

Remarks for AIAA Space 2005 Conference & Exhibition

by

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Eighteen months ago, President Bush committed this nation to a new direction in space, and set forth a fresh, clear mission for NASA. The President's directive gave all of us who are privileged to work in this business a challenge bold enough to last a lifetime. Indeed, it is a challenge big enough to last several lifetimes.

The Exploration Vision commits our nation to the exploration of the Solar System, beginning with a return of humans to the Moon by the end of the next decade, and from there to subsequent voyages to Mars. I'm here today to discuss something of how we plan to reach these goals. But let me start by discussing our progress in returning the Space Shuttle to flight.

Three weeks ago, we viewed the successful conclusion of the STS-114 mission with the landing of *Discovery* at Edwards Air Force Base. Commander Eileen Collins, her crewmates, and our entire Shuttle team demonstrated tremendous skill and dedication throughout the mission, as we tested the new Shuttle External Tank, and resupplied the International Space Station.

Following *Discovery's* landing, the Los Angeles Daily News wrote an editorial that expresses quite well, I think, the views of many of our fellow citizens: "These men and women are our heroes, after all, for braving the dangers and taking us into the wide, wondrous world of space exploration and all of the discoveries it holds. We await the next space mission with eternal hope and renewed anticipation. Suddenly, the Moon and Mars seem that much closer, and within our reach."

I agree with this, and for reasons beyond what that editor has noted. The STS-114 crew are indeed heroes. In this era, with the technology we can bring to the task, every man and woman who flies into space is a hero for literally risking his or her life in support of the goal of human space exploration. Their families are heroes for risking their own emotional lives in support of their loved ones. Beyond that, every man and woman who helps get them there is a hero, because although they do not literally risk their lives, they are as much a part of the effort as the few who get to fly, and they bear the terrible weight of responsibility for having to be, literally, almost perfect in what they do. They are all heroes for "getting back on the horse" that we all know will throw us again, and again, and again. This is how it was as mankind learned to conquer the air, and it will be the same as we learn to conquer space. The Moon and Mars are not closer

because the STS-114 crew lived to tell their tale. But they are closer, maybe, because we at NASA, on behalf of America as a whole, are willing to confront our mistakes, remember them, learn from them, and take another halting step forward.

As we all know, the STS-114 mission was not without flaw. Clearly, there remains much to learn about eliminating debris from the Shuttle's External Tank. We must learn it before we can launch the next mission, and resume using the Shuttle to assemble the International Space Station. But overall, in my opinion, it was a superbly executed *test flight*, and it furnished us with our first real data in connection with our efforts to improve the design of the External Tank.

And maybe we need to understand, down deep, that every flight we fly is a test flight, because our naivete in talking about "operational" flights brings with it a relaxation of rigor we can't afford. Let this be one of the "lessons learned": we humans do not yet have the technology for "operational" spaceflight. We will. We're learning. But we don't have it yet.

That said, however, it remains true that the STS-114 mission gave us many reasons for optimism. But despite this, some observers see NASA's glass as being half-empty. There have been calls for an immediate end to the Shuttle program, and abandonment of the International Space Station.

In my opinion, it is time for us to remember that, by definition, major decisions have enduring consequences, not easily undone. The decision some 35 years ago to make the Shuttle the centerpiece of America's manned spaceflight program was of this nature. Today, we are largely agreed that it is necessary to retire the Shuttle. So, in accordance with the President's direction, we intend to fly out the Shuttle program in an orderly, safe, and disciplined fashion, with retirement not later than 2010. Terminating the Shuttle program abruptly at this time, while superficially attractive from some points of view, carries with it grave consequences for American preeminence in space, and would be utterly devastating to the workforce we will need to carry out any future human spaceflight program.

Those who are my age, or thereabouts, lived through the consequences of the same abrupt program termination that is now recommended by some in our midst. From 1975-1981, between the retirement of the Apollo-Saturn system and the first flight of the Shuttle, the United States did not have the capability to send humans into space, our country was not driving the space exploration agenda, and our aerospace workforce was decimated. We lost valuable people from the program, people who never came back. We lost valuable skills that were relearned with difficulty, or not at all. We lost momentum.

Some fifteen miles north of here is the site of the historic North American Aviation plant in Downey, once home to the people who built the Apollo Command and Service Modules, and the Space Shuttle Orbiter. Today, you will find a shopping center and a movie production lot where the folks in the Downey facility once focused on the

real stars. This is what happens when we lack continuity and thoughtful policy direction in the space program. We've abandoned too many facilities like Downey, and the aerospace workforce that filled them, in the course of the last several decades because we've had no coherent sense of direction in space policy. We have one now. But it will require some time, and much discipline, to work our way out of the difficulties which confront us today, these difficulties being a direct result of a long history of neglect of, and poor decisions concerning, the U.S. civil space program.

Let us learn from these experiences. Let us not repeat them. Let us at least make a *new* mistake.

Thus, given where we are today, carrying out an orderly retirement of the Shuttle is the best that I believe NASA can do for the nation. We are carefully reconsidering the Station assembly sequence, and we believe if we utilize the Shuttle fleet in a disciplined, measured fashion over the next five years, we can essentially complete that assembly. We can meet our obligations to the international partners and effect a transition to the Shuttle's successor. If feasible, we will conduct a mission to service the Hubble Space Telescope. But we will no longer adhere to a plan requiring a fixed number of Shuttle flights.

I am gratified that during the recent *Discovery* mission, President Bush again recognized the importance of moving forward by saying, "It is important for our fellow citizens to understand that we're going to take the NASA mission beyond the current mission...It's important for the American people to understand, that, one, exploration is important; two, there will be some good coming out of exploration; and, three, that we've got a new vision embraced by NASA and its pioneers."

