Remarks by the Honorable Sean O'Keefe
NASA Administrator
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Thank you Craig (Craig Steidle, Associate Administrator, Exploration Systems Mission Directorate) for very, very thoughtful introduction.

It's occasions like this that have always reminded me of that great John F. Kennedy line, where he said, "Gosh, I wish my parents would have been here. My father would have been proud and my mother might have actually believed it." A less generous version of that is my wife's. She says that litany of all the different things I've done is just testimony of the fact that I just can't keep a job. And yes, I'm demonstrating that once again by moving on to a yet another capacity.

To Joe Lehman, John Karas, Mike Lembeck and the others who organized this exciting conference, I

want to thank you for your remarkable commitment to the Vision for Space Exploration, and for beginning something that is certain to bear fruit in the months and years to come.

I thank you all for your attendance at this conference dedicated to this continuing voyage of discovery.

And I'm very appreciative of the eagerness that all have demonstrated I think in the course time since the President outlined this Vision just a year ago to share your ideas and concepts that will enable us to extend humanity's presence throughout this corner of creation.

Now there's a guy who has labored for the last several years on my staff, a fellow named Ed Goldstein who drafts up comments for me in the hope that I might actually follow them. And he's usually disappointed. But at the same time he has marked this as the 228th time that he has made this failed

attempt to give me very structured commentary in making public addresses. And I find that amazing. I've been putting people to sleep that many times. It's really astounding.

And of course then guys after I get done from making up what it is that they didn't want to hear me do, guys like Glenn Mahone our Assistant Administrator for Public Affairs and our Chief of Strategic Communications, he usually has to do the really painful job of then describing for folks afterwards, "What he really meant to say was the following…" So yes, were off on that yet again and for their purposes, and I guess for yours, this will be about the last time. So that's the good news for all of us.

In the course of the three years I've been privileged to lead the team we describe as the larger NASA Family this has been a really privilege and opportunity to be a part of this. And I'll soon be

headed to Baton Rouge, Louisiana, back home to my home state, as the Chancellor of Louisiana State University for a new chapter in our life's adventure and for our family.

And this is a really diverse state. For folks who aren't familiar with the state of Louisiana, this is a really small place. But it's an incredibly diverse place. Indeed when you look around geographically to the state, there are very different parts of it, and different themes that you can find as you travel around it in very short time…. From the southern part of the state which is predominantly influenced again by the French and Spanish, and indeed Irish—there's a whole section there called the Irish Channel in a part of the state that was settled a couple hundred years ago for that purpose. In the northern part of the state it is a whole lot more like most other southern states you see, and indeed in places like Shreveport and elsewhere, the typical attitude you see is from

most Louisianans is “Yes, it was annexed away from Texas not long ago.”

In the southern part of the state it’s a very different kind of place. So there’s a very different cultural background best typified by a story I remember from years ago. A friend of mine when he graduated, one of his first (legal) cases was he represented a guy from Monroe—and there’s a different pronunciation: everywhere else it’s referred to as Monroe, M O N R O E, but down there’s its referred to as “Munroe.” …In that northern part of the state he was representing a client who was involved in a civil case in an area that was in the southern part, a place called Plackman’s Parish. Parishes are counties, and that’s something else I’m going to have to get back getting used to. And as he was defending his client in the southern part of the state, he appeared before the judge with his client. And the prosecutor from Plackman’s Parish arrived

and they all sat down. And the Prosecuting attorney stands up and begins his opening statement in French. So my friend stands up and says, “Your honor, your honor, I object! This man’s speaking French. I don’t understand a word he’s saying.” The judge looks over at him and says, “Don’t you worry about a thing. He says anything bad about your client, I’ll tell you all about it. Sit down! (laughter).”

That’s what I’m about ready to get used to again. There’s no doubt about it. It’s a very diverse place in a very small compact area, but one that certainly captures the same, I think, range of perspectives and diversity that you see in our own community here. Just in a very compact smaller area.

But I want to thank you for this opportunity this morning’s final opportunity to share a few thoughts I’ve been saving for a long time, and the chance to reflect on a few points that I hope will be of utility as we begin this next chapter of this journey.

I have been again truly honored to lead the NASA team during our three years of a most momentous period in this Agency's history.

We've shared incredible moments of triumph, and, regrettably two years ago, the sadness of a terrible tragedy that still painfully cuts to the bone of all of us. And through this time the Columbia families have demonstrated, I think, remarkable courage, and I think have been a tremendous source of inspiration for all of us.

Out of that tragedy we've emerged a stronger community, one with a more sophisticated approach to mission safety, and by this experience I think we have learned that the faith expressed by President Bush to entrust to us a focused long-term mission of exploration and discovery will profoundly affect the future of human civilization. It is one that really is a remarkable consequence of what is otherwise an incredibly tragic episode of our history.

There were a few absolutes that I heard before that accident that were uttered to me by lots of colleagues and friends and folks in our community. The most common absolute was that we were one accident away from going out of business, from extinction.

That was a view uttered by lots of folks who were of a mind that we simply couldn't withstand, in this community, one more tragic event. Indeed, as a consequence of everyone pulling together that proved to be flat false. Indeed, it almost became a consequence of renewal, tragic as it was. And motivated and inspired by the families themselves who said you cannot, you cannot, quit what they dedicated their lives to.

The other view that was expressed as an absolute, was that all we needed, all we needed, was for someone to do a Kennedyesque stand up and say, "We're going to wherever within X number of

years." That proved to be false too. This is hard work. Indeed, the President has entrusted to us, I think, with the broader Vision and a statement of the strategy is one that is certainly a very, very good motivator for us to move along and accomplish the kinds of objectives he articulated. But it's up to us to achieve it.

