

Robert Lightfoot: Well good morning everybody. I appreciate everybody coming in. We're going to try to get this thing started on time because we have flights to catch, but we appreciate Charlie Bolden taking the time come see us here today. He was in Montgomery yesterday and since he was in the area, he offered the opportunity to come talk to the team. Charlie, the way we do it here is we've got people in person, but there are people out on the net watching it all our remote sites as well. We project this usually to California and ATK and MAF and Florida where we have offices. So people can watch it on their desktops. So, again thanks everybody for coming out. Charlie is going to give you an update on where he sees we are, and then hopefully have some time for some questions and answers, so be thinking about that as well. Don't be too tough on him though because I'll hear about it when we get on the plane when we get back. So anyway, thanks for coming and without further ado, Charlie Bolden, Administrator.

Bolden: Thank you very much. Thank you. I was telling Robert and Sandra and everybody that if I had been in your place, I wouldn't have been here. Because of the weather, I'd have stayed at my desk and watched it on TV or something. But I do appreciate those of you who came out coming out. I don't get here enough. I think you heard me say that before and I mean it every time. It's a beautiful part of the country and you do incredible stuff, so it's always good to come back here. George, where's George Hamilton? Ok, there's George. In the area of full disclosure, George and I had an opportunity to sit together and talk a little bit earlier today so I got some perspective from the union and he and I exchanged some thoughts and some ideas and answered some questions. And as I told him, he and I

agree, one of the things that is critical as we go forward, is to try to foster an open and honest communication among ourselves. You know, I think the senior leadership team here just went probably through a retreat where you talked about trust. Trust is a really difficult word for some people to understand. Some people think that if I disagree with you then I don't trust you. Or if you disagree with me, you don't trust me, and that's not it at all. You know, when people trust each other, they can disagree. And they can agree to respectfully disagree and you keep working at whatever the issue happens to be until you reach a consensus or you reach an agreement on something. But sometimes that never comes. How many of you are married? Ok, you know what I mean. You know, if you're a husband, you're always wrong, but you reach consensus. You know, that you agree. If you're a wife, then you know you're always right, and the sooner you reach consensus that you're right, then the better off your marriage is, so that's the kind of thing I mean. But it's because you trust each other that you can do that. So that is important. Let me talk a little bit about things that are going on right now in the agency. For example, we stood up what's called a Mission Support Directorate. And I think most of you may know that but some of you may not. And Mission Support Directorate does its business through something that we call a Mission Support Council. Woodrow Whitlow, who is the former Director at Glenn Research Center is now the head of Mission Support, and what the Mission Support Directorate does through the Council is to actually

take care of hearing all issues that pertain to infrastructure and people in the agency. And then, because they have representation, in fact they have Center Directors, Mission Directorate and other officers in charge who are members of the Council, I really count on them hearing cases that are presented, or issues that are presented, reaching an agreement and making decisions. And that means it doesn't come to me for a decision. And that's the way it ought to be. And I met with them again, Robert and I sat and met with them via video teleconference because they were getting ready to talk a little bit about the fact that Woodrow is the Corporate Portfolio Manager for the agency. When you talk about facilities that we have, and we have too many, I think some of you know that. Around the country, in fact around the world, we have facilities around the world. We have far too many for this day and age. Far too many for our budget and everything. So we, in the coming years, will have to make very difficult decisions on which facilities we maintain, which ones we excess, and then that means that the government services, General Services Administration, GSA, will take them and either auction them off or give them to somebody, or which ones they get rid of entirely. So those kinds of decisions are made at the Mission Support Council level. The other thing, in terms of, like George and my meeting, there is an organization that's called Labor Management Council and Lori Garver, the Deputy, leads the Labor Management Council. They meet periodically. They usually come to headquarters and they deal with issues that are of interest to all of you as

employees of NASA. If you're a member of the union, then they generally deal specifically with issues that the union raises. So the Mission Support Council for Infrastructure and People, _____ our Management Council in dealing with people issues, if you will. So I thought I would tell you about two things that are a little bit more active than they used to be. Well, Mission Support Council didn't look good before, so it's definitely more active. But the Labor Management Council has become a lot more active under President Obama and this administration, because they really push to improve labor management relationships. A couple of other things before I let you ask me questions. I really want to congratulate you on the 50th anniversary of Marshall. It is incredible what has occurred in your story's history here. You have always been a vital part of exploration in the space program, and 50 years is a long time. A lot of organizations don't survive that long, but you have all done more than just survived. You continue to excel, and one of the things that we really count on you for is your engineering expertise and general diverse expertise across issues that concern the agency. When you wonder about where we're going, you know the Authorization Act that the President signed back in October pretty much lays out a relatively clean path for where the Congress and the President have agreed where we want to go. I think all of you know that last February, what I did was I rolled out what was called the President's Budget Recommendation or Proposal. It's got a name. But it was, as I learned over the course of the year, just

