Remarks by the Honorable Sean O'Keefe
NASA Administrator
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Thank you Mr. Chairman. I'm always reminded as the former Chairman of the House Science Committee, Bob Walker's great leadership in this community certainly has brought us to where we are today and I thank you sir for that continuing participation and that effort. And the guidance that you laid the groundwork for over some years has brought us to this point. And I thank you for that perseverance as well as persistence in helping us get to this stage. I thank you too for that overly generous introduction. You're very thoughtful. And I wish I did have some high priced clients, but indeed it's more a case of the logic of ultimately coming to the conclusion that we really need a focus and a strategy and I'll talk a lot more about this here this morning.

To my friend Elliot Pulham, I want to thank you as well Elliot for pulling together a remarkable confluence of events and an exciting agenda. One that really has energized in a way that this is the largest attendance in the twenty-year history of the Space Symposium that the Space Foundation has ever pulled together. This is really astonishing to see this level of interest and it means again that people really care about this and I thank you all for your attendance and Elliot for having the effort to pull us all together and make this work.

It has been a tumultuous year, certainly, since last year's symposium, but we have, I think as Bob Walker just mentioned, emerged as a community from this difficult period with renewed, defining goals.

And in fact, I think the nature of the debate has changed dramatically and much to the better along the way. A little over a year ago the nature of the debate was around a fairly basic, fundamental, persistent shop worn theme that it ought to be about either humans or robots. That was the argument. We've progressed so much further beyond that. But that was the argument and it still comes up from time

to time and it ought to. It's a very important question, but nonetheless is at its base core, the foundation of it. And there is a great cartoon that I saw not long ago that I want to show you. It reminded me of a year ago, and the arguments about humans versus robotic space flight. The caption reads, "Alarmed by the many dangers, the pioneers abandoned westward exploration, except for a series of unmanned prairie probe vehicles." Gosh, if we had gone to that level we'd probably wouldn't be gathered in Colorado right now were it not for the temerity on the part of lots of folks that we counted on, at that time, to want to be a part of this broader exploration agenda that they exhibited at that time.

There is a certain poetic value, as well, to meeting here at the Broadmoor at this time. Twenty-five years ago, just a few hundred yards from here where the historic Broadmoor World Arena stood for so many years, the gold medal miracle making U.S. Olympic Hockey team was first assembled; just a few hundred yards from here.

When coach Herb Brooks brought that team together, he knew he had a bunch of raw talent. He recognized to

truly be successful the team would have to be extraordinarily focused and dedicated to working together day and night to achieve a goal most thought impossible.

The team's "miracle" was their belief that they could indeed achieve the seemingly impossible and their willingness to act on that conviction. And for that reason the earned the gold medal. That was a great, historic achievement. Our community is now confronting a comparable challenge. We can add to the equation that this challenge was clarified as a consequence of great tragedy.

Last year at this time, we were still trying to determine the cause of the tragic Columbia accident. The remarkable interagency Columbia recovery process in Texas and Louisiana was still underway. Just about ten days ago at the Goddard Memorial Dinner the Goddard trophy was awarded to the Columbia recovery team and Dave King, Mike Rudolphie, and Alan Flint were the three heroes of our agency who helped pull together and coordinate the efforts on the part of 30,000 people in a span of a hundred days walking over an area of terrain the size of the state of Rhode Island to recover every piece of Columbia that we

could to better inform what happened so we'd have a fighting chance of never repeating that tragedy again. Those folks deserve all of our thanks for the tireless effort that they put to it, but in the process of doing so what they did was in many ways in the midst of that tragedy something that renewed our national spirit. They reminded us what the risks are when we take on exploration and in the end why it's so worth while and that a tragedy can produce an outcome that can be quite astounding.

A year ago we were also just beginning to assess the challenges of returning to flight and some were calling for a complete reassessment of the Space Shuttle and International Space Station programs. Those are the kind of inquires that are important in order that we constantly remind ourselves why we do what we do and why the risks are being taken to achieve the kinds of goals that we're looking for.

But this was all systematic of a larger problem. The Columbia Accident Investigation Board concluded that our national strategy for space exploration needed definition. Indeed, the Board's investigation spanned much more

broadly beyond the technical dimensions of an accident investigation. Indeed, what they concluded was that the insulation on the external tank struck the leading edge of the Columbia and brought it down, but that was only part of the story. In essence, they found that our space policy has been poorly defined and that we needed a new focus, a new direction.

