Time to Take Longer Strides

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Remarks
to the

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First, let me offer my thanks to Dick Covey, Dan Brandenstein, and Kate Kronmiller for organizing this conference and inviting me here this morning as Rick Gilbrech's warm-up act. Breakfast is a great way to start the day.

I'll keep my remarks brief so that we can spend more time for interactive Q&A, which you'll probably find to be more informative than me simply reading prepared remarks. You don't need me lecturing you about NASA's greatest challenge; you're living it. Here's what you're doing: safely flying the Space Shuttle to complete assembly of the International Space Station and honor our commitments to our international partners, completing the final Hubble servicing mission later this year, retiring the Shuttle in 2010, bringing *Orion* and *Ares I* online as soon as possible, and operating the Station while laying the keel for the *Ares V* and *Altair* lunar lander. These are the immense challenges NASA faces over the next several years. You're the ones meeting these challenges.

I am lucky to be the NASA administrator at this critical time. NASA's greatest administrator, Jim Webb, once observed about the challenges he faced, "The process of management became that of fusing at many levels a large number of forces, some countervailing, into a cohesive but essentially unstable whole and keeping it in a desired direction."

Those of you in this room are living this quote. You already know that what we're doing is more complex than Apollo. It is for this very reason that all of us – everyone in this room, and the engineers and technicians who work on these systems every day – already know that we must conduct our business with a concerted sense of purpose, self-sacrifice, and in more innovative ways than we might have done in the past.

We are all in this together – NASA, our other U.S. government partners involved in spaceflight, our international partners on the Space Station with whom we hope to explore our Moon and the rest of the solar system, our stakeholders in the White House and Congress, the science community at universities and research institutes across the country, and those of you from industry who are prime contractors, subcontractors, and suppliers. Many of you will transition from Space Shuttle operations to developing and operating our Shuttle-derived Constellation systems. Now is the time, this is the juncture, and we are the people to meet this

challenge. I love being a part of the greatest journey mankind has ever undertaken. I know you love it too.

The challenge before us reminds me of the immortal words that the thirty-year-old Meriwether Lewis wrote in his journal on our nation's Independence Day in 1805, as he led his Corps of Discovery: "We all believe that we are now about to enter on the most perilous and difficult part of our voyage, yet I see no repining; all appear ready to meet those difficulties which wait us with resolution and becoming fortitude." Of course, when Lewis wrote that, it was only two weeks after he survived being chased by a bear, charged by three bull bison, and found a rattlesnake curled up next to his bed, all in the span of 24 hours. So, maybe our challenge today is not really all that tough...

During my career in the space business, I have been fortunate to experience a 360^{o} view of NASA. I've worked for NASA as both a civil servant and support contractor, partnered with NASA from other government agencies, and been a supplier to NASA. I have walked in the shoes of many of you in this room, and I know that communication – two-way, frank dialogue where people pause to *listen* and not simply talk past each other – is something that everyone in the NASA family needs to foster every day in this demanding, dynamic environment where lives are on the line.

Conferences like this one are important for the communication they enable, both among ourselves and with NASA's stakeholders in the White House and Capitol Hill, about the challenges we face as a nation in the arena of spaceflight, and what space exploration means to America's economic competitiveness, security, and leadership on the New Frontier of space. It matters greatly. Our stakeholders will not simply open their wallets for our noble intentions when there are so many other competing priorities for our nation's time, energy, and resources. So let's get to the essence of why space exploration is important.

Human spaceflight, exploring and eventually settling the New Frontiers of other worlds, is "the giant leap for mankind" of which Neil Armstrong spoke so eloquently almost forty years ago when he took that one small step. Human spaceflight is about inspiration, leadership in great endeavors, pushing the edge of the possible, and reaping the benefits of those things for our society. It is about living and working in a far-away land, learning to exploit its resources, and expanding our reach to other worlds. It is about the survival of our species.

There is a fundamental, qualitative difference between exploring other planets with astronauts and doing so with robotic spacecraft. And it is not simply about the scientific return which can be achieved by one means or another.