because the President put it out, it didn't mean it was sold. In our form of government, there is discussion and negotiations and everything that goes back and forth, and so what happened from the President's budget is that we now have an Authorization bill signed by the President into law, and then what will finally follow will be the checkbook. And that will be the Appropriations bill that we are hoping will come as soon as possible in all likelihood not before the new Congress comes in, but that's not an impossibility. Having had an opportunity to talk to almost every newly elected representative or Senator or governor the day after the elections and on up until this weekend, once again I was heartened to find that if there is an agency that enjoys bipartisan support, it's NASA and the work that we do. So I am cautiously optimistic that we will be okay once the appropriations bill is signed into law. When George and I were talking he asked me a question what do you see as best case, worst case and likely case. Did I get it right? For, you know, for the budget. Best case was, best case would have been to get the President's budget exactly as it was proposed, you know, last February because that gave us sufficient funds to get a technology development program in place, to work on a heavy lift vehicle, to work on a crew vehicle, to really put the money in to help with the development of a viable commercial launch industry and still keep our science and aeronautics and our education efforts strong. So that would have been the best case. That didn't happen, but I think we're still at what could be a best case with the Authorization Act if the appropriators follow

suit. Worse case, some people are talking about rolling us back to 2008 levels. It would not be devastating. You know, people like to use the word devastating. This agency and you adapt so whatever the budget turns out to be, we will make it work. The thing is we will do differently than I think has been done in the past is whenever we get the Authorization Bill, we're going to look at it and we're going to make determinations as to what we think we can realistically do. And what we don't think we can do is going to come off the table. So there will be some programs that might go away. So that's why when he asked me about worst case, the reason that going back to the 2008 appropriations level would be worst case, it would mean because some of the things that we really want to do and we think we can do, we won't be able to do. But the big thing I want to do is be honest with Congress, honest with the public and honest with the administration and not get us in a situation where we're promising we can do everything knowing that that's not the case, and kind of hoping. Because I think all of you know, particularly any of you who have ever lived any time in the military, hope is not a plan. And we are not going to work on you know, a plan built on hope. We're just going to do solid planning based on what we get as a budget. So you're going to have to help us there because we really count on your expertise and your input. I go back to what George and I talked about, the critical importance of communication is you have got to talk to us. You've got an incredible Center Director here. Robert Lightfoot is, and

I've told him this, so this will not surprise him. It is a pleasure to work with him, to have him as a Center Director because he keeps you informed, whether you think it or not. I think he reaches out to you and he asks you for input. And he is really, he makes Marshall a part of the team. There is never a question as to whether or not Marshall is a viable contributing member of the team. And so you're very fortunate in that regard. So talk to us. I think that would save us, that's one thing that I would make a plea with you to do. We may not always agree. In fact, we will not always agree. If we were to have a show of hands on any topic now, my guess would be you know, this section would have some hands up for something in that topic. This section would have some hands up for something in that topic. And that section would have some hands up for something totally different. That's because of our strength. Our diversity is our strength. But it means that every once in a while we're going to have different ideas about the way we ought to proceed. So we are never going to agree on everything, but what we will do is reach a consensus. We'll figure out what the right thing to do is based on what we get from you all, and then we'll press forward with it. How many of your worked Ares? Ares I or Ares IV, or anything in Constellation? I hope you don't get tired of hearing me say this. I want to thank you for all that you did. No matter what it was that you did in Constellation, for those of you who did work the Ares portion of Constellation, there's still a lot of work left to be done in your daily work. I think when you look at some of the systems that

came out of both the plan for Ares V and the execution of Ares I-X, we're going to find that there are definite things that will be applicable to whatever we do in terms of future exploration. The J2X undoubtedly will play a critical role, not just in NASA, but probably across the national front in terms of providing an upper stage capability. So the work that you've done, all of this is not for naught, so we will use that insight. I really thank you all very much for everything that you've done up until now, and I expect that you will continue to do so. What's next? What's next in human exploration? I think all of you have heard of the HEFT. Don't be confused by it. Don't get concerned by it. Don't get worried by it. I hate acronyms, but I'm in an organization that loves acronyms. That's why I have learned to live with them. Some time ago, and I may have told you all this, I just got frustrated with all the different ideas about what we should be doing and where we should be going. And they were everything about, I mean, you name it. All across the playing field by heavy lift. All across the playing field about crew vehicle. Everything imaginable. And I finally said one day, stop! Because I had heard that up here you all were trying to look at the proposed Authorization Bill, the different versions, the four different versions if you talk about two Authorization Bills and two Appropriation Bills. And I told Robert and the other Center Directors stop! Just tell you're people to stop! Let's not try to guess what's coming down the road. Let's just take some time. You all go out there and gather up all the ideas and then let me know