They concluded as much as NASA has done great things since the Apollo era, our space program has become diffused and fractured in our activities. They concluded we had gotten away from our primary focus--to carry the torch of exploration to heights unimagined and into frontiers unknown. Indeed, we go to space to discover answers to questions as old as humanity itself, and to ask new ones.

But they concluded that somehow we lost our compass. While the scientific and technology objectives of spaceflight have been well intentioned, this diffusion did create internecine warfare among the various interests. And while public support for NASA during this trying time was positive…again by the evidence of lots of folks from lots of different agencies, state and local government, etc.,

and volunteers who came to that east Texas, west Louisiana area to recover Columbia. That was the greatest expression of positive support and national pride for what we're engaged in that we could ever see. But it also became clear that the American people found that what we were doing was not sustainable and needed clarity.

Clearly, we needed a unifying vision and a series of measurable objectives that would enable us once again to do what the American people expect from our space program. That is to extend our exploration horizons, to address profound scientific questions having long-term importance to the future of humanity, and in so doing, to help fuel American creativity, innovation, technology development and leadership.

Fortunately, the President believes in setting bold goals for our country and achieving them. When President Bush confidently stood in the James Webb auditorium at NASA Headquarters over two months ago to announce a new vision for our space exploration program he said, "America is proud of our space program. The risk-takers and visionaries of this agency have expanded human

knowledge, have revolutionized our understanding of the universe, and produced technological advances that have benefited all of humanity." And with this new direction he has challenged our community to reignite that spirit of exploration and discovery.

The President has proposed we focus on an ambitious yet affordable space exploration program. This program will use human and robotic explorers in the years ahead to gain new beachheads in the cosmos.

We will extend the reach of human civilization and the spirit of freedom throughout the solar system, using a meticulous stepping stone approach that will allow us to learn from our experiences and to incorporate new technological developments along the way. We will reach our goals in space the way we have reached so many others, one voyage, one mission, one step at a time as we build on our capabilities.

Now rather than interpret what the direction is that we've received form the President, let me present a short video that highlights the vision and the work that we'll need to do to implement it.

(VIDEO PRESENTATION)

For the last twenty-five years every commission, every symposia, every conference, every gathering of people interested in this community have called for a national vision and the President has produced it. Now it's up to us to deliver on it. And it's something that's going to transcend long after he's President, certainly long after I'm Administrator, long after any of us are in the capacities we're in because it is a strategy and a focus that has that kind of enduring depth to it.

It affirms our nation's commitment to space exploration, a commitment that has historically led to some of our nation's greatest moments of triumph and achievement during some of our darkest hours. He has given our agency a new focus and clear objectives that the best minds in America, working in partnership with other nations, will achieve.

Our space program boosts the opportunities we have to become a smarter, safer, healthier and more intelligent world on a scale never seen before in the history of the planet, at a pace hardly thought possible.

These are objectives that will inspire the next generation of explorers to study math, science, engineering and technology fields and prepare themselves to help carry the torch of exploration ever outward. And in these fiscally stringent times the President has outlined a strategy for space exploration that is affordable and sustainable.

We must carry out the President's vision with a passion and verve that reflects our nation's spirit.

This is a historic turning point for the space program. Our community has been waiting for decades for an opportunity to unleash our creative potential. The President has turned a period of crisis into a time of opportunity to truly pioneer the space frontier and we are responsible for seizing that opportunity.

And make no mistake about it…this period between the President's announcement and the time when Congress will act on it through its budget deliberations is critical.

Already, we've heard from a chorus of skeptics expressing arguments questioning the expense and value of this vision.

This ongoing national dialogue reflects legitimate points of view. But it is imperative that the advocates of this vision become as vocal as the skeptics. We have a compelling, positive story to tell about why our investment in space exploration is beneficial to society on so many levels and in so many ways.

We can win this debate. The opportunities are there and indeed the receptivity in the halls of Congress and throughout America is responsive and receptive to exactly this message. I've been in both locations and I find it overwhelming to see the response that can be had. But we can't win it by sitting on the sidelines. We need to do our utmost--all of us--to enjoin these issues in the venues of public discussion.

