

**JOHNSON SPACE CENTER ORAL HISTORY PROJECT  
EDITED ORAL HISTORY TRANSCRIPT**

MICHAEL L. COATS  
INTERVIEWED BY JENNIFER ROSS-NAZZAL  
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ROSS-NAZZAL: Today is August 5th, 2015. This interview with Mike Coats is being conducted for the JSC Oral History Project in Houston, Texas. The interviewer is Jennifer Ross-Nazzal, assisted by Rebecca Wright. Thanks again for inviting us to your home this afternoon. We certainly appreciate it.

COATS: My pleasure.

ROSS-NAZZAL: I thought we'd start today by talking a bit about the duties of a Center Director. When you came on board, we were still flying [Space] Shuttle missions. There were about, I think, 20 missions that flew while you were Center Director. I wondered if you could talk about your role as a mission was assigned, and then eventually was training, and went on to launch and landing. What was your role in the Flight Readiness Review process, the CoFR [Certificate of Flight Readiness]? All of those things that went on behind the scenes that we don't know much about.

COATS: I guess to start with, the Center Director has a responsibility for approving flight assignments for astronauts and the crews. I was very careful to make sure that, while I informed [NASA] Headquarters [Washington, DC] about what crew assignments were, I didn't ask for their approval. I just said this was the crew, and sometimes explained a little bit of the

background. The Center Director has final approval for crew assignments. Obviously a NASA Administrator could override him if he wanted to, but it never happened with either Mike [Michael D. Griffin] or Charlie [Charles F. Bolden]. Got a bunch of questions when Lori [M.] Garver came in as Deputy Administrator. She questioned every crew assignment. How come we didn't have more minorities and more women? I'd usually let Charlie deal with that out there. Charlie frequently said, "Don't worry about it." The Chief of the Astronaut Office comes to the Director of Flight Operations, and both of them come to me with crew assignments and explain why these crews are being assigned, both the Shuttle and of course the [International] Space Station crews.

Getting ready for a mission, the Center Director's involved with the Flight Readiness Reviews, and of course, then, the pre-mission and during the mission down at the Cape [Canaveral, Florida]. We go down for all launches for the Shuttle, all launches down at the Cape, a couple of days ahead of time, and have a day-long meeting. For the Shuttle, we'd have the Flight Readiness Review also down at the Cape, a month or two before the launch with the Center Directors for the four Human Space Flight Centers. Of course, those were run by the Associate Administrator for Human Space Exploration up there. Sitting next to him was the Chief of Safety [and Mission Assurance], Bryan [D.] O'Connor. Then later Terry [W.] Wilcutt took over that job. Of course the program managers for Shuttle and Station. Station, because the Shuttle, and later Soyuz were going to the Station, so they were involved there.

We had a lot of senior management for the contractor personnel there as well. We'd have a day, or sometimes two days of discussions about the readiness of the mission. Not just the Orbiter, but the payloads. That got pretty detailed. It was very reassuring. I think anybody who, even if they had no background or relation to the space program, if they had a chance to sit in,

they would be totally lost with the technical side of it, but they'd be reassured that boy, do we talk about the details of these things.

At the end of those couple days of Flight Readiness Review, they conduct a poll. Very formal poll. They go around and they ask each individual, "Are you go or no go?" You had to speak up. It's all recorded, so it's very formal. We had to sign the CoFR as well at the end of it.

Then before launch, we're down there. They have a L [launch]-minus-2 [days] senior management meeting again, same people are there and listen to any updates to any issues that we had, and say we're still go. Then of course, on launch morning we're out there on what they call Management Row in the Launch Control Center. Back there, the NASA Administrator, Associate Administrator, and Program Managers, and then the Center Directors for human space flight, and then the Safety Associate Administrator. We're there if an issue comes up, and occasionally one does during the countdown; essentially they're waiting to see if anybody objects, and we'll ask questions. We had a lot of issues for a while with the Shuttle. Some of the connections that pumped the hydrogen into the tank were leaking. We fought that battle, it seemed like, for months and months and months. They thought they had it fixed, and then it would leak again. We'd scrub a launch, and it got pretty frustrating.

We had a lot of meetings in between launches to understand what was being worked on. I was encouraged, because it was very open. Everybody's encouraged to speak up. Bill [William H.] Gerstenmaier's fantastic, and so was Mike Griffin and Charlie Bolden, about encouraging people to speak up. If you have any concerns at all, you're expected to speak up, and I think people felt very comfortable speaking up and asking questions. Sometimes we get a pretty strange objection, far out into it, but we take it very seriously and respond to it. I was encouraged also by the professionalism.

Bill Gerstenmaier, of course, had the perfect background for the job he was in. He'd been a flight controller and program manager, and knew the systems of the Shuttle and the Station, and the Soyuz for that matter, I think better than anybody else. Had a big picture view of it with some incredible detail, and asked really pertinent questions. There was one event when we were down there. Bill had been what we called a Prop [propulsion engineer] flight controller, so he knew the OMS [Orbital Maneuvering System] and RCS [Reaction Control System] on the Shuttle really well because he'd helped design some of it from early on. There was an issue about that, and a poor guy from Boeing [Company] was up there explaining how it worked.

Bill said, "Well, no, actually, it doesn't work that way."

The guy said, "Well, it does though. We've checked the diagrams, and it works this way."

