

House Committee on Science and Technology
Decisions on the Future Direction and Funding for NASA: What Will
They Mean for the U.S. Aerospace Workforce and Industrial Base?

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Good morning Chairman Gordon, Ranking Member Hall and members of the Committee. I am grateful for the opportunity to testify before you today on the importance of the future direction and funding for NASA and what that will mean for the U.S. aerospace workforce and industrial base.

As the largest aerospace trade group in the United States, the Aerospace Industries Association (AIA) represents nearly 300 manufacturing companies with over 631,000 high-wage, highly skilled aerospace employees across the three sectors: civil aviation, space systems and national defense. This includes the thousands of workers who make the satellites, space sensors, spacecraft, launch vehicles and ground support systems employed by NASA, DoD, NOAA, NRO and other civil, military and intelligence space efforts. Our member companies export 40 percent of their total output, and we routinely post the nation's largest manufacturing trade surplus, which was over \$57 billion in 2008. Aerospace indirectly supports 2 million middle class jobs and 30,000 suppliers from every state. The aerospace industry continues to look to the future, investing heavily in research and development and spending more than \$100 billion since 1995.

Our members are deeply concerned with the issues of workforce and the industrial base, so I am delighted that you are undertaking a serious review. In our most recent "Member Needs Assessment," a lack of a trained technical workforce for the future was an extremely urgent industry issue for our membership.¹ As part of our response, AIA produced the report, "Launching the 21st Century American Aerospace Workforce," which documented the rising concerns over the future of our aerospace workforce, and detailed how our industry is addressing this issue, including recommendations on how to partner with government to improve our education system.

¹ 2008 AIA "Member Needs Assessment" Report.

Last year, AIA also produced a seminal report entitled: “The Unseen Cost: Industrial Base Consequences of Defense Strategy Choices.” This report provided analysis on how certain defense decisions made by policymakers could impact the future of our industrial base from a national security perspective. Among our conclusions: Government decisions directly impact the ability of our industry to mobilize and these decisions could either weaken – or preserve -- the capacity to do so rapidly. Thus, policymakers need to be keenly aware of the long-term impact that policy can have on our industrial base.

Our nation’s space endeavors are encountering this same challenge, which this hearing has been convened to examine today.

Much of our industry’s success can be attributed to the growth of our nation’s space program and we are proud of NASA and industry’s many achievements. American astronauts have been aboard the International Space Station continuously since 2000; our probes are en route to, or have reached, all the planets of the solar system and have explored the surfaces of the moon, Venus and Mars. Our telescopes are looking deep into the cosmos and satellites gaze upon the Earth, monitoring climate change. NASA has led these achievements in partnership with our industry.

Now NASA is at a crossroads in deciding its future options for space exploration. The U.S. human space flight program is being debated by policymakers.

While this is an issue for the Administration and Congress to deliberate, your decisions regarding NASA’s programs will undoubtedly affect our current and future aerospace workforce and industrial base.

NASA and the Aerospace Workforce

Concerns over the Current Workforce and Industrial Base

NASA’s programs play a critical role when it comes to the aerospace workforce, which supports everything from its launch vehicles to satellites.

According to NASA there are about 45,000 “work year equivalent” contractors. AIA further estimates that about 151,000 contractors are indirectly enabled by NASA.² And

² 2008 AIA Facts & Figures.

according to NASA's latest workforce transition strategy there are 4,600 civil servant "full-time equivalents" working on the current programs of record, Shuttle and Constellation, and as many as 21,200 contractor "work year equivalents" in 2009.³

Under current plans for the Shuttle's retirement and the transition to the Constellation program, NASA projects a drop of almost 7,000 contractor "work year equivalents" in the next two years and will recover only 1,200 the two years following. In other words, contractors will drop to 17,000 from 21,200 by 2013.⁴

Some regions will be hit hard by the transition. In Brevard County alone, Shuttle-related activity in Florida supports a workforce level of approximately 9,235 contract employees, (not including Federal workers). The total estimated shuttle-related annual payroll for this workforce is estimated at \$600 million. Additionally, the shuttle program provides an estimated secondary economic contribution to the state, above salaries, of approximately \$2 billion.⁵

I bring these points up to highlight the impact NASA's human space flight program has on the lives of so many Americans. Brevard County is but one example. As Congress and policymakers deliberate over the future of NASA, we should reflect on the unique skills of these men and women and the regions that benefit directly from these programs.

NASA is linked to the health of our industrial base. While the loss of a person's job is no small matter, especially in light of today's economic environment, we must also view these jobs as a national resource critical to our nation's technological capability and our national security.