Now first let me address head-on the issue of cost. Through NASA's strategic planning process and the extensive discussions that took place…the interagency effort, we spent hours and days and days of grinding through lots of options in developing this policy. It was ultimately pulled together as a consequence of the President's first and final instinct, which is that it's all about

the human desire to explore, discover, and know something about that which we don't know enough about and we have a curiosity to pursue. So we put a lot of thought in how we can advance this policy in a very practical and responsible manner.

Let's reflect for just a moment. There is no reason to turn the clock back to the days of the space race when we expended four percent of the federal budget on the Apollo program. That was an imperative at that time, born by our desire as Americans to demonstrate to others on the other side of this globe why we would not be intimidated. And then we could demonstrate that technology prowess in a way that no one could miss. It was a crash program to make a global statement. We were seeking to compel people on our planet to be impressed by our talent and resolve and therefore to be deterred from actions that would otherwise harm us.

That's not the environment we live in today. Today we spend less than one percent of the national budget on civil space activities, and these activities pay for themselves seven times over. That projection isn't changing. We're

not looking for a crash program or an enormous investment to do this. Our five-year budget projection incorporates modest increases in funding well within this current percentage of federal spending. We can do this.

Indeed, each American annually contributes to space the price for a family of four to attend a movie one time. Less than fifty dollars is what every individual taxpayer contributes to what we do. And that investment in the future pays off a lot more than that movie would. It's not a budget buster. That's a myth that the establishment newspapers have tried to publicize in editorial pages across the country and they're wrong. There is no evidence to support that.

We can achieve sustainable progress under this budget profile through strategic investments in new space systems. Resources for this effort will largely be derived through transformation in what we do at NASA. As the Shuttle retires, Project Constellation will come on line. As human endurance challenges are conquered on the Space Station, our options for human exploration will be enhanced.

Additionally, the budget strategy supporting the President's vision will not require large balloon payments by future Congresses and Administrations….

Unlike previous major civil space initiatives, this approach is intentionally flexible, with investments in sustainable exploration approaches to maintain affordability and to build on successes when they are achieved rather than when they are forecast.

Even after the end of this decade, the budget projections indicate that the exploration vision can be implemented within a NASA budget that merely keeps pace with inflation. That's the goal we need to commit ourselves to, maintaining that focus and constantly adapting what we do to fulfill it. Indeed, unlike every editorial I've read again from a major establishment newspaper that would like to perpetuate a myth on this point, this is not a trillion dollar program. I wish we had ten percent of that. Even over the course of this next five years it doesn't even rise to that level. So how that (number) is derived is pure fantasy. This is an affordable program that again is one that really calls on us to be more resourceful, more creative,

and to pursue those objectives as those successes are achieved and not before.

In the first budget hearing on this issue, the House Science Committee Chairman, Sherwood Boehlert, congratulated President Bush for quote "having done what no one has been able to or willing to do for more than 40 years--lay out a well thought out space policy with a seemingly reasonable price tag." We've got to fulfill on that comment.

As a second matter with the skeptics, let's turn to the issue of space program benefits. We have a powerful story to tell the American public about the tangible benefits we receive both from direct space applications and from spinoff technologies. Most Americans are quite proud of our space program. That's an overwhelming response to every survey that's been conducted. But most only have a vague idea of what actual benefits they receive. Most don't know, for example, that for every one dollar invested in the civilian space program, seven dollars eventually flows through the economy.

The scientific and technical return that are verifiably the direct result of NASA's space research and exploration activities are tangible and significant enough to impress even the deepest cynic if they give a few seconds listening to (information) about them, and that's our task.

Let me give you just a couple of examples.

The monitoring systems used in intensive care units and in heart rehabilitation wards were developed from the systems used to monitor the heartbeats of astronauts during the first space missions in the 1960s. Buzz Aldrin is still alive and here with us today as a consequence of that and doing quite well thank you very much. A single nurse can now monitor several patients in critical care situations. Countless Americans recovering from heart attacks and other serious illnesses or injuries owe their lives to this technology—which is a direct result of NASA's space program.

In 2002, NASA honored pioneering heart surgeon Dr. DeBakey with our Inventor of the Year award. This award was given in recognition of his collaboration with NASA scientists on the Ventricular Assist Device, a small heart

pump that can be used as an artificial heart that will improve the lives of thousands of heart patients. This device was made possible from technologies derived from the Space Shuttle. That's how he found out about the potential of this technology by working with engineers on that program.