And while there was lots of inspiration to be derived from what the President uttered in those early days of 1960's of "We shall go to the Moon, within this decade," it nonetheless required lots of resolve on the part of lots of people to make that really happen. Or else it would have otherwise gone away. We are in that time right now. It is an interesting speech too it's one that I have always found kind of interesting. Where you always see it relayed and replayed in lots of different historical pieces, where John Kennedy is there in Rice Stadium at Rice

University uttering the immortal words, “We shall go to the Moon.” Everybody has seen that snippet.

Now there’s an interesting part though. If you reel back the tape just a few seconds earlier, you come to find out why he had to say three times, “We shall go to the Moon.” Folks weren’t excited about that. The stadium wasn’t uproarious about that point. What they were really excited about was he was describing how difficult things are and why people take on incredible challenges that sound audacious. Because it is the nature of a challenge, what he was trying to say. And he laid this right out. And the line just before “We shall go to the Moon” and his description of why people take on tough challenges, was he said, “Why else would Rice play Texas?” (Laughter) Look it up.

That was exactly the point. There are things that are really outrageous that you can say and describe as aspirations. But they are the nature of human beings

to want to exceed and do well. And that's what he was trying to capture.

We've developed this romantic view of what happened at that time by snippets like that. But we forget that it was about Rice beating Texas or trying to. It's really hard. This is a very difficult proposition. And that's the element that was lost in that particular period, in our history, the way we've written it since. It is that somehow there was this overwhelming public support for it at the time, and there was lots of enthusiasm about where everybody wanted to go. The reality is that it was day in and day out challenge to make sure it happened.

And that's where we are too. President Bush has given us a tremendous start on this. It is up to us in this community to make it happen.

You are I think indeed blessed to play prominent roles in our quest to extend humanity's reach into the

cosmos, a quest that will truly honor the enduring legacy of the Columbia heroes.

Because indeed that is the prompting event that forced us all to recognize that we cannot continue to pursue every individual element of what we'd all like to see as direction of a larger space policy or programs, or whatever else, but it must be a focused and concerted strategic effort to obtain very clear goals and objectives. That's what that cathartic event did for us. It tragically took seven lives. But it was a wakeup call that we all had to recognize.

At last night's opening commentary--and Craig very thoughtfully referred to some of those, the comments that I heard were many, many kind words--and I want to sincerely thank all of you for those warm and generous sentiments.

That said, the reality of my position is that by virtue of being in this capacity, I just happened to be the most public face of a remarkable organization of

talented and dedicated scientists, engineers, astronauts, support and safety people who every day come to work thankful for the opportunity to engage in such exciting, meaningful set of objectives on behalf of the American people.

I have viewed my role as being the visible torchbearer of this extraordinary research and exploration team.

I am as Craig said the 10th Administrator who's been privileged to carry the torch. I am profoundly grateful to have been given this opportunity to carry on in the spirit of such giants of the giants of the past who really did it when it was extremely hard too, like James Webb, who guided our fledgling space program on its way to the Moon, and Tom Paine, the visionary leader who decades ago advocated the very same bold exploration objectives now enunciated and given life and direction proposed by President George W. Bush.

And lest there be any uncertainty about what lies in the future, I'm very pleased to say as my time at NASA comes to an end, the stage is as well set as it could be.

We have compelling mission goals and a coherent strategy to achieve these objectives. We have painstakenly developed them over that time. In my public service career, I have rarely ever seen as explicit and as clearly enunciated a set of directions contained in a Presidential directive as this one.

Now folks can argue as to whether the sequence should be one versus another. Or whether we should have picked something else. Or whether the President had should have had a different Vision entirely. And I'd like to invite anybody who like to debate that to hold a separate conference over would've, should've, could've, might've somewhere else.

But for our goals here, let's accomplish this set of objectives. It is indeed the first time that's been pulled together in decades. Norm Augustine who led a commission some 15 years ago after Challenger was trying to define what the goals and objectives of a space policy should be, began the opening part of the commission report that he was the chair of by saying that all folks, everyone agrees that there should be a uniting vision and a strategy of where the space policy should go. He proceeded to say, "And no two people can agree on what it ought to be." Well that's resolved. That issue is settled. And it's up to us in this community to make that a reality.

Now well into the second year of this articulation of a strategy and a Vision we are advancing it with events like this conference, with very productive work at all the NASA Centers, industrial facilities and academic halls, with forward looking research on the International Space Station and with incredibly

productive science missions to Mars and Saturn. This has really been a great time to be a part of this community. No question about it.

Further, we have passed through a critical stage in which the Congress has endorsed and provided adequate funds to implement it.

Everybody counted that out. There wasn't one article that I read during the course of the year's proceeding in which any journalist believed, or any editorial writer, thought that we had any prospect whatsoever of succeeding with this. Yet we did. Succeeded at it. And of course now they are trying to explain why it was they were right all the way along, or that there was something else that went on. Trying to diagnose or analyze the entrails of what goes on inside the 17 mile logic-free zone we know as Washington, D.C. is a colossal waste of time. Please don't engage in it. It's not worth it. Because at the end of it you'll be no better off than most of the

journalists have been in trying to figure out how it all worked. And probably maybe more informed than they are. But not particularly any more right than they would be. Instead let's take yes for an answer. And let's proceed ahead.

