

**Bill Gerstenmaier on the DC Variable  
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(Edited for clarity.)

Gerstenmaier: Thank you very much. I'll go through the charts and I'll talk to you a little bit about some things to think about and consider. I think one thing that is important is I am by no means an expert in this topic. These are kind of based on personal observations and things I have observed in the Washington environment, but the purpose of this talk is to make you think about some of those things and understand kind of what is going on in D.C. sometimes when it makes absolutely no sense to you down in the field centers. If you're from D.C., you perfectly understand what is going on—you don't even need to be in this talk. In fact, you should be up here explaining to me what is going on in D.C.

We'll start off with some stuff I really know hardly anything about, but we'll talk about some psychology first of all. So we'll talk about Maslow's Hierarchy of Needs and I think you have all probably heard these someplace. You know, you start out with your basic needs—that's food, shelter, things that kind of keep things in place—then safety, then psychological needs, then self-actualization, then finally peak experiences. So the basis of this is there is a pyramid, and as you satisfy the lower level things you can keep moving up to higher and higher level things. Now I'll take that and we'll convert that into something a little bit different.

So these are my hierarchy of needs, and you'll notice my age is 412, so those engineers can calculate what that means, but it's kind of like dog years. Program manager years are different than normal calendar years or maybe Martian years, but you can figure that out. The way I think of things, is you need to have strong technical expertise down at the bottom and that's how you make a project successful and without that, your program or project is not going to work. You then have to have a safety culture where you're aware of what is going on from a safety standpoint, you're aware of risk, you do risk management—all of the things that you've talked about and I'm sure in many sessions here. You then also have to have very good information flow—you need to be able to communicate up, out, around [to] all the people on the project so they know what is going on, they know what is happening. You can really communicate with the team to keep people moving forward. Ultimately, if you are going to commit your project to flight or commit to a severe test, you have to the rationale for that. Why are you ready to go do that test? Have you done all the preparation? Is the push far enough, or have you not pushed far enough in your test considerations? So all of those things flow up, and they all yield to mission success. So this is what I think we would all collectively think about...how we get to the ultimate mission success within our programs and projects.

Then I would tell you that I think there is another one that were really missing especially, and this is kind of the D.C. variable piece—that underpinning all these things, we have to have stakeholder support and I don't know exactly the right way to phrase that or state that. The things we're doing, it has to have some acceptance in the general public, it has to have acceptance in Congress and Washington, it has to have some acceptance in the administration. Without that stakeholder support piece underpinning all of this, all these other things will not lead to mission success. So I think there is this underlying thing that is equivalent to Maslow's basic need down at the bottom that needs to be there, and you can think about it as [the] relevance of your project. Stakeholder support—you can kind of pick the right term that fits there—but I think that is extremely important to be there, and now I'll talk to you a little bit, on the next

couple slides, about how I see stakeholder support coming about and how difficult that is. I'll make you think about some of this stuff.

So first of all, I just captured a bunch of news clips, and these are wonderful things if you read these. You know instead [of], "President Obama laid out the goal of sending astronauts beyond on the Moon and into deep space" —that was a commercial space flight—"Obama hails important milestone in space." "Republican gains could mean losses for NASA." "Election results could put NASA's future under fire." If you read all these, this just shows how diverse the environment is on the outside that we live in, and they are all headlines that are grabbed. I randomly picked these. The headline is something that...the press is going to put out to shock you, to capture attention so it is going to be a piece of truth, but then [also] something that is not quite the truth. It may not actually reflect what is in the article, as we all know, right? Sometimes the headline gets you all excited and you think, "Oh the entire world is done," and then you read the article and it's actually not that bad of an article, but there is a headline writer that has been hired by the press department to capture that snippet to make you want to go read it. So you got to be careful when you read all these things, but the purpose of this is to really show you how diverse the environment is, so when I put that little stakeholder support down there, how do you ever get a consensus across this diverse of an environment, this diverse of a public and a readership, and get that stakeholder support as strong as you would really like to have it to make your project whole and strong? And I don't know exactly how to do that, but this, again, is something for you guys to think about and ponder as you go forward in your projects so you think about all those other things—the technical expertise, the safety culture, the communication, and those. But I don't think you think sometimes about that other piece underneath, and the purpose of today's talk is to make you think about the piece underneath and this is the media piece of that.

