langley Research Center in Virginia, and Glenn Research Center in Ohio. They focus on developing

technologies to increase the capacity and safety of the National Airspace System. In their conduct, he was also responsible for strategic alliances with the Federal Aviation Administration, and for developing formal relationships with the FAA's Technical Center and the DOT's Volpe Transportation Center.

Previous to that assignment, Dr. Lebacqz was Chief of the Flight Management and Human Factors Division at NASA Ames, a position he held between December 1996 and December 1997. As Division Chief, he had technical and personnel responsibility for 200 civil servant and contractor employees, with an annual budget of approximately \$35M. He was specifically responsible for interdisciplinary Division programs in Air Traffic Management, Aeronautical Human Factors, and Aviation Safety research. Prior to this appointment, he was Deputy Chief of the same Division since 1994, during which time his specific responsibilities also included Rotorcraft Systems. Concurrently, he was Program Manager of NASA's Rotorcraft Base Research and Technology program from February 1996 until December 1996, with programmatic responsibilities for the entire NASA rotorcraft program at the same three NASA Aeronautics Centers.

Between 1991 and 1994, he was Chief of the Flight Human Factors Branch at NASA Ames. In this position, he was responsible for the development of human factors programs in crew resource management, fatigue countermeasures, and air-ground integration. Between 1985 and 1991 he was Chief of the Flight Dynamics and Controls Branch at Ames, where he was responsible for programs in rotorcraft and VSTOL stability, control, and handling qualities, and developed helicopter flight research activities cooperative with the U.S. Army, including the new RASCAL UH-60 helicopter. Concurrently, he was a lecturer at Stanford University between 1982 and 1992, teaching the graduate course "*Dynamics and Control of Rotary-Wing Aircraft*". From 1978 to 1985 he conducted flight and simulation research at Ames, and, prior to that, he was with the Calspan Corporation in Buffalo, NY, where he was Head, Flight Control Section.

His BSE (cum laude), MA, and Ph.D. degrees in Aeronautical Engineering are all from Princeton University. He is the author or co-author of over 50 technical reports, articles, or papers, was a member of the American Helicopter Society (AHS), and is a Fellow of the American Institute of Aeronautics and Astronautics (AIAA). For the AHS, he has been Technical Director for the San Francisco Bay Region (1982-1983), as well as Technical Chairman for an International Conference on Flying Qualities and Human Factors in 1993. For the AIAA, he has been an Associate Editor for the *Journal of Guidance, Control, and Dynamics* (1982-1987), a member of the Technical Committee for Guidance and Control (1988-1991), and the Deputy Director, Aircraft Operations, for the Aircraft Technology Integration and Operations Technical Group. He was the Technical Chairperson for the first AIAA Aircraft Technology Integration and Operations Forum in November 2001.

Dr. Lebacqz has received two individual NASA Special Achievement Awards, five NASA Group Achievement Awards, six NASA "Turning Goals Into Reality" (TGIR) awards, two NASA Ames Honor Awards (for excellence in supervision and for mentoring), the US Army Aeroflightdynamics Directorate Director's Award for Interagency Cooperation, the NASA Exceptional Service Medal, and has twice been awarded NASA's Outstanding Leadership Medal. He was named a Presidential Rank Award Meritorious Executive in 2003. He is listed in the *Lexington Who's Who Registry 2000-2001*.