And indeed, the next piece of evidence, if anybody is looking for one, next Monday, when the President's proposes the budget for Fiscal Year 2006 you will see that the Administration is determined to continue the exploration agenda at the pace that President Bush announced last year.

The really great news is that NASA will be among the very few domestic discretionary agencies with an increase. That's great news.

The really bad news is that NASA will be among the very few agencies with an increase. This is like the old joke. Why do you rob the bank? Because that's where the money is. And that's exactly the feeding frenzy that will occur in Washington, D.C. as

soon is this begins. There's the increase. Let's go get that that to pay for something else.

So the only way we can fail at this with certainly, is if we fail to keep focused on what the strategic objectives are all about and proceed in that direction.

Indeed, lots of folks will view this as a marvelous opportunity to make a lot of money. This is going to be a great opportunity. Here we have an increase, let's go out and find a way to spend it. If we do that it will certainly fail.

The only way this has hung together is because there is a very concerted focused strategy. Indeed if we maintain the same view that I've seen in evidence over the course of this past year in which everyone rises above that individual interest, be it for its bottom line or anything else in pursuit of this set of objectives, all boats will rise.

And more importantly, this is an opportunity that we can fulfill for the first time in decades, the way people just kind of talked about it whimsically, to achieve a set of goals and objectives that haven't been realized in 30 years.

That's what the stakes are. And it can easily collapse if we become divided in that process, or think about what the individual self interest will be, or who's going to make money and who's going to be the competitors or who's going to win and who's going to lose, over the larger objectives. Because there are lots and lots of folks outside this community, again, who will view this as if we can't get our act together, we have other things in mind to spend these very scarce resources on.

Make no mistake about it. They will be lined up and can't wait to see anybody stumble. That's the challenge. That's going to be the really difficult part of this.

So as I am in the capacity at this point of passing on the torch of exploration to my successor I'd like to take a just couple of minutes to help you peer over the horizon to a time when if we are united, if we are focused on achieving this particular set of objectives, and do apply the work and creativity that this community is well known for, today's exploration dreams will certainly become tomorrow's reality. It will take that concerted, dedicated, focused effort to it every day.

In talking about how we'll chart our path to the future I don't intend to speak about the details of upcoming contract awards and so forth. That's something I'm sure will be debated endlessly. Lots of folks will have lots of views and opinions about it. Although those will come, and nuts and bolts of for example, Project Constellation, that Admiral Steidle and his team are working so hard to achieve, that is something that will be part of this and many other

conferences to come. I don't intend to spend a whole lot of time talking about what it's is going to look like or who's going to win, or who might, or what the ground rules ought to be…instead that we all be focused on that objective.

Rather, I wish to discuss with you a new frame of mind that our community will need to embrace in order to dramatically advance this Vision over the long haul.

To put it a slightly different way, to truly transform the way we do business, we will need to think transformatively.

Some one asked me not long ago at NASA Headquarters, "We've started down the road of this transformation stuff and it really is painful, it really is hard. When are we going to be done with this?"

And the answer is hopefully never. Hopefully never. This should be a continuous evolving process to constantly takes advantage of the technology

developments and the alterations of just activities of what we see as results, to seize on them and take them to the next level. It should be a continuous process. And that's going to be uncomfortable. It's going to be painful. It's going to be really unsettling.

And to those who really want certainty in how all this will play out, and where it's going to be in X number of years, what it's going to look like, I've invited them to apply for a job at the Post Office. Certainty is guaranteed by them. You follow the same route every day. As a matter of fact, they've etched this in buildings. Notwithstanding weather rain, snow, hail whatever else all this is going to be achieved in the same pattern every day. At least that's what the American public counts on from the Post Office.

What they count on for us is constant creativity, a constantly evolving circumstance inwhich we are trying to seize on results and take it to the next level.

Not because we planned it that way, but because whatever happens we're smart enough to take advantage of it. It ought to be a constantly evolving circumstance. That's discomforting. It's unpredictable. There is no certainty to it.

And that's the part that makes it exciting. It's why people are engaged in this. It's why people wake up every morning wanting to be a part of it. We need to seize that and recognize that is the reality and indeed the circumstance that we want to encourage always.

The requirement I think for a new frame of mind is a product of the new circumstances we will face in 21st century space exploration.

This time when our pioneering astronaut crews leave the comforting shores of our home planet and go back to the surface of the Moon, and then on to Mars and other worlds beyond, they will be going on

lengthy journeys of discovery, not brief excursions. We're into a whole different realm.

On such missions we will do much more than conduct short exploration forays. We will dramatically expand our scientific horizons, exploring answers to fundamental questions of importance to science and society. And indeed doing something that we cannot quantify, which is to on behalf of the American people, explore and discover for them. Something that's inherently human. Throughout the course of human history every advance has been as a consequence of not knowing where you were about to go and proceeding anyway, to try to figure it out and upon understanding those discoveries capitalizing on them.

Jacques Cousteau had a marvelous line that I've always found instructive. When asked by a reporter, "On your next mission when you dive for this, what do you intend to discover?" He looked at the guy

like, “You idiot,” and said, “If I knew that I wouldn’t go.”

That’s what we get to do in this community. That’s what everybody wants to do. We’re just the ones who’ve been anointed, or appointed, or volunteered or for whatever set of circumstances or reasons you want to ascribe, for the opportunity to try on behalf of everybody. In trying, you also have the act of success as well as failure.

