

Remarks by NASA Administrator Charles F. Bolden, Jr.

Washington Space Business Roundtable

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Good afternoon and thank you for inviting me today. It's my pleasure to be with you during the Roundtable's 25th year to talk with you about NASA's future direction. Before I begin, I'd like to thank the organizers of the Satellite 2010 conference for their efforts, as well as the board and officers of Washington Space Business Roundtable (WSBR) who bring the Washington space business community together to develop opportunities for young people in the Washington area. As many of you know, this is a cause that is close to my heart, and I applaud your continued work to raise funds for space scholarships.

Last week I was in Japan for the International Space Station (ISS) Heads of Agencies meeting, which brought together the leaders and senior staff of the International Space Station partners. I can tell you that there was tremendous excitement about NASA's plans at the meeting, most of all because of US leadership in proposing and planning for extension of the ISS. I am proud that the men and women of NASA and its contractors built, launched and assembled much of the station. Now nearly complete, ISS offers tremendous potential for developing new breakthroughs to improve life on Earth, and it offers a tremendous symbol of cooperation among nations

around the world. It is truly a laboratory of both science and peaceful international cooperation. The ISS can be seen every few weeks orbiting overhead by most of the people on Earth.

The ISS partners know that, with this budget, the United States has positioned itself to continue our space leadership for years to come. I'd like to talk with you today about that leadership, and about some of the highlights of the new budget. I would also like to spend a few minutes dispelling some myths that have sprung up about NASA's future.

My first message to you is that this budget is good for NASA because it sets the agency on a sustainable path that is tightly linked to our nation's interests. One measure of this is that it increases the agency's top-line, in a time when many agencies have been flat or taken a cut. Even more, it reconnects NASA to the nation's priorities – creating new high-tech jobs, driving technological innovation, advancing space and climate science research. It puts the agency back on track to being the big-picture innovator that carries the nation forward on a tide of technological development that creates our future growth. We should make no mistake that these are the drivers for NASA's budget increase of \$6 billion dollars over the next five years.

I think perhaps one of the most exciting things for you and your fellow Business Roundtable members is not only the expansion of NASA's involvement in commercial spaceflight for cargo and crew, but the many near and longer term opportunities we'll be embarking on with this budget. The tech development, the big and small demonstrations that will be necessary if we are to be able to take people beyond low Earth orbit for extended periods of time, will create many more opportunities for companies whose

business is space. And on the education front, we'll be actively cultivating the next generation of leaders in your field – beginning with our *Summer of Innovation* targeting middle school students and their teachers for STEM education enrichment. I expect you and your colleagues will play a substantive and lasting role in all of these areas.

So let me just tell you a little more about this budget. Bear with me if you're already knowledgeable here.

At the highest level, the President and his staff as well as my NASA senior leadership team closely reviewed the Augustine Committee report, and they came to the same realization the Committee concluded: The Constellation program was on an unsustainable trajectory. If we continued on our current course, at best we would have ended up flying a handful of astronauts to the moon sometime after 2030. But to accomplish even that limited task, we would have had to make even deeper cuts to the other parts of NASA's budget, terminating support of the ISS early and decimating our science and aeronautics efforts. Further, we would have had no money to advance the state of the art in any of the technology areas that we need to enable us to do new things in space – no money to lower the cost of access to space, no money for closed-loop life support, no money for advanced propulsion technology, no money for radiation protection. The President recognized that what was truly needed for beyond LEO exploration was game-changing technologies; making the fundamental investments that will provide the foundation for the next half-century of American leadership in space exploration. In doing so, the President put forward what I believe to be the most authentically visionary policy for real human space exploration that we have ever had.

Some have argued that the Constellation program was the symbol of American leadership in space. I think they have been misled. An unsustainable program, as described in the Augustine Committee Report, with no funding planned to support the ISS beyond 2015 and no definitive, funded plans for a heavy lift launch vehicle necessary for exploration beyond low Earth orbit can hardly be considered a symbol of American leadership in space. U.S permanent human presence in space and our international human spaceflight partnership would have ended or been totally dependent on the Russians for the foreseeable future. That is not American leadership in my book. Under the new plan, however, we will ensure continuous American presence in space throughout this entire decade, re-establish a robust and competitive American launch industry, start a major heavy lift R&D program years earlier, and build a real technological foundation for sustainable beyond-LEO exploration. That to me is real leadership, and our international partners already recognize it.

The idea that a renewed focus on research and technology development is somehow foreign to NASA is just plain wrong. When NASA was first established, the Space Act mandated research as one of the agency's central missions. Even the original Vision for Space Exploration intended to use the moon to test advanced technologies for exploring more distant destinations. But the development of Ares and Orion consumed these technology development plans. By 2009, there was little exploration funding available for anything besides the immediate launch vehicle and capsule programs. The president sought to correct that, and it required a bold course adjustment.

I often hear the criticism that under the President's plan we have no destination. This is also not true. The ultimate destination in our solar system for our exploration efforts is Mars, but we don't have the technological where-with-all to safely get humans there yet. In order to reach this destination, we need a robust research and development program to help us provide the capabilities that will make this goal attainable. When NASA's transformative technology development and demonstration programs are underway, the commercial sector will be moving rapidly to develop crew and cargo capabilities for U.S. based transportation to LEO. Commercial providers have long carried our most valuable payloads to space for the nation and have been integral to every human spaceflight mission since the beginning. My guess is that the American workers who have successfully built and launched the Atlas V 20 times in a row would disagree that US commercial spaceflight is untried or untested.