what's out there and then we'll try to work with the leadership team and give some guidance and some direction in the way that we should be going. And so that's essentially what HEFT is doing. It is not heavy lift. HEFT is Human Exploration Framework Team and it's looking at heavy lift, crew vehicle, commercial crew, commercial cargo, exploration, robotic precursors. You name it, everything that we need to facilitate the success of a human exploration initiative. HEFT is just a nursery, if you will, for ideas. It is not a program. It is not an office. They don't make decisions. They just feed information to me and the rest of the leadership team and we try to use that information to go off and either do what we're about to do, which is to have Robert and Doug Cook get together and decide who will be the Program Manager for the Heavy Lift program. That has to be decided here sometime soon and I'm going to depend on Robert and Doug Cook and the rest of the leadership team in coming up with that particular person and then the programatics of how that program runs. And there will be similar things done for the other programs that will fall out of the Appropriations Act that we finally get. Let me see. International partnerships are critical. You did it probably as well as anybody. You and JSC are always involved in international partnerships by nature. Doing the Space lab and Space Hab days, much of the international partnerships were focused right here in Huntsville because everybody came through the payload operation center. Most of us came here to train for international missions, and I think we still do a lot of that

and that will continue in the future. So you will play a vital role as we try to expand our international partnerships. The International Space Station has been an incredible model for the way that we should operate in exploration. Fifteen nations that have come together that have enabled us to have ten years of continuous human presence on the International Space Station. That is no small feat. Any of you who have worked station in any regard know how difficult it is, not just technically, but politically and in every other way. I mean, fifteen nations. Think about it. They all have their ideas about how things ought to be. The good thing is from my perspective since I head NASA, is that they all look to us as the leader, so that makes my job a little bit easier, but not always. You should feel very proud that every single head of agency when we get together reminds everybody that the U.S. is really the country to which they look for leadership, and so you can feel comfortable that that's the way it is. I recently came back from a trip to China. I spent a whole week over there with Bill Gerstenmeyer and Peggy Whitson, the Chief of the Astronaut office. We got an opportunity to see everything. Everything that we asked for plus some more. We started out in Beijing at most of their facilities where they produced the Long March, which is their big rocket where their Astronaut Training Center is. We went out into the Gobi Dessert some distance away, a long ways away from Beijing where their launch site is, where they do all the _____ launches, their human space program, and also most of their military satellites. So it's a different

environment than what we're accustomed to. The people's army runs everything. That's just the way it is. They are struggling right now with how they split up responsibility for programs. My opinion is they really want to be a member of the, what I call the society of space fearing nations. I went there with three principles and I repeated them over and over and over again everywhere I went, and that was if they were going to do anything with us, and we went there to listen. We didn't go to propose or to make any deals or anything. We went to listen. But I told them that if anything was going to come from a relationship between the United States and China in space, then they would have to demonstrate to us that they could be transparent in all dealings, that they would have to demonstrate that they were willing to exercise reciprocity which means they give us something, we give them something and we go back and forth. And then the third thing is they had to be mutually beneficial to both nations. If we didn't get anything out of it, we weren't interested. We felt that they were the same way. And I will tell you one thing. My final night there, I met with the big head of their human space flight program who ironically is also head of their anti-satellite program. An odd mix of responsibility. He is a Three-Star, a lieutenant general in the People's Liberation Army Air Force or something. And he started out the conversation. He introduced the conversation and he said they're going to be very candid. We don't need you. We don't need the United States, and you don't need us. But the potential, if we choose to work together, is incredible. I thought that

spoke volumes. Very, very candid. And they don't. They don't need us, and we don't need them. But I happen to be one who kind of every once in a while just wonders about what things could be like if we were able to bring more countries into the partnership. It's going to be difficult and it will take years, but we may get there sometime. Let me see here, I'm going to ask Robert in a second what I forgot, but I want to go through my notes here. Anybody have a question? Feel free to ask at any time because I always stumble, bumble and do this kind of stuff. Continuing resolution. I was supposed to talk about that. Anybody want to know about continuing resolution or should I just go away? Everybody know what a CR is, a Continuing Resolution? I had an idea. I'm learning a lot about Continuing Resolutions. When the Congress doesn't want to do anything, then they pass a Continuing Resolution. In essence though, in effect, it does something because any action that they take has an effect on things. When they're not ready to pass an act or to pass a budget, then they pass a Continuing Resolution that says okay, continue to march where you are. So we currently are operating on a Continuing Resolution that goes, who's the Legislative Affairs person here? Or who knows the answer to this? This CR goes through December 3rd? Okay. And what it means is that through December 3rd, we are expected to operate under the budget ceiling that we operated throughout 2010. So it means that okay, the coffers got restocked from whatever date they passed the Continuing Resolution to December 3rd, take that period of time you know, and divide

it into twelve, and that will give you the slice of money that we got. Some of you were affected by decisions which we made because we could have chosen a couple of things with reference to Constellation. We could have chosen because know that the spending on Constellation is going to go down in 2011, because that's what the Authorization Bill did. The Authorization Bill reduced the amount of spending on Constellation close out significantly. We could have chosen to go down to that level to make the transition somewhat smooth. We decided that we didn't want to do that. That one, it was very disrupting because it might potentially mean that some of you who are contractors might have had to lay off even more people that we were laying off. So the decision we made was that we wanted to continue to operate at the same level we were spending at the end of 2010, and so if you're in the Constellation program and you're a money person, that's the reason we did it. Because we didn't want to make an abrupt change right away and end up having more people out of work. So it's an effort to try to smooth, to try to make it a ramp down instead of just a drop off a cliff. We expect that there will be another Continuing Resolution passed here pretty soon. It could go out until February. Some people tell me it will likely go out to February. But as I mentioned to you, I talked to almost every Congressman and Senator who was either re-elected or elected and in talking even as late as yesterday with some, they said look, don't give up. We are still trying to get out an omnibus bill before we go on vacation for Christmas. Now, again, you

know, that means certain things, but it would mean that we could get approval and funding to press on with some of the new programs that we want to do. That could happen. The likely thing is that we'll get another Continuing Resolution that will take us out until February or something like that. So that's the effect of a CR. If that's still not clear to somebody, ask me and I'll get him the answer. Kevin? Will you answer? Let's see, what else did I forget there Robert?