Bill said, "Well, okay. Go back and check, would you, and get back to me?" Well Bill knew, because he'd written the diagrams. He literally was the one who had written the flow chart, so he knew exactly how it worked.

They came back later and said, "Well, okay, you were right." Everybody in the room's going, "Oh boy." How many senior managers would know that level of detail about a system? It was reassuring to have people, up and down the line. From NASA Administrator on down to the subsystem level who were extremely knowledgeable, extremely professional, and felt comfortable speaking out and asking very difficult questions sometimes. If everybody wasn't comfortable, we didn't proceed. We frequently delayed launches.

There was one instance with Ellen [L.] Ochoa, who was at the time Deputy of Flight Crew Operations. That's the only case I'm aware of where one individual scrubbed the launch. It was a similar to what I was talking about before. We had a hydrogen leak, and just barely out

of the limits that we'd agreed on. They went around and polled everybody to see, "Are you comfortable with this?" Everybody agreed, "Yeah, we can waive it." There were a lot of reasons that made sense to waive it. The wind was blowing, so there wasn't any worry about hydrogen accumulating. It was just barely out of the limits. Until they got to Ellen and she said, "I'm not comfortable doing it." She said, "We agreed these were the limits, and if they're outside the limits—we didn't say if, and, or buts—we said we weren't going to go."

As soon as she said that, all of us on Management Row stood up and said, "[If Ellen isn't go, we're not going,]" including Mike Griffin, who was the NASA Administrator, which is reassuring to see. ... If there's anybody not happy, we're not going to go.

Now you got to remember, there was a lot of launch pressure down there. You want to launch. You got literally tens of thousands of people out there waiting to see a launch. The crew's waiting. They're strapped in. They want to go. They've been training for years. It takes some pretty strong individuals to say, "No. We're not going." KSC [Kennedy Space Center, Florida] is very good about having launch directors down there, and they always have had, who are very strong in saying, "Nope, we're not going today. We're going think about this problem some more." It's always a tradeoff, and there's risk in waiting, sometimes, too. Scrubbing a launch. We can't discount that.

The Center Director's role is there to raise a hand if you're uncomfortable, or ask questions. I didn't see any of the Center Directors, or any of the Associate Administrators that were uncomfortable asking questions. That's to the credit of the NASA Administrators, I think, Charlie and Mike, who were obviously very knowledgeable, technically savvy, which hasn't always been the case with NASA Administrators. We've had people come in from the outside who knew nothing about the space program. I was fortunate that I got to work with NASA

Administrators who knew a lot about the space program, and were very comfortable listening to questions and objections.

ROSS-NAZZAL: At any of those Flight Readiness Reviews, were there any objections that you raised that you thought, “Maybe it’s not safe to fly? We should reconsider.”

COATS: I don’t think I ever objected. We had issues like the hydrogen leak that we worked very, very hard, that were of concern to us. Obviously we got to a point where we’re comfortable with the fixes. Now sometimes the fix didn’t work, which surprised us. It was pretty complicated stuff. I never objected to a launch. I certainly asked questions going in, and would probe in, “Well why do you say that? Explain that again. I’m just a dumb pilot. Tell me again. Tell me again why that works.”

We had an incident on one of my missions, STS-29 I think it was, where they had looked at the paperwork—we were approaching a week or two before launch—they’d looked at the paperwork, and decided that the ET door, external tank door, that’s supposed to close after the tank separates, and the door has to close so you’ll have tile [thermal protection system] across all the bottom of the Shuttle, of course. But the door was not rigged properly, so there was some question about is the paperwork wrong? Is the door rigged okay? Is it just a paperwork, or is it really a problem? We had a lot of meetings. We were there at 1:00 a.m., out at JSC in a big conference room. I was there, and Bill [William B.] Lenoir was the Code M [Associate Administrator for Human Spaceflight], we called it at the time. He was anxious to go, and I was not comfortable with this. Some of my friends stood up—Chief Engineer of the Shuttle Program stood up and said, “Yeah, we’re confident it’s just a paperwork error.” They were going around

the room polling, and crew's the last one they get to. I'm going, "Oh, man. This is going to be embarrassing when I say I'm not comfortable." Fortunately, it got to the Associate Administrator for Safety, [Reliability] and Quality Assurance [SR&QA], [George A. Rodney], and he said, "Well."

About that time, Forrest [S.] McCartney at KSC who was a Center Director there says, "You can stop this polling right now because I'm not comfortable. We ain't going. We're rolling this thing back, and unstacking and taking a look at it."

I'm going, "Oh, thank God." Bless your heart, Forrest. Which caused then, the SR&QA guy, whose turn it really was, to say, "Well, if Forrest ain't happy, I ain't happy. We're not going." Bill Lenoir couldn't override that, when you have both a Center Director and a safety guy saying no. Bill had to make the decision to roll it back. It turns out the door was not rigged properly, and it might not have closed. I think Forrest may have saved our future there. I thanked him many, many times after that. He said, "That's my job, to speak up." There was no question in his mind. "You all vote all you want, but we're rolling this thing back."