Another innovation we're proud of that is a new lighting technology originally developed for plant growth experiments in space that doctors are now using to treat brain and skin tumors and other medical problems such as wounds. Physicians at the University of Wisconsin in Milwaukee are using this technology to improve a chemotherapy technique called photodynamic therapy that uses focused light to activate medicines to kill cancerous tumors.

On the list again of medical advances, at NASA, unusual applications often arise from unusual challenges. Dr. Rafat Ansari, who works with fluid physics experiments conducted by our astronauts in space, found an unusual use for a NASA device when his father faced the challenge, as many Americans do, of cataracts. The

physics experiment that we conduct on the International Space Station looks at small particles that are suspended in liquids, a description which also happened to fit the nature of his father's eye disease.

In a flash of insight, Dr. Anasari realized that the instrument being developed as part of this experiment might be able to detect cataracts—possibly earlier than ever before. The device is now being widely used to assess the effectiveness of new, nonsurgical therapies for early stages of cataract development. It is also being adapted as a pain-free way to identify other eye diseases, diabetes, and possibly even Alzheimer's.

This device also may have an unexpected return for NASA. It is being investigated as a medical tool for astronauts to detect cataract development, which might progress more rapidly as another side effect of the kind of radiation exposure received on long duration deep space missions. So you see, we are already making progress in working to surmount the physiological challenges of the President's space exploration initiative. This is one of the

contributions that we need to understand the answer to if we are to engage in these long duration efforts.

At NASA, it's also true that extraordinary goals inspire exceptional minds. In this case, Dr. Anasari set on his life's path to become a scientist when thirty-five years ago he watched with awe and wonder on his family's black and white television in Pakistan the sights and sounds of Neil Armstrong and Buzz Aldrin walking on the Moon. Who knows what innovation will be inspired by a youngster watching our explorers work to establish a lunar base and resources processing facility in the next decade?

A final set of innovations I want to mention are a direct result of the work of as outstanding a group of astronauts that has ever been assembled. The crew of STS-107, Columbia. There are some skeptics who've asserted that nothing of substance was accomplished on the mission. I find that infuriated, because that is flat out wrong!

On Columbia's final mission, the STS-107 crewmembers helped scientists study how prostate cancer cells and bone cells come together. Their goal was to learn

about how the cells might interact in the early stages of when cancer begins to spread.

The Columbia astronauts used a NASA-invented device called a bioreactor that will help researchers turn cell cultures into functional tissue, which can be used for experiments, transplants and drug development.

Without a bioreactor, cells fall to the bottom of a Petri dish and grow as a sheet one cell layer thick—thinner than a human hair. In the space bioreactor, the cells stay suspended and form the kind of large samples researchers need. During the Columbia mission, the cell "assembly" grew to the size of a roll of pennies – much larger than anything researchers have seen before. That was what was accomplished on Columbia. The Columbia experiment was so successful that we plan to fly similar, longer-term experiments on the International Space Station because it will inform the challenges of long duration space flight, but also have great benefit to all of us who will never have that opportunity.

Also, a hydrogen experiment aboard Columbia's final mission produced the weakest flames ever created – 100

times weaker than a birthday candle. Imagine what that research could mean in our efforts to produce cleaner and more efficient cars in the future by helping scientists seeking to improve the burning of hydrogen and other fuels in engines and furnaces. Two major corporations, Pratt and Whitney and General Electric, have already used space flight combustion research to improve their jet engines. This could offer the breakthrough that we've been looking for.

Who knows what great inventions will result from our renewed exploration and commitment to discovery and exploration beyond lower Earth orbit? Again, our space program boosts the opportunities to become a smarter, safer, healthier and more intelligent world on a scale never seen before in the history of the planet, and at a pace hardly thought possible.

In a larger sense, these benefits of exploration provide a stark contrast to the consequences of being insular. On this point the history of China at the end of the Ming Dynasty is most instructive.

At the time, China dominated the seas between Asia and Africa. Commanding the Chinese fleet of 300 ships was a nearly seven foot tall explorer named Zheng He.

The treasure ship of the fleet measured some 400 feet--about five times larger than Santa Maria, the ship that took Columbus, of course, westward to the new world.

Zheng He is largely unknown in the history books because after his last expedition, in 1433, the Chinese ruling class went through a major philosophical shift, and claimed his voyages were indulgent adventures that wasted the country's resources. This is the kind of an argument I've heard more recently.

Confucian court officials closed down ports and chose not to pursue future sea adventures.

