

**Statement of David Swain  
Senior Vice President of Engineering and Technology, and  
Chief Technology Officer, The Boeing Company  
before the  
Senate Commerce Committee  
Subcommittee on Science, Space and Technology**

Thank you Mr. Chairman and members of the committee. I am David Swain, Senior Vice President of Engineering and Technology and Chief Technology Officer for the Boeing Company. I am pleased to testify in support of robust aerospace research and development funding and NASA's Aerospace Technology Enterprise.

I want to leave three points with you this afternoon.

- First, aerospace research serves an important public good. It is a foundation for national security and economic growth, not least because of the role of aerospace research in attracting, developing, and retaining the intellectual capital on which the nation will depend for global aerospace leadership.
- Second, the Boeing Company strongly endorses Administrator Goldin's goal to reinvigorate NASA's role as the enabler of breakthrough aerospace research. Over the years, NASA leadership and investment have significantly advanced aerospace technologies and reduced the risk of application. These enabling technologies have produced significant public benefits by improving the safety, efficiency, and environmental performance of aerospace products and services.
- Third, the last several years have seen a decline in government investment in aerospace technology, especially funding related to aeronautics in NASA and the DoD. I view this situation with concern in view of the challenges that lie ahead of us in a future characterized by uncertainty and change.

Aerospace research is important to national security and economic growth.

Aerospace research and NASA's contribution over the years have been a strong component of our national security posture. The quickening pace of technology development around the world and a future global environment that is quite uncertain make it even more important to invest in technology research that

reduces risk and enables options for future needs. Looking back, it is exactly this type of research, conducted by NASA in concert with the Department of Defense, that has advanced options such as unmanned air vehicles, which are ready today to transition into development.

Aerospace research contributes to both our national and economic security in its pursuit of safer, more reliable and lower cost access to space. The military is critically dependent today on space based assets, and is expected to become more dependent in the future. In the age of instant global communications, our economic well being is also dependent on space based systems. Fundamental technology challenges remain in this arena, including light weight, low cost airframes, propulsion, and health management systems.

Aerospace research has significant implications for air transportation, which is a basic enabler for economic growth. First among the challenges is our national aviation system, which is approaching limits in its capacity at the same time that traveler demand is increasing. This situation, under-scored by passenger delays with increasingly serious economic implications, is approaching a crisis that demands a comprehensive effort with the highest national priority. As you are aware, Boeing has established a new business unit dedicated to air traffic management, and we are working with NASA, the FAA, and other stakeholders to define a new operational concept to improve safety, increase capacity and reduce delays.

Another dimension of air transportation is the demand for environmentally responsible aviation, including control of noise, emissions, and more efficient airplanes and airplane operations. NASA pre-competitive research is addressing this public good with focused programs that involve all the stakeholders.

Boeing strongly supports NASA's role as the enabler of breakthrough aerospace research.

The European Aerospace vision identifies \$90B or so from public and private sources over the next twenty years for aerospace research and technology. Over the same period, Boeing will invest \$40B-\$50B in Research and Development. Most of this will be product focused, with about \$4B-\$5B related to long term research and technology. Even then, longer-term research must satisfy certain business constraints. It is therefore critical that government, and particularly NASA, continue its historical role of supporting break-through, pre-competitive research that has a longer time horizon than industry can support—ten years or more--before it is mature enough to be considered for transition to product development.

In addition to NASA's role as an innovation engine, we strongly support focused NASA efforts that integrate breakthrough technologies for system solutions. Each of Boeing's top aeronautics research and technology priorities demand and

benefit from the synergies of an integrated approach, and are well aligned with the NASA budget that is before the Committee. They are air traffic management, 21<sup>st</sup> century air vehicle technology, and the space launch initiative.

Projected air travel threatens to overwhelm an already congested air traffic network calling for a new, system level approach incorporating space-based assets integrating accurate navigation and information technologies. Research and technology investments are needed in modeling and simulation, architecture studies and tools.

NASA's long-term investments for aeronautics research and technology will be applied to 21st century commercial and military air vehicles. The goals for 21st Century air vehicle technologies are increasing performance, maintaining an outstanding safety record, improving reliability, and reducing development and production cost and cycle time. Breakthrough 21st Century air vehicle technologies will be pursued with an integrated (wings, propulsion, and fuselage) approach within a 10 to 20 year vision.

Similarly in the space launch arena, NASA's long-term investments provide an opportunity for technology breakthroughs that will change how we think about meeting the safety, reliability and affordability goals for future commercial and military access to and use of space.

#### Funding for US aerospace research is declining in a competitive global environment.

Notwithstanding the significant implications of aerospace research for national security and economic growth, there are some who question the government's role in this arena. This is not the case with our aerospace competitors in Europe and Asia. Europe, for example, prizes global aerospace leadership and a world class transport system as a goal by 2020. The goal is underpinned by a supportive public, favorable policy regulation, and a rigorous research agenda. To quote from the European Vision: "European aeronautics has grown and prospered with support of public funding, and this support must continue if we are to achieve our objective of global leadership."

More troublesome than the actions of our global competitors are recent trends in funding for aerospace related science and technology in NASA and in the DoD. Industry associations, including the Aerospace Industries Association, and concerned aerospace professionals have documented these trends. Statistics of particular concern to me are the amount of national funding going into aerospace research and development, which has halved over the past 20 years, and NASA's investment in aeronautics research, which has declined 40% in the last six years. These trends put in future jeopardy the aerospace industry's position as the most positive contributor to the trade balance of any industry in the United States. The trends are already manifest in declining global market share for US

aerospace companies, and translate directly into fewer American jobs and reduced US tax revenues.

Budget constraints mean fewer technology initiatives and fewer prototype demonstration programs in DoD and NASA. This has translated into fewer opportunities to develop and transition leap ahead technologies to address national needs, and importantly, fewer opportunities to attract and engage a new generation of aerospace talent on which our nation will depend. A strong “base research and technology program” in aeronautics and aerospace is essential for providing the foundation on which to build a wide array of specific applications that serve the national interest.

Given today’s constraints on federal resources, I do not expect the funding gap for aerospace research and technology will be closed in a significant way this budget year. However, I do strongly recommend that the Congress, at a minimum, fully support the NASA aerospace research and technology budget. Moreover, I recommend that the Administration and the Congress take a long-term view of the nation’s investments in aerospace technology and the return on those investments to the American taxpayer. This view should consider the benefits that have resulted from past investments in aerospace technology, and what the consequences to national security and economic growth will be from not investing in the future.

Mr. Chairman, it has been some time since Boeing has testified in support of aerospace research and technology funding. I sincerely appreciate your initiative in providing us this opportunity. My hope is that today’s proceedings are the start of a national dialog on this important subject.

Thank you.