



**Committee on Commerce, Science and Transportation—
Subcommittee on Science and Space**

Contributions of Space to National Imperatives

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Introduction

Chairman Nelson, Ranking Member Boozman, distinguished members of the Subcommittee. It is an honor and a pleasure to testify before you today on the importance of NASA's space exploration program and the role of space in addressing America's national priorities.

I am here on behalf of the Aerospace Industries Association (AIA)—we are an association of over 300 aerospace manufacturing companies and the highly-skilled employees who make the spacecraft, launch vehicles, sensors and ground support systems employed by the National Aeronautics and Space Administration (NASA), Department of Defense, National Oceanic and Atmospheric Administration (NOAA), the National Reconnaissance Office (NRO), and other civil, military and intelligence space organizations. This industry sustains nearly 11 million jobs, including many high-skilled, high-technology positions. The U.S. aerospace manufacturing industry remains the single largest contributor to the nation's balance of trade, exporting \$80.5 billion and importing \$27.2 billion in relevant products in 2010, for a net surplus of \$53.3 billion.¹

We appreciate the efforts of Congress to keep our commercial, civil and national security space programs healthy. We are pleased that Congress recognizes that space capabilities have increasingly become part of everyday life and that virtually every part of the U.S. economy has been touched by their applications.

Space programs are essential to our national, technological and economic security. U.S.-developed space technology and its many spin-offs have fueled our economy and made us the unquestioned technological leader in the world for two generations. U.S. economic and technological leadership enabled us to prevail in the Cold War and emerge as the world leader in a new era.

AIA was disappointed that the president's fiscal year 2012 budget proposal underfunds NASA by nearly \$800 million below its authorized level—\$19.4 billion—agreed upon just last fall. Given the current fiscal environment, AIA believes that the level of funding proposed by the administration for NASA provides at least the minimum required for its important programs. It is therefore imperative that NASA receive the full amount of the president's fiscal year 2012 budget request of \$18.7 billion. When allocating this funding, AIA's position is that funding for NASA should reflect the budget priorities as outlined in the NASA Authorization Act of 2010 as closely as possible.

The Need for Program Stability

Despite the clear bipartisan direction provided in the NASA Authorization Act of 2010 and in the fiscal year 2011 Year-End Continuing Resolution (CR), substantial uncertainty remains over the direction NASA will take—most specifically on the new heavy-lift space launch system. The impact of the long delayed fiscal year 2011 Continuing Resolution, the current budget climate and the impending gap in America's

¹ US Census Bureau, Merchandise Trade Exports/Imports Quarterly 2010.

ability to launch crews into space—after decades of ever increasing capability—are causing ripple effects throughout the space industrial base and highly trained space workforce in both private and public sectors.

Fluctuating budgets and delayed programs take their toll on schedule, production and maintaining a skilled workforce—exacerbated by the winding down of the space shuttle program. This funding and programmatic instability may result in the permanent loss of this highly skilled, unique human capital by reducing the options for retaining this specially trained and skilled workforce. Our nation's aerospace workforce is a perishable national treasure; experienced aerospace talent, once lost, may be unrecoverable and new workers without this critical experience may take years to train. Unfortunately, the on-again off-again plans for the Shuttle's replacement over the past decade have led to considerable uncertainty not only at NASA—where civil service positions are protected—but across the entire industrial base where firms are faced with wrenching decisions to let highly skilled personnel go because of the lack of clear direction.

At a time when the space shuttle is being retired and the United States is paying over \$60 million a seat to Russia in order to get crews to the International Space Station, it is critical that NASA's new programs for exploration and crew transportation be adequately funded to remain on track. Fifty years after astronaut Alan Shepard became America's first man in space, two generations of Americans have never known a time when we were not engaged in human space flight. But let us be clear, this is a legacy not an entitlement—without continued investment, this could become the last generation of Americans to be members of a spacefaring society.

In addition to workforce impacts, failure to stick to a funding plan for space programs makes it difficult to manage them effectively, sends mixed signals to an industry making long term investments and places them at risk of overruns or cancelation—jeopardizing the taxpayer investments already made.

NASA's research and development efforts have consistently produced ground-breaking technologies with benefits for nearly everyone on the planet. Investments made in NASA have produced invaluable benefits to our national security, economic prosperity and national prestige and should be pursued as sound economic stimulus.

NASA Space Spending Impacts All Sectors, Including National Security

The U.S. military and national security communities rely on the space industrial base to provide them with capabilities they require to keep our nation secure. 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 to maintain our competitive edge.

Interruptions or cancellations negatively impact large companies and can be catastrophic to smaller firms—often the only entities with the unique abilities to produce

small but critical components on which huge portions of our economy, infrastructure and security depend. As an example, only one firm in the United States produces ammonium perchlorate—a chemical used in solid rocket propellants including the space shuttle solid rocket motors, other space launchers and military applications. Retiring the shuttle will impact all these other users as costs rise due to a smaller business base.