Robert: I don't have your sheet Boss, so I don't....

Bolden: Yeah, but you're clairvoyant. No! And I'll quit. I talk too much anyway. Anybody know what BAA's are? Broad Area Announcement? If you're working Heavy Lift, then you're probably aware that we put out a Broad Area Announcement, a BAA, some months ago and we got a healthy dose of people who said we want to participate in thinking about what the future Heavy Lift system should be like. Most of the companies that were awarded contracts, and they're, I think everywhere from \$300 million to \$600 million or something. Three hundred thousand, not million. Yeah! Yeah! Don't get people too excited. I think we had about \$7.5 million to put on these Broad Area Announcements, the results. We selected thirteen different companies and some of them are partners. Academia, industry and the like, but the majority of them are from Huntsville, or Huntsville related. So not surprising. But what we want them to do is to give us ideas that will supplement the work that Gary Lyles and Robert and some of the folks here have been doing in terms of Heavy Lift just to see if

there's something that we missed. Is there some consideration? Is there some technology that they know about that we don't? Right now if you're an engine person, or if you're a Heavy Lift person, I think you'll know, and for those of you who are like me and aren't a Heavy Lift person, the big question for us is what do we use for a first stage engine? Do we use LOX hydrogen or do we use LOX RP, kerosene. It seems real simple but it's not. Makes a big difference. It makes a difference in cost. It makes a difference in what do you call it Dan? Long term? Life cycle cost. And it determines the architecture for our Heavy Lift vehicles. So the ball is in my court right now. Dan and Todd, me and Gary and everybody, all of you, have done an incredible job of giving the information. My action right now is to go deal with the political side of my House and find out what is it that the nation, that the leadership of the nation, wants us to do. Do they care? Or do they want us to bring them the best answer and that's what we'll do. So that's where we are right now. Trying to decide which type of first stage engine we'll use. Because that will determine the architecture. Anything else I should have talked about? I know you don't have a paper.

Robert: The only thing to touch on is what the shuttle team is doing. We are getting ready to head to the last few missions.

Bolden: If you work in shuttles you know this. If you're not working shuttle, let me tell you, we were really disappointed that we were unable to launch 133 two weeks ago now. We're working on some cracks in the external

tank. The crack in the foam which began this revolution of discovery of things. That's something we've already, we haven't finished the work on it, but we will. I will tell you because Robert told me this morning. The cracks are something that we have dealt with before. In fact, you know, we know how to do this. We know how to repair the stringers where the cracks are occurring, and right now what the team is doing, the engineering team mainly, is to look at what the impact, not just of the tank itself, because structurally we think we're okay. But we're looking at what the impacts of the cracks in the metal of the tank, the basic tank itself, may cause, may have on the foam. Whether it might cause some foam shedding or something like that, that would cause us problems on ascent. So I think there's going to be a meeting next Monday where the engineering team will look at everything one more time and then we'll determine whether or not we can make a November 30th launch. The International Space Station, as I mentioned, these next two flights will finish off, I mean they'll complete the construction. It's essentially completed now, but they'll finish everything off. FCS 134 will deliver the alpha magnetic spectrometer. If you're an astrophysicist or something like that, or you do that for a hobby, you know when you go home. I am told, and again I'm only telling you what I'm told, that if they get one particle, one, that goes into this thing, this satellite if you will, that's going to be attached to the International Space Station, it will be a game changing discovery. It will completely revolutionize astrophysics because it will

prove the presence of something that's called anti matter. Some of us only read about it when we were kids. You know it was like science fiction stuff. But Dr. Sam King, who heads the AMS team, is really excited because they are convinced that AMS is just, because it's outside our atmosphere and everything, they are convinced that we're going to get hits on AMS like we've never seen before. So that's really exciting. We are hoping to fly a third shuttle mission in June. What everybody calls the launch on need mission, it would become FCS 135, and that's really needed to bite on the risk for the development time for commercial cargo. If there's any delay in commercial delivery of commercial capability to take cargo to station, we could find ourselves in a situation as bad as having to de-man the station or take it down to three people, and we really don't want to do that. So FCS 135 would give us an opportunity to put additional supplies and parts and pieces on board station that would take us out and give the commercial guys an opportunity to experience delays as we anticipate they will, because everybody does. We do in everything. So that's that. Is that it?

Robert: You went to Nepal I think.

