

**STATEMENT BY
MR. JOHN W. DOUGLASS
PRESIDENT AND CHIEF EXECUTIVE OFFICER
AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA**

Hearing on “The NASA Workforce: Does NASA Have the Right Strategy and Policies to Retain and Build the Workforce It Will Need?”

**Committee on Science
Subcommittee on Space & Aeronautics
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Introduction

Chairman Calvert, on behalf of the Aerospace Industries Association of America, or AIA, I wish to thank you, Representative Udall, and the Space & Aeronautics Subcommittee for the opportunity to testify on the human capital challenges that confront NASA and the aerospace industrial base. I would also like to commend NASA for requesting the National Academies study on its workforce, and I am honored to serve on this panel. I will leave the panel findings to Dr. Black and focus my comments on industry perspectives.

As you may know, AIA represents more than 100 regular member companies and 170 small business suppliers, and we operate as the largest trade association in the United States across three sectors: civil aviation, space systems, and national defense. The cyclical nature of our industry also provides us with a long history of workforce development initiatives.

The sections of my testimony, Mr. Chairman, correspond with the four questions that you posed in the witness letter of invitation.

“What trends in the aerospace industry should affect NASA’s workforce planning?”

In workforce planning, NASA must remain aware that a healthy aerospace workforce holds the key to America’s economic competitiveness.

Civil aviation workers foster the movement of people, resources, and ideas that anchor jobs at home while expanding our trade and investment opportunities abroad. Cable and wireless technologies pioneered by military contractors planted the seeds for the Internet and mobile telecommunications. Materials and optical transmission research performed by the space transportation industry has advanced life-saving diagnostic procedures, land management techniques, and our understanding of climate change. And in the realm of national defense, the producers of precision-guided weapons and real-time reconnaissance systems allow our dedicated forces to protect the United States from asymmetrical threats.

Despite these successes, today’s economic environment poses challenges to the U.S. aerospace workforce. Two recessions and subsidized foreign competition have caused the U.S. share of the global aerospace market to fall from 72 percent in 1985 to less than 52 percent today. The aerospace manufacturing workforce, more than one million strong in 1990, now stands at approximately 627,000. Because of the cyclical nature of the industry, NASA must manage its human capital accordingly. The agency, for example, may not need solid rocket fuel until 2010, but rather than close the production facility, the Administration should negotiate with industry to keep it open, thereby preserving highly specialized non-recoverable labor skills.

Our industry also faces a significant shortage of younger, technically-skilled professionals. The average age of the American aerospace manufacturing employee is now 51; the average age for engineers rises to 54. In 2008, 27 percent of aerospace workers will become eligible for retirement. On the basis of briefings that I have received from NASA, the agency's workforce is at least as senior, and perhaps more so, than the general population of aerospace workers.

Previewing future generations, foreign nationals now represent more than 40 percent of the students who earn engineering and science doctoral degrees in the United States. These young people often cannot qualify for sensitive domestic defense and space-related jobs. In addition, the bipartisan *Commission on the Future of the United States Aerospace Industry*, on which I had the honor of serving, found that the math and science testing performance of American students relative to their European and Japanese counterparts gradually erodes to the 10th percentile or below by the end of high school.

In summary, these trends mean that in order to maintain its skilled workforce, NASA must have a long-term plan for the renewal of its human capital and that competition for these skills will likely grow more intense.

“What are the tradeoffs associated with completing work in-house at NASA or contracting them out?”

As the forthcoming National Academies panel report will note, industry has the flexibility to move engineers and managers among programs depending on customer needs, a key advantage for NASA in a constrained budget environment. Work contracted to the private sector also offers the agency the benefit of civil-military integration since so many aerospace companies maintain research and production lines in both sectors. Access to the people and technology in the companies that support the Departments of Defense and Transportation will deliver significant benefits to NASA. We can summarize the third benefit of NASA contractor work in one word: relevance. Private sector work in the realm of aeronautics will ensure that federal research has relevance to engines and aircraft planned for public use. Research with product and application potential subsequently increases the nation's return-on-investment at several levels, such as job creation, increased tax revenue, new services, and technology spin-offs.

NASA, however, must preserve its traditional mission of conducting basic, laboratory-focused research in areas such as aerodynamics or propulsion that yield broad public benefits. In the view of AIA, Agency centers, wind tunnels, and other core facilities will always ensure a role for government research programs that improve operational safety and protect the environment.

In the area of exploration, NASA obligates more than 80 percent of its budget to the space industrial base, giving industry an extensive record of systems development and testing that can support every stage of the *Vision for Space Exploration* (VSE). Since the retirement of the Shuttle and the early phases of the VSE will demand a shift by NASA from operational to broader RDT&E disciplines, it should remain open to alternatives for expanded contractor participation in the latter. The Aldridge Commission, for example, recommended that NASA designate industry as the main service provider for low-Earth orbit payloads.

“What are the critical skills that will enable NASA to complete its goals in space and earth science, aeronautics, and exploration?”

NASA's Systems Engineering and Institutional Transition Team, Mr. Chairman, informs us that while 50 percent of the agency's critical skills have applicability to only one mission directorate, more than 40 percent are needed in multiple directorates, and 80 percent fall under the category of exploration.

Bearing in mind this extensive overlap of disciplines and the centrality of exploration, I would identify the following as among the skills needed by NASA to successfully execute its full range of NASA missions:

- Systems engineering;
- Project management;
- Manufacturing technology for human space flight;
- Human space flight operations;
- Fuel technology;
- Aerodynamics;
- Experimental methods;
- Materials technology;
- Advanced space propulsion; and
- Small nuclear reactor skills.

I would just close this segment, Mr. Chairman, by noting that from its inception, NASA has served as an inspirational workforce organization for engineers and scientists. The half-century old X-1 project, for example, defined the post-war synergy among between U.S. military forces, industrial capabilities, and research facilities. This platform exemplifies the vision that the agency must sustain to attract America's best and brightest.

"Does industry have the capacity to successfully absorb additional work from NASA?"

This question also serves as an appropriate point for the conclusion of my testimony. Without a doubt, industry has the personnel, facilities, and flexibility to absorb additional work from NASA. The cyclical nature of the aerospace business also means that extended partnerships with NASA and other federal agencies will support the industrial base in preserving core research and manufacturing competencies. This absorption can occur primarily through two of the agency's mission areas:

- aeronautics programs that combines basic and transitional research for the benefit of society; and
- contractor R&D capabilities for executing the *Vision for Space Exploration* as NASA changes its operational and workforce and requirements with the retirement of the Shuttle.

Thank you once again, Mr. Chairman, for this opportunity to share the perspectives of AIA on the workforce challenges faced by NASA and industry. I am optimistic that the two parties can find creative and efficient ways to manage their human capital since space systems make such a vital contribution to the military and technological power of the United States.