That taught me a lesson, too. If I ever have concerns, speak up. I had the good fortune—I didn't have somebody pressing to go launch, like Bill Lenoir was pressing to go launch. I had Bill Gerstenmaier, and I had Mike and Charlie who were looking for reasons not to launch. They would not have argued, and that's comfortable. That allowed you then to press in on the issues as deeply as you wanted to, and be comfortable with the solutions they had. The same thing with the Shuttle Program managers. [N.] Wayne Hale and then John [P.] Shannon. Boy, they were hard-over on safety, which is what you want. If we're not comfortable—completely comfortable—we're not going. Bill Gerstenmaier said over and over and over again, "I'll find

the money. If we have to delay for a year to fix whatever it is, I'll find the money. We'll do it when we're safe." That's the kind of attitude you want to have.

One of the questions you ask on your list there was the biggest concern I had. It comes into this, too, which is a concern about complacency. I was in the space program for almost 40 years in one role or another. I've seen the pendulum swing back and forth several times. It seems like it's almost *Deja vu* all over again. When you have a lot of flights that are successful, you tend to get complacent. People don't ask as many questions. They don't delve in as deeply. Launch fever is probably stronger. You have an accident, and for several years, everybody's focused on safety, and "Everybody speak up, I want to hear it." I saw it after [Space Shuttle] *Challenger* [STS-51L accident], I saw it again after [Space Shuttle] *Columbia* [STS-107 accident]. Pendulum swings back. I was fortunate, in a way, that I came in [as Center Director] after *Columbia* and it was hard-over safety focus, if you will.

It's an attitude more than anything else. When you've had a hundred flights in a row that were successful, almost a hundred, you tend to get comfortable and complacent. Same thing before *Challenger*. We had debris coming off the external tank on 11 of the 24 flights before *Challenger*, including my first flight. They'd had huge chunks come off, and they thought, "Okay, well we've survived that, so obviously it's not a big deal." That's not the attitude you're supposed to have. As the Rogers Commission [Presidential Commission investigating the causes of the *Challenger* accident] indicated, that was pretty poor thinking on that part. I've seen the pendulum swing.

My goal, my biggest concern was, I don't know how you prevent complacency, which comes from success. When you've had a lot of success, you tend to get complacent. I'm not sure how you prevent that, except to keep the focus on, and to keep putting the right people in

critical jobs. We worked very hard to do that. I don't know. Only time will tell. Have you instituted a system, a culture, that makes complacency difficult? Always looking back after you've had an incident or an accident. You say, "Oh, man. We got complacent there." That's a challenge, and because human nature's involved, I'm not sure how you can guarantee you never get complacent. Success breeds complacency, unfortunately. In the space program, that's dangerous.

ROSS-NAZZAL: Do you think it's been beneficial having your former flight crew member, Charlie Bolden, former flight crew member, Bob [Robert D.] Cabana? You can name all these folks in leadership. Do you think that influenced decisions in a positive way in terms of Shuttle and Station?

COATS: I think so, but I've also seen it work the other way. I won't name names, but I've seen former astronauts in senior positions say, "Eh, we'll take that risk."

I'm going, "Well actually, you won't take that risk, because we're not going to let you take that risk. You can't take that risk for the crew, sorry. Just because you've been there, and you would have taken that risk, we're not going to allow you to take that risk for the crew because your behind is not riding on it."

It can work the other way as well. I think it depends on the individuals involved. Mike Griffin was not an astronaut. On the other hand, he wrote the textbook on spacecraft design. Literally, he's the author, so he knows more about spacecraft design than probably anybody at NASA. It just so happens he was the Administrator. We called him "the Chief Engineer of the Universe." That was really nice having Mike there. Now, sometimes it would drive people

batty, because he could ask questions until the cows came home, but they were good questions, that needed to be answered. Intelligent, insightful questions that didn't waste time. I've been involved with organizations where the senior people didn't know what they were doing, so they tend to go down dirt roads and waste everybody's time. Mike didn't do that. His questions were very insightful and very pertinent to what we were working on, which is reassuring to have. That's the kind of thing you ought to have in a NASA Administrator.

Charlie is the same way. Charlie's attitude is, "I want to hear everybody's input. Now we've worked this to death. Is everybody comfortable? If not, speak up." Then you've got to have the culture and create the atmosphere where people are comfortable speaking up and asking questions. Charlie was very good about that too. He emphasized over, and over, and over again, "Speak up. I want to hear your objections and your concerns if you're disagreeing. If you think we're off on the wrong track, tell us." He's humble that way. He's not the least bit arrogant. Sometimes arrogance can bite you in this business.

I was very fortunate in the people I had to work for and work with. We delayed and scrubbed a lot of launches. If there was any doubt in anybody's mind, we didn't go. It's got to be the attitude from the top, which is, "We're not going unless we're sure it's safe to go." As safe as we can make it. It'll never be completely safe. We'd stay on the ground if we're just going to be completely safe, but if anybody has objections, we're not going to go. You've got to say that over and over and over again, or launch fever will get you. I was, in a way, very, very fortunate to be—of course I came in a year or two after the *Columbia* accident, when everybody was hypersensitive about safety as well. If I'd come in five years before that, it might have been a different story.

ROSS-NAZZAL: Would you talk about that first mission when you were Center Director, STS-121? What are your memories of that?

COATS: Well, I'll tell you, my best memory is a personal memory. My first two grandchildren were born launch morning. Have I showed you the montage they sent to me? I can show it to you in just a second. I'll tell you the story though.

When I told my wife that I wanted to take this job, she was not a happy camper. We were living in Colorado, and she loved Colorado. The kids actually loved coming to Colorado. Fortunately, eight months after we came down here, our first grandchildren were born. Our daughter was expecting twins. They [the doctors] had told her, "Boy, it'd be great if you could wait long enough with twins to [be born on the] 4th of July, the gestation period, stretch that out, we'd be really happy if the twins made it that far."

