



**Committee on Science and Technology  
Subcommittee on Space and Aeronautics  
U.S. House of Representatives  
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***Introduction***

Good morning Chairwoman Giffords, Ranking Member Olson and members of the Subcommittee. I am grateful for the opportunity to testify before you today on the growth of global space capabilities.

As the largest aerospace trade association in the United States, the Aerospace Industries Association (AIA) represents nearly 300 manufacturing companies with over 640,000 high-wage, highly skilled aerospace employees across the three sectors: civil aviation, space systems and national defense. This includes over 140,000 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 all 50 states. The aerospace industry continues to look to the future, investing heavily in research and development, spending more than \$100 billion over the last 15 years.

AIA appreciates the efforts of the Congress to keep our civil and national security space programs healthy, as well as in promoting commercial space ventures. Over several decades space technologies have increasingly become a part of our daily lives with virtually every part of the U.S. economy being touched by their applications.

Commercial interests such as banking transactions, business and personal communications, and precise location for our emergency responders, airliners and automobiles all depend on communications and GPS satellites.

Essential national security information and support of our troops' military operations are all are dependent upon space assets.

Weather and climate satellites give us life saving warnings and provide us recurring, global wide data on climate change.

Observing, monitoring and exploring space relies on incredibly robust equipment functioning in extremely hostile and demanding environments.

Additionally our space programs, particularly NASA's work, remain an excellent source of inspiration for our youth to study science, technology, engineering and mathematics and to enter our aerospace workforce on which much of our nation's transportation, security and satellite infrastructure depend.

### ***Global space capabilities***

For many years the benefits of space programs were provided primarily by the United States and Russia. Our leadership was based on the strength of our engineers and scientists, and research and development supported by our industrial base. Our lead was also achieved because space was given a 'Cold War' priority and funding at a level it no longer receives.

Now other nations with the foresight to make the necessary investments and a pool of talented workers have rapidly caught up. By learning from our early successes and mistakes their investments - while not insubstantial - have generally not needed to be as great as ours to reach near parity.

Allow me to quickly mention just a couple of areas where the U.S. can rapidly lose its leadership edge in space: satellites and human spaceflight.

Satellites are now employed and built by a number of nations. Because of U.S. export control restrictions some foreign built satellites actually advertise themselves as "ITAR free." The U.S. share of overall world wide satellite manufacturing revenues was 47 percent - or 4.6 billion dollars - in 2003 but it decreased to only 29 percent - or 3.1 billion dollars, in 2008.

An example of other nations developing their own satellite systems can be seen with Global Positioning System satellites, or GPS. Our GPS system is used by our military, airlines and emergency responders. It also provides exact timing that allows our communications to share limited bandwidth with more than one party at a time. This timing is also important to accurately mark financial and banking transactions.

Of the 144 billion dollars generated world wide by satellite revenues in 2008, roughly 23 billion are directly related to America's GPS system.

As a result, other nations are moving into the global navigation satellite market. Russia has modernized its GLONASS system and plans to launch six more satellites by March. It should be complete next year. The Europeans and Chinese both plan to have their

systems – Galileo and Compass - operational between 2014 and 2017. India and Japan are also developing their own systems.

New global navigation satellite systems will compete with our system, impacting our revenues. They will also raise issues of compatibility (ensuring new systems don't impact the function of existing ones) and interoperability (where the systems can work together).

In regard to human spaceflight, other nations clearly recognize the value of space programs as innovation drivers, increasing world stature and as a source of national pride.

The Chinese orbited one “Taikonaut” for nearly a full day in 2003. Since then they have achieved significant milestones (multiple crews, orbital maneuvers and space walks). The Chinese have made these steps at about the same pace as the U.S. and U.S.S.R. did during the moon race and they are doing it with far fewer flights.

The Chinese “Shenzhou” spacecraft is an adapted design of the Russian Soyuz, which the U.S.S.R. once sent around the moon and returned safely to the Earth with turtles aboard as biological specimens. Using several flights on its Long March V rocket – currently under development – they could make a human moon landing within a decade.

India is planning to set up an astronaut training center in 2012 and is looking at a human launch around 2015. They have also sent a probe into lunar orbit.

The Europeans and Japanese have developed and flown remote control cargo ships – the ATV and the HTV - to the International Space Station. The Europeans have suggested in time they can replace the cargo section of their craft with a capsule creating a human rated spacecraft.