But along the way we’ll be answering much different questions and understanding the broader context of exactly what role we play in this vast universe. Ed Weiler, who’s Director of the Goddard Space Flight Center, and who previously was Associate Administrator for Space Science, has this great line that I think is really the best description of what we’re all about. Given the fact that we have this circumstance that we’re on this little planet, one of several planets in this solar system, and indeed

around a star that's not particularly big, and indeed in a galaxy in which there are millions and millions like it, and as we're discovering daily, there are more and more planets that look more like this, in a Universe in which there are billions and billions of other conditions. And he refers to this and everything we do at NASA as "the quest to scrape the last crumb off the plate of human arrogance."

We live in a vast place of which we know little about. And that's what we're about in this community. That's what this opportunity that the President has laid out, the focus and the strategy that was given to us, is to pursue understanding of that which we know pitifully little about right now.

So those of you who've heard this theme before also know that I am fond of exploration analogies from the age of sail.

I genuinely believe, for example, that we can learn valuable lessons from the first European

pioneers who sailed across the Atlantic to settle in the new world of North America.

One analogue to what our crews will soon experience is the Jamestown Colony, whose founding we will commemorate the 400th anniversary of in just two years time. Disease and famine almost caused the immediate collapse of the colony, but structured leadership on the spot by Captain John Smith, rather than long-delayed instructions from the Virginia Company back in London, helped to keep the enterprise afloat.

We will need those Captain John Smiths in the future, and we're training them to think that way right now. If somebody is waiting for instructions on these future missions, it will either be a long time coming and probably not very informative.

Each Thanksgiving we recall the rigorous 65-day voyage the Mayflower Pilgrims took across the Atlantic Ocean, and how with the help of the

Wampanoag Tribe member Squanto, the Pilgrims learned to live off the land. That's the kind of mindset we're going to be needing to think about in the future, different then how many flights can we figure out in the next few weeks, months, whatever.

Up until now, we have structured our space program to ensure that Mission Control in Houston is able to respond instantaneously to and assist crews when problems arise on orbit. The very term, "Mission Control, we're in control, you're not," is going to change.

When crews are stationed on the Moon for weeks and months at a time, or are on Mars, where it takes eight minutes to send a message back to Earth, there will be times we will not have the luxury to wait for Houston to solve problems.

And we do a whole lot better at it these days, working with folks in Moscow now in real time in order to what is exactly necessary to solve problems

on the International Space Station. It's more and more becoming in a way that the individuals there on the spot have a lot more control than anybody in Mission Control does.

But it's an imperative now that we move away from the mindset of "mission control" and move into a new era of all of us on the ground providing "mission support" to our intrepid explorers. Because the influence we'll have will diminish with the passage of distance and time.

Forty years ago, the definitive and final word from the ground in Houston was, "The Flight Director says get back in," after Ed White had extended his first American space walk just a few minutes beyond the prescribed mission timeline.

Well, when our astronauts are on the Moon or en route to Mars, I doubt that anybody in Houston will be able to issue any kind of instruction like that. By the time that they would receive it, it would be

long enough ago—because the transmission time is so long—that they'd probably be off doing something else, by the time they get it.

It reminds me this very fragile rate of communications, of what happened when the Mars Exploration Rover Spirit landed on the 3rd of January last year. I stood there in Mission Control and there was nothing controlling about it at all. We were all sitting there observing numbers, data, and we were observing it after the fact, it was all coming in seven and eight minutes later than the reality because it had already happened. We were just sitting there trying to figure out what had occurred, not what was about to occur. And we had absolutely no control about what was going to happen. Zero.

We all stood there anxiously watching this and again Ed Weiler, our Goddard Space Flight Center Director, who at that time was the Associate Administrator for Space Science, was standing next

to me, and at about the three minute mark after it was supposed to land and he's looking there and everybody's very tense in the room, and he looks at me and says, "It's all over." At that point my heart stopped, you know I was looking for the defribulator. And I looked at him and said, "Ed what are you seeing that nobody else in this room seems to be mindful of?" He said, "Oh nothing. Again it's just the transmission time of eight minutes. We're just watching the history here. It's already happened. We're just seeing the history being recorded. Because it has taken that long to come back."

When I finally realized what he was telling me, I just about hit him. (Laughter) But it's a point. There isn't going to be a lot of control that anybody will have over this unless somehow, somebody is going to make a remarkable invention that changes the speed of light, sound, or defies other basic laws of physics. We're just not going to have any control

over this. It's going to be happening in the past tense when we see it. As a consequence I think it's going to take a lot more influence by individuals who have control at the time.

Indeed, our emphasis in the future will be more so on adaptability, flexibility and resilience and less so on roles, strict procedures and absolutes.

Indeed, it's going to be an absolute imperative to think expeditionary, about everything we do to design systems, capabilities, procedures, to think expeditionary, which incorporates resilience, flexibility, and little if any control.

We must think expansively about how our pilgrims to the new worlds of the 21st century can grow their food, construct their shelters, supply their power, and maintain their health on their own.

And what we do to facilitate that, to design capabilities to achieve these goals will be critical.

In the future there will be a tremendous amount of value in having a capability to design space assets in ways that do not require repetitive resupply and have the fewest number of moving parts in order to avoid breakdowns far away from the nearest service station.

John Young, of course the longest serving astronaut, who just retired over a month ago, used to refer to this as the way you have to think differently when you're several months versus two days away from a can of beans.

Suddenly the whole mindset has got to shift and you think very differently about the fact that there isn't a lot of option unless you have already thought about it before hand and made it available as a contingency.

We've already received several great ideas from industry and academia on how we can approach these challenges, and I encourage you to continue thinking

outside of the container that we label the old NASA way of conducting business.

If you want to think about what various people think about the way we do business, just read the latest utterances of guys like Bert Rutan. He's got a real high view of what we do and of how resilient he thinks we are.