Bolden: Oh, SERVIR! How many of you work SERVIR? I know there's at least one. There's got to be some more. SERVIR is an incredible, incredible system. It's a 30 year archive of, correct me if I get any of this wrong okay? Don't let me misstate. It's a 30 year archive of earth science data that has come from satellites, ground sensors and the like, and it's

augmented with real time data that's coming down from satellites today, and from ground measurements today. And we have three sites around the world. The first one was in Panama that services Central and some of South America. The second one was opened a number of years ago in Nairobi, Kenya, and I had an opportunity to visit with them several months ago. And then we opened a third site just last month in a place called Kathmandu, Nepal, in the foothills of the Himalayas. SERVIR in the Himalayas services eight different countries, to include China. What it does, it is an incredible tool to decision makers, whether they are in government or in other things, in terms of looking at disaster management, disaster relief. The center in Nairobi, Kenya, they actually have representatives from fifteen different East African nations, nations who have developed drought and flood models to help that region of the world. It helps them with water resource management, with crop management, you name it. But it makes a difference in the lives of people. It started here at Marshall and University of Alabama Huntsville, the majority partner in it. We are a minority partner. We're partnered with the U.S. Agency for International Development and USAID puts in the lion's share of the money, but we have increased significantly the amount of money that NASA put into it. If I can be so bold as to talk about things, visions that we have. We even have visions of putting an instrument aboard the International Space Station that would help us with SERVIR, that would widen and increase our ability to provide even more data to the decision

makers and the like. Did I get it all? Anything else you want to add?

Okay. Okay. We're looking at it. We're trying. Station is incredible. I always tell people, Tina knows this. I don't read the blogs. You all can read them. You know all they do is just upset my day so I don't read them, and you read them if you want. I know what you're doing. You know what you're doing, and you don't need anybody else to tell you, you know, what you're doing and the quality of your work. So if you want to go read somebody who's going to be critical of you everyday, have at it. I don't recommend it. If you need that, that's okay. We are doing incredible work whether it's from aeronautics to science to human space flight and exploration, and we will continue to do that. You know I look back on 2009-2010 at the accomplishments just in the area of science alone, and it is mind boggling. If you look at the solar dynamics observatory, WISE, WISE is a satellite that is looking at, it maps the entire sky as we know it. The entire sky as we know it, it was intended to find, I've got to get this right. It's earth sized planets. Not earth like planets. But the thing about earth sized planets is they may have water. They may have atmosphere. They may have other things, and there may be sources of life. One of the things that some people through WISE would do would be help us detect asteroids, and comets and the like, near earth objects. And WISE just expanded the catalog of known near earth objects. I don't want to use the term astronomically, but astronomically. It really did. And it had given us an idea that some people were nurturing all along that if we could just take

an instrument like WISE and put it in orbit around Venus, for example, and then look at Earth from the vantage point of Venus, which is looking out from the sun, the number of near earth objects that we will see will be even more expanded. So I mean, really incredible things that are making a difference to people here on earth, and you all should be very proud of that because you're a part of the team that has been able to do that. So enough talk from me. Let me see if you have questions.

Robert: If you could, come up to the mike because we've got folks listening in, so if you've got a question, just walk up through right here in the aisle.

Bolden: And I knew I forgot something so please forgive me. You know the problem in trying to highlight anything is that you forget stuff. And so don't go home and pout and have somebody send me an email that says you don't love us because you didn't mention us. I didn't mention a lot of things because we've done a lot. Yes?

Question 1: My name is _____. I'm an astrophysicist here at Marshall and I would like to ask your opinion on what the interest is going to be to the Science Mission Directorate and possibly to the agency overall, the fact that the Webb telescope has come out over budget and over schedule. We're talking about a half a billion dollars, and basically that comes in a year when a decadal survey for astrophysics is getting ready to provide input to NASA for the next generation of missions. And they actually have come up with one major mission as it is already, but looking at the half billion deficit to start with, that doesn't look like it's going anywhere

so this discussion about input not only in the SMD but precipitating upward into other areas. So could you care to please comment on that.

Bolden: Her question is about James Webb Space Telescope, and impact of the results that we got from a recent study that I asked John Casani, an astrophysicist out of JPL and a team, to take a look at the James Webb Space Telescope project and tell us where they were. In a nutshell the findings were the program is technologically very sound. They are doing incredibly well. We spent a lot of money up front in technology development. What we found, however, is that once we got through that period of time, there were threats and liens against the program that we, NASA, did not account for. And they now, we're now finding that we need some of that money to the tune of whatever it may be. It's too early for us to tell what the impact is going to be. I may have directed that we make some significant changes in the project. We've actually pulled it out of astrophysics and stood it up as a separate program at NASA headquarters and SMD, but still at NASA headquarters, it's my program. I designated Chris Scolese, who is the Associate Administrator, to do the day to day monitoring of JWST. We took Rick Howard, who was the Deputy of the Office of Chief Technologists, he is now the Program Manager. We didn't have a Program Manager before. And he's going to be the Program Manager for JWST out of headquarters. We changed out the Project Manager at Goddard Space Flight Center and are changing out some other members of the team. Right now what we directed be done is

