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Introduction

Chairman Everett, on behalf of the Aerospace Industries Association of America, or AIA, I wish to thank you, Representative Reyes and the Members of the Strategic Forces Subcommittee for the opportunity to testify this afternoon on the human capital challenges to the development of a flexible and technically proficient national security space workforce.

In the 21st Century, digital communications have become vital to the ability of the U.S. military to project power rapidly and effectively. Stable Defense Department space organizations, with transparent skill concentrations and established career plans, can subsequently function as key force multipliers since the United States faces new adversaries -- concealed in mountain ranges, embedded among city dwellers, or protected by rogue regimes -- whom we must confront through a combination of ground-based special operations and satellite-generated intelligence data.

I am therefore grateful, Mr. Chairman, for the chance to discuss the industry's perspective and initiatives regarding space workforce revitalization. AIA has a long record of leadership in addressing human capital issues since our member companies employ nearly 600,000 engineering and production workers. With approximately 80 regular and more than 150 associate members, we operate as the nation's largest trade association in the aerospace manufacturing arena.

Aerospace Industry Human Capital Trends

At the beginning of the nation's second century of flight, the civil aviation, space, and military assets of our industry have never made a more critical contribution to the economic and national security of the United States. This contribution, in turn, demands a skilled and motivated workforce.

The cultivation of a professional military space workforce, as the Rumsfeld Commission made clear, depends on the country's scientific and engineering capabilities. To support science and engineering occupations, industry and government must expand their education, recruitment, life-long training, and scholarship efforts. The United States

has lost more than 600,000 aerospace jobs in the last 14 years, and the industry's manufacturing sector employment stands at its lowest level since the Second World War.

While aerospace employment has declined significantly since the end of the Cold War, the industry accounts for four percent of the U.S. manufacturing workforce. Our industry as a whole, taking into account the supply chain and the indirect economic impact of products, totaled almost $900 billion in sales last year and accounted for approximately one in seven American jobs.

The average age of the aerospace production employee, however, now exceeds 50 years; the same number for engineers rises to 54. In 2008, 26 percent of aerospace workers will become eligible for retirement. Government agencies confront similar demographic trends. NASA's personnel under the age of 30, for instance, are one-third the number over the age of 60.

As the workforce ages, technical professionals also migrate to other disciplines. Twenty-five years ago, aerospace companies employed 20% of the nation's R&D scientists and engineers; by 2001, the level had tumbled to 2.4%. At the same time, foreign nationals represent 41% of the students now earning engineering and science doctoral degrees in the United States. These young people often cannot qualify for sensitive domestic defense and space jobs.

Previewing future generations of workers, we find that the math and science testing performance of students in the U.S. relative to their European and Japanese counterparts gradually erodes to the 10^{th} percentile or below by the end of high school. These aggregate figures confirm that aerospace companies face a dramatic shortage of technically-skilled professionals.

The National Security Space Sector: Incubator of Technical Workforce Renewal

National defense space agencies open a window on the broader workforce revitalization challenges to the aerospace industry. In his March 19, 2003 House Armed Services Committee testimony on National Security Space activities, for example, Secretary Teets identified a full spectrum of information, surveillance, and reconnaissance technologies sustained by America's space launch and satellite network. The Secretary added that the Air Force was building a cadre of professional acquisition and systems management personnel to deal with the complexity and high cost of deploying these technologies.

The November 2002 report of the bipartisan *Commission on the Future of the United States Aerospace Industry* also warned that anemic investments by federal research organizations could prompt the nation to forfeit the development of several "breakthrough capabilities" in high-performance computing, propulsion, and alternative fuels such as hydrogen for air vehicle engines. The space research and transportation sectors in particular both have a central role to play in the advancement of such capabilities.

From real-time enemy surveillance to streamlined procurement practices and more efficient energy sources, the skills applied by the American space workforce, Mr. Chairman, offer us a framework for the renewal of defense-related science, engineering, and technical occupations.

Reforming and Rebuilding the Aerospace Workforce of Tomorrow

AIA, along with the Departments of Defense, Labor, and Commerce, as well as a number of state employment agencies, have undertaken a variety of initiatives to revitalize the aerospace workforce. In the Pentagon, Department-wide human capital programs will prove necessary to surmounting the single largest barrier to the creation of a reliable cadre of military space professionals: a lack of leadership expertise. The Rumsfeld Commission's study of the 150 top DOD space operational positions revealed that less than 20 percent of the flag and general officers who hold these appointments had space career backgrounds. This trend disrupts the process of improving the performance of military space organizations through continuous, high-level guidance on strategy, execution, resource investments, and recruitment.

The bottom line is that if the Air Force fails to provide a clear and achievable career path to leadership positions for space professionals in its corps of general officers, the Service should and will lose its space-related missions.

In light of this problem, AIA strongly supports the Pentagon's ongoing effort, recommended by the Rumsfeld Commission and the GAO, to develop a National Security Space (NSS) human capital strategy.

We also commend Secretary Teets for his leadership in the creation of a mission-specific Air Force space curriculum with options for mid-career refresher courses. In addition, the Naval Postgraduate School and the Air Force Institute of Technology have started a joint graduate-level program for military space professionals.

From the industry side, AIA, in conjunction with its federal and state partners, launched the National Aerospace Workforce Initiative last December. Charged with devising solutions to what the *Aerospace Commission* termed a "devastating loss of skill, experience, and intellectual capital" in our industry, the Initiative brings together company representatives as well as officials from the federal government, organized labor, the states, and trade associations.