So then let's talk a little bit about the, I call it the "supremity clause" and really what this is, this is kind of Government 101, right. There is the executive branch and then the legislative branch of Congress, right. So you can see the White House is there. There is one President, one Vice President, 15 cabinet secretaries, [and] you know there is Congress with 435 Representatives and 100 Senators. You know, look at the diversity, just in the sheer numbers of people represented by both of those organizations, and [you wonder] how do you get the advocacy or how do you get that stakeholder support with that diverse piece? The other thing I put down at the bottom—you look at the U.S. as a total, the U.S. budget, right, is 3,830 billion dollars. 3 trillion. The employees that are employed by the federal government are 1.9 million, and then down at the bottom, in that little blue box down there is NASA Headquarters, just for fun for you. NASA's total budget is 19 billion dollars, which is pretty dramatically less than 3,830, and then if you look at our number of employees, we're .02 million so we're also a little bit smaller than that other piece. So part of our job is to influence that kind of environment with what we're doing as we move forward, so this is something that is not going to be easy for us to go do. And then if you broaden it a little bit more, you take a look at who are our real stakeholders and where do they sit? Again, you know we've got the Department of Defense as a key player...it definitely influences our budget down in the bottom. We have [the] aerospace industry on the outside. We've got the National Science Foundation, which has huge impacts potentially on some of our work. We have Department of State, which allows us to have international relations, you know, [it] has export control laws [and] all those things we have to deal with. We have the Office of Management and Budget, we have the White House, we have the Office of Science Technology and Policy. We have the National Institute of Health, the National Resource Council. And then Congress, and then the Senate, and then really, ultimately, then we respond to the public. So if you think of NASA and who our stakeholders are, even defining the term stakeholder is pretty tough when you look at this chart and think about this, right? Who is the real stakeholder? Who are we trying to influence? Which one of this diverse group is the most important for us to influence for our project? And the answer is probably, there is not a single one of these or it would be an easy answer, so we've got to

figure out some way that we communicate to all these diverse groups and [find] some way they can understand. And the message may have to be different depending on which group we are communicating.

Now I'll talk to you a little bit about the legislature side, right. It's not homogeneous here at all. We have the United States Senate. These are the committees that NASA reports to. So we have the Committee on Commerce, Science, and Transportation, we have the Subcommittee on Science and Space, the Committee on Appropriations, the Subcommittee on Commerce, Justice, Science and related activities, the Committee on the Budget. Then down in the House, we have those myriad committees as well, so NASA is getting a lot of guidance from a lot of different people. Again, it's even difficult within, say, the legislative branch to get a consistent message out of this diverse group, and we get pulled in various different directions. So again, I think part of our job is how do we reach out and convey the message we want them to hear as we move forward and go forward in activities.

Then on the Executive Office. You know, you think a lot of the White House, but there are some places that are pretty close to the White House that have tremendous influence on what we do, and one of them is the Office of Management and Budget. You know the core mission of OMB is to serve the President of the United States and implement his vision across the executive branch. They have 500 employees and \$70 million annual budget, but they have a tremendous influence on what we do, because they are essentially the arm that gives us the budget to go do the cool programs that we want to go do, go do the investigations and things we want to go do. So they are a key player in what we do. The other side is the Office of Science and Technology Policy. They are known as the President's science advisor, so they are looking more at the mission, the cool things we want to go do, how the project gets put together. Is the science sound? Is the research sound? Is the destination [and] are the goals important? These often conflict. Sometimes you'll get a very good policy direction of the research we want to go do—we want to go look at these planets or we want to go do this other activity—but then the Office of Management and Budget says you only get X amount of dollars to go do this huge, dramatic thing, and therein lies a clash. We're not given the funds to go do what we have been asked to go do down on the policy side. So how do we can resolve that, or do we figure out a plan to go forward? And I'll kind of offer some suggestions, but I don't really have the answer here. This is really what we're struggling with today. We're given very distinct and different directions from these different groups, and how do we then craft a plan to kind of get through all of these and not offend anyone to the level that they cancel us, but they let us keep moving forward? How do you get that compromise that is technically sound enough and is still pushing enough in the direction that we need to go? And again these are powers not delegated, right? There is the public, right? They're very interested in what NASA does. You know we make the front page all the time with things, so we have a tremendous influence with the public. We need to continue to do that. We have the National Academy of Sciences, the National Research Council, and all of these other agencies I read on the earlier page. So all these are also pushing on NASA's mission and helping us to go, to go move things forward and get activities done. So we have a tremendous difficulty in doing stakeholder support down at the bottom because our stakeholder base is really so diverse.