that we do a bottoms up review of what we expect cost and schedule impacts will be so that we can go to the Congress and OMB and others and say okay, we should have known this. We didn't. We screwed up and I've said that. You've seen me quoted in the paper as saying I screwed up. But here's where we think we are with JWST. My personal feeling, it is incredibly important, not just to the astrophysics community, but to the world, that we make JWST successful. So while everything's on the table, you know, the cancellation of JWST is not something that's sitting in my head. I am determined, and I promised Senator Mikulski, who is our Appropriations Committee Chair, that I was going to do everything in my power to make sure that we get a grip on the program and that we find a way to salvage it. We will very likely have to find the money inside NASA, but that has not been determined yet. We haven't asked anybody for additional money. In fact, one of the complaints is that we knew we didn't have enough money and we never said anything. If we had gone to Congress and said, you know, we need more money, they would have given it to us. That's always supposition. It's easy to say it after the fact. What is fact is that we didn't ask for more money, and so nobody was going to come forward and say we think you need more money for JWST. We're hearing rumors. We now know that we should have asked for more money and we didn't. It's too early to tell you what the bottom line is yet. It will have some impact on it, but I think we can work it out with the changes we make. Okay?

Question 2: I'm _____, one of the scientists here. When you and the Deputy Administrator were here some time ago, you were both talking about the need to have some of the agency's activities be in small incremental steps that are achievable on 4-5 year time scales, like robotic missions, like technology demonstrations, and we saw that come out in the President's budget request, and as a number of people feared, that's one of the first things to get raided when big programs need that kind of money, and we saw that come out in the Senate bill. A lot of those were taken down to levels that are very, very low, maybe too low to do anything meaningful, and so I wanted to get your opinion on what you think the balance should be, needs to be or is likely to be between something that's a long term investment like Heavy Lift or Crew Launch Vehicle and some of these smaller, more robotic kinds of missions.

Bolden: Interesting you refer to Heavy Lift or Crew Vehicle as a long term investment. I would put it just the opposite. Anything like Heavy Lift or Crew Vehicles are short term investments. They, you know, they're something that we do now but no, without investing, without making the long term investment in technology, there are going to be programs that we will find very quickly outgrow our ability to sustain them. If we don't do technology development that enables us to put new systems, whether its lightweight tanks or different navigation systems, or other kinds of things into a Crew Vehicle or into a Heavy Lift Launch Vehicle, we'll find very quickly that we're back where we were with Constellation. So the

long term interest of the agency is to do the technology and dump investment. What we're doing now that we have an Authorization Act, which has significantly cut down on the amount of funds set aside for technology development, space technology development in particular, is we have asked the Directorates to sit down with the Office of Chief Technology and find out where we have programs or projects that are duplicative. Do we have some science missions right now that we could turn into precursors? And the answer is yes. I would give you the example of Epoxy. And I don't know how many of you follow, you know Deep Impact was the original mission, and it flew to a comet years ago. When the mission was over we thought, the team looked at it said hey, we've got a lot propellant left in this doggone satellite. Let's do something else with it. And so they did something we call, I learned this word, repurposing, so we repurposed the mission. We changed its name to Epoxi. It's still Deep Impact. It's the same satellite, but we turned it into Epoxi and last Thursday, I think, we had, what's to me, and I'm not an astrophysicist or an astronomer or anything, but it was breathtaking to me to watch the first five images, you know that came into JPL from Epoxi as it had this close encounter with a comet. The first thing I noticed was it wasn't a comet. Now that's not true. It was a comet. It just didn't look like one. It didn't look like what I envisioned a comet would look like. What's everybody's perception of a comet? A little ball of fire with ice trailing out of the tail and stuff like this? What was Hartley II? A

peanut! It was a peanut shaped thing. That blew everybody's mind. Now maybe there's somebody sitting in here, you know, who is smart enough to know, yeah, we're going to see a peanut shaped comet one of these days. If you did, then you were very enlightened. Your predictions had come true. I never expected to see a peanut shaped comet. Granted, there was ice coming off the back of this thing as it's speeding along, but incredible. So that's what we're trying to do. We're trying to look at what is it that we have money right now for. And what is it that we would like to do that's insufficiently funded that we can put together? In education? _____ really wants to put out an opportunity for us to award 500 fully paid graduate fellowships in technology. We have to get that out within the next month or so or we will lose the opportunity for a whole year. Any of you who are associated with colleges and universities know. Because kids start applying, students start applying you know in January, it's all done in February or March. So if we don't get something on the street here soon, we will miss the opportunity to produce 500 new graduate students, doctoral candidates actually, in the fields of technology. So we think that's really important. That money got cut, so what we're doing is looking into the education department because there is money there for grants, for graduate grants and doctoral grants, which we either weren't using or we were using for something else. We may be able to just modify it and we'll get the 500 technology grants that we wanted, but it will be a collaboration between education and technology. We never

thought about it before. So it's causing us to think different ways. That's like when I tell you it's really important for you all to talk to us. You have wild and crazy ideas. I know you do. You wouldn't be here if you didn't. And so every once in a while you need to send Robert a wild and crazy idea and let him scratch his head. And he may say you know, I like that wild and crazy idea. I don't know why I didn't think of that. Or he may say forget it. I already thought about that and it doesn't work. But it's just the fact that we bring new ideas in and a different way of doing things that's going to make us successful in the future. I'm not just, you all need to understand, I'm not just saying that because it's something nice to say. I'm saying it because it's the only way we're going to survive. It is the only way that NASA is going to survive and continue to be the agency that is on the cutting edge of everything in space science and technology for the agency. We've got to do things differently and I know you all can do that. So that's why I ask you to talk to us. Come on.