Many scholars of this period on world history believe had the Chinese fleet been maintained and had China not turned inward and willingly lost its vast scientific and military advantage, Europeans most likely could not have taken over the spice trade and subjugated the Asian and African continents.

A half-century after China turned inward, the imperial court of Spain was faced with a similar question. Would King Ferdinand and Queen Isabella support the exploration ambitions of the son of a wool merchant and weaver from Genoa, Christopher Columbus?

Well, as governments often do when difficult matters come up, the monarchs formed a commission to settle the question. Samuel Morison writes in his book, Admiral of the Ocean Sea, that Fray Hernando de Talavera's panel came to the following conclusions:

First, a voyage to Asia from Spain would require three years.

Second, the western ocean is infinite and perhaps unnavigable.

Third, if he reached the land on the other side of the globe from Europe he could not get back.

Fourth, there are no lands because the greater part of the globe is covered with water, and because Saint Augustine says so. I might add as someone who went to a good Jesuit School, it pains me to admit the error of Saint Augustine on this matter.

Fifth, of the five zones of the Earth, only three are habitable.

And sixth, so many centuries after the creation it was unlikely that anyone could find hitherto unknown lands of any value.

Today, there are plenty of people who can tell you that the Moon and Mars are worthless pieces of rock and that we will be forever bound to planet Earth. And they will tell you so with the same confidence of King Ferdinand and Queen Isabella's committee. They will also be equally wrong I would submit. But we'll never know until we ask the question and go find out.

There's also again a view that I started with, which is we can do all this robotically. Why do we need to risk human beings to do that? Well, that is the question. The answer is we do need robots and autonomous capabilities to tell us what's out there, what it is like, and to be precursors for human exploration efforts. But we ultimately need all of us vicariously living through someone to see in space what it is like, what it means and how it feels. That's what has always motivated us.

We currently have two robots on the surface of Mars, and they have performed magnificently. But imagine what would have happened if we had humans on the surface of Mars working alongside those robots. Over the course of 36 days Opportunity operated in a crater that is roughly a third the size of this room, navigating around. It is responsible for some amazing discoveries. A human could have conducted that whole activity that Opportunity conducted over that 36 day period in a matter of a day, and yielded results we are seeing now. A future Mars explorer would be able to collect the same amount of material as Spirit and Opportunity have collected in two months in a single eight-hour work shift. Further, using his or her cognitive skills, our Mars explorer would be able to quickly spot those areas of the surface that are most promising for investigation and inquiry, such as the El Capitan outcropping where Opportunity was able to find evidence of ancient water on Mars' surface.

The Moon, Mars and places beyond are more than interesting destinations. They represent our destiny. Informed by our science goals in the years ahead many

human beings will explore their fascinating landscapes, tap their enormous resources, and help to create a human civilization that will in many ways define who we are as a people and where we are headed.

Indeed, we have barely begun this adventure without end that we call space exploration. We're just at the beginning of this.

On a Universal scale, our own solar system is a comparative flyspeck in the grand scheme of things and eventually we need to head beyond that.

This is a destiny not ours for the taking. But as the President so eloquently stated last year, "This cause of exploration and discovery is not an option we choose; it is a desire written in the human heart."

When people ask me how we are going to make our new vision for human and robotic exploration of the Solar System work, I like to point out that we are making it work today.

Spirit and Opportunity, are dramatically demonstrating what we can do when we bring new capabilities such as mobility together with our best science

and technology tools. And the interest is there. In the last 75 days, nine billion hits to our website provide testimonial to the interest that people have. Nine billion. All of last year we received 2.8 billion hits…all of last year. So in a span of two and a half months it is a factor of three greater than we've seen. And last year was a factor of five greater than we've ever experienced historically. And it isn't just the Mars website. It's everything we're engaged in. People are navigating through this website because they're interested, they care, and they think it's worth it. And that is the thing that's impressed me to no end. People are voting with their fingers. I mean, going to the NASA website because it's that interesting and you can see the same response everywhere. That's just the tip of the iceberg.

Three days ago, Americans woke up to read in their Sunday newspapers about the record-breaking flight of the X-43A airplane, which used a scramjet engine to fly seven times the speed of sound. Among us here, Ron Sega was probably the most enthused of anybody and justifiably so.

Let me tell you an interesting fact about this flight. Just over 100 years after the Wright Brothers took off at Kitty Hawk, we flew approximately the same amount of time, but traveled in this 10 second period 15 miles instead of 120 feet! That's the difference. And it will open up the opportunity for continuing to develop that capability that may ultimately produce access to space in ways that we've never thought we could achieve.