So then let's go back to the Kennedy words... "not because they are easy, but because they are hard." All right. So not only are they hard technically as you see in these pictures, right? Each one of us is engineers or folks on the technology side. They understand how difficult it is to go do these things, to fly the space the shuttle, to design this vehicle, to return from space, to fly at Mach 25 during a re-entry is pretty amazing. The Hubble Space Telescope provides unbelievable images of the universe, but it sure didn't work so good the first time it got on orbit. We had to go figure out a way to make it fixed, and we needed to live long enough to get it fixed before it got cancelled. Very, very difficult technical challenges, but they are also tough to keep moving politically. As you know, space station came within one vote of

being cancelled way back in its history. It was 5 billion dollars over budget. Somewhere along its history, it almost got cancelled for that. So these are not easy programs for us, but I think we as engineers like these tough challenges. We can figure out a way to go make them, but now there is another variable we have to go think about, and that is really the DC variable. It's not just the technology. It's just not the other things. How do we get the political side to align with what we want to go do from a technology standpoint?

So then, let's kind of go back to the beginning again, right. So this is the "mirror Gerstenmaier," those of science fiction fame. I think we've got to think about this. You know, I showed them in the logical order before with stakeholder support below. I don't think that is necessarily the way it is—they're interrelated. There is not a hierarchy in a sense that I described to you up front, so I am telling you I am wrong on the charts up front. I'm proving to you I don't know what I'm talking to you about, so this should convince you to go dialogue and talk to your friends about this tonight and think about what I presented to you, because there is no answer. But I think we have to have missions success, that's a pieces of stakeholder support. When we're over budget or we set a perception that were going to deliver in a certain amount of time and we don't deliver in that certain amount of time, that erodes stakeholder support...that bottom underpinning thing [may] actually be gone because of not getting mission success. So there is some interplay between all of these. So my latest thinking is we really have to do all of these to be successful on a project, and there is not a logical hierarchical sense in that, as much as I would like to put them in some ranked order that one is more important than the other. I'm not sure there is one more important than the other. We really have to do this whole subset, and these are not easy to do. They continually get evaluated and reviewed, but I think this is extremely important to us in our new programs. We're constantly in the spotlight—we get a lot of visibility. We need to figure out a way to make these things happen, and we have to show [a] compelling mission.

So going back kind of to the beginning again...where I think all this comes about or comes together is that our goal has got to be for NASA to step back technically and realize what we really want to go do. Take the best inputs from this diverse group, and build a plan that we can then show to everyone else of what we want to go do. If we stay in react mode where we are continually reacting to the stakeholders and all these other pushes, we will be continually be bowing back and forth, and I don't think we will ever make any progress going forward. So we [as] NASA have to take all this diverse input and listen to it to the best of our abilities, and build a plan that we can then start taking forward and move forward and go defend. I don't think we are going to get back to the Apollo days when we are given the plan to go execute. The diverse stakeholder base doesn't allow that to occur very easily. That may be a once-in-a-lifetime occurrence. What we're going to have to do is craft the best plan we can. It will not be a perfect plan, but [we'll] build the best plan we can put together and put all these pieces together and then go try and execute. So the point of all this talk was that I think there is another variable out there that we need to think about, and that is the D.C. variable. How do we keep our projects and programs moving forward? And it's a piece of what you're talking about here in this conference today. It's not just the program project management, it's not earned value, it's not PERT charts, is not Gantt charts. All that is important, but also this is another consideration you need to think about as you go manage your projects.

So with that I'll leave it open to any kind of questions or comments you got, and we'll see what you guys think. Then I'll let you go relax and you can talk about this same kind of stuff amongst yourselves.