The five companies to whom we awarded Recovery Act funds last month represent the expansion of the development of commercial crew capabilities. These are some of the large and small companies that will be developing transport systems as well as their supporting technologies. These technologies include such components as self-contained life support and rocket health monitoring systems that will be required in the future. You can also be certain that future stages of this competition will be fair to both the nation's established aerospace companies, as well as the newer entrepreneurial entrants.

What we are trying to do is to develop multiple, redundant, made in America capability for access to LEO. So we'll never again be dependent on just one provider.

And as these companies grow and succeed, the potential for spinoff companies and job growth we expect to be substantial.

Let me also add a few words on the issue of safety. These commercial providers are already deeply involved with us in human spaceflight, and the newer companies will have cargo flights under their belt before crewed flights are considered. They will all have to meet stringent safety requirements. I have lost friends in the pursuit of exploration, and I will not allow anything to go forward that I believe is unsafe.

The government has always pioneered in areas where the investment was simply too large for any one company, and then industry followed along once an initial path has been blazed. That's what we're doing here, and a full 50 years into the space age, we think it's an idea whose time has come.

I began these remarks with the International Space Station, and noting how it was central to American leadership in space. Let me briefly say a few more words about the benefits of extending the ISS, likely to 2020 or beyond. I think ISS doesn't get enough credit as a milestone in human history. Not only the construction of it, but now with its unprecedented capacity as a global laboratory.

Right now is where the rubber starts hitting the road. In addition to NASA scientists, our international partners, other government agencies, academia, and industry are all poised to begin making use of the station's new research capabilities. Already we've gleaned information about Salmonella that has led to a candidate vaccine with human trials soon to begin. We've learned about methods of micro-encapsulation, a process of forming miniature, liquid-filled balloons the size of blood cells that can deliver treatment

directly to cancer cells. We've learned about gene expression in plants and how that might enhance crops being grown in space. These are a few of the literally dozens of results that we're just beginning to get and which we can look forward to in the years to come.

Beyond ISS, our Science mission portfolio is full of amazing things that will inspire our children and further our knowledge of the universe. In early August, 2011 we'll be launching JUNO, a mission to Jupiter. This will follow up our investigations with the satellite, Galileo, which traveled to and explored Jupiter and its moons from 1985 until we crashed it into the Jovian surface in 2004. Among its objectives, JUNO will pursue the following questions from Jupiter orbit... How did the giant planets form? Does Jupiter have a rock-ice core, and if so, how large is it? How deep into the atmosphere do the Great Red Spot and other atmospheric features reach? Several years out, we'll be sending a satellite to Jupiter's moon, Europa, an ice covered world believed to be covering a liquid ocean – a potential habitat for life. This will join the final realization of the spectacular capabilities of the James Webb Space Telescope.

We'll also be sending a satellite on the closest approach to the sun ever. I think that's simply incredible, even as I remember my mother's admonition not to look directly at the sun. Well, we can now.

We're going to be cataloging and studying near Earth objects to learn more about asteroids, not only as potential threats, but also as potential sources of scientific knowledge and of resources for exploration. And these are now candidates for future human visits.

We're going to get a second chance with the Orbiting Carbon Observatory that failed on launch last year. Its global perspective on carbon emissions is urgently needed. We're also going to accelerate the launch of several other missions that the Earth science community has told us are key to our future understanding of our planet and our well being. Among the benefits will be more accurate forecasts of regional and global weather changes and more effective response to natural disasters. I can't think of any more urgent priority than those addressed by our Earth observation systems.

A particular area of interest for me is our renewed focus on aeronautics. Many of you are aware of the Next Generation Air Transportation System (NextGen), the nation's overhaul of our air travel system to incorporate new technologies and create safer, greener, more effective travel for everyone. At NASA, we've always pioneered cutting edge aircraft, and we will continue to develop the technologies that will help travelers every day. They may not even think about NASA as they take off in a plane, but we'll be right there with them - looking at key challenges to validate flight critical systems and increasing the efficiency of air traffic management. We're talking technology here, but again, it all boils down to people, on the ground and in the air, and making an essential part of daily life better.

Finally, we all know that without new leaders coming behind us, all the work we do today could flounder or stagnate. It's essential that we get more kids from all backgrounds interested in science, technology, engineering and math. NASA has the perfect portfolio to inspire kids over the long term - the big picture stuff that makes them really want to find out more about careers connected to space. I always tell kids to get an engineering or science degree and then look at the range of possibilities that opens

up. They could send into space their own science experiment. That's probably just a few years down the road. They could be remotely controlling a robotic precursor as it explores the moons of Mars. They could be a principle investigator on a telescope peering into the heart of the sun or peering into the Cosmos for more on the "Big Bang" Theory. They could even be the first to step foot on Mars.

The possibilities are endless, but they need to get connected now, and we are renewing our focus on this with a program we call *Summer of Innovation* for the next three years targeting middle school students and their teachers for enrichment in the areas of STEM education. We also have many other hands on, interactive activities that bring NASA to kids' homes and hearts. I know the Business Roundtable does a lot in this area, and we want you to consider us a partner in reaching today's students.

Ultimately, this budget not only establishes the foundation for continued American leadership in space, it also gives NASA the big picture mission under which it has always thrived, and uses its resources to affect national goals in economic development, education and the environment. It does all these things and more. That is why I credit President Obama with his fresh thinking, his thoughtful analysis of big picture issues, and his vision for where he wants the nation to be in space and technological development long after he is out of office.

I think you again for inviting me, and now I'm happy to take your questions.