We've got to be a whole lot better than that. We've got to be thinking more in the direction of how to be adaptable and flexible in this process to assure that people who have the opportunity to engage in these exploration missions in the future have at their disposal whatever contingency they need in order to make decisions on the spot by themselves. That's the reality of where we are going.

We also need to think about reemploying existing skills in the space industry into the new directions required by our long-term exploration agenda.

There will be new vectors of skills, resources and talents that we will apply to this challenge. The Vision will require extensive systems integration efforts to sustain long-duration missions in a variety of conditions.

When you really get down to it, 40 years ago that's what made NASA and the larger space community so remarkably historic. It was the capacity to integrate systems in ways that were never thought of before. It wasn't the hardware it was how we applied it differently than anyone thought was possible. That's the same mindset we've got to have today.

Furthermore, this community must bluntly confront the fact that as momentum continues to build for the Vision, some programs that don't fit into the clear, focused objectives the President outlined last year must fall by the wayside.

This is hard. A lot of really good programs, a lot of really neat things that have been pursued over the course of time are frankly a distraction from the larger focused, strategic objectives that we need to be about. The mere fact that they are neat shouldn't be the reason why we are doing them. They need to contribute to what these overall objectives are.

There are lots of folks within NASA and the community I think who will be perfectly happen for the Vision to continue as long as it didn't affect their program, or their friend's program: 'That's fine. As long as you just add everything on top of that you can go about the business of pursuing this Vision stuff. That would be fine. But leave me alone.'

If we engage in that we're not going to get anywhere. We will get right back to the same condition that I think has characterized this community before, which is a loose amalgam of lots of different disparate programs that were loosely

pulled together by this community, but were not particularly defining of anything.

This Agency must continually I think take a hard look at projects unrelated to these strategic objectives and capabilities developed over time for very different purposes. Not that they are bad, but they are just different purposes.

Members of Congress who similarly have a strong fondness for activities that no longer serve a useful purpose for this objective need to be challenged to release their attachments to programs that have been kept alive and on respirators.

We contribute to this. There's lots of ranting and and raving and railing about earmarks that goes on again in the 17 mile logic free zone we know as Washington. But where did they come from? And in the course of the last several years they've really grown abundantly.

Five or ten years ago you probably saw something on the order of a dozen or so, that were specifically earmarked in the appropriations bills and amounted to less than $50 million bucks.

Today there's something on the order in this last bill of 150 that scarf up about $400 million bucks. The size, the volume and the amount in my mind isn't nearly as problematic as the motivation and incentive of how they got there.

Now some of it is the kinds of things that lots of journalists like to write about and make fun of members of Congress: You know, the Lawrence Welk Museum, the Endive research and all of this kind of stuff.

And we have our share in the NASA appropriation, of museums and all kinds of things that are totally unrelated to what we do that some member of Congress put in because some local constituency really wanted it. Well they're doing

something that is really kind of expected. They're representing their constituency. There's a thought. So why should we ever be surprised if they're doing exactly as we insist that they do, which is to represent their constituency?

No the bigger problem is among ourselves in this community. It's not the two-bit earmarks. Those are bad enough. It's the things that we promote among ourselves as community, where we disagree with each other about what the priorities ought to be, and when it doesn't make it in to the President's budget submission, we then go find a friendly member of Congress to makes sure it stays alive.

And you can read more of that in any appropriations bill than any amount of museum bucks. I'll take those. Those are nickel-dime by comparison. Instead, what happens is we continue programs that long ago should have ended. Not because they are bad, but because they aren't focused

on this strategy any longer. And we participate in that.

Every single time any company, any department, any division, any group, any constituency decides that they made a mistake, they didn't understand, they don't understand how important my program is, and go find some interested member of Congress. They are just doing what we ask them to do, representing a constituency.

The bigger problem is right in the mirror. It's ourselves. And the fastest way to end that kind of stuff is to stop that.

We'll see. But it is nonetheless a distraction, and it's one that keeps lots of things going, and along the way diffuses what the larger strategic objectives need to be. That's the bigger problem with this. It isn't habit on their part of doing what it is we elect them to do which is to represent all of us. It's how we misuse it within our own community.

I suspect that hard calls will need to be made in the future. There's no doubt about that. It's going to be difficult. It's not going to be easy. Because again everybody would love to see this just kind of added and layered right on top of what is the status quo.

Instead this transformation stuff really means you change the way you do business. Change the way you focus on it. Change the programs and the strategic objectives around what are our larger messages.

And make no mistake about it, I think that rather than be terribly fond of the things that we can do but serve different strategic purposes than the ones we've been directed to do, this community needs to have the courage I think to step back and look and that and say, "This is not contributing to what the larger objective is, however noble, how interesting the technology, or whatever else is.

Indeed, I think if we don't do that, we will quickly back to the same period I think that we have just emerged from in which we muddled through with a multitude of disparate missions that were defined by not much of anything. A lot of neat stuff but not particularly defining in terms of where we are going.

With our future requirements in mind I'm very gratified that even before President Bush directed Space Station research be oriented toward preparing astronauts for long-duration missions beyond Low Earth Orbit, the initiation of six-month International Space Station Expedition missions, has brought us a wealth of knowledge and experience that we can apply to our future objectives.

This is a great example of being very adaptive, very rapidly by necessity.

In every conversation I have had with the President, he's been very future oriented, thinking

about where this is going and how do we get there. And his primarily interest in how we can use our talents and capabilities in the service of a long-term mission worthy of the risks we take on when we explore the unknown.