Question 3: I'm Daniel _____. I've got a question. You were describing HEFT as being, you know, launch vehicle, crew exploration vehicles, cargo, all of these things. How is that going to be different from exploration and what evolved into Constellation. Can you distinguish, you know, what this big thing was and what seems to be growing up to be another big thing that's very similar?

Bolden: Well, it's not a big thing. Remember I said HEFT is not a project. HEFT is not a program. HEFT is an incubator for ideas that will help us decide

what programs and projects we want to undertake. One of them we know will be a heavy lift launch vehicle. And it's going to be an affordable, sustainable heavy lift launch vehicle. That will be different than Constellation. It is going to be systems for crew that will allow us to go to multiple destinations throughout the solar system. That will be a little bit different than Constellation because, as all of you who work Constellation know, we robbed you of everything. We took the money from you for other things or I think we, obviously you can't do anything if you don't have a vehicle. And so we put most of the money on the vehicle, and Constellation had gone from being a visionary Mars program to a semi-visionary lunar program, but without a lander and without some other things. And we just, we do not want to find ourselves there again. That's why I told you, and I re-emphasized this this morning to the team, whenever we say we're going to add something, then I want you to tell me what we're going to take off the table. And that will be different. So we are not going to be able to do everything that is in our portfolio. We are not going to be able to do everything that Congress or the President or anybody else wants us to do. We are going to have to go and tell them great idea. We can do that. But if we do that, we can't do this. And that's what'll be different. I don't think, at least in my 14 years at NASA, I don't ever remember anybody going in and saying yeah, we got it. We'll do that. But we are not going to do that or we can't do that. Again, you've got to help us though because you know, in your own projects

when we're getting you to the point where it's unsurvivable. We're telling you to build on a shoestring, and you ought to say hey, make up your mind. Do you really want me to do this or not? We cannot do it at the level of funding that you're giving me. You know that better than we do most times. Anybody else? Yes?

Question 4: Good morning Mr. Bolden. My name is Mark King. I'm in the Ares project office here at Marshall and now that we actually have an Authorization Act approved, could you kind of just talk about from the Administrator prospective, what the appropriation process is like.

Bolden: Explain what the appropriations process is like?

Question 4: From your chair.

Bolden: From my prospective. And I'm going to ask Kevin to get up here. No, no! Just, if I get it wrong, okay, I'm not going to ask you to talk yet. But if I get it wrong, you correct me, alright? And Robert can help also. Because he's been there and done this stuff. What happens, what normally happens at this point is that the Appropriations Committees in the two Houses get together and they look at what the authorizer said and they take that as sort of semi-guidance and they look at the money that they think is going to be available, or that they think Congress is going to have the stomach for approving and expenditure, whether it requires them to raise the debt ceiling or whatever, and they write down an Appropriations Act that says okay, we agree with this, we agree with this, we don't agree with that, so that's not going to be in the bill. Our expectation, because the authorizers

and the appropriators work hand in hand in coming up with the Authorization Bill we are told. In both Houses. Is that what you heard? Yeah. So, we are expecting that with, the reason, when I talked earlier, the reason I said I am cautiously optimistic is because we were told all along don't think you can split us here. That's what the appropriators and the authorizers told us. Don't think you can take this bill and then go around behind our backs and get the appropriators to change because it's not going to happen. We have been in conversation with each other. We may not be in lock step, but we're in tremendous agreement on where we want NASA to take the nation. And so we expect that, you know we may have some cuts along the way, but we don't expect any drastic changes. So that's why you see us, I say we have a pretty, a direction that's set out pretty firmly for us by the Congress, because I believe them when they tell me that they have been coordinating among the committees and they think they're going to be ready to do it. The wild card, I will admit, is the new Congress. You know it's changing parties. It's changing philosophy, at least if you believe what you heard in the campaigns. We even had one candidate in Florida who campaigned against the incumbent because the incumbent supported wasteful NASA spending. But now we have already seen that the new person wants to support wasteful NASA spending, so it remains to be seen. We just have to wait and see what happens.

Robert: I think it's important to add one thing to that. We don't always get an Authorization Act. I think this is the first one since 2008. Is that right

Kevin? And before that I think it was 2006, so we don't always get one, but I think what's important about this from my knot hole, is getting one in a year where Congress was not agreeing on much frankly. It shows how strong Congress felt about what they wanted NASA to go do.

