

**Charles Bolden, NASA Administrator**

**Humans to Mars Summit**

**George Washington University**

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I want to thank Explore Mars, Inc. and GW's Space Policy Institute for bringing us together for this important summit.

Interest in sending humans to Mars has never been higher, both from our international counterparts and from a growing number of American commercial space companies, many of whom are represented at this conference. And of course, President Obama has challenged us to send humans there by the 2030s.

The original space race, which used to be a game of one-on-one, has suddenly become a tournament of rivals that looks more like the NBA playoffs, the Olympics, or the race for the Triple Crown. I think that's a good thing. Competition has always been the engine of American ingenuity and progress and NASA has always been a leader.

As I have said many times, a human mission to Mars is today the ultimate destination in our solar system for humanity and it is a priority for NASA. Our entire exploration program is aligned to support this goal. You will hear more about the specifics of our plan from the senior leaders of our human exploration, space technology, and science mission directorates a little later in the day. I want to set the stage by giving you an overview of how NASA's overall strategy supports our scientific and human exploration of the Red Planet, and how the backing we have received from both the President and the Congress moves the ball forward.

As many of you may recall, three years ago President Obama paid a visit to Kennedy Space Center where he set a goal of sending humans to an asteroid for the first time in history by 2025 and making a crewed journey to Mars by the 2030s.

A few months later, the President signed NASA's 2010 Authorization Act into law, extending the life of the International Space Station and committing the nation to fostering a growing commercial space industry – all of which freed NASA to start work on building the next generation heavy lift rocket and multi-purpose crew vehicle needed to take our astronauts beyond low-Earth orbit into deep space, including our planned mission to Mars.

If anyone thinks that interest in human spaceflight has diminished since the end of our Shuttle program, let me remind you that last year we received the second highest number of astronaut applications in our history – more than 6,300. Less than 20 of them will make the final cut that will be announced in the coming weeks. These astronauts will be among the first to be trained specifically for long duration space flights.

Last year we also announced that NASA's Scott Kelly will undertake a one-year mission to the International Space Station in 2015. That mission will add to our knowledge of the effects of microgravity on bone density, muscle mass, strength, vision, and other aspects of human health. This research is essential as we plan for a long-duration flight to Mars.

While NASA has not been immune to the economic downturn and the budget battles that have raged in Washington in recent years, we remain central in the President's strategy of investing in science, technology, and innovation as essential to jumpstarting our economy and winning the future.

The President has proposed a fiscal year 2014 budget for NASA of \$17.7 billion. This budget ensures the United States will remain the world's leader in space exploration and scientific discovery for years to come, while making critical advances in aerospace and aeronautics to benefit the American people.

It is a budget that reflects today's fiscal realities and aligns NASA's full spectrum of activities to meet the President's challenge to send humans to an asteroid in 2025 and Mars in the 2030s. This budget makes it clear that the Administration remains committed to a vibrant and coordinated strategy of Mars exploration and continuing America's leadership role in the exploration of the Red Planet.

Right now on the International Space Station (ISS), our research is helping us prepare for missions to Mars and other deep space destinations – such as an asteroid. Our activities and experience on the ISS are making significant contributions to sending humans to Mars. NASA and our international partners are handling, on a daily basis, challenges that are critical to sending humans to Mars. This includes improving life support systems and the challenges in maintaining them as well as learning about and handling the effects of microgravity on the human body, including human health and performance.

We are also using the ISS as a test bed for technologies and systems under development for Mars exploration with humans.

Our goals include both new game changing robotic missions to Mars and a groundbreaking asteroid mission on the way to our ultimate goal of a human Martian mission.

As you all have probably heard, NASA is developing a first-ever mission to identify, capture, and relocate an asteroid, followed by exploration and sampling of the asteroid by astronauts using our human space flight assets under development. Capturing and redirecting an asteroid will allow us to accomplish multiple goals. First, it takes advantage of the hard work on our deep space technologies and will provide valuable experience in mission planning and operations that are needed for future crewed deep-space missions, including our planned visit to Mars.

Second, it will allow our astronauts to interact with an asteroid for potential resource utilization in space. And third, it will inform our efforts to prevent an asteroid or other Near Earth Object (NEO) from colliding with devastating force into our planet.

Planning and design of this mission has already begun and will continue into this coming summer. Leveraging capabilities throughout the Agency, we plan to use a high-power solar electric propulsion system to rendezvous with, capture, and redirect a small asteroid into a stable orbit in the lunar vicinity. From there our astronauts will be able to visit and return samples using the *Orion* spacecraft launched into space on the SLS rocket.

This mission represents an unprecedented technological challenge -- raising the bar for human exploration and discovery, while helping protect our home planet and bringing us closer to a human mission to one of these mysterious objects.

Our asteroid strategy – of which this mission is just one piece – brings together the best of NASA's science, technology, and human exploration efforts to achieve the President's goals of a human mission to an asteroid faster and at a lower cost to taxpayers than continuing with business as usual.

The asteroid strategy is preparing us for Mars journeys with technology development and operational capabilities that are needed for human missions to the Red Planet. Our asteroid mission builds off our experiences on ISS and prepares us for even deeper space exploration by offering a test environment that is very different than low earth orbit. This experience exploring an asteroid will be critical for future Mars journeys.

It is worth noting that America's Mars exploration program and our track record of successful missions to Mars are second to none. The U.S. is the only nation that has successfully landed missions on the Martian surface and our investments in Mars exploration since FY 2000 total more than \$6 billion.



Ongoing and future missions will continue to improve our understanding of Mars, allowing us to make better site selections for future lander missions and to better understand the Mars atmosphere to support precision entry, descent, and landing, all while continuing to make scientific discoveries.

Nine years ago, we landed the *Spirit* and *Opportunity* rovers on the surface of Mars and we currently have two satellites in Mars orbit observing the planet. Last August, after the most harrowing atmospheric entry and landing in the history of planetary exploration, the *Curiosity* rover touched down on the Martian surface and is now assessing whether Mars was or is today an environment able to support life. The science being conducted on *Curiosity* is also paving the way for a future human mission. In fact, we will soon have radiation data from an instrument on *Curiosity* that will help us better understand and overcome challenges to human life in the Martian environment.

On the heels of *Curiosity*, the Fiscal Year 2014 budget includes funding for another mission to the Red Planet, continues operations of our rovers and orbiters already there, and makes possible the *MAVEN* mission's launch this November to study the Martian upper atmosphere and the *InSight* lander to launch in 2016.

Over the past year, we have recalibrated our Mars science program in order to optimize both what it can achieve scientifically and how it advances our human exploration goals.

As a former astronaut who has flown four missions on the space shuttle, including the 1990 flight that deployed the Hubble Space Telescope, I've learned that scientific discovery and human exploration go hand in hand. NASA's vision is to reach new heights and explore the unknown so that what we do and learn will benefit all humankind. I believe that unraveling the planetary puzzle about life and climate on Mars is the essential next step in realizing that vision.

By better coordinating NASA's scientific and human exploration programs, we will achieve our goals of discovery quicker and at less cost to the taxpayer.

You have an exciting line up of presentations and discussions at this summit and I look forward to hearing about the findings and recommendations out of this important forum.

Thank you.