Now when you think about it the explorers of the future are going to look more like the mindset and approach we've asked to be taken on by folks like Peggy Whitson, Ken Bowersox, Don Petit, Mike Foale, Ed Lu, Mike Fincke, and now currently on orbit Leroy Chiao.

Frank Culbertson started this process down the road, before this accident ever occurred. But it's that group of people who think differently and must think differently about how we continue to survive in these cases along with their cosmonaut counterparts, and all of our colleagues from across the European Space Agency, the Japanese Space Agency and the Canadian Space Agency. This is a remarkable

international partnership that has demonstrated and shown its resilience and depth as a consequence of it.

We have demonstrated on lengthy missions that human explorers can be tremendously adaptive to the requirements of the exploration journeys that lay ahead.

There's a great line that Rob Manning who's with the Mars Exploration Rover team out at the Jet Propulsion Lab used one time in an entirely different context. But it is one that really does capture the essence of how we need to think about these things when he said, "Our truths are often temporary."

That's a really discomforting thing for engineers and scientists to hear. We like to have absolutes. We like to understand what things are. We like data. In our Agency we love piles of data. As a matter of fact we get warm to the idea that maybe we know something when we see lots and lots of data.

The reality is they're temporary, and ought to be. Because each time we learn something different we build on it. And the duration of I think what we've learned on the Station for example, in moving to the six month Expedition crews has been remarkable, and indeed has demonstrated a capacity to violate all the absolutes we believed to be firm just two years ago.

Again, by necessity we've really had to think these things through differently just to continue operations. Think about some of the absolutes that have been dismissed that were uttered with great conviction and absolute certainty just two years ago. The one I'm most fond of is the argument I heard from every journalist, every congressman, every person who is a skeptic about the International Space Station who said, "You can't operate the International Space Station with less than two-and-a-half crew members. And you get no science at all,

zero, unless there's more than two-and-a-half people on board." Well for the last two years we've had two. I don't know where that other half person went. And as best I can tell it's the other half person who's been eating all the groceries on the International Space Station. (Laughter) I guess that must be it.

You couldn't do a space walk, an EVA, with a two-person crew. You can't do it. You've got to have somebody inside. How many have we done now? I've lost count. As a matter of fact we were kidding Mike Fincke just a couple of weeks ago at his awards ceremony for counting his five-minute EVA as one of the EVAs. He stepped outside, it was his very first one, he said, "I have four EVAs." Well it was 3.1.

But that's how frequently we're doing this. And these were absolutes, that were stated with conviction that, "You can not do this." Well we're doing it all the time now. All the time. Defying all those odds.

There were other things we simply couldn't do. The conviction was certain that the entire partnership after Columbia was going to collapse. This is transparent. This is the U.S. just fronting for all the other international partners and as soon as we fail to be able to get back into space it's going to collapse under its own weight. And it didn't.

The partnership has stood up in a way that no one thought was possible and I have yet to read one headline that said, "We were wrong. This is really done better than we ever thought." Well, I'm sure I just missed that edition of the paper. But it was stated with great conviction as an absolute certainty this was going to collapse. We beat the odds. That's what has to happen all the time now. This isn't a rant about journalists. It's more about what we need to do ourselves to ignore those who assert that there are certainties and absolutes. We ought to contest that all

the time. Because it's a limit to our imagination every time that we hear this.

The experiences of our Expedition astronauts are fundamentally different from what we've encountered before, and more akin though to what we will encounter in the future. This is more typical of the kinds of things we are going to be involved with.

It is that very mindset that has motivated us to ask Mike Foale, who is of course the commander of the Expedition Eight crew, to take on the task between Space Operations and Exploration Systems, both, to assert into the future requirements and operational modes and everything else of what we're going to do through Project Constellation what we have learned now. And similarly to contest within the Space Operations community every rule, every procedure, every conviction about how we've always said we have to do it, to question why that needs to be done. And why we've ought to be doing it

differently, in order to assure that we build in adaptability today, not tomorrow.

So straddling both that future as well as current operational activity is what Mike and a lot of folks like him will be engaged in more. And asking the kind of questions that are in some cases painfully obvious, but need to be asked and addressed if we are to proceed in the future.

So I encourage all of us to continue learning from these experiences and build into the future capabilities, procedures and processes of how we do business. We can investigate how we can master the human factors side of the space exploration equation from folks like mountain climbers, ocean explorers, submarine crews and Antarctica-based scientists.

Those are the kinds of folks who have more experience in the kinds of things we will be doing more of than what we did in the past. Those are the ones we ought to be talking to more.

Last September, at NASA's "Risk and Exploration" symposium conducted at the Naval Post Graduate School in Monterey we initiated a very productive and provocative dialogue with some of the world's most accomplished explorers of the land, sea and space about how they address the inherent risks of their vocations and interests. They think about these things differently and more akin to way we need to think about them in the future. The space community can continue and expand upon this dialogue to prompt a different kind of thinking.

I also believe and trust that the space community will develop innovative technical approaches to the challenges of sending crews on multi-million mile journeys to the planets. That's what we've got to think about rather than 250 miles out. What we learn today on the International Space Station as close as it is is more akin to the kinds of things that we will

need to know more about in the future if we use that platform as an expeditionary capability.