Bolden: I was in Prague. Let me tell you why I tell you don't read the blogs okay? You can. I can't stop you. I was in Prague in the Czech Republic on the day of the House vote. I was on the phone with everybody, you know, all of our committee members. Robert was on the phone. Every Center Director was on the phone with somebody answering questions. Not lobbying, but answering questions. Is there any question we can answer for you? I mean I did that for a little bit more than 24 hours. And what was incredible was the result when the vote occurred, two hundred and some odd, I may have it wrong. What was the final vote Kevin? Do you remember? It was big. It was big in favor of the Authorization Act in a year, as Robert says, when they haven't agreed on anything, and generally have not passed anything. And it was very heavily pro-NASA and people who were on the floor lobbying for passage were Democrats, Republicans, people that didn't even have, who aren't even on committees, but they understood the importance, and one of the things that we have tried to do in the year and sixteen months that I've been the Administrator, because I've been following the guidance of my Legislative Affairs Chief, Seth Statler, is we've recognized all along that you've got to play everybody fair. You can't pick favorites, and you can't pick favorites even when it

comes to party because things change, and so we have tried to be very honest with everybody and it showed when the vote occurred because we had Republicans on the floor lobbying beside Democrats because they thought it was important for the country. We had Democrats speaking in opposition, and Republicans speaking in opposition. The good thing for us was the vast majority spoke in support, and they passed the bill. And again, I tell you that's why I'm cautiously optimistic. I don't want to mislead you at all. I mean things could blow up. But I am cautiously optimistic. But that's our job. Our job is to listen to guys like Kevin and Seth and try not to do anything stupid that's going to tork somebody off. We can do, I can do stupid things. Anybody who knows me knows for one thing I talk too much, as you have heard today, and I like being honest with people. It's always important to be honest, but sometimes you can answer a question that wasn't asked. So that's one of the things that I'm trying to learn is answer the question and then shut up. What's your name over there? Big smile! You! I knew that! I told you he talks too much! Did she say that? Mark, did she say that? Tell me your name, and I should know, I apologize. (inaudible) But I'm right, right? I talk too much sometimes. And I should just answer the question. I get it. That's okay? Alright, okay. She's just laughing because when we do audits, and we get a few of those, the advice to everybody is answer the question. That's it. That's all. Answer the question. I'm learning.

Robert: If it's a yes or no question, the answer is yes or no, and I'm just as bad as you.

Bolden: So I promise you all I will try not to talk so much and I will try not to, I'll try to answer the question.

Robert: Speaking of that, time for one more, so you've got it.

Question 5: Thank you. Thank you Robert. Good morning General. President Obama's Deficit Reduction Panel, one of their recommendations was to not spend a single dollar on commercial crew and commercial cargo, and if that should come to pass, then what is, how does NASA access the International Space Station and any other missions in low earth orbit?

Bolden: My advice is don't worry about it because the Deficit Reduction Panel has not reported out yet. If you listened to the conversations, they have not reached consensus yet, and so don't spend a lot of time in supposition. Be cautiously optimistic. I will tell you, commercial crew and cargo are essential for us. So that decision was made a long time ago. You all have heard me say this before. We made the decision back in 2003 after Columbia, that we were going to phase shuttle out. We were going to bring in another exploration program, which at the time was Constellation, but that we were going to help stand up a commercial launch industry that will provide access to low earth orbit. I mean that was supposed to go along with Constellation. Some people didn't believe it or didn't try to make it happen, but that's fact. And so that's what we're trying to do now, and we are critically dependent upon the success of the commercial

entities. And they can do this. The last time I was here, I think I remember asking some of you to stop giving the commercial guys and girls a hard time because weeks before I was here the last time, on this stage, some of your fellow co-workers had gone to the commercial entities. And if they were good enough for you to trust here, what's changed? Because they've changed badge. You should feel very good that they're there. You should all feel very good that they're there because I want to have somebody that I know and trust that's helping me develop something. This is a partnership. It's not them and us. It has always been a partnership between industry and NASA. We don't build a lot of stuff. You all do here at Marshall but not a lot of centers build stuff. We have always been reliant on industry to build it. We provide the oversight. And that's the challenge that we have with the commercial industry is what is the proper level of oversight. We continue to agonize over that. I had an exchange of emails last night and this morning on that very topic because it is a hot topic. The opinion of what our level of oversight should be goes from that wall to that wall. Am I right Dan? And also in between, and some people are very passionate about their position there. And we're going to come somewhere in here when the final decision is made. But it's good to have the discussion now because we want to make sure that decisions we make on oversight and insight are proper. The decisions that we make on the acquisition model that we use are proper because we're going to live with this for a long, long time if we make it work. If we

don't make it work, all of us are out of work because we go away as an agency. That's how important it is. It is critical that we really strengthen the NASA industry team and help them understand that we count on them, but that there are certain rules that they're going to have to follow. That's the argument and the discussion that we have. Thank you all again for letting me come up and spend some time with you.

Robert: Charlie, thanks for coming and again it's always good to have you here. We'd take you every week if we could get you here. Thanks for fighting a good fight up there in that logic free zone that you live in. Thanks a lot.

Bolden: Thank you. Thanks a lot.