

WOMEN IN AEROSPACE KEYNOTE BREAKFAST

FEATURING NASA ADMINISTRATOR, DR. MICHAEL GRIFFIN

MAY 3, 2005

CAPITOL HILL CLUB

DR. MICHAEL GRIFFIN: Thanks, Lynn {Lynn Cline, Deputy Associate Administrator for Space Operations}, to you, and to the Board for Women in Aerospace, for having me here today. It is a pleasure. I actually was just thinking back. We were talking about the progress that women have made in the profession.

I first taught in 1979, a couple of years after getting my own Ph.D., and so I was working--I had a real job for a living, but I was teaching part time because I enjoy it. And I remember at that point I had exactly one female engineering student in the class. And she was brilliant and she went on to an excellent career before eventually marrying and now has a couple of kids. And at this point my formerly young student is now in her mid-forties and I occasionally still hear from her. Which, of course, ages me quite considerably as well.

But by the last time I taught a class in any university setting, it was in graduate school at The George Washington University and approximately half of the class was comprised of

women. So, that was a period of time, you know, not quite, but pushing 20 years apart and considerable progress was made.

Lynn was talking about some of the statistics of the demographics of women in the industry at NASA and I certainly--I think that's good. I think also, it can be and will be improved. I think if you watch as the months go by, that you will see more, rather than fewer women in senior management positions at NASA.

I'm not looking for applause, I'm looking for the best people. And I'm really not that concerned with what package they come in, because I'm trying to access their brain. So, we will be getting the best people and I'm sure that there will be some changes in demographic trends.

Before we move on into anything like what I would laughingly characterize as a speech, I'd like to recognize a woman who has been extraordinarily valuable in her contributions to NASA. And that would be Juliane Sullivan. Until last week, the Chief--I don't know your exact title, sorry. She was the head space person for Majority Leader, Tom DeLay.

Mr. DeLay's Office, Mr. DeLay himself, have been incredibly helpful to NASA and Juliane was the point person in doing that. She helped organize the House Action Team, comprised of many of NASA's key congressional stakeholders, provided access for NASA

folks, NASA Leg-Affairs folks, NASA Management to people that they'd never had access to before.

Juliane's been an incredible supporter and actually a key person in helping on The Hill to get the President's Vision for Space Exploration off dead center and moving forward. She's been personally helpful to me in my first few weeks here and in the few weeks between my nomination and my confirmation.

So, to recognize that aid in the week before she gives birth to her baby and at least temporarily vanishes from the scene, Juliane, would you step forward, please? I want to give Juliane plenty of room up here.

This is a NASA Exceptional Service medal and a plaque commemorating that, which is in recognition of your exceptional contributions and leadership in providing congressional support for the vision for space exploration. So, that's for you.

MS. JULIANE SULLIVAN: Okay.

DR. MICHAEL GRIFFIN: Don't pick up anything too heavy. And here's the medal that goes with that. And we also have this montage for your wall, with a flag of Texas, a certificate of appreciation from NASA and some photos in space and from space.

MS. JULIANE SULLIVAN: Thank you.

DR. GRIFFIN: Thank you. Good luck.

I think also at this time, I'd also like to recognize some of the prominent women that we have here in the business. Of

course, some of their names were already mentioned in connection with the founding of Women in Aerospace.

But, of course, there's my old friend and associate, Kate Kronmiller. Lori Garver, who has had a senior position at NASA. Lynn Cline, Deputy Associate Administrator in Code M. Marsha Ivins, a five-time Shuttle veteran. My wife, Rebecca Griffin. Rebecca is not quite a founding member of WIA, but a very early member of WIA, and one of the people who, when we started dating, urged me to join.

And, of course, also not featured here today, but prominent future aerospace engineer and astronaut, Katie Griffin, my six-year-old, who keeps saying she wants to be an engineer just like Daddy. And I--we'll see how that turns out. Being just like Daddy may not be quite the right thing, as many of you would know.

And, of course, we also have here, Angela Phillips Diaz, who has experience both in the White House and currently as Acting Assistant Administrator for Legislative Affairs at NASA.

So, with all of that, let me then proceed. I have a couple of notes, but as usual, for those of you who heard me before, I will mostly be speaking extemporaneously, with a couple of reminders.

What I wanted to talk about today was basically two things: return to flight as the first step back toward the Vision for

Exploration that the President announced last year, and then some points about the Vision specifically.