The U.S. military and national security communities rely on the space industrial base to provide them with capabilities they require to keep our nation secure. Due to export restrictions on space technology and limited commercial markets for space systems, key elements within industry often must depend on stable government programs for survival. This two-way, symbiotic relationship means that in order to keep our overall national security strong, both sides of this relationship are critical.

Given the lack of a large external space market, such as exists in civil aviation, if government spending pulls back from investing in the space domain—be it in NASA, the Defense Department or Intelligence Community—the industrial base will shrink accordingly. This will mean capacity loss and potentially leaves the United States incapable of building certain national security assets in the future.

Investing in NASA Benefits STEM Education

Developing the aerospace workforce of the future is a top issue for our industry. NASA's space programs remain an excellent source of inspiration for our youth to study the STEM disciplines—science, technology, engineering and math—and to enter the aerospace workforce. In fact, the exciting periods of our space program history are reflected in the demographics of our industry and the influx of young workers they engendered.

Unfortunately, the state of education for our young people is today in peril, including poor preparation for STEM disciplines. American students today rank 25th in math and 17th in science internationally. Low graduation rates of students in those fields and an overall lack of interest in STEM education contribute to a looming shortage of workers qualified to become professionals in our high tech industries.

In a study done by Raytheon, one of our member companies, 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 even take out the garbage. This lack of interest extends into interest in aerospace. For example, in a 2009 survey 60 percent of students majoring in STEM disciplines found the aerospace and defense industry an unattractive place to work.²

One of the reasons for the lack of interest in aerospace and defense could be the uncertainty of NASA programs.³ Just as the recent Wall Street crisis turned young people away from financial careers, lack of job security in aerospace will hurt recruiting

² 2009 Experience Industry Survey.

³ 2007 National Academies: Building a Better NASA Workforce.

efforts. The video gaming industry has captured the magic to attract young people, while space—despite its history and potential—has lagged behind. In some instances, our own employees discourage their children from pursuing careers in aerospace engineering due to the uncertainty of future programs and career prospects. A commitment to a robust human spaceflight program will help attract students to STEM degree programs and help retain the current workforce—which also benefits national security space programs, many of which are not in the open.

While AIA and NASA are vigorously engaged in the “supply” side of the equation—exciting and inspiring students to study math, science and engineering—it’s the “demand” side that needs congressional action by providing the resources needed for visible and inspiring aerospace projects. These, in turn, provide young people with exciting programs to work on in the near future and on an ongoing basis. A robust and sustainable space exploration program is essential to building a future aerospace workforce capable of technological innovation and economic competitiveness.

Investments in NASA Have Increased Economic Prosperity

Since its beginnings, NASA has been at the forefront in developing new technologies to meet the challenges of space exploration and much of what has been developed has had benefits in other areas. The list of NASA-derived innovations is impressive and wide-ranging, including memory foam cushions, video image stabilization technology, cordless power tools, power sources for heart defibrillators, ventricular assist pumps for heart disease, portable breathing systems for firefighters and many others. These NASA-enabled innovations are not just old history; for example, today the International Space Station is enabling us to develop new vaccines to protect people from Salmonella and MRSA pathogens by exploiting the organism’s response to the weightless environment.

Past NASA investments such as the Apollo moon landing program stimulated technology development like the miniaturization of electronic circuits. Electronic computers were first created during World War II, but miniaturization in the 1960’s enabled the first personal computers to be created in the late 1970’s and early 1980’s—by a generation of inventors who grew up during the Apollo era. In fact, today a number of new commercial space systems are being developed by entrepreneurs who have made their fortunes in information technology or other fields, but whose intellectual development was inspired during Apollo.

NASA is a Source of National Pride

And then there are space program benefits that don’t have a dollar figure attached—those unquantifiable “know it when you see it” benefits that reap long-term rewards—increasing our nation’s pride in our abilities and garnering attention from across the globe. These include the already mentioned Apollo program, the space shuttle and International Space Station, numerous planetary spacecraft which have revealed the wonders of our solar system as well as spacecraft which have helped us understand our

home planet and the universe. If there is one area where the world unquestionably looks to the United States for leadership, it is in our space program.

Conclusion

The future of U.S. space investments are threatened due to our constrained fiscal environment. While cutting the federal deficit is essential to assuring our economic future, cutting back on exploration investments is a penny-wise but pound-foolish approach that will have an infinitesimal impact on the budget deficit. Cutting exploration any further threatens our economic growth potential and risks our continued national technical leadership overall—even as emerging world powers increase their investments in this important arena. China, India, South Korea and other rapidly developing economies are investing in space technology.

In the decade ahead, our nation's future in space will likely see one or more commercially developed American crew vehicles supporting the International Space Station and potentially new commercial space stations, as well as a robust NASA multipurpose crew exploration vehicle and new heavy lift launch system that will be getting ready for new missions of exploration beyond Earth orbit. But this bright and inspiring future is dependent on our nation continuing to make the critical investments in programs and technologies needed to lead in space.

In conclusion, the U.S. human spaceflight program is at a critical juncture. As a nation we can choose to continue our leadership in manned exploration and innovation or inevitably fall behind.

I thank the committee for their time and attention and would be happy to answer any questions.