I'm down at the Cape, and we're actually scheduled to launch, I think, on the first of July. We had a launch scrub for some reason. We're down there, and so we're driving out again the morning of the 4th of July. I get a call on the phone as I'm driving from the hotel out to the Launch Control Center saying Laura's water broke and she's going to deliver today. Naturally, I'm a little bit distracted, but I got to the control center a few hours before launch. Of course, I'm sitting there trying to maintain text back and forth with my son, who's at the hospital as well.

I'm sitting there. Jim [James W.] Kennedy was the KSC Center Director sitting next to me. I'm getting all these text messages, and finally the babies were born, so they're sending me pictures of the babies in the hospital, there. Jim Kennedy surprised me by taking some of the pictures and making a montage. I'll go get it and show you here. I'm really proud of it.

Jim had grandchildren, so he was pretty excited too. He had this made up. This is a picture of the babies, the morning they were born. It's got the names of the babies, their weight, their length, and what time they were born, one minute apart. Then the Space Shuttle when it launched. *Discovery*, and the weight, and the length, and the time it launched, which was really, really neat. He surprised me with this. Then he had one made for my daughter and her husband, too, which was really nice. That's my best memory, and it was funny.

Of course, we have an airplane down there that as soon as the Shuttle's safely on orbit, the management team piles into the airplane to fly back here so the Shuttle Program's managers can be here during the mission as soon as possible. Man, I was really anxious to get on that airplane, to get back here, so I could go to the hospital and see those new grandbabies. As soon as they said we're safely on orbit, I go, "Okay, let's go." I was surprised. I told people jokingly, I said, "Okay, you better not be late out at the Shuttle Landing Facility, because we're leaving." I thought I was racing out there pretty fast, and when I got there, everybody was on the plane waiting for me. They believed me, I was going to leave them behind. That was a good memory for me, anyway. STS-121.

ROSS-NAZZAL: Are there any rituals or traditions that involve the Center Director around a Shuttle mission? Of course, the crews have their own traditions, the cake, and those sort of things. What about the Center Director?

COATS: Not really. Because I'd been a crewman, I didn't want to impose on the crew in any way. Their time is pretty full before a launch, when they're down at the Cape. They like to spend time with their family, their spouses. I didn't want to impose on them. We would have a

dinner, here in the crew quarters, while they were in quarantine here if the crew wanted to. Some did, and some didn't. I made it clear to them, "I'd love to have dinner with you. If you'd rather do it with your family, I'll certainly understand." I made it clear that I really would understand. It's up to them. Some did and some didn't.

Remember, I was still getting to know some of the astronauts that I didn't really know very well. We had the dinner, but what I would do then, I'd try to stay out of their way down at the Cape. I didn't go to crew quarters to bug them. Some of my crewmen, when I was flying, were a little bit put off when we had bigwigs coming through the crew quarters all the time. The irritation was, even though these guys and gals would be looked at by the flight surgeons, to make sure they didn't have colds or anything to pass on, we weren't allowed to see our kids for a week or two before launch. It just didn't seem right that if we couldn't see our kids, but we could see all these bigwigs, something's wrong here.

Now, obviously, there's reasons for that, but I remembered this comment from some of the crew. "Okay, here comes another four-star general we've got to say hello to." The reason was, surprisingly, of course, when we launched on our first mission with Hank [Henry W.] Hartsfield, he was part of the [US Air Force] MOL Program—Manned Orbiting Laboratory. When they cancelled that program, and transferred over the astronauts below a certain age, most of the ones that didn't get picked actually went on to have stellar careers in the Navy and the Air Force. A whole bunch of four-star admirals and generals in that MOL group. They were friends with Hartsfield, so they wanted to come down and see the crew, so we got to see a whole bunch of four-star flag officers down there. Bigwigs.

I was a little bit reluctant to bother the crew, if at all. What I wanted to do was focus on the families. I made a point of visiting. Each of the families has a reception before launch, a day

or two before launch, with their friends and families down there for the launch. I would try to drop in on the receptions just to say hello and show the flag. We'd always have an astronaut escort, of course, with each of them, but I'd come in. It gave me a chance to meet the spouses, if I hadn't met them, and meet the families. I enjoyed doing that. I learned there are an awful lot of places to have receptions in the Florida area. Having GPS [global positioning system] really helps finding them around there. That meant a lot to me to visit, just briefly, with the families. I didn't want to impose, but I'd say hello and ask if there's anything we could do to help.

Other than that, the Center Director stays out of the way of the crew. It's up to the Director of Flight Crew Operations, Chief of the Astronaut Office, and the commander of the crew to let us know if they need anything—anything we can do to help them get ready.

Obviously, things are a little bit different launching from Russia on the Soyuz. I went over for three or four launches, and one landing. I wanted to see a landing, which was pretty impressive, to see a landing as well. I think I saw four launches. What you do is go to Moscow and visit the control center, and then you'd fly on to the launch site and see a launch. I think I made a trip or two just to visit the control center, because we have people over there at the control center as well. Of course, when you launch and you're at the control center, you have to have toasts, and there's a ceremony afterwards, so you got to say a few words. They have a lot of traditions in Russia as well.