I think everyone understands that the first step back into space for us is the flight of STS-114, commanded, coincidentally, with today's theme by Eileen Collins, a veteran Shuttle astronaut herself. This is the first step in the President's Vision for Exploration and it is the essential first step for NASA to return to space and return to space safely.

I know that all of you are aware of the decision that we made in NASA last week, to slip out of the May window and into the July window. We thought it was the prudent decision. Frankly, we thought it was the necessary decision.

There were just too many open items needing to be addressed. None of them in themselves a big deal and no significant problems that we know of, but collectively comprising a larger pile of work than we wanted to try to get done in the next few weeks. And we thought taking a deep breathe and proceeding a little bit more cautiously and using up an extra six or seven weeks wasn't going to hurt anything in the long run, and might help things a lot.

This is a very significant step for us, as I've indicated a couple of times. I'm now the Administrator, so it's my step. Nothing is more important to our future than flying the Shuttle

successfully, because we're going to be relying on it until 2010.

But, no Shuttle launch decision that we make from now forward, will ever be able to be considered routine. And while I am on watch, it will not be treated as routine. We'll go when we're ready. We're going to return the flight, as you heard me say the other day, but we're not going to rush to flight.

I will say, NASA has been besieged, on all sides, for its culture. Culture was implicated in the Challenger accident. Culture was implicated in the Columbia accident. I'm not sure that I think that's the best word, but I'm not a psychologist, so I will leave that to them.

When I think of what needed to be, or needs to be, and will be different within the NASA culture, to me, it comes down to essentially to what I would call common courtesy. I've read the report of the Columbia Accident Board, I think now three times, quite carefully. And I've read the report of the Challenger Commission probably more than that.

What I see that we need to focus on in NASA, in terms of mending the culture to the extent that it needs to be mended, is the traits that we were taught in kindergarten. Listen to what other people have to say. Pay attention to their opinions. You know, give them respect of hearing them out and hearing them

through and encouraging them to speak, and making sure that all the viewpoints are heard.

There is no question that managers must make decisions. It is what managers get paid to do. I've, in a bit of a tongue and cheek way, often defined management as the art of making decisions with less information than any fool would like to have. That is what we get paid to do. But in order to make good decisions with less information than you would really like to have, it is at the very least, important to hear all of the information you can get.

And when we talk about mending aspects of the NASA culture, which might have needed mending, I think that's the first feature that we need to do. We need to be able to listen to what people are having to say. People need to know that there is encouragement and not retribution for having something to say which is different than might be common--the thought of the common herd. And, we need to be encouraging about that. And that is really, nothing more than the common courtesy that we all learned at our mother's knee and just need to remember to practice.

When we're in a hurry, when schedules are tight, when the days have been long and tempers flare and irritation strikes, and I am not only no more immune to that than anyone else, but probably more prone to that than anyone else.

A former boss, whom I liked quite a lot, once said that it would--that Mike not only has no patience, you would have to add patience to Mike just to get up to zero. I think it was a true statement.

So, I try to watch myself and I try to be fairly quick with an apology for where I've sinned. And if we can all just do that, and everyone should be working to do better than me, then that will go a long way toward mending our culture.

I was incredibly impressed by--I was telling somebody, I've spent, of my little bit over two weeks as Administrator, I've spent four days at technical meetings on return to flight. I don't have any problem with that balance, but it's been a bit hectic the first couple of weeks.

I was incredibly impressed by the robust quality of the technical discussions and the airing of all views in these meetings, and trying to come to what people thought were the best sets of decisions we could come to. And if we can just keep going like that, then we're not going to have any problems with our management culture. So, that--I think that was a good note.

If there was anybody in those meetings that I attended who didn't feel like they could speak their mind, then they had to be hiding very carefully, because the discussions were, as they should have been, quite thorough and quite robust.

Flying the Shuttle brings with it great risk. There's no other way to say it. It is not a forgiving vehicle, and when something goes wrong, people can't get off. The next generation of manned spacecraft developed for the United States, will not have that feature. But there are important strategic reasons to fly the Shuttle and we will be flying it until 2010.

More broadly, sending brave women and men into space is not, and never will be without risk. We ask, on behalf of the United States, we ask brave people to do things that are risky all the time.