I firmly believe that men and women putting footprints in the lunar dust and Martian sands, seeing and experiencing new worlds with our own eyes, is the

essence of what makes us human. All of us here have seen postcards of the Grand Canyon, Mt. Everest, the Galapagos Islands, the Great Barrier Reef, Antarctica and other natural wonders of our world, and guess what, those same pictures could have been taken by a robot. But they weren't. And it matters. Having been there in person, or even seeing a photograph taken by someone who was there in person, conveys enormously greater meaning to the image. It brings out the splendor and majesty of creation in a way not possible without human presence.

To steal a line I once used in another context, "I can explain it to you, but I can't understand it for you." And, actually, I'm not even sure I can explain it to you. You either get it or you don't.

It is probably for this reason that so many people want to experience spaceflight for themselves, to view our planet Earth from the vantage point of space, to see what it is like to float weightlessly in space. This is an experience many, many people wish to see and feel for themselves, and perhaps it is why NASA has to turn back over 99% of the people who apply to become astronauts.

So, just imagine the feeling of the first astronauts to venture into the Aitken Basin of the Moon; the nostalgia of finding the family picture of Charlie Duke from Apollo 16 and returning it; of climbing Olympus Mons on Mars, the tallest mountain in the solar system, or hiking in Valles Marineris, which is four miles

deep and 2,500 miles long and which makes the Grand Canyon seem, well, not so grand by comparison.

The next giant leap then is to make our journey sustainable, to live off the land and build outposts and homes and eventually settlements and cities. Far-fetched? Hardly. We simply need to consider the steps mankind has taken to get where we are today. And then, if we are to be worthy of the sacrifices of our ancestors, we need to persevere.

NASA and those of us gathered here today are celebrating our agency's 50th anniversary, the 50th year of following in the footsteps and blazing new trails of great explorers like Magellan and Columbus, who petitioned their respective kingdoms five hundred years ago to explore their vast "new ocean", just as President Kennedy petitioned the U.S. Congress to explore "this new ocean" of space with Apollo.

NASA's budget for space exploration is hardly equivalent what Queen Isabella sacrificed for Christopher Columbus' expeditions in the fairy tale about her crown jewels. While I fully realize $17.6 billion – NASA's budget request for 2009 – is a lot of money, in this town it's more like what we engineers call rounding error when compared to the $3.1 trillion budget of the entire Federal government. In fact, NASA's budget is less than 0.6 percent of the entire Federal budget – less than a penny out of every Federal budget dollar. Unfortunately,

however, a recent and very interesting poll reveals a huge misperception: the average citizen believes that NASA receives 24% of the Federal budget – a figure comparable to that of the Pentagon. This can only be because what we do, what we accomplish, is so highly visible. Indeed, according to many polls, NASA is the most recognized agency of the Federal government. Thus, again, we need your help in educating our stakeholders and the public about the reality of NASA's budget, and how important this budget is to our nation's economic competitiveness and technological innovation, as well as our place in world affairs as a recognized leader on the New Frontier.

From this small investment in NASA over many years, new engineering and scientific capabilities built originally for our nation's space program are now pervasive in our lives, critical to a range of activities that create and provide value. Since the 1960s, NASA pioneered research in high bandwidth satellite communications which helped lead to the development of high-definition satellite television with 24-hour news, entertainment, and sports anywhere in the world.

Forty years ago, engineers like me used three pieces of wood and a piece of plastic – the slide rule – to make calculations. Thirty years ago, 1000 transistors could fit on a silicon chip; today, it's 1.7 billion. The cost of such chips has dropped by a factor of 100,000. Few people know that the development of the first microprocessors—now found in every computer in the world—was born of a

competition between Fairchild and Intel corporations in the 1960s, to build components small enough to fit in NASA's Apollo spacecraft.