### ***Why is this important to Congress?***

There is a clear trend that the projects other nations have for space are already in place or could potentially be achieved within a decade.

Space is a major demonstration of ‘smart power.’ The United States is a world power – as is Russia – and we have strong space programs. China and India are becoming large players in the global economy and they will certainly continue demonstrating their prowess with space systems.

Even more substantial is that space is an excellent technology driver. Military programs enabled early human space exploration. Recall John Glenn and the Russian Yuri Gagarin were launched on ICBMs. It is important to remember that the reverse is also true – strides other countries make in their civil or commercial space programs can enable military capabilities. From a security point of view we always want our space capabilities to be leading edge.

Our lead has already shortened in many places. Over the last 20 years competition from foreign launch systems has grown significantly. The U.S. Commercial Space Launch industry now only has about 15 percent of the global commercial launch market.

### *What can Congress do?*

Congress should maintain its commitment – both through the actions of its Appropriators and Authorizers – to U.S. space leadership so we have an edge, or at least are “first among equals.” This can best be done by ensuring our nation maintains its industrial drive.

To do this first and foremost, our nation’s space programs need stable and robust funding. By their very nature space programs take several years to develop, test and build. Once launched, satellites are not accessible, so systems must work with high reliability the first time. Fluctuating budgets and delayed programs take their toll on schedule, production and maintaining a skilled workforce on the project. Budget shortfalls also deeply impact agencies like NASA that have been asked to take on many valuable projects simultaneously.

We need Congressional leadership to also support space being treated as a “singular enterprise” where the decisions and strategies of the many agencies using space are coordinated at a White House level.

We face challenges with our future workforce. AIA members have identified that a “lack of trained technical workforce for the future” is one of the most important long-term issues facing our industry. Currently the U.S. annually graduates just 74,000 engineers in total – covering all fields in the discipline. Further, many of these students are foreign nationals who return home shortly after graduating which drops the number of domestically employable engineers under 60,000. In comparison, China and India respectively graduate 600,000 and 350,000 engineering students each year. The U.S. runs the real risk of losing its skilled engineering lead over other nations.

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 remember that 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 U.S. produces ammonium perchlorate which is used in solid rocket propellants including the space shuttle solid rocket boosters, other space launch and military capabilities.

Additionally all other nations provide their commercial launchers with some form of government indemnification. The House recently extended our form of indemnification until the end of 2012 through the Commercial Space Launch Act. We hope the Senate follows suit. Elimination of U.S. government indemnification would drive even more launch business overseas and could also impact launches of U.S. civil

and national security payloads. AIA believes the indemnification of U.S. commercial space launch should be made permanent.

Our nation needs to ramp up technological development, which has atrophied in recent years. In the September the Review of U.S. Human Spaceflight – or Augustine – Committee recommended NASA once again put greater focus into this area.

As a nation, we need to consider future international partnerships, pooling funds, talent and resources for space exploration or climate study from space based sensors. International participation will increase the number of possible projects, providing us with a win-win situation. It will however, be important to ensure our cooperation is equitable with our partners, opening opportunities for all but not adversely impacting the U.S. industrial base.

An important step to promoting further international cooperation in space is continuing U.S. participation on the International Space Station until at least 2020. U.S. involvement is currently in danger of ending in 2015. Supporting the ISS will clearly demonstrate America's commitment in other areas of international cooperation in space. Further this will allow America to continue utilizing the ISS as a National Laboratory.

While AIA believes it is important to protect critical U.S. capabilities, many U.S. export control policies are counterproductive for our industry, negatively impacting our security interests. While we must keep sensitive technologies out of the wrong hands, we also must facilitate technology trade and cooperation critical to U.S. interests with our friends and allies in a timely manner. Barriers to the export competitiveness of U.S. companies have prompted numerous countries to develop their own indigenous aerospace capabilities, leveraging their own R&D and innovation. Without a cutting edge U.S. space industrial base, our government could be forced to rely on foreign suppliers for key components.

### ***Conclusion***

Over the last 50 years, space technologies have become an increasingly important part of our nation's economic, scientific and national security capabilities. Over time, all sectors of the U.S. economy have become inextricably reliant upon space systems. As other nations make rapid advancements in acquiring or exploring space capabilities, America's leadership in space is no longer guaranteed and the securing of its space assets is no longer assured.

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