We have 150,000 people in Iraq risking their lives daily. The last time I checked, the casualty reports, if memory serves, it was something a little bit over 1,500 have lost their lives and many more have been wounded. We've asked people to do these things on our behalf before and we will again. So, space flight is one of these, but only one of these.

But, what we have control over at NASA, are the risks we ask people to assume in space flight. And it is our commitment, going forward, to do everything we know how to do to minimize those risks. The goals are worthy. We need to see to it that they continue to be worthy, but we need to see to it as well that we've done everything we can do to make it as safe as we can. If it takes more time to achieve that goal for any given mission, then so be it.

Now, let me change themes, if I might, for a little bit. Although maybe it's really not a change. Because, without the tragedy of Columbia, we would not have the vision for exploration that we have today. The aftermath of that accident, as I've said several times--and here, I'm going back a little bit to a theme I touched on at my confirmation hearing, but probably most of you did not see that. And so, though I dislike repeating myself in public addresses, I will do it on this occasion, because unless a lot of you are policy wonks, maybe you didn't hear the confirmation hearings.

But, the aftermath of Columbia brought us, in my view, to a real watershed moment in the civil space program. It took a while for that to be absorbed, as it always does, in the wake of a momentous event. But out of that, came not only a report on the proximate causes of the accident, but also sections in the later chapters dealing with the fundamental purpose of the space program.

And the points were made, and I've abstracted and repeated these points and probably some of you have heard them too many times. For that, I'm sorry. But, space flight for the foreseeable future, with the level of technology we have, will continue to be expensive, difficult and dangerous. There will come a time when it's not.

A hundred-and-fifty years ago, a fourth of all the ships that we sent out, all the steamships that we sent out on ocean-going voyages, didn't come back. Steam boilers would blow up. The technology of the time was not sufficient to understand the relationships between boiler pressures and heat and all of that, and strength of materials and the quality of fabrication required to construct them. Indeed, the origination of pressure vessel codes within the United States arose out of requirements by insurance companies on the manufacturers of steamships, to operate them at pressure levels that they could stand with substantial margin.

But when steamships were first sent out into the open ocean, there was, of course, no radio. They would go out and a sizable fraction of them wouldn't come back and people didn't know why. They hadn't had those kinds of problems with sailing ships. I mean, sailing ships, of course, occasionally came to grief, but the art of sailing had been well mastered.

When steamships came along, that was a new art of oceangoing navigation and it needed to be mastered as well. And one day we will master space flight. But that day is not now.

And so, in a period of time when space flight is expensive, difficult and dangerous, the goals must be worthy of the risks. And that was a key finding in the Columbia Accident Board, and one that I certainly resonated with.

Apparently, the White House resonated with it as well, because the President's Vision for Space Exploration gives us a strategic vision and a purpose for NASA and the Civil Space Program, where in my judgment, the goals are worthy of the costs and risks.

There are differences of opinion on this matter. I absolutely know, I know personally, scientists who believe that the only proper purpose of the space program is to fly unmanned scientific spacecraft. There are on the other end of the spectrum, those who believe that the only proper purpose of a publicly funded space program, is to figure out how to put more and more people in orbit and let them go settle the new frontier. That would be the other end, the other extreme.

The truth is that public policy will not seek either extreme. We will continue forward with a relatively [cut in audio].

We've got plenty of time for questions. I don't have to leave until 9:30, so, you can also send me away if you like. But you've got as much as 20 minutes for questions. Yes, back in the corner?

UNIDENTIFIED MAN: On the subject of aeronautics, NASA had some great successes with the X-43A Hyper-X Program last year, but then they cancelled [inaudible]. At least to my knowledge,

there are no more hypersonic flight demonstrations that are funded by NASA.

Could you just give us your thoughts on hypersonics and your feelings of its importance and your plans?

DR. GRIFFIN: That's a good question, actually, for me. Because there's only two things I know about aeronautics. One of them is how to fly a light plane, keep the pointing end forward and the dirty side down. And the other is hypersonics. And you would never want to get anything close to an air-- anywhere close to an airplane I had anything to do with the design of.

But, hypersonics is interesting and important to me, and I think it's important to the future of the United States, as much for military purposes as for civil purpose. And, if we believe that NASA is a core element of the Nation's aeronautics research program, then we need to be doing more in hypersonics. And I'm going to be trying to adjust that as we go forward.

There is very limited amount of adjustment that can be done in '05 and not much more in '06. As I'm sure you appreciate the budgeting process. But, I'm going to be trying to do something more for hypersonics.