In my mind, I don't have a detailed picture yet of what all the Project Constellation hardware is going to look like. And what for example the boosters will look like that will propel these epic voyages in the future. But my advise is we simply cannot, cannot return to the days of the Saturn Five where we put all our eggs in the basket of a few huge, expensive, fire-belching rockets. These are spectacular to watch. No doubt about it. Everybody in the industry, everybody in our community recall with great fondness what that looked like. There is a reason why there was only a limited number of them. What we tried to do was with brute force get off this planet, off this rock. And they had to do it that way 35 years ago. We don't need to do it that way now. As romantic as it may seem, we don't need to do it that way. Indeed if we do it that way we'll only do it a couple times.

And the tolerance for that will be waning just the same way it did in the1970's. There's got to be something where we look at this much more adaptively.

I'm convinced as will turn to a variety of launch, transport and cargo vehicles for our space infrastructure needs we'll find those answers. And rather than stretching out the assembly of in-space facilities over a number of years much as we've had to do on the International Space Station as a consequence of necessity and circumstance, I can foresee a time when we will conduct several sequential launches to rapidly build that space infrastructure thereby obviating the need for this capacity to very dramatically get off this rock with a lot of fury and fire. We're going to do it a whole different way. We must.

Furthermore, I am quite confident that through Project Prometheus we will master the use of nuclear

power and propulsion technologies in space, providing tremendous benefits in terms of low mass, generation and fuel requirements to enable complex human and robotic missions to our planetary neighbors.

Currently, when utilizing conventional propulsion for spacecraft missions, we are limited in the size of the vehicles that we can send to the outer planets. Also, due to just basic laws of physics and gravitational dynamics, once these spacecraft approach their destinations on brief flybys, we can only do limited but rewarding science for a few months with the best imaging available for a few weeks or even days.

But using nuclear and advanced propulsion systems we can do a whole lot better. With nuclear propulsion, missions can, for the first time, be redirected to take advantage of circumstances as they unfold, just as Meriwether Lewis and William Clark

redirected their voyage of discovery two centuries ago when it became clear there was no single water passage to the Pacific Ocean.

By using nuclear propulsion technology, we could send a spacecraft to perform remote sensing duties around any planetary surface and then program it to rendezvous with and send a probe to land on previously unknown passing objects. We'll have the adaptability, the means by which to accomplish that task. And it takes little mass. Very little by relative comparison to what we do today with chemical propulsion.

Nuclear fission will allow us to send a spacecraft on a tour of Jupiter and all its major moons, without being constrained by the gravitational pull of that planet.

Similarly, this technology might enable an orbiting spacecraft to send a probe to investigate Titan for a period of months, and building on the

amazing success that we saw this past January 14th, but nonetheless only lasted a few hours. And we were buoyant, jubilant over the three hours. We can do that repetitively with this kind of capability in the future.

At present most spacecraft are designed to operate with the equivalent power generation capacity of what you'd typically see contained in one or two bedside reading lamps. That's what we have to do. All of our engineering talent is poured into how do you draw the least amount of power between here and there because it takes so long to get there. The Saturn mission we're all celebrating now launched seven years ago. It took that long.

This is a big solar system but boy it is pretty puny by comparison to everything else in this galaxy and this universe. We're not going anywhere. This is the age of sail. We're at the very beginning of this stuff. And until we get out of a fondness for the

current means by which we get to places, we're going to continue to do real short hops. Because that's all you can do. This is the kind of thing we've really got to be looking at.

A nuclear powered spacecraft could give us instead of this one or two 60 watt light bulbs, it could give us stadium lighting, the equivalent of that kind of power generation, that then completely liberates all the engineers and scientists from trying to figure out how to design something that draws very little power for extended periods of time. If you remove that from the equation imagine what that's going to unleash in terms of creativity in the approaches we use.

By comparison as well, nuclear power would allow us to return the equivalent of hundreds of CD-ROMs of data as compared a few floppy disks we're receiving now with great joy from our current spacecraft. We're thrilled to see it. But we can do a

whole lot better than that. And this is a whole lot better than it was 10 years ago. We've got to continue to make that kind of exponential leap each time.

Without a doubt, nuclear energy I think nuclear energy is the key to expanded human exploration of the solar system beyond low Earth orbit. At some point in this century we will send explorers to Mars, we will no doubt rely on nuclear energy for in-situ manufacturing of consumables and propellant production, which will enable our crews to do productive scientific research for an extended period of time and then return safely to Earth.

While it is useful, I believe, to peer over the horizon to imagine the new technologies we will employ in this epic exploration effort, and to consider the new ways of thinking that are required for success in this journey, I feel that it's important that we reel

this conversation back for a few moments to the present.

In the near term the challenges that my successor I think will have and the entire NASA community will face in the weeks and months to come revolve around the immediate first steps of achieving the strategic direction that the President has handed us.

Make no mistake, the stakes of Return to Flight with the Discovery STS-114 mission are substantially higher than what we experienced with Return to Flight after Challenger in 1988. This is the first major step in the direction of demonstrating that we are about the business of achieving these goals.

Getting the Shuttle's flying again will present a stern test to NASA's credibility as we seek to achieve this first major step in this long-term exploration agenda. And there is no margin. We've got to do this very successfully. Everybody's going to be watching. Is that schedule pressure? No. It's going

to fly when it's ready. Is it pressure? You bet. Lots of it. As a consequence for the last couple years that's why all of us within the NASA community have spent time, regularly every day asking the fundamental question, "What are we doing to return to flight today?" It is an essential element of this.

There are a lot of eyes on NASA right now, and I am concerned that we not allow the expectations of the public to get in the way of our work force's diligent efforts to prepare the Shuttle for flight, when we are truly ready to fly.