Aerospace talent lost to other industries may be unrecoverable; new workers may take years to train. Additionally, if we lose certain facilities that manufacture high-tech technologies, it may take years and additional resources to bring them back.

Among the issues affecting the health of our industrial base that need to be considered by the White House and Congress are: How to maintain required skills for the duration of the shuttle's operation, how to maintain the workforce skills required for utilization of the ISS and how to transition the workforce to other current and new NASA programs.

³ 2009 NASA Workforce Transition Strategy, 3rd edition.

⁴ Ibid.

⁵ 2007 Brevard County Development Board.

Concerns over the Future Workforce

Another crucial relationship NASA has with the aerospace workforce is its ability to attract and educate future workers. In fact, the demographics of our industry reflect an influx of young workers who entered our industry during exciting times in our space program.

Developing the aerospace workforce of the future is a top issue for our industry. As the leader of the largest U.S. aerospace trade association, the most significant concerns and trends facing the U.S. aerospace workforce and industrial base at the present time include the impending retirements within the next decade. Today, 13 percent of our workforce is eligible to retire. By 2013, retirement eligibility for some job functions like R&D and program managers will be around 20 percent.⁶

The state of education for our young people is also in peril, including poor preparation for Science, Technology, Engineering and Mathematics, also known as STEM fields; low graduation rates of students in those fields, especially when compared to other nations, and a lack of interest in STEM fields overall.

Currently, the U.S. annually graduates just 74,000 engineers – covering all fields in the discipline. Further, many of these students are foreign nationals who return home shortly after graduating – which lowers the number of new domestically employable engineers under 60,000.⁷ By comparison, India and China respectively graduate six and ten times more engineering students each year.⁸ If this continues, the U.S. runs a real risk of losing its skilled engineering edge over other nations.

The latest national test scores show that, in math, fourth graders are 62 percent below proficient and eighth graders are 69 percent below proficient. In science, fourth graders are 68 percent below proficient, while eighth graders are 73 percent below proficient.⁹

In a study done by Raytheon, most middle school students said they would rather do one of the following instead of their math homework: clean their room, eat their vegetables, go to the dentist or take out the garbage.

⁶ 2009 Aviation Week Workforce Study.

⁷ 2008 American Society for Engineering Education, “Engineering by the Numbers.”

⁸ 2005 National Academies: Rising Above the Gathering Storm.

⁹ 2007 National Assessment of Education Progress, U.S. Dept. of Ed.

This lack of interest seeps into interest in aerospace. For example, in a recent survey 60 percent of students majoring in STEM found the aerospace and defense industry an unattractive place to work.¹⁰

One of the reasons for a lack of interest in aerospace and defense could be the uncertainty of NASA programs.¹¹ A commitment to a robust human spaceflight program will help attract students and hold workers.

If a decision were made to reduce programs, the implications would be detrimental for our aerospace community and national security. Just as the recent Wall Street crisis turned young people away from financial careers, a lack of job security in aerospace will also hurt. Google has captured the magic to attract young people, while space, despite its history and potential, has lagged behind.

Young people want to work for companies with exciting opportunities. For example, when Lockheed Martin was hiring for the Crew Exploration Vehicle they had 25 high-qualified resumes for each job. There are other companies are doing exciting work; for example, the commercial resupply to the International Space Station service contracts at SpaceX. Young people are inspired by the projects they get to work on.

To help bring enthusiasm for the aerospace industry, AIA is being innovative. We run the Team America Rocketry Challenge, or TARC, for middle and high school students.

TARC starts off with a regional competition, with students teamed in many cases with real rocket scientists, with qualifiers coming to the Washington, D.C. region for the national competition. Their challenge requires them to achieve a designated flight time and altitude all while safely returning a raw egg payload. The winning team goes on an all-expense paid trip to the international competition for the “Trans-Atlantic Trophy.” Last year our students were in Paris; a year before, in London. Plus, the top-scoring teams get invited by NASA to participate in a more demanding Student Launch Initiative.

The excitement of participating in TARC is inspirational; we have heard more than a few stories about young people who now work in our industry because of their TARC experience.

¹⁰ 2009 Experience Industry Survey.

¹¹ 2007 National Academies: Building a Better NASA Workforce.

Since our first contest in 2003, one of the participants majored in aerospace engineering at the Naval Academy and is in the Navy in Florida flying helicopters. Another is a software engineer working on tanks, and a third is an aerospace engineer at an aviation company. And there are more success stories like these.