Other questions? Yes, ma'am?

MS. BARBARA CLAYTON: Barbara Clayton, Lockheed Martin.

As you look out over the industrial base that's there to support NASA, what are the things that you like and what are the things that you don't?

DR. GRIFFIN: Well, the industrial base, I mean, obviously, that's our bread and butter. This is a personal view, nothing more.

UNIDENTIFIED WOMAN: We couldn't hear the question.

DR. GRIFFIN: Sorry. The question was, as I look out over the industrial base of the United States, what do I like and what do I not like?

Well, first of all, the thing to like about the industrial base is how incredibly capable it obviously is. I mean, everything we have in the world of aerospace from, you know, Piper Warriors to SR71s to, you know, F22s, comes from that industrial base. So, it's incredibly capable.

I'll offer now a personal opinion. I was not fond of the industry restructuring that went forward following the downing of the Berlin Wall. There was a lot of consolidation. It was, in fact, requested by senior government leaders at the time, both on The Hill and in the Executive Branch, to achieve a certain amount of industry consolidation.

My own opinion is, that's gone too far. I am a fan of competition. I believe in it. I think it makes us sharp. Not every problem can be solved by competition, but many can. And

we've consolidated to the point where, you know, as NASA Administrator, I would certainly worry if I saw any more of it, because I don't know--I think we'd all collapse into one big company. That worries me.

I'll be doing what I can do to establish and encourage competitive approaches, going forward, because I think that's going to bring out the best in us.

Another question?

DR. GEORGE WHITESIDES: George Whitesides, National Space Society.

The success of the Vision for Space Exploration will depend to a certain extent on the support of the public in general. What are your thoughts on how best we as a community can reach out to the public and engage them, going forward?

DR. GRIFFIN: The question was, how, as a community, we can reach out to the public and engage them to support the Vision for Space Exploration?

George, I don't know. This is not--public affairs and how to do all that is not my specialty. My wife is the one who was in marketing. And everything I know about it, which is not much, because of my impedance, not because of her capabilities, comes from her.

I know we need to do better. Many here know that I'm an avid golfer and I often play, you know, go out and just hook up

and find a game. And invariably, in the course of four-and-a half-hours playing 18 holes, people will say, well what do you do? And those of you who are golfers in the room all know this. I mean, it's kind of ritual.

And so, by the time you're done with the 18-holes, where you started out with three strangers, you at least know each other a little bit and, you know, everybody knows what everybody does.

So, for 100 years, I've been saying well, I'm in the space business. I've always been in it, different parts of it, but I always talk about that. And immediately, people latch on to me and say, oh, wow, that's so great. I never, never, never see anybody who doesn't think that being in the space business and having anything to do with the space program is great. And it never mattered whether I was on the military side or the civilian side, and I've got about equal time in both. They just think the space business is great.

That's fine, I do, too. But then they start telling me, as they have been for 20 years, okay? I've been hearing comments, essentially, what are we doing with the Space Station, you know? We should be on the moon. We should be going back to the moon. We should be going to Mars. We should be out there doing things. I mean, I get this from people who drive trucks for a living. You know, I get this from plumbers.

You know, I was at Easter dinner with my mother-in-law and her side, my wife's side of the family not long ago, and one of the male appendages to the female family member, makes his living as a, you know, a tradesman. And he was very knowledgeable about what goes on in the space program. And was saying, what is with this Space Station thing? He didn't see it, from the point of view of the public, as a worthy thing on which to spend time. And he starts explaining to me how Space Stations are okay if we were using them as a place to assemble stuff so that we could go somewhere else. That would be a useful function for a Space Station, but he didn't think we were doing that from what he could tell reading Popular Science and the newspaper.

And I'm sitting there listening to this guy and he knows more about the architecture for space flight than, you know, that I can tell, half the people in the community. I mean, he's got the big picture on what the proper functions and roles of the basic hardware elements are, you know.

I just--when I engage, you know, what you're talking about, George, as the public, it's usually on a golf course and the people involved can come from anywhere. I mean, I've played golf with beer distributors. And I played golf one time with, who's the guy, Alice Cooper? Is that his name?

UNIDENTIFIED WOMAN: Yes.

DR. GRIFFIN: Okay, thanks. I was playing golf up in Columbia a year or so ago, and it turned out that this guy, Alice Cooper, was in town for a concert, and he's an avid golfer. So, he's out there and we hook up on the first tee. He's just looking for a round of golf. And he has to introduce himself, and I said, Alice?

