

The Rocket Team

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Good evening. Miles, thank you for being here tonight and for introducing me. Last summer, just prior to a Space Shuttle launch, I sat down for an interview with CNN just as one of your producers informed me that they had to cut away from their coverage of the mission. There was breaking news of vital national interest from Los Angeles: Paris Hilton was going to jail.

That was the moment when I realized how tough the NASA Administrator's job really is. There is no way I can compete for the American people's attention against Paris Hilton. But I guess there is also a good side to this; my face will never grace the cover of *People* magazine.

But seriously, CNN as a network and you in particular, Miles, have done a wonderful job of informing and educating the American public about the who, what, where, when and – most importantly – the whys of our nation's journeys in space, and we thank you for that.

Space exploration is a complex story, a rich story, full of drama and despair, pride and pathos. It is a story we need to tell our children and grandchildren, lest they forget why it is we explore what John F. Kennedy referred to as the "New Frontier" of space. There are many distractions in modern life, and I believe it is necessary for us to discuss openly with the public the principles that led us as a nation to embrace space exploration, five decades ago.

I recently read an interview with actor Bill Pullman, who is famous among those of us who watch science fiction movies for being the president who beat the aliens in the movie *Independence Day*. Pullman wrote and produced a new play about the International Space Station Expedition 6 crew, Ken Bowersox, Don Pettit, and Nikolai Budarin, and their trials and tribulations aboard the ISS following the loss of the Space Shuttle *Columbia*. When Pullman was asked the question about how he first learned of the *Columbia*'s loss, he responded quite simply and insightfully: "It was a Saturday morning, and I think I was in the car driving. I had to go run to get milk and I heard the radio report. I remember pulling off to the side of the road and listening to it. It was stunning to me. I was aware that I hadn't kept up on it. I wasn't somebody who was aware that they had even gone up. Suddenly I became hugely interested."

Probably everyone in this room remembers that Saturday morning of February 1st, 2003. I know Dave King does. He spent the next several months in Texas and Louisiana leading the debris recovery and investigation efforts for *Columbia*. Many of us that morning were probably going about our lives in a manner similar to Bill Pullman when we were pulled in by the television or radio with the news. We called and emailed our family and friends in the space business, and most importantly, we rolled up our sleeves and went to work finding the cause of the accident, fixing it, and continuing the journey.

All of you here know that there are galvanizing moments in our lives, moments we remember forever, moments when we hold our breath in the realization that the events unfolding before us will forever change the course of our lives. These are the events for which we remember precisely where we were and what we were doing, what we saw and what we felt, when we first heard. For the rest of our lives, we return to them in quiet introspection, thinking about how the world changed in those moments. Those who are older can recall many such. For the oldest among us, there is still Pearl Harbor, and later Hiroshima.

For those a bit younger, the assassinations of John and Robert Kennedy, and Martin Luther King, Jr. might be the first. Younger still, and there is the fall of the Berlin Wall or September 11th. Not one of us ever, ever forgets such things. And, for those here tonight, there are many more such milestones even closer to home. Sputnik. Yuri Gagarin. John Glenn. The Apollo Fire. “The Eagle has landed” and, “one small step...” Challenger. Columbia.

These are the things, too often crises, which shape the course of human events. Thus, tonight I will pose for you a question which I hope will stir some debate: Why does it take a crisis to capture our attention?

This is a simple question without a simple answer. However, I do believe that it is fundamental to some of the problems we face in explaining the importance of space exploration to the American public, or to our children. There are many distractions in our lives, distractions that make it difficult to distinguish between what is urgent and what is important. It is easy to become complacent about or even apathetic toward the signals that, too often in the clarity of hindsight, show that another crisis looms, that action should be taken.

Crises can take many and various forms, and always – always – in the investigation that occurs after an accident or a tragedy, we find that there were warning signs, that there were people who connected the dots but were not heeded. Churchill was right about Hitler years before Hitler proved him so. And as Admiral Gehman said of the Space Shuttle *Columbia*, “The machine was talking, but why was nobody hearing, how were the signals missed?”