And when it comes to being a recognized leader in the world, is it any wonder why China has emerged in recent years as one of the three spacefaring nations? They understand the value of space activities as a driver for innovation and a source of national pride in being a member of the world's most exclusive club. China today not only flies its own taikonauts, but also has plans to launch about 100 satellites over the next five to eight years. It should be no surprise, especially to those who have read Tom Friedman's book "The World is Flat" or John Kao's "Innovation Nation", that this environment in China is breeding thousands of high-tech start-ups. As John Kao couches the issue, America is currently facing a "Silent Sputnik" where "many countries are racing for a new innovation high ground while our own advantages are showing signs of serious wear."

The challenges we face today, in transitioning from the Space Shuttle to new Constellation systems and moving beyond low Earth orbit, are part and parcel of the challenges we face on the larger stage of world affairs. We must recognize the strategic importance of space exploration, and talk about it with our stakeholders.

We must explain, in simple terms, why simply continuing in low Earth orbit is not a compelling rationale for human spaceflight, and why "Now it is time to

take longer strides", as President John F. Kennedy framed the issue before a joint session of Congress on May 25th, 1961. We must not fall prey to self-serving interests, cynical carping, or benign neglect about the goals before us. We must maintain our sense of purpose.

As Admiral Hal Gehman noted in his report of the Space Shuttle *Columbia* Accident Investigation Board five years ago, "The U.S. civilian space effort has moved forward for more than thirty years without a guiding vision." This is a damning assessment spanning multiple Administrations, Congresses, and NASA Administrators.

The CAIB also noted the failures in developing the National Aerospace Plane, the X-33, X-38, or any replacement for the aging Space Shuttle with the observation, "previous attempts to develop a replacement vehicle for the aging Shuttle represent a failure of national leadership." They then recommended, "The country should plan future space transportation capabilities without making them dependent on technological breakthroughs." This has been a touchstone of the Constellation architecture, despite the carping that has sometimes resulted. And again, "The Board notes that this approach can only be successful: if it is sustained over the decade; if by the time a decision to develop a new vehicle is made there is a clearer idea of how the new space transportation system fits into the nation's overall plans for space; and if the U.S. government is willing at the time a

development decision is made to commit the substantial resources required to implement it." And they conclude, "Continued U.S. leadership in space is an important national objective. That leadership depends on a willingness to pay the costs of achieving it."

Thus, the Vision for Space Exploration, enunciated by the President less than a year after the *Columbia* accident, and endorsed overwhelmingly by the Congress in December 2005, honors existing commitments with our international partners on the Space Station, follows the *Columbia* Accident Investigation Board's findings and its recommendation that "because the Shuttle is now an aging system but still developmental in character, it is in the nation's interest to replace the Shuttle as soon as possible as the primary means for transporting humans to and from Earth orbit", and initiates new journeys to the Moon, Mars, and beyond. We will use the International Space Station as an important laboratory and testbed for technologies and biomedical countermeasures for long-duration human spaceflight to Mars and beyond, just as the Moon, three days journey away, will be another stepping stone. Again, "Now it is time to take longer strides".

Before pausing for your questions, I would like to remind all of you here of the words of the chaplain who spoke at the National Cathedral five years ago, for the memorial ceremony for the crew of Space Shuttle *Columbia*. If you have not visited the National Cathedral, I highly recommend it while you are here in

Washington. One of the stained glass windows in the cathedral commemorates America's exploration of space and the Apollo missions, mankind's greatest journey to date. In the upper center of this window is a precious rock from the Sea of Tranquility.

Speaking at the National Cathedral, Chaplain Charles Baldwin reminded us:

"When it's dark, the stars come out… The same is true with people. When the tragedies of life turn a bright day into a frightening night, God's stars come out and these stars are families who say although we grieve deeply as do the families of *Apollo 1* and *Challenger* before us, the bold exploration of space must go on. These stars are the leaders in Government and in NASA who will not let the vision die. These stars are the next generation of astronauts, who like the prophets of old said, 'Here am I, send me.' "

Five years after the *Columbia* accident, I firmly believe the best way for all of us here to honor their memory is to face the challenge before us, steeled with a sense of purpose to make that next giant leap for mankind.

Thank you.