Needless to say, it was not my finest hour in terms of demonstrating that I was familiar with the pop culture. But after we got through what do you do and what do you do, you know, he was talking about how, oh, yeah, we need to get out there and explore. So, it's everywhere.

So, I don't know what we need to do as NASA, the Administration, the entire Executive Branch, I don't know what we need to do to connect with the public. But they're trying. Pardon?

MRS. REBECCA GRIFFIN: Is it going to be an action item?

DR. GRIFFIN: Oh, and Rebecca reminds me that, yes, it is going to be an action item. Thank you.

Well, the thing about not knowing about Alice Cooper is not nearly as bad as when I had to have who Michael Jordan was explained to me. And that's not a joke. Yes, sir, in the back?

MR. KEITH: [Inaudible.] You said, you [inaudible] competition and that everybody would wind up working for one big company. Yesterday afternoon, about 4:00, a press release came

out [inaudible] two big companies who are about to become one. [Inaudible.] Do you have any comments on [inaudible] competition and whether it's a good thing? [Inaudible.]

DR. GRIFFIN: Well, I mean, the question is the announced joint venture between Boeing and Lockheed to launch EELVs, is that a good thing or a bad thing?

I mean, I think it's probably a good thing for the EELV side of the launch industry. Because, I think the Air Force and the companies themselves, have come to the--we have to start with facing facts. That's kind of always where I start.

There is not enough commercial traffic for EELV to sustain two and there's not enough military traffic to sustain two. The original hope behind EELV was that there would be, you know, if the government undertook the development of these new birds, that between commercial traffic and military traffic, you'd have enough to sustain two.

I think it's recognized that that's just not there, at least at present. And so, if there is a certain amount of collapse of that business venture into one, and then letting the joint venture pick the right vehicle for the right flight, I mean, I think that's great.

I think it would be a problem if that were the only launch option available to the Nation. The President's space policy directs the DOD and NASA to work together to advance

architectures for space lift, with a preference, but not a requirement, for EELV. The reason for the preference is obvious, because you've already got developed systems.

On the NASA side, we have the obligation to come forward to the leadership with our view of the launch architecture as well and our requirements. Now, our requirements are going to be in the range of several tens of metric tons for the new crew exploration vehicle, and notionally, a hundred metric tons for heavy lift requirements to return to the moon. Those are the requirements.

I personally don't care how they get met, you know. If I could be Tinkerbell and wave the wand, that'd be fine, too. NASA should be, needs to be about more than just getting up the first hundred miles. We've spent far too long trying to overcome that problem.

So, as NASA Administrator today, I already own a heavy lifter, okay? That heavy lifter is the Space Shuttle stack. It currently carries the Orbiter. So every time I launch, I launch more than a hundred metric tons into low orbit which, of course, is what we need for returning to the moon.

So, as I've said often, again, a little bit tongue in cheek, from the point of view of the cargo, the Shuttle was a payload shroud, a rather heavy one. But the intrinsic capability of the stack is quite impressive. It's not quite up

to where Saturn V was, but it's close and it's there. So, I, you know, I will not give that up lightly and, in fact, can't responsibly do so, because it seems to me that any other solution for getting a hundred metric tons to orbit is going to be more expensive than utilizing efficiently what we, NASA, already own.

And on the other end of the scale, we need to look at what new development makes the most sense. The CEV, with all that I want it to do in terms of being able to service Space Station and later go to the moon, cannot easily be assumed to weigh less than about 30-metric tons which that was the weight of the Apollo Command and Service Module stack, leaving aside the Lunar Module.

It's not reasonable to suppose that a vehicle that needs to carry maybe twice that many crew on some, you know, earth orbital missions on some occasions, or have space for a certain minor amount of cargo and consumables, and have other missions, will weigh much less than that. And that amount of mass that needs to be carried, or a mass of that order, and I'm not trying to pin it down. My pencil's not that sharp. But it will be at least several tens of metric tons to be an effective Shuttle replacement. Well, we don't have a vehicle today which does that job.

So, the question going forward is, okay, you're going to have to do something new to do that job. What is that new thing? Will that be derived from Shuttle components from the NASA end or will that be an EELV upgrade? As far as I'm concerned, it's all about the money, as my job now is to be a responsible steward for taxpayer funds.