In a survey of participants we found that TARC has a strong impact. For example: 83 percent became more interested in science and math as a result of TARC. Almost 70 percent became more interested in a STEM career as a result of TARC and 81 percent gained a better understanding of how math, science, and technology are used to solve problems in the real world.

Many of AIA's members also have their own exciting STEM initiatives. Among these are Raytheon's "Math Moves U", Boeing's "Space Camp", Northrop Grumman's "Flights of Discovery" and Lockheed Martin's "Space Day." Our companies are literally investing millions of dollars to help inspire and attract the future aerospace workforce.

AIA CEOs have also publicly announced that this is an issue for our industry and have committed to actions to address STEM, as described in AIA's "Launch into Aerospace" report.¹² Such actions include: encouraging industry professionals to participate in mentoring and other volunteer activities; earmarking corporate grants for educational programs, and making government a partner in achieving the future technical workforce.

NASA's Office of Education is also very involved in STEM programs. In fact, the report I mentioned earlier: Launching the 21st Century American Aerospace Workforce, helped catalyze a joint industry-education forum last week at NASA to discuss ways in which we can collaborate on this important issue.

While AIA and NASA are vigorously engaged in the "supply" side of the equation, it's the "demand" side that also has to be worked on by Congress by providing the resources needed for important aerospace projects. These, in turn, provide young people with exciting programs to work on. A robust and sustainable space exploration program is key to building the workforce.

¹² 2008. "Launch into Aerospace" (Report)

What can Congress do?

Most importantly, maintaining our workforce depends on continuing stable and robust funding for our nation's space programs. By their very nature, space programs take several years to develop, test and build. Fluctuating budgets and delayed programs adversely affect the schedule, production and maintenance of a skilled workforce. Budget shortfalls also deeply impact agencies like NASA that have been asked to take on many important projects simultaneously.

We need the Administration and Congressional leadership to conceive of and treat space as a "singular enterprise," for which the decisions and strategies of the many agencies using space are coordinated at a White House level. This will better leverage and align our nation's space endeavors.

Our space industrial base designs, develops, produces and supports our spacecraft, satellites, launch systems and supporting infrastructure. These systems are often produced in small, or even single, numbers. We need to keep this base healthy. We ask that Congress remains mindful that interruptions or cancellations negatively impact large companies and can be catastrophic to smaller firms – which often are the only entities with the unique abilities to produce small but critical components on which huge portions of our infrastructure and security depend.

To maintain and capitalize on our leadership in space exploration, the federal government needs to ensure support for U. S. space exploration, provide for maximum utilization of the International Space Station and support NASA's science and aeronautics programs.

Congress and the White House must also help instill an exciting direction for NASA's efforts that could include: a robust commercial space sector that provides cargo resupply to the International Space Station; exploration plans that go beyond low earth orbit; cutting-edge space and aeronautics designs; utilizing the national laboratory aboard the ISS for innovative research; U.S. leadership that promotes peaceful international cooperation in the pursuit of interests important to all of humanity, and earth observation programs to help study our planet and address important issues such as climate change.

While we want to have a young workforce looking out to space we also need to ensure we have the right skill set looking back at the Earth. Observing the Earth's

environment takes a global perspective – a perspective space-borne systems supply. How can we draw young people toward this special skill set? I would suggest that one approach would be for our agencies that use space imagery, such as NASA, NOAA, USGS, the EPA and others, to work with companies that make this imagery widely available to the public. Let’s find ways to make these services both exciting and educational to draw our next generation into Earth sciences, geology and even cartography.

Supply and demand

What can drive more engineering-minded students into the discipline of aerospace and aeronautics? I believe the opportunity to expand human spaceflight is the ideal type of project. An industry that can inspire them must remain vibrant and active.

Over decades, our space programs and workforce have helped fuel our economy and advance our technologies.

The United States has enjoyed preeminence in aerospace in great part due to our space program. That leadership is now in danger. The primary threat comes not from competitors’ actions but from our own aging demographics and potential failure to act, both of which could be detrimental to our future aerospace and space programs.

The generation of aerospace talent that won the Moon Race and the Cold War is reaching retirement age, while our Shuttle workforce is also aging. Unfortunately, America is not producing the volume and quality of engineers, designers and technicians needed to even begin replacing those who have served so well for so long.

While Congress considers the future of NASA’s funding and direction we must also continue as the world leader in space exploration by investing in our young people and providing cutting-edge programs for them work on. The vitality of our nation depends on a vital workforce.

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