It's interesting to see their traditions, which a lot of them hark all the way back to Gagarin's very first flight. They have, not an L-minus-2 as we call it, but a similar thing to it. It's more of a formality. They go through the motions. Ours is very detailed. Well, they've done that offline. Now they're doing it just for show. A lot cameras. Learning their customs and traditions over there was fascinating to me as well. Again, you want to stay out of the way.

You don't want to be a nuisance to them, get in their way over there. Let them do their job. They're very, very, very cordial and accommodating. Bend over backwards, I think, to accommodate us.

ROSS-NAZZAL: Did you have to participate in any Flight Readiness Review or anything like for Station? Was there a difference?

COATS: Well, sure. We also have Flight Readiness Reviews for every Soyuz mission. Those we'd have at JSC here. We had a power outage at JSC when a guy ran into a light pole off Space Center Boulevard. How he got over there to hit that huge power line tower I don't know, but sure enough it knocked out our power. The way Joel [B.] Walker told me, he says, "You're not going to believe this, but a drunk actually hit one of those electrical towers and we don't have any power at JSC."

I said, "Well we've got a Flight Readiness Review in a couple of minutes."

He said, "No we don't. Not at JSC." What we had to do was go out and use the facility out at the NBL [Neutral Buoyancy Laboratory, Sonny Carter Training Facility]. You know, we've got Space Station facilities and rooms out there. They hadn't lost power, so we went out there and had our flight readiness review.

Same thing. Just like the Shuttles, we go over everything. Of course, now the Russians are involved, and the Europeans, and Japanese have representatives there as well, at the table. It's conducted just about the same way.

ROSS-NAZZAL: What was your role when a mission was up? Were you playing a role on the MMT [Mission Management Team], for instance?

COATS: No. I tried to stay out of the way. The people in MMT have rehearsed, and rehearsed, and rehearsed. They've had simulations like crazy. They know how to work as a team, and the last thing they need is a Center Director stepping in and mucking things up. When an issue would come up, the program manager—the Station Program Manager, or the Shuttle Program Manager—would come and explain it to me when they had time and it was convenient for them, just so I'd be informed if I got questions. They were very good about that, the program managers. The understanding was, I won't get in your way, you run your program—you're the expert. I'm not an expert on the Soyuz, or the Station, or not even the Shuttle anymore, so you guys are the experts. I just appreciate being kept informed so that I can answer questions if I get questions.

We would have an MMT meeting in the mornings during the mission, and I would go or my deputy would go. I enjoyed going and listening. I wasn't part of the MMT, but I had a chair assigned. Not up at the table, but next to it, back there. We could listen to a daily update, how the mission was going, and what problems they were working. We were certainly kept informed that way. It was fascinating to me to watch this team, both the Shuttle and Station teams working together as one team. It was really fun to watch. ... I enjoyed it. I knew enough to be really excited about it. I'd usually have Milt [J. Milton] Heflin, who was my deputy for technical, sitting next to me. I'd ask him questions occasionally, and he'd go off and make sure he had the right answers. We'd sit in on the MMTs, but we weren't members of the MMTs.

Some of the issues they had were pretty serious. You mention in there one time the ripped solar array on the Station which was an interesting situation, and actually very serious. If we couldn't fix that thing, we were down to about half power on the Space Station, which is pretty serious. We couldn't extend it and we couldn't retract it where that thing ripped, or it would have made it a lot worse. I watched them come up with the solution after a couple days of working it.

We sent out Dr. Scott [E.] Parazynski. He's on the end of an arm, and if he'd been 6'1" instead of 6'2", he wouldn't have been able to reach that thing out there. He was able to fix that. I had a personal interest in it too, because at Lockheed Martin, guess who was responsible for the solar arrays? We made those. My organization made those out at Sunnyvale, [California] so I was really interested in fixing that solar array. Scott did a wonderful job. The whole team did a wonderful job. On Saturday morning, they were able to put those fixes in place—cuff links we called them—put the things in there and extend the solar array out, and it worked.

I'm driving home that day after being up all night watching this. Saturday morning, and I'm just on cloud nine. I'm thinking, man this doesn't get any better than this. Life is great. They just came up with a very elegant solution to a very difficult and serious problem. I wish the public could understand what this team just did. Unfortunately, NASA tends to downplay it. "Oh yeah, no big deal." Well, it was a big deal, it really was.

I got home that day, and it's funny, because I walked in. My son was over here because we were going to watch Navy play Notre Dame. Navy had lost to Notre Dame 43 years in a row, which is the record. No team had ever lost to another team that many years in a row. Still is the record. Notre Dame was heavily favored. ... I walked in the door, cloud nine, and Paul says, "I hate to burst your bubble, but Navy's about to play. They're going to get their tails kicked." I

said, “Oh, jeez, thanks.” Well Navy won, and upset them that day. Man, was I really on cloud nine now. I should have gone out and bought some lottery tickets. That was a good day, indeed. Then two years later, they did it again. Beat them again. Haven’t beat them since, but that was a good day.

I just wish NASA knew how to do a better job of connecting with the public about how serious it was without exaggerating it. How elegant the solution was to fix it, and how much work went into the solution. You got to work with what you got up there. You can’t transport materials up there overnight. They just did a wonderful job. That was one of my best memories, was driving home that day from that.

ROSS-NAZZAL: I wonder if you can expand on—you talked briefly about it—but if you could expand on your relationship with the ISS Program Managers, Shuttle Program Managers. Then you also had Constellation at the time as well. What’s the Center Director’s relationship with these big programs?