So, I will be advocating whatever method of getting crew exploration vehicles to orbit appears to me to be the cheapest. I won't be the sole judge of that, of course. Everybody who can use a calculator will be adding that up. But that's the goal, is to operate cheaply, efficiently, routinely, safely, all those things, to the extent that we can figure out how to do it and it's not an easy problem.

Did I answer your question, Keith? You are a hard taskmaster.

Yes, ma'am?

MS. DEBBIE ZEBARENKO: I'm Debbie Zebarenko, I work for Reuters.

You talked at the top about demographic change at NASA. Can you specifically, Mike, kind of [inaudible] where the opportunities for women are?

DR. GRIFFIN: Well, I can't comment on any specific spots. What I said was, looking forward, as a few months roll by and I begin to assemble around me the team that I will want for the

next four years, the comment I made was, you will see more women. Anything more specific than that would be inappropriate at this time.

MRS. REBECCA GRIFFIN: But Mike, another way to look at that is any capable, competent, qualified person could have any job but yours.

DR. GRIFFIN: Well, okay. That's a good--I guess going beyond that is to say, as I said earlier, I'm looking for capability. I will be looking for capability. And the package that it comes in--you know, my job is the only one that's not up for grabs in the next four years.

So, people come and go, and every new leader wants to assemble a team around himself that, you know, best suits him, going forward. And I will be doing that. But specifics other than that are just inappropriate at this time.

MS. ZEBARENKO: Could you tell us who you're [inaudible]?

DR. GRIFFIN: No, no.

Yes, other questions? Charlie?

CHARLES WALKER: Mike, challenges, inspiration and competition, what are your thoughts with regard to the Centennial challenges, in terms of the magnitude? NASA's now limited in terms of legislation limiting how much it can offer in the way of prizes. What are your thoughts on that regard?

DR. GRIFFIN: Well, I like the prize concept. I regretted from outside, that we were as limited dollar-wise as we were. And going forward, I'm going to try to put some human capital behind it, my own, and get that elevated. I think it's a good idea. I think it's one of the best ways to encourage entrepreneurship. So, hard to be more specific than that.

And ma'am, next to Charlie, you had a question?

MS. BETTY: I wanted to--this is Betty [inaudible], from Berlin. I wanted to follow-up on how you are going to use your background from working in entrepreneurial organizations and what aspects of leadership style you think would transgress to working now as the leader of NASA?

DR. GRIFFIN: The question was, essentially, given that I have some entrepreneurial background of my own, how would I help bring that into NASA, and what leadership style is required for that?

A couple of points. I don't want to confuse entrepreneurship with public service. I, indeed, have done both. There are features of each that the other could use. Remember, most entrepreneurs fail.

When we are stewards of public money, we have as a prime requirement, that we try to do things that have a reasonably good chance of success. And that limits, as leaders and

managers, the aggressiveness with which we can pursue certain things.

I think the crossover is this, what I want to try to do, and this is, I'll say I, because this is something I want to do, and I need to get the team to go where I want to go on this. Is as we create the lunar architecture and as we create the system that will supply station for the long-term, and as we learn to do other things, I want to favor architectures, collections of systems.

I want to favor architectures which provide opportunities for people to interface with NASA at the service provider level. I want to provide places where, if a commercial provider can step forward and perform the service or deliver the goods, that they can do so and they get rewarded, but we don't have to depend on them.

I cannot put public money at risk, depending on a commercial provider to be in my series path. He might decide not to show up for good and valid business reasons. Okay? I can't put return to the moon and crew exploration vehicle capability, I can't put the ability to send humans into low earth orbit on behalf of the government at risk, based on whether or not a commercial provider decides that he actually wants to do it that day.

But I can provide mechanisms where if the commercial provider shows up, the government will stand down and will buy its service and its capability from the industrial provider and let them have the competition among themselves.

In other words, and the phrase I've used is, I don't want to pick winners, but I do want to be able to reward them. If you can prove yourself to be a winner, then NASA should be able to reward you. And we need to transition to that. It's not necessarily a huge shift in our thinking.

But, we need to create an atmosphere within the government that commercial providers of a given service are welcome. And that's what I'll be trying to do. And then of course, as I say, the architecture has to be structured so that there are those opportunities. So, I'll be--I think you'll be seeing it, going forward.

It's 9:30 and I think I really need to end. So, thank you very much.

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