Question 1: [Inaudible]

Gerstenmaier: The question was, are there other groups—and that's a very good question—that have a similar dilemma that NASA does with this diverse stakeholder [base], and can we learn anything from the others? And I would say yes. If you look at, I would say National Science Foundation is probably one

that has [a] similar kind of dilemma about how we want to invest our science dollars. So we can definitely learn from them. I think there are some other organizations—NOAA...another's FAA. Almost all those government agencies that sit out there, NIH (National Institute of Health). Almost any one of them have this similar kind of issue with us. I think the unique aspect of NASA may be that we're very high visibility, right? No matter what we do, we tend to make press very big because we're tied to the view that people have of the U.S., right? You hear people and you even heard in President Obama's speech. He looks back to Sputnik moment, right, or we talk about we can put a man on the Moon. If you can put a man on the Moon, you can do X, fill in the blank. NASA's scene is a piece of that "can do" culture within the U.S. That is different than some of these other agencies, and that's a burden we carry because then that brings extra insight into us when we do things, so we'll get more visibility sometimes than, I think, other agencies do, but we can definitely learn from them and take their best practices from other groups to go do things.

Question 2: [Inaudible]

Gerstenmaier: I try to spend a little bit of time understanding who I am going to go talk to, so I'll talk to the legislative affairs folks at Headquarters, and I'll do my best to understand who I am going to talk to. The other thing I have found is very effective is if I establish a relationship with the staffers or with OMB where I go brief them on a regular basis. You know, when I first came to Headquarters, the only time I would go brief a staffer or go brief OMB is when something broke, or we were over budget, or when we were in some schedule dilemma. So, then I'm going to them and I'm doing my best to defend this, which wasn't such a good scenario to be in. So what I tried to do is establish a more a routine basis where I would just go talk to them every month and I could actually tell them what is going well, what is not going well. I could actually predict probably what is going to come out in the paper in a couple weeks when my budget finally becomes known. I could actually tell the staffers ahead of time what is coming, so then they could go brief their bosses and their bosses could see value from that. So establishing a regular rapport and a regular communication on a non- crisis mode was very beneficial to me. I don't know if that works in every case, but being where you established a relationship and they come to trust and know you that hey, what you're telling me is right, then when it's really going bad, and it's not a good day, and you're over there talking to them, you're not perceived as you just trying to save your program or move forward. You've already established some kind of relationship with them so there's a serious trust there...they won't kick you out of the office immediately when you tell them it's not really as bad as it says in the paper. But the idea is how do you do that? And you have to do that really routinely and it really comes from spending time and taking time to go talk to them.

Question 3: [Inaudible]

Gerstenmaier: I came from a center where I was program manager, and as program managers—in the old days at least—you were seen as pretty important. And you would say something, and people would immediately do whatever you said because you were the program manager and you had all the money, you were in charge, right? So that's kind of a nice world, and it kind of goes to your head a little bit, and you feel kind of good. Then you go to Washington, and...I've got somebody who is a 22 year-old law degree student, telling me about program/project management and earned value. Not only that, but they're telling me about the first law of thermodynamics, and I'm going, "I don't think that is really right," but I'm dutifully taking notes, because there could be another law that was never written, you know. It's the square root of a negative one, it's the "i law" of thermodynamics that I never heard about, but I'll write it down anyway. So then you have to listen to him, but then you got to figure out a way that you can communicate to them on their own language...you need to know your audience and who you're talking to. If I come in and I show you the physics equation or I give you the equations of motion for space station and relate it to propellant and drag and this is why we're doing whatever, there ain't no way that a lawyer

is ever going to understand what I am trying to explain. So I have to explain it in some terms that they can understand and work that. So I think the problem is that if we come in and we just expect them to know exactly the way we were talking from our perspective, it won't happen. You're going to have to think about what matters to them as constituents in their area. What is the real driver behind what they're doing? I think we also need to be fair that we can get out in front of that and we can actually help steer them and guide them in their technical solutions such that we're getting a technical solution that is actually obtainable and workable, and we're not given one [because] they don't know any better. They can't judge easily what's physical and what's not physical.

The other problem in our business is our stuff isn't intuitive. They see an aircraft take off and land. They...can't comprehend the amount of energy it takes to put capsule or a rocket into space. It is just dramatically different than their day-to-day experience, and it's even hard for me. You know when we broke a little flow control valve off and the gaseous hydrogen system that pressurizes the external tank, right? This little piece broke off, this little tiny piece, and then it whipped down the pipe and hit the corner and dinged the corner of the tube. So I thought it's probably going, you know, maybe 30 miles an hour into the corner and around. Well it turns out...all the pressure that flows through this little tiny valve...is actually Mach 7 coming out of that orifice...so that little particle was accelerating at 7 times the speed of sound, and it was whippin' into the corner. It was about to go punch a hole right through that tube on the other side. And now that is so unintuitive to me, because I don't have any situations in my daily life where a little particle is traveling at Mach 7...