Even worse, with the passage of time we seem to forget the lessons learned from those crises which occurred many years ago. Time heals the wounds, the fear, the pain we felt when the galvanizing moment occurred. We move on. And slowly, our complacency grows back. The great engineering educator and author, Henry Petroski, writes about this facet of humans and their organizations in his book, *Design Paradigms*:

Case Histories of Error and Judgment in Engineering. He cites a trend, two centuries old, of major bridge disasters occurring about every three decades. Younger engineers who did not experience the community-wide trauma of such an event do not fear it, do not believe it can happen to them, and do not embrace its lessons as deeply as those who were there. The cycle thus begins anew.

As managers, we must understand this aspect of human nature, and fight against it. We must inspire and reward perseverance and persistence to the task before us. We must check, re-check, and check again to hear what our machines and our people are saying. All of us – from assembly-line technicians through young and mid-career engineers to Center Directors and Associate Administrators within NASA – have the responsibility to speak up if we believe that something is amiss with their part of the complex machine. Other people may disagree with any given concern, or may simply see things differently; in fact, it is guaranteed that they will. And no decision can be made that doesn't leave at least one group feeling as if their concern has been set aside. But it is still everyone's responsibility to offer their own judgment on a controversial issue. The final decision cannot be made better by the lack of debate. In this way, sometimes a crisis can be averted.

This takes me to last week's Flight Readiness Review for STS-120. We should all applaud the folks from NASA Engineering and Safety Center who brought forward their concerns with regard to the integrity of the Shuttle *Discovery* wing leading edge. We have a new inspection technique that, if nothing else, demonstrates that we don't know as much about the reinforced carbon-carbon (RCC) panels that comprise the wing leading edge as we thought we did. This realization brings with it the concern as to whether several of the panels had adequate margin for flight. We had a good, healthy engineering discussion, culminating in a majority, but not unanimous, decision that we have an acceptable level of risk to launch the Space Shuttle. The bottom line is, I don't think we're seeing new behavior in the RCC panels. I think we're seeing how the panels we've always flown look,

when inspected via a new technique. But I will say here, I simply could not be happier with the manner in which the NESC folks pursued, and brought forth, this concern.

In the space business, we live up to a creed of excellence, or die from the lack of it, and we make our entire society better for the acceptance of that challenge. We are not perfect; we do not have perfect knowledge of our machines or the environment in which they will be operating. Our machines are no more perfect than we ourselves. A quote that I love goes like this: “Excellence is the result of caring more than others think wise, risking more than others think safe, dreaming more than others think practical, and expecting more than others think possible.” My hope is that we inspire our people to work – and work hard – toward the goals of the missions placed before us, as our forebears did. That’s what it takes. This *is* rocket science.

NASA is a high-performance organization, working on large, complex engineering systems on their way to Mercury, Mars, Pluto, and with the Dawn mission, the asteroid belt between Mars and Jupiter. Weather permitting, my hope is that tomorrow or later this week we will launch Space Shuttle *Discovery*, commanded by Colonel Pam Melroy, to ISS on the STS-120 mission. This Shuttle mission will deliver the Italian-built *Harmony* module to connect the European and Japanese laboratory modules which will be flown on the next two missions.

But, we will only launch after checking, re-checking, and checking again. Tonight, as I speak, hundreds of technicians and flight controllers are working toward that launch. Tonight, here at Marshall, payload operators are working on experiments onboard the ISS. Tonight, the Expedition 16 crew commanded by Peggy Whitson will soon wake to begin preparing for *Discovery*’s arrival. On November 2nd, we will celebrate seven years of continuous manned spaceflight operations aboard the Space Station. Many, many people said that such a goal could never be reached, but as Meriwether Lewis wrote in his journal, “we continued on.”

In discussing the great things we have accomplished and seek yet to do, I need to return to my original question: why does it take a crisis to get the American people's attention? It is frustrating sometimes for those of us in the space business to realize that many people in the American public are not aware, or do not care, about the things we are accomplishing, often for the first time in history.