COATS: Well, they officially work for Bill Gerstenmaier at NASA Headquarters, so they don’t work for the Center Director. They get their funding from Bill. They get separate funding. It all flows through JSC. They would come in once a week, each of the program managers. We had a weekly tag-up where they’d come in and give me a briefing on what they were working on, what their problems were. Of course, my focus was, okay, how can JSC help? Is their engineering group doing everything they can? Or medical group? Have you got the facilities you need? Have you got the support you need from Johnson the Space Center? Is there anything more we can do to help?

Of course, they were anxious to keep me informed so I wasn't surprised if something came up. First thing a politician does is call a Center Director, "Hey, I hear the Station's got a ripped solar array. What the hell's this mean?" It's embarrassing to say, "I have no idea what you're talking about." They all did a really good job keeping me informed.

I'd known all of them for years, before I came back to this job, which was nice. I've known Gerstenmaier for 30 years, and I've known Wayne Hale, who was a flight director. He'd been a flight director on some of my missions, so I knew him well. I knew [Michael T.] Suffredini. I didn't know him that well before. I was comfortable with them, and I'm comfortable saying, "Okay, you guys got more money than I've got." The Space Station's budget was almost 10 times what mine was as Center Director. Same with the Shuttle. They had a lot more money than I had, budget-wise, and frequently it meant, "Okay, can we talk about how we're going to fund, for example, the new astronaut training, or the ASCR [Astronaut Strength, Conditioning, and] Rehabilitation [Program] gym. How are we going to fund that?" Gerstenmaier and I, and Suffredini, and Shuttle all kicked in money. A few million dollars each. The thing cost about \$12 million, and we each kicked in about \$3 million each to fund this thing and pay for it. We worked that way a lot.

Now the Shuttle Program had been funding a lot of things over the years. It's funny, because for some reason, when Congress sees money in the budget for the Centers, the first thing they want to do is cut it. They see money in the budget for the programs, they don't want to cut that. That's important, those are programs. We have to have a Space Station. We have to have a Shuttle. We have to have Constellation, but they didn't have any reservation about cutting the Center's budgets. But, we still had to get the job done, so we'd frequently go to the programs to say, "Can you help out here or there?" Especially at KSC, the Shuttle Program is paying for half

of what Kennedy Space Center should have been paying for, but they didn't have the money to do it. The Shuttle [Program] built buildings. They did all kinds of stuff down there.

Now the Shuttle Program's gone away. Poor Suffredini doesn't have hundreds of millions of dollars in his budget to help out the Centers. So, we did a lot of negotiating and discussion about, "Can you help out here?" They were very good about it. John Shannon was fantastic. As the Shuttle Program was being phased out, boy, he bent over backwards to help us, to help the Station Program. Suffredini had a lot of constraints on his budget, because his budget was getting cut a little bit; the Station budget every year or so. He couldn't help out as much as he probably would have liked to. I think we had a good working relationship with them, and it was an open one, I'd say. I had no problem saying, "We got a problem here," if we had a problem. "Let's work together to solve it." They were very good about working together. It was very much a team effort, and I appreciated that a lot.

I have seen program managers in my history that were just extremely difficult to work with. I'm very proud of the NASA program managers. I think NASA has prepared their program managers better than I saw on the Department of Defense or on the contractors' side. I think program manager is one of the most difficult jobs around. You've got to balance the technical, and the cost, and the politics all at the same time, and it's pretty challenging. I thought we had some very strong people in the programs. I was delighted to be able to work with folks like that.

ROSS-NAZZAL: What about Constellation? That was a very young program when you first came to JSC, and they were just getting set up, I guess, at that point.

COATS: Yes. I'll tell you, I was excited about Constellation. It was really neat the first couple years when we had three major programs in different stages of their lifecycle. Of course, the Shuttle Program was going to wind down, and we needed to fly that safely until we finished the Space Station. The Space Station was going to be around for some period of time. It wasn't clear when. Is it 2015? 2020? 2024? 2028? Exactly when? Gerstenmaier would say, "We'll just work on it. We'll keep working it." Bill never got riled up about anything.

Then the Constellation Program, of course, was on the drawing boards as a new program that we were excited about. Now it was apparent when I came in—even early on—we'd have meetings with the senior management. Mike Griffin, and the Associate Administrators, and the Center Directors would get together every month. Mike would rotate that around to different Centers, different locations. Lot of traveling, unfortunately, because we were not only going to Flight Readiness Reviews, and launches, but we're going to this monthly management meetings. But, it was worthwhile. Mike was very good about keeping communications open with that.

Of course, Mike was very interested in the Constellation Program. He'd been instrumental in a lot of the studies that had come up with the whole concept of Constellation. The challenge we saw, even then early on when I came back, was, while [President] George W. Bush laid out the Space Exploration Initiative, and laid out a budget, they immediately started cutting the budget. The OMB [Office of Management and Budget] cut the budget every year. Instead of getting the funding we had been told we were going to get, we were going to get significantly less funding.