So it is the same thing, I think, when we talk to the lawyers and legal people in the world [and] when we tell them about our business, they don't have a way to relate. They can't—it's not like their automobile, it's not like an airplane they get on—so we need to figure out a way we can talk to them better and get out in front of them so they are not giving us guidance. I will tell you that...we are also guilty of that, I am guilty of that. Do I flow down to the people that work to me to lower specifications? You know if you go back and look at Kennedy's speech, he said, "Take a man to the Moon and return him safely," that was the requirements. It wasn't doing an Earth-Orbit rendezvous or do a Lunar-Stable-Orbit rendezvous with X number of delta v at the Moon, then eject down, then go down to lunar landing and come back [trails off]. But today, because we got computers, we can do all that stuff and we think we're all hotshot folks so we'll go ahead and specify all that to the workers below us, and it just doesn't work. I've seen the thing back at the university where they give freshmen students AutoCAD. They take them to the machine shop and they actually have them use the six degree of freedom milling machine, and they learn this as a freshmen. Then later for their senior design project, they are given AutoCAD and then they are going to do go down to use the same six degree of freedom milling machine they used as a freshmen to actually go manufacture the part that they design on AutoCAD. What happens is, you can design things on AutoCAD that will take you seven years to manufacture on this six degree of freedom milling machine because all the tools changes, all the passes that have to change, all the speed changes that have to occur to manufacture this part. So, yeah it's physically possible in this wonderful 3D CAD program, but in reality you're going to see in seven years after you're supposed to have graduated. So now you have extended your project. So that is an object lesson where we tend to specify things or show things that look very doable, but in reality they're not nearly as doable. So I think we need to be just as careful as the politicians are about flowing down to lower level requirements. What do you really want to be successful for this project? What is the absolute minimum set that I would be happy with...or not? That is the minimum you ought to specify. Even though your tendency is to specify a lower level, I think we need to avoid that. So I think it's not only them, but I think we are also guilty of the same thing, myself included. Again, I told you I don't know anything so you guys think about all this stuff, base it on your own experience and you think about what I am telling you and see if any of it rings true and if it does, then amplify it. If it doesn't ring true, debate it the other way and develop your own plan.

Question 4: [Inaudible]

Gerstenmaier: Well I think that is extremely important, that's another dimension here that I probably missed on the charts, but you're exactly right. The fact that we go through four-year cycles, we go through Congressional cycles, that's a concern in the variable. So what I think what we need to think about there is we need to be—I call it agile. You need to be flexible in your development so that you got this plan, right, but you may have to deviate along the way depending on what political influence you get, but you still keep that long-term vision in place. I think I've learned from the Russians that they have a very long-term view of where they want to go, and they may go through a 100 iterations and permutations, but they are always making slowly steady progress towards that goal, and we need to think about that. We also need to think about the timing of some of our projects. Can we get it done within an administration change, or get done with a Congressional change?

I used to think that NASA had a tough problem here, but then I look at the European Space Agency (ESA) and with ISS, they have 16 countries, and I think they are going through an administration change in every one of those countries almost every year. So imagine you're the administrator of ESA, and now your French delegation has changed, next year your German delegation has changed, and you need all these countries to provide you funding so that is another good case to look at how does ESA survive in this environment with a lot of political change over time. But I think it is a very important consideration that wasn't in here that should be.

Question 5: [Inaudible]