And as our HyperX project manager Joel Sitz from the Dryden Flight Research Center noted, the scramjet is the holy grail of aeronautics because it promises the most efficient path from the ground to space.

Now try to imagine the consequences. Over time, through the National Aerospace Initiative, that the Defense Department and Ron Sega are so effectively championing, if we could ever achieve horizontal launch as a means to do this it becomes a routine or more routine matter than we see today. We've got a long way to go achieve that but this is one step in that process, but it's a big, big step and it's set a new record in the process of doing so.

Of course in the world of horizontal flight this technology also has promise for revolutionizing high-speed point-to-point suborbital travel as well.

And there's more. In the upcoming months, we will launch the Messenger spacecraft to map the surface of Mercury, and the Cassini spacecraft will enter into orbit around Saturn and send the Huygens (Hoy-Gens) probe hurtling into the liquid atmosphere of Saturn's mysterious moon Titan. All that's coming ahead. This is not just a couple of bounces we've seen as a result of Mars or the X-43A, it's continuing.

While all this goes on our careful work continues to return the Space Shuttles to flight and use the International Space Station to conduct research that will help us overcome the challenges of long-duration spaceflight.

I'll tell you one more thing. These are the kinds of objectives we're focused on, but it also means we need to be more mindful of what the challenges are… One of the strongest controversies in the last couple of months has swirled around our effort to extend the service life of the Hubble space telescope. We are intent and committed to

doing just that. We are putting our best minds to work on developing innovative solutions for extending the Hubble Space telescope's service life. We will continue to use the Hubble, the Spitzer and Chandra space telescopes, all of them, as we launch at the earliest possible opportunity our next space astronomy projects, the Kepler space telescope, the Space Interferometry Mission, and James Webb Space Telescope at the earliest part of the next decade. In this way we will continue to keep opening new windows on the Universe. And along the way we will, and must remain conscious of the primary focus of what the Columbia Accident Investigation Board intoned. A mantra that they have now insisted through not only their statements, but also every congressional hearing, every editorial page, every commentary, which is that we adopt their view to prove that something is safe as opposed to prove that it's not.

Along the way we have to be diligent, thoughtful, and serious about putting that test to it. They put a lot of time in that investigation and they were right. We need to change the focus to prove that it's safe. And that doesn't

mean we'll ever eliminate the risk. That's not going to happen. It will always be present. And the risk of exploration is always been an element the humans have accepted to advance our condition. But along the way we also need to be diligent about it, responsible about it, and explore every other option and opportunity to achieve those objectives and that's what the Hubble experience is all about. We are finding all of those other alternatives to achieve the primary goal, of figuring out how to extend its service life. And that we're committed to doing and the great news is we have time.

We move forward in the second century of flight at a time when the best is yet to come. Our vision for space exploration will only happen if we collectively roll up our sleeves and demonstrate through our deeds and words the value of exploring the cosmos.

The larger objective in this too is the effect we're having today. Through the explorer schools program we are affecting the lives of that next generation of explorers right now and the enthusiasm they have for math/science and its applications ultimately to materially improve the

condition of human lives is substantial and they're seeing it and benefiting from it right now and being motivated and inspired to pursue this as that next generation of explorers who will take up where all of we leave off.

If you look up at the western sky at sunset, this is really a remarkable period of time. It is really quite historic to see an amazing site. Along with the Moon….Mercury, Venus, Mars, Jupiter and Saturn are all visible to the naked eye.

In 32 years when this rare planetary alignment occurs again, attendees at your 52nd conference will likely marvel at the sight of these planets hovering over Pikes' Peak.

And as folks gaze at this stunning celestial display, I have no doubt they will be filled with awe and wonder knowing that brave humans will at that very moment be hard at work exploring the Moon, Mars and other distant worlds. Perhaps an astronaut climbing Olympia Mons, the Martian peak that is eight times higher than Pike's Peak, will be the Space Foundation's keynote speaker that year.

You can only dream about that. And set the path and the motion for that to be possible. The dream of

interplanetary exploration is alive again. It is our challenge and our opportunity to make this dream come true. It is our responsibility to do that and I thank you for accepting that commitment on behalf of those who will follow to do things we never thought possible. And I thank you for your attention this morning. Thank you.