But right now there's a very wide gap in terms of what the views are of various folks on this task. Hopefully within the next four months we'll be returning to flight. And if you listen to the National Academy of Sciences, that recently advised on what they think we ought to do with for example the Hubble Space Telescope Shuttle servicing mission, they're treating return to flight as if its already

happened. So, 'No problem, we can achieve that.' And meet all the objectives of the Columbia Accident Investigation Board. 'No problem. We'll do that.' So that's why you ought to look at a Shuttle mission.

Alternatively, what we're hearing from the Stafford-Covey task group is that we're nowhere near meeting all the objectives of the Columbia Accident Investigation Board's recommendations. We've still got a long way to go.

So they both can't be right at the same time. There is no way. It just isn't feasible to treat one circumstance as if it's already compliant, and yet others who believe that we have a long way to go to achieve that. But we'll reconcile that. It will all come to closure at some point. But at the same time, it's a pretty wide gap right now. And the impressions of different communities are 180 degrees apart about where things are.

So I implore those in leadership throughout our community to do their best to insulate all of our colleagues from any outside pressures and expectations about NASA's readiness to fly. We really need to do this right. And again there are those who believe we are already done, and there are those who believe we are so far from done that we've got a long way to go. We've got to reconcile both ends of that. And more importantly do so without having that pressure exerted on our on colleagues.

It bothers me to read commentary from some who are treating Return to Flight as it is already a done deal. While we have made great progress with our efforts to implement all of the Columbia Accident Investigation Board's safety recommendations and indeed raise the (safety) bar higher, again the Stafford-Covey independent review of our progress is not fully complete. We are still working through that. As they've said, there are no

show stoppers, but something we've got to diligently work at every day, 24/7 in order to get this to work. We have an awful lot of work still to do before Discovery flies.

But as I prepare to take leave I am gratified that there have been many positive changes taking place throughout the Agency with regard to how we work collectively to ensure mission safety. I'm confident that we will be able to sustain this vital focus in the future. I think it is part of the ethos, the method in which we approach this. Because in large measure we are returning to something that somehow got lost. We are personalizing every one of these missions. Making a point to get to know who the people are who are affected by this. Thinking about it like, 'If that was someone related to me, would I treat this differently?' Or as T.K. Mattingly talks about it, if everybody treats what they do in their part of the job,

‘It won’t fail because of me.’ That’s an ethos and an ethic that we are renewing in our Agency. And it’s working.

While we will never eliminate the inherent risks of spaceflight—never, there will never be a way. As a matter of fact, the only way that we will ever eliminate the risk is to do kind of like what we are doing right now, not fly. It’s perfectly safe. But that’s not what we are all about. And indeed we will never eliminate the risk once we return to it (flight). I know that each and every person in this community is doing everything possible to minimize the risks of what we will face, but knowing that there will be some. Tremendous diligence and commitment I think for that effort is going to be required to make this work.

We meet today during a historic turning point for the space community. We’ve been waiting for decades for an opportunity to unleash this creative

potential. Again the President has turned a period of crisis into a time of opportunity to truly pioneer the space frontier and all of us I think are responsible for seizing on that opportunity.

My only regret as I prepare to head off to LSU is that I will not be regularly on hand at the Kennedy Space Center as a witness when our human and robotic pioneers lift off and set sail for the new worlds of the 21st century.

But it has been the greatest privilege to sail with all of you in the time that I've had. The President reminds us regularly that we have an opportunity to serve, some of us for a season, or for a term, or for a career. But in doing so we all have a responsibility to do our best. And that I've tried my best to do.

When Columbus made his voyages across the Atlantic in the 15th and 16th centuries his ships carried the inscription, "Following the light of the sun, we left the old world." In our time together we have

sailed towards the light of the sun and left the old world behind. But we are still in this age of sail.

And as I move on to new challenges, I wish all in this community the very best of voyages to come. We will indeed reach the light of the sun, and sail far beyond as well I'm sure.

And along the way I trust you will continue to be inspired by an ethic, an ethos, a culture that has never wavered at NASA in its great 46 years of existence that manifests in its very best form in an emotion, and indeed a charge provided by President Teddy Kennedy…Teddy Roosevelt over a hundred years ago. Ted Kennedy? I don't think so. (Laughter). Teddy Roosevelt did utter a commentary that I think is very descriptive of what all of us in this community are united by: "It is far better to dare mighty things, to win glorious triumphs even though checkered by failure, than to take rank with those poor spirits who neither enjoy much nor suffer much

because they live in the great twilight that knows neither victory nor defeat." That's what we are all about. We are defined by our great successes, and indeed by our great tragedies. Because they are that dramatic and the stakes are that high and what we do is that important. And it means a lot to a lot of people.

One of the last great absolutes that I remember when I first joined this great Agency that has been busted, along with the two that I referred to earlier, is the view that the American people just don't care much about space anymore. Well in the last two years I've seen everything in evidence to support exactly the opposite. Seventeen billion hits to the web site isn't accounted for by one person with a flat finger. There's a lot of interest out there and you get it and you see it everywhere you go.

At any time I felt like, 'God, this is just too hard. This is just a big pain, and we really aren't getting

anywhere,' I'd make it a point to go to a school. If you want to see enthusiasm for what we do—it's unbelievable. They believe that what we're doing is really important, and is really important about where they think they are going in their time, in their generation. And we owe them, that next generation of explorers, nothing less than our best in taking this strategy, this focus, this direction, and doing something with it for them.

It has been a tremendous privilege to serve these past three years. I truly thank you for your commitment to this great cause of exploration and discovery. God bless each of you who continue to help chart our course to the planets and the stars. Go Tigers.