Gerstenmaier: That is a good question. So the question was should we alter our budget cycles that we actually get a five-year, six-year, or maybe a ten-year budget for the entire program, right? Again, I am biased a little bit because I have pragmatic tendencies. So to me that would be the ultimate way if we could do that, but I don't know that I could ever change the Congress to actually give us funding for that period of time so then I turn it around the other way. What that tells me is that even though they tell us that they want us to optimize for life-cycle cost or look for the lowest cost, cost of project—I've been told this my entire program/project management career that they want me to look at the total end-to-end life-cycle cost—but then I have never been given a budget...that ever met anything close to the profile that I needed to minimize the life-cycle costs. I have been given year- to-year budgets subject to somewhat random swings each year, so then what I have adapted to is I'm not as efficient as I can [be] in my project. It is not going to be the lowest cost solution, but it is the most resilient solution that I got that I can tolerate [due to] big budget swings from year to year. So I actually build [a] program/project management [approach] that actually reflects a yearly budgeting process. It's even become more problematic now because this year, here we are, we'll be in March, right, half way through Fiscal Year '11 with actually no budget for Fiscal Year '11. So here you are. How [do] you deal with that? They can come in halfway through the year and decide to cut your budget by a quarter, and because it's already half a year expired, that's double so then that's a 50 percent cut to your project, which is huge. So do you pull back? Do you not move forward? This is the art of program/project management. How do you manage that risk to keep moving forward in this uncertain environment? I have always dreamed that someday I would get the budget on October 1, and we'd be all ready. Throughout my entire tenure, I don't think I have ever gotten a budget on October 1, maybe once. It also varies from year to year in kind of a random fashion, so I think I would turn the question around the other way instead of trying to wag the dog with the tail. We need to recognize that we got to deal with the environment we're in and how can we make ourselves more resilient to the environment that were in.

Question 6: [Inaudible]

Gerstenmaier: That's another thing that has really changed dramatically is not just the newspaper headlines, but...the blogosphere or the instant comments out there. Boy, how do you control those? And my point is I don't think you can control those. I will tell you that in the shuttle/station program, [I] used to get offended. I would I do a Flight Readiness Review, and the report would be written before we got off this Flight Readiness Review on what occurred during the review. That made me feel kind of bad. So then I thought, well maybe I'll tell everybody I am going to break your arms if you send any text messages or you call anyone during this review. We're going to have total silence and then we will go talk to the press afterwards. And it wasn't going to work either. Then what I decided to do is now I have PAO sit in the back of the room and they Twitter. So now I have my PAOs putting out the message during this Flight Readiness Review kind of the way I wanted. It was still on the edge a little bit. At least it is still kind of the NASA story as a review is going on, and I'm actually now beating the blogs to the web. And so the message there is: instead of trying to slow down communication, again, recognize communication is diverse and fast. How can you now participate in that and use that to your advantage?

My other story that I will tell you is that I had one of my program managers whose son didn't really follow the program very much, and his dad gets an email from his son: "I see your getting ready to go do your presentation, good luck at the FRR." So this guy comes up to me [and says], "How the heck did my son know that I am getting ready to go present at the Flight Readiness Review?" Then he finds out that his son was following the Flight Readiness Review on Twitter and found out his dad was there. So now I connected him and his son through Twitter in the Flight Readiness Review.

So the message there is use these things to our advantage.

Question 7: [Inaudible]

Gerstenmaier: Yeah I think if you go back to Apollo, again it was a very unique time. We were given a direction to go do something, which was very demanding and the other thing that was also pretty immediately obvious. Every human—you can look up and see the Moon, right, and you could go man, that's a long way away, and there are going to be people up there walking on the Moon. And that immediately resonates with you. It doesn't take a whole lot of explanation, right? I mean it's there, you know when you got to go look at Space Station and you see the white dot traverse overhead, if you don't know there's six people in there, you know, it's not nearly as meaningful to you. So you're going to have to go above and beyond, but I'll drag my neighbors out at 4:30 [AM] to watch Station fly overhead. They're not sure I'm stable, but that's OK. Then I not only drag them out, but I drag out pictures of the crew, so I show them, "See these people? They're in that little white dot." And they look at me, but then I'm making a tie that they wouldn't normally make. There are actually humans up there, and if something's broken on Station, I'll have a close-up on the radiator, right, it's got the big peel-back panel. "Oh, you see that? It's up there." Or the little ties that we put in the solar panels to fix them when it is broken...[I'll] get a picture of those and show him that. So then I have to go above and beyond just normal communication to get that message across, where in Apollo, it came much more naturally. It was very easy to see. The other thing is we also lost interest in Apollo very quickly. You know, we did the first flights, and then it became kind of routine, because again, I think it's the perception of what we're doing. We understand how hard it is, but I don't think the general public does, and...we can't go too strong that way or they can't tolerate it either, because were not very risk [oriented] as a society today. "Why are you working that hard for this crazy thing? Why do you want to go understand what is on this planet or why do you want to understand if there is life here?" In reality, what we're really doing is we're learning more about ourselves by pushing ourselves to these new heights and new envelopes, but we got to figure out another way of talking to folks about that. I don't have the answers, but these things that we need to think about, and you need to think about is you communicate with your family and friends. How do you talk to them about what we're

doing and how we move forward so you can build that base? I think that stakeholder piece was always there—it just came easier in the past. And it may be more complex in the future.