We saw this for the first time with the lunar missions that followed Apollo 11, except most famously the harrowing Apollo 13. Some people lost interest – lost interest! – in seeing a precious few of their fellow Americans begin the exploration of an entirely new and unknown world. Today, it can be frustrating when some young people actually question whether we ever really landed on the Moon. However, it has been almost 35 years, and enough time has passed that many Americans forget the importance of these events in their time. In a way, it's a lot like Petroski's observations concerning the three-decade cycle in major bridge collapses. New generations sometimes need to relearn the lessons so painfully gathered by their fathers.

Perhaps, that is what prompted the *Columbia* Accident Investigation Board to observe: “The U.S. civilian space effort has moved forward for more than 30 years without a guiding vision.” That was a damning statement, citing as it did a lack of leadership in space policy, a strategic interest for the United States, reaching to the highest levels of our nation for over a generation.

Earlier this year, Mike Coats asked me to speak at a dinner in Houston. It was “budget season” in D.C., and I didn't have time to write a speech, or even to seek help from any of my colleagues, who might have been willing to furnish a draft for editing. I was simply out of time when the dinner arrived, and so I stood up to speak with nothing more than the benefit of a few notes I made on a napkin during dinner. Thus, I spoke more from the heart and less from my analytical side than is customary for me. I discussed the “real reasons” – as compared to the

“acceptable reasons” – why those of us in the space business make the sacrifices we do to pursue the dream and the challenge of spaceflight. Some of you may have been there or perhaps have read the speech, which later appeared in *Air and Space* magazine. I’ve been enormously surprised by the outpouring of positive feedback I’ve received in regard to that speech, far more than for any other speech I have ever given. With those thoughts, I must have touched a sensitive nerve that the analytical side of my brain did not know was there. The real reasons which drive those of us who are in this business are, I think, more visceral, or even spiritual, than can be expressed by means of any tangible rationale.

While NASA’s budget is about half a cent out of every federal budget dollar, spaceflight in all its forms is a strategic capability for this nation. We must understand the real reasons why that is so, we must explain those values to our children, to their children, to the public, and to the nation’s leadership, lest it just slip away.

Thus, maybe the reasons why the American public is not aware of what we’re doing in space, of what we’re trying to accomplish, is that we’re not explaining it well enough. Maybe the scientists and engineers in this room need the help of folks like Miles O’Brien, Neil Tyson, Homer Hickam, Tom Hanks, Bill Pullman and many, many others who are far more charismatic than I will ever be, and who know how to weave the fabric of such a story. For those of us in the space business, this is our story, a complex story full of richness, daring, drama, comedy, and pathos. While I don’t pretend to know all the different ways to tell it, or maybe any of them, I do know it cannot be condensed down to a bumper sticker slogan. But it can be distilled. “This cause of exploration and discovery is not an option we choose,” as President Bush put it in his eulogy to the *Columbia* astronauts. “It is a desire written in the human heart. We are that part of creation which seeks to understand all creation. We find the best among us, send them forth into unmapped darkness, and pray they will return. They go in peace for all mankind, and all mankind is in their debt.”

A few weeks ago, many television news shows and newspapers recognized the 50th anniversary of the launch of the first man-made satellite, the Russian *Sputnik*. Some commentators noted the galvanizing reaction of this event on the American public and our national leadership around the question of whether we were falling behind in recognized leadership in the world, falling behind the Soviet Union in technological competitiveness, and how this reaction was primarily a media-driven frenzy. That is the power of the American media then as now. America at the forefront of the frontier is a concept deeply embedded in our national psyche. People who tell stories for a living know this better than I do. Space was the New Frontier, as the junior senator from Massachusetts and future president would say. He was the first of our national leaders to recognize the strategic importance of the new medium, the new arena of space.