Over the last seven months, our Initiative Committee has begun the process of examining best practices that will eventually form the basis of a national aerospace workforce strategy. The core of this strategy centers on an effort known as *Solutions Aerospace*, a state-focused pilot program to identify gaps and incubate reforms in industrial base training, recruitment, skills development, and education. AIA has proposed that the *Solutions* pilot initially take root in the major aerospace states of

Alabama, California, Connecticut, Colorado, Ohio, Florida, Illinois, New York, Texas, Virginia, Washington, and Wisconsin.

AIA's recommended objectives revolve around action plans in each pilot state to meet the following challenges:

- combining the assets of state agencies and the federal government to execute the Labor Department's "power of e3" strategy (education, employment and economic development) through worker, student and faculty enrichment programs;

- establishing a program element to reduce factory and research facility turnover and harness the energies of non-traditional labor pools to stem the loss of technical talent;

- revising curricula to address K-12 math and science education, vocational training, and undergraduate courses of study; and

- creating online databases that list state aerospace job openings and alert students and entry-level candidates to workplace fellowship opportunities.

In support of *Solutions Aerospace*, Mr. Chairman, the Labor Department's Employment & Training Administration, under the diligent leadership of Assistant Secretary Emily Stover DeRocco, has acted on another key recommendation of the *Aerospace Commission* by convening an inter-agency federal task force to ensure that Washington and the states coordinate resources to reduce industry personnel and education shortfalls.

Secretary DeRocco's task force complements the second part of the AIA Initiative: *Destiny Aerospace*, which outlines a plan for expanded classroom instruction in math and science to stimulate student commitment to aerospace careers. *Destiny Aerospace* consists of elementary, high school, teacher training, and college work-study components. For the youngest students, *Destiny* proposes a series of curriculum tools to combine traditional instruction with technology and engineering case studies. Primary and middle school teachers, for example, would receive instructional packages that rely on aviation and space applications to explain affiliated math and science concepts.

This technique gains new dimensions during the high school years with field trips, extracurricular activities, and fellowship assignments. At the college level, *Destiny* envisions the recruitment of students to earn tuition and academic credits by supporting teachers in the elementary and high school programs and to serve as aerospace course-of-study counselors.

AIA has enhanced its space education activities by sponsoring an annual nationwide Team America Rocketry Challenge (TARC), the world's largest

competition of its kind. During the last two years, the TARC has attracted more than 16,000 students from all 50 states for a model rocket design competition to meet specific technical objectives, and we expect more than 10,000 participants in 2005. The friendly competition, teamwork, and pride in achievement generated by this event make the Rocketry Challenge an inspirational experience for new generations of scientists and engineers.

Finally, AIA commends both the FAA and NASA for their forward-looking approaches to workforce development. NASA's Human Resources Consortium serves as a model plan for the federal government. The agency's Education and Human Resources Enterprises have pioneered new scholarship and recruitment programs to narrow gaps in professional skills across the organization. This approach, by assigning responsibilities to all functional and program activities, makes the improvement of human capital a continuous institutional mission.

Solutions Aerospace and *Destiny Aerospace*, Mr. Chairman, draw on the time-tested practices of early inspiration and early intervention to revitalize our workforce. We have a compelling story to tell -- aerospace enterprises equip the nation not only to defend itself, but also to trade, communicate, and explore the galaxy at revolutionary degrees of precision. One of the missions of AIA is to persuade students and younger workers to rise as the future trustees of this revolution in the interest of making our economy more innovative and our homeland more secure.

Conclusion: Improving Life at Home By Exploring the New Frontiers of Space

Mr. Chairman, the critical requirement to sharpen the nation's military space capabilities reflects the larger benefits of restoring a safe and reliable space exploration program. The new national vision for the robotic and human navigation of the Moon, as well as long-term travel beyond Low-Earth Orbit, represents the most significant realignment of American space programs since the flight of Apollo 11 more than thirty-five years ago this week.

AIA has dedicated our organization to the task of moving the space exploration program into a new age. Delivering human space farers to the frontiers of the solar system will help us with the improvement of economic and physical life at home. The prospects for discovering more effective means of industrial production, transportation and environmental resource management, for example, show how the benefits of space can address the traumas and challenges of everyday life.

After the attacks of September 11th, search and rescue crews relied on space robotic technologies to survey the devastated site of the World Trade Center. Ultrasound techniques developed by NASA also allowed doctors to treat burn victims of that tragedy with greater speed and efficiency.

International developments similarly point to the importance of maintaining the role of the United States as the world's leading space power. For the first time ever, American competitors in Asia have undertaken human space flight programs. Moreover, the European Union has announced the ambition to overtake the U.S. in several commercial space activities during the next several years.

Space, Mr. Chairman, charts our future, because its proven benefits have allowed the United States to make dramatic strides in personal health, public safety, and national prosperity. The benefits of space allow us to overwhelm our adversaries by knowing their movements in advance. They allow us transform our economic and cultural lives by interacting and learning through high-speed satellite transmissions. And they alert us to potential diseases or disorders in time to take life-saving measures.

AIA therefore applauds the Subcommittee's interest in the space component of a high-skill, high-morale American aerospace workforce. Our commitment today can set the stage for decades of continued technological and educational leadership as global trade and investment intensify the engagement of the United States with the world. We appeal to both the Subcommittee and the Congress as a whole to continue their enthusiastic support for a national plan to reinvigorate this vital element of America's economy and national defense infrastructure.