Question 8: [Inaudible]

Gerstenmaier: I think there is clearly something there that we need to think about how we put the message together and how we talk about things. What Apple Inc. [is] kind of pulling on, and what happens is...the same thing car ads do. They're pulling on an emotional piece, right? That if you really want to evoke change in somebody, you pull on the emotional side. I mean they show you—they don't tell you—how many horsepower the car is and [how] it can drive and all that stuff. They show you this car driving down this Pacific Coast Highway, right, and the wind is blowing. They are appealing to some emotional piece that resonates within you, and that's the marketing piece. So [I] think there is a piece there that we need to touch on, that they can understand the passion that we feel. I think we all feel it because we know how hard it is to do our projects. You know how many hours you've spent, how much sacrifice you made to get ready to go do this test or go do this flight. Then to actually go see it execute, that is a true emotional release for all of us. But then how do we get that out in the general folks? I think there is a piece of that...again, I don't know how you do that and how you do that credibly in our world, but I think there is a piece of that. There has to be an emotional piece. We're not going to be able to look at spinoffs and show a rational logical progression of where we are. There needs to be a piece of that because the budget guys will look at that. Then there needs to be this other underpinning of a more emotional, theological thing. We're answering the big questions, right? Are we alone? Are we the only planet finders looking for other planets? How did this species evolve? What did we learn about ourselves? Is 1 g critical to the way the human has evolved or come about? Or could we have been the same as 0 g? Those are some big questions we're toying it with and I think for some us have emotional or, I guess, theological kind of underpinning, but that is a good thing to think about. Maybe I'll do two more questions.

Audience Question #9: [Inaudible]

Gerstenmaier: Well, we do a couple things. We do astronaut events for certain things where we bring astronauts in to go talk about certain activities. I'll do my one on one meetings kind of thing with them but mine are more on the technical program project management kind of thing. We'll participate in some Hill events and some things with the Congressional folks. We do visits with the Congressional areas, they'll come to launches, those kind of things, but that is about the kind of outreach we do in those areas so it's not. It's formal, but it's not as maybe rich as it could be. In the back somewhere then maybe we'll do one up here.

Audience Question #10: [Inaudible]

Gerstenmaier: I think another thing that's happened—that's a good comment—I think another thing that has happened to us [was that] in the Apollo era...the way we received information was very different. You got a magazine. You got a newspaper. Everybody watched the evening news, right? So the way you received information from the outside world as a person was very monolithic, or there was just one way. So that tended to galvanize the public in pretty strong ways. Today everybody gets news and information a whole bunch of different ways. A lot of people don't even get newspapers. Nobody watches the evening news. You do TiVo, [and you] pull what you want to pull. The other thing I think we do that is sometimes...really bad is [let's say] I get the morning news feed from NASA, where they skim through all the newspapers or all the blogs and they put this space stuff they think I'm interested in this nice set of

clips for me. The problem with that is, it's not in context. All I'm looking at is the space stuff. I'm not looking at what's going on in the rest of the world. That really gives me a distorted view. So then sometimes I tend to overreact, thinking, "Man I saw seven stories on this thing, this must be a big deal." Well, it's seven stories in a very small focused world. If you look at in the context, or if you got a newspaper, it would have been buried back in the back by the ads somewhere in the back, and it would have never been found. But because we filter that way, we get our news a total different way, so we [have] got to reflect how we get our news.

The other thing we've done is, we've also brought the Twitter folks down to some launches, and that's been tremendously insightful because again they have a natural tendency towards technology, and for them to get a chance to see the launch and sit in the tent and then actually tweet from the tent and watch a launch is pretty amazing to me. The way they reach out to folks is pretty phenomenal. One of their blogs was [saying something] like, "This is the most amazing experience I have ever had. As I was I was typing this, the only thing that could sort got me is the tears that ran into my eyes that didn't allow me to see the keyboard." You know, I am just [thinking] "Holy cow!"...I think we need to expose what we do, openly and honestly to folks as much as we can and then just see what happens and recognize were not going to reach everybody, it's just so diverse out there.

So with that, anyway I'll let you go a little bit early. You got seven minutes to spare so you can spend seven minutes talking to each other. Thanks.