President John F. Kennedy also understood what it meant for nations to ignore the tell-tale signs of a looming crisis, failing to connect the dots. His thesis at Harvard in 1940, *Why England Slept*, compared the failure of the British government to take steps to prevent the rise of Nazism in Europe with allusions to how America was also ignoring its own looming crisis, and could be pulled into another world war. Like Churchill, Kennedy spoke up about his concerns, just as I have asked every NASA employee to speak up if they have concerns. In Kennedy's case, when he spoke in his famous speech on May 25th, 1961, about the need to "take longer strides", the Congress and the American people listened.

In my own small way, I have recently given vent to my thought that the pace of China's space program may be faster than our own. Later this week, China plans to launch its first satellite to the moon. I also believe that, if they so choose, the Chinese have the economic and technical wherewithal to send their taikonauts to the moon before the United States plans to return our own. If this happens, we in the United States will not like our position in the world of that time. I am speaking

out now because I hope to avert the situation our nation faced fifty years ago with the launch of *Sputnik*.

Even at the age of eight, I was as attuned to events following the launch of *Sputnik* as closely as was possible by watching television and reading *The Baltimore Sun*. The newspapers were full of both soul-searching analysis and rampant second-guessing. We questioned our military plans, our civilian research programs, and our educational systems, and made changes in all those areas and more. America's readiness – or more properly our lack of readiness – to explore and exploit the space frontier decided a presidential election. *Sputnik* changed everything.

I was in Russia a few weeks ago toasting the 50th anniversary of this accomplishment with my Russian counterpart, Anatoly Perminov. Times have changed. NASA is now paying the Russian Space Agency several hundred million dollars over the next several years for the *Soyuz* and *Progress* vehicles necessary to support the International Space Station. Partly for that reason, we need the help of the rocket team here at Marshall and our industry partners to develop the next-generation Ares rockets as expeditiously as possible. I would rather we spent NASA's funds within the American space industry, first with U.S. commercial systems to support the Station, and then the *Orion* crew vehicle and *Ares* rockets. This is both important and urgent, and we need to work with the same sense of purpose as our forbears to build these new systems.

While we engineers like to talk about the machines which propel us into space, in a democracy it is really the American people who ignite our Nation's space program. Fortunately for those who care about space, one of the most charismatic men in history was the first director of Marshall, Wernher von Braun, whose memory we honor here tonight. Chris Scolese brought to my attention a wonderful book, *The Rocket Team*, about the life and times of von Braun and the team he built. I commend it to your attention.

There's no need for me to recount to this group the story of the von Braun team and how they built the V-2, Redstone, Jupiter, and, finally, the Saturn V. Many of you know far more than I do about these accomplishments. Von Braun's charisma, technical acumen, and leadership in the field of space exploration are legendary.

But do you know what Huntsville was like before von Braun settled here to work in the spring of 1950? The population of Huntsville was 16,000, and the city fathers proudly advertised it as "The Watercress Capital of the World". Von Braun changed Huntsville, the nation, and the world in the course of his pioneering efforts in space exploration. Von Braun and other legendary engineers and managers like Glynn Lunney, George Mueller, George Low, and Chris Kraft turned President Kennedy's vision into a reality. I've said before, and will do so again here, that James Webb was NASA's greatest administrator for the manner in which he kept those people and their programs pointed in the right direction during the 1960s. Today, young engineers in this audience are following in their footsteps, and pursuing a vision for space exploration which, I hope, will be sustainable over the next fifty years.

Look around the room. You are the people whose accomplishments future NASA administrators will toast 50 years from now. You are the ones who will be building the *Ares I* crew launch vehicle and the *Ares V* heavy-lift launch vehicle to propel our nation back to the moon. But it will only happen if we all work just as hard as they did. *You* are the new Rocket Team. But not only must we be able to build rockets, we must also re-ignite the passion for space exploration that Von Braun conveyed to his team, and to the nation. This is now our story to tell.

Only a few months before he died, von Braun wrote the following: "While the members of this magnificent team changed with time, the fundamental characteristics of the team itself never did. It always has been characterized by enthusiasm, professionalism, skill, imagination, a

sense of perfectionism, and dedication to rocketry and space exploration. How can the story of such people and of the exciting programs with which they are involved ever end?"

So, let us resolve that it will not – not ever – end.

Thank you.