So what are the next steps?

After the return of the Space Shuttle to flight, the next step in the President's Vision for Exploration is the completion of the International Space Station. Here again, I must note that the decision to build this facility in accordance with its present partnership arrangements was made over a decade ago, and that decision too carries with it major consequences and obligations not lightly dismissed. These arrangements have resulted in the creation, by scientists and engineers in many nations, of many dozens of peer-reviewed research programs which, if the ISS is abruptly terminated, will never fly. The work we expected to do with the Space Station would go largely undone. After getting most of the way to the finish line, we will have missed the opportunity to use the Station to learn how to live and work in space.

But the Station is expensive to sustain, if we continue to rely upon a government-only approach to that effort. As I stated earlier this year, one strategy NASA will employ to meet our future needs is to utilize, to the fullest extent possible, commercially-developed cargo resupply and, ultimately, crew rotation capabilities for the International Space Station. Indeed, we will issue this fall a request for proposal for such capabilities, with the development to be done on a commercial basis, much like that in the commercial

communications satellite market. This is a priority for NASA. Utilizing the market offered by the International Space station's requirements for cargo and crew will spur true competition in the private sector, will result in savings that can be applied elsewhere in the program, and will promote further commercial opportunities in the aerospace sector.

After completion of the ISS, we can turn once again – for the first time in decades – to the challenge of exploration beyond low Earth orbit. The basic element of our architecture for exploration is, of course, the launch system. Recognizing the need to obtain the maximum possible efficiency from the nation's space launch systems, the President's National Security Policy Directive requires NASA and the Department of Defense to coordinate their plans and requirements in this area. Thus, since commencing my tenure as Administrator, I have worked with my DoD colleagues on this crucial topic. We will soon be able to discuss the specifics relating to this topic.

The spacecraft and systems that succeeds the Shuttle will build upon the foundation of the proven designs and technologies used in the Apollo and Space Shuttle programs, while having far greater capability. They will be able to carry larger and heavier cargos into space, allowing more people to remain on the Moon for longer periods of time. Even on the initial missions, I envision a system that will take an entire crew of four astronauts to the surface instead of two, remaining on the surface for a week instead of a few days, while the crew exploration vehicle remains unoccupied in lunar orbit. Going well beyond Apollo, we seek the ability to land and conduct exploration activities anywhere on the moon, including on the far side or in the polar regions.

In our planning, we want to ensure that we are designing systems with the maximum possible applicability to future missions to Mars. Nowhere is this more important than for the core heavy-lift transportation system. Knowledgeable analysts are aware that a voyage to Mars will require a spaceship on the order of 500 metric tons, more than half of it fuel, in low Earth orbit. The heavy lifter built for missions to the Moon can support the LEO assembly of such a vehicle in a matter of months, with no more than a half-dozen assembly flights.

Earlier, I made reference to the decisions in the American space policy arena concerning the Space Shuttle and Space Station programs whose consequences have spanned decades. In our future planning, we should recognize that history is full of such crossroads, of opportunities for bold steps either taken or not taken, with consequences that can last not for decades, but for hundreds of years. The decision to explore and extend the frontiers of one's own time, or not, is just such a crossroad.

Today, we live in a world with only one superpower, the United States. It was the same in the 15th Century, except that the superpower was China. The Ming Dynasty had a fleet of 1,500 ships, the largest of which rivaled the size of an aircraft carrier today. Because of the fleet, the influence of China reached to the Philippines, Malaysia, India, and as far as the east coast of Africa to the Cape of Good Hope. Indeed, some believe that the Chinese reached the west coast of the Americas.

Eventually, the leadership of the Dynasty fell to a young emperor, at which point certain elements of the Chinese ruling class advised the new emperor that the fleet was a wasteful indulgence. The emperor was told there was nothing in the world to match Chinese culture, and was advised that the highest priority was to protect what China had from the influence of foreigners. The Emperor followed this advice, ultimately burning the fleet. And Chinese influence in the larger world waned for centuries.

Now consider Portugal. Looking at a map, it is hard to imagine that a country the size of Portugal could ever have a significant influence on world culture. But precisely because Portugal made a commitment to sail the high seas in search of trade, treasure, discovery, and glory, the Portuguese influence can be seen in such diverse places as Macau, West Africa, India, and of course Brazil.

Perhaps all of us would be speaking Portuguese today, but eventually Portugal tired, and England made an even greater commitment to the exploration, discovery, and settlement of new territories. The decisions that nations make to explore, or not, matter.

The human imperative to explore and settle new lands will be satisfied, by others if not by us. Humans will explore the Moon, Mars, and beyond. It's simply a matter of which humans, when, what values they will hold, and what languages they will speak, what cultures they will spread. What the United States gains from a robust program of human space exploration is the opportunity to carry the principles and values of western philosophy and culture along on the absolutely inevitable outward migration of humanity into the solar system and, eventually, beyond. These benefits are tangible and consequential. It matters what the United States chooses to do, or not to do, in space.

It is our nation's privilege and obligation to lead yet another opportunity to explore places beyond our own, and to help shape the destiny of our world for centuries to come. We in our generation are uniquely privileged to be given the challenge of initiating a visionary program of exploration and discovery on behalf of the American people and the world. As you leave this conference, I hope you will take some time to ponder the enormity of the task ahead, and to contemplate the fundamental reasons why American leadership in space is so vital.

I thank you for your commitment to American leadership in space, and I look forward to working with you in the months and years to come.