It didn't take a whole lot of insight to say, "Well, we can't get there from here if they keep taking away our money." Now I anticipated that they would stretch out the program, because funding had been cut. I kind of expected to have a Democratic administration, because

[historically during] the last 70 years, we throw out the incumbent party after eight years and let the other party try for eight years. In fact, with one exception, it's been that way since FDR [President Franklin D. Roosevelt]. Every time a new party comes in, they want to change direction a little bit. I had a hunch we were going to have some changes in 2009, when the new administration took office. I expected the changes would be, "Okay, the previous administration didn't fund this Constellation Program, so we're going to restructure it and stretch it out, to live within the budget.

Now, [President Barack] Obama had made some campaign promises to actually cancel the Constellation Program, initially. [He was] going to put the money into education for five years. Well, you don't cancel a program and fire everybody for five years. Now he retracted that when it was pointed out Florida was a purple state, and he really needed to carry Florida, so he retracted that statement. It was obvious where his heart was. He wasn't real crazy about the Constellation Program. That was perceived as a George W. Bush program.

I guess I should have expected they might cancel it, but I really didn't see that coming. I expected them to restructure it and stretch it out. I was shocked when they cancelled the Constellation Program, and I think Charlie, behind the scenes, argued very hard to be able to restructure the program instead of cancelling it.

Like I told you before, that period for six weeks or so after that announcement was pretty grim. I had a hard time when people would ask, "Well, what's our future?" I didn't have an answer because I didn't see a future. Space Station was only going to last for about another five years, technically. We figured it'd last longer, but it was only going to be about another 10 years at the most, so what kind of program did we have?

That was a difficult time. That's when I started really focusing on—and getting the senior staff at JSC to focus on—where do we go from here? How do we recover? How do we keep human exploration alive? What can we do as the Johnson Space Center to keep human space exploration alive for the United States? Other countries were going to do it. They expected us to take the leadership role, but we didn't have a program anymore. We didn't have anything for a while.

We got together. My guidance to the staff was, “Okay, number one, let's follow the money.” It's always the smart thing to do, is let's find out where the money is going. Even though they've nominally cancelled the Human Space Flight Program, they're probably not going to cut NASA's budget. Congress won't let them cut NASA's budget. Where's that money going to go? Let's follow the money and see how we can get involved. How can we go partner with whoever is going to have the money? What more can we do?

At the same time, I asked the staff, “Okay, given our constraints, we're not allowed to go lobby Congress. That's illegal. We can't ask for more money.” We're allowed to answer questions from Congressmen, but we can't just call up and say, “Hey, we ought to be doing this.” We can answer them if they ask us. Now that's a silly game that's being played, obviously, because what you do if you need to talk to a Congressmen, and you want to make a point, is you will contact a staffer and say, “If the Congressman would like to call me, I'd be glad to talk about such and such.” ...

We actually came up with a lot of plans on how to inform key congressmen about the risk to human spaceflight. Now they were just as shocked as anybody. Congress was absolutely flabbergasted. Nobody from the White House had informed anybody over in Congress that they're about to cancel the Constellation Program, so the Democrats were just as mad as the

Republicans. They were caught flat-footed as well. Some of the key Democrats over there, Bill Nelson, Barbara [A.] Mikulski, who were chairmen of the key committees, were pretty upset with the White House. The White House wasn't talking to them at all. I'd talk with Bill Nelson a lot. He'd flown on the Shuttle, and I knew Bill pretty well. He was very frustrated. He said, "They don't answer my phone calls. For heaven's sakes, I'm from a purple state that they have to carry, and they're not answering my phone calls. For heaven's sakes. I'm not going to help them when the reelection comes around."

I said, "Yeah you are, Bill."

He said, "Yeah, okay, I know it."

I said, "They'll promise you a high-speed rail system in Florida and you'll do whatever they want."

He said, "Ah, yes, okay. I still don't like it." The White House didn't do a good job at all of relations with Congress. I think it's showing now. A lot of the Democrats say, "Okay, you're not running for reelection. We don't really care what you want."

Our staff was strengthening relationships. We certainly had them, but we were trying to strengthen relationships with key congressmen and with their staffers. Certainly, I had a good relationship with Nick [Nicholas V.] Lampson. I'd known Nick, and then Pete [Peter G.] Olson when he came in. I'd known Pete when he played basketball at Clear Lake High School. Of course, John [A.] Culberson, who is now chairman of the appropriations subcommittee for NASA, and was then the number two to Frank [R.] Wolf. Of course, Kay Bailey Hutchison was just fantastic. She was amazing. She went out of her way, frequently called. Sometimes I'd be in the shower, and she would call. I'd be at the gym, and they'd call and say, "Senator Hutchison is on the phone."

“How does she know I’m in the shower? She always knows when I’m in the shower.” I’d come out, dripping wet, talking to her for an hour sometimes. Of course Bill Nelson, who I knew pretty well. We spent a lot of time talking with them on the phone, visiting with them.

What I was trying to tell all of them—certainly John Culberson was interested—was, “Look, this year-to-year funding, and especially the continuing resolutions, are absolutely killing us.” What it allows the Obama administration to do, with the continuing resolution, is not to spend money. Even the money that’s been allocated and appropriated, they can say, “Well, we have to set aside a certain percentage of that in case we don’t have a final budget.” Or, if the final budget is less than the real budget, then it’s less. Then when we get the final budget come in, they say, “Well, it’s too late to spend all that money.” Which is a crazy way to do business. The continuing resolutions hurt us because we weren’t allowed to spend the money we had. We had to save some as a set-aside contingency.

I said to Congressman Culberson, “Look, this year-to-year funding is killing us, and the change of administrations is killing us.” Every time a new administration comes in, new party comes in, they want to change the direction of the Space Program. Just because the previous administration had done it one way, they had to do something different. The ultimate example, of course, is this asteroid mission. The Constellation Program wanted to go back to the Moon and establish that as a base to learn how to explore before you went to Mars, which made a lot of sense. All of the different studies have come up with the same conclusion.

Well we can’t go back to the Moon because that’s what George W. Bush’s Space Exploration Initiative said to do. We got to do something else. What’s out there? Well, they scrambled, and this is short-term, over a weekend, when they cancelled the Constellation Program, and they said, “Okay. We’re going to go out there and we’re going to go visit an

asteroid. That's what's out there." Everybody's going, "What?" If you want a meteorite, go down to the South Pole and pick them up. They're on the ground out there, for heaven sakes. What does that accomplish, to go visit an asteroid? Good heavens. That's where we are now, let's go visit an asteroid. Let's go capture one and bring it back to near-Earth orbit. Lunar orbit. Okay, if that makes sense to somebody, I guess I don't think they talked to people in the Space Program.

Changing direction was really painful, and changing the budget was even more painful. I was trying to make the case, if we could have multi-year funding—and some agencies do—if we could have a NASA Administrator for like 10 years, like the FBI [Federal Bureau of Investigation] does, so we've got some consistency, and NASA wouldn't be politicized as much, gosh that would help. We could live with a smaller budget than we've got right now and accomplish a lot more if we knew what our budget was going to be even 12 months from now. We waste so much money on all these changes that we're doing.

Culberson actually came up with several good plans. I don't think any of them will ever be enacted. Maybe someday in the distant future, but Congress is reluctant to give up their year-to-year funding authority. Space is political. Let's face it. The space agency was created for political reasons because of Sputnik [Russian satellite]. The race to the Moon, and everything. Gosh, that was as political as you get. That's real life. Space is political, and you have got to take that into consideration.

One of the questions you had in there, what has changed in the time I was Center Director? The biggest change was the politicization of the Space Program. When Mike Griffin was there everything was technical. What's the best technical answer? What's best for the Space Program? What's best for the country? It was tightly focused on the right technical

answer. When the new administration came in, suddenly everything's a political answer. What's best for the Democratic Party? What's best for the unions? Some technical decisions were made for political reasons.

Now, decisions have always been made with political reasons weighing in and playing a factor; that's the Space Program. It's political, but it's a whole lot more after the Obama administration came in. They weren't interested in space, so how can the Space Program help him be reelected? How can it help the Democratic Party? How can it help the unions? For the first time, the union representatives sat in on all management meetings at NASA. Very vocal. Read the mission statement for NASA. That was written by the union representative. Makes no sense to me. It could have been written for McDonald's French fries, for all you know. It had nothing to do with space. It doesn't mention space in there at all. It was literally written by the union representative, and Lori [Garver] insisted that they adopt it.

The politicization of NASA is the biggest change I've seen. Charlie fought that as best he could, I think. Some he won, and some he lost. I think he won the Orion argument. He kept arguing for an Orion Program and a launch vehicle. Congress, of course, was pushing for that, and they basically compromised with the administration, and said, "Okay, you can have your commercial program, but we also want our exploration program, with an Orion vehicle and a launch vehicle." Now how to fund both of them, they had to squeeze both of them in a budget that was fixed, so neither one got the funding they wanted. Still haven't, so things are being pushed out.

What I heard last week, the commercial vehicles are not going to be ready in 2017 like we had hoped. We're going to continue to pay the Russians \$70-something million a launch to take our astronauts up there, which is very painful.

That's the biggest difference. Everything's a political answer instead of a technical answer, now.

ROSS-NAZZAL: I wonder if you could give an example. You said that there were some technical decisions made for political reasons. Can you give an example or two?

COATS: Okay. Where's the Commercial Crew Program located?

ROSS-NAZZAL: Not here at JSC.

COATS: Why? Astronauts have always been here at the Johnson Space Center. Why is the Commercial Crew Program down there with the program manager who had never had a Human Space Flight Program? That was an edict. I objected strenuously to Charlie. We had a phone call, Charlie, Bob Cabana, and I, and I objected strenuously to that. I said, "Charlie, the Johnson Space Center's where the astronauts are. That's where they live, that's where they train. Why are we going to put the Commercial Crew Program in Florida? Are we going to move all the astronauts down there now?"

Charlie says, "We just have to do this." Well, we have to do it for political reasons.

Bill Nelson wanted it there, and the White House said, "Florida's a purple state. We're going to put it down there."

Charlie said, "Well, okay. Now JSC, you have to provide the deputy program manager, so somebody can speak the language of human space flight." Florida's great at launching

vehicles, but we happen to know a little bit about crews. That's probably the most egregious example of politics—pure politics. Still painful.

ROSS-NAZZAL: I wonder if you can elaborate. You mentioned the weekend. Is that when you found out? You found out before the news broke from Charlie about the cancellation of Constellation, or how did you find out?

COATS: No, Charlie found out. We didn't find out until Monday morning. What we've heard since then, and the conventional wisdom is, Charlie actually found out like on a Thursday or Friday before the announcement. He was informed by the White House they were going to cancel the Constellation Program. I think probably informed by Lori Garver, but I don't know.

From what I've heard, Charlie spent the weekend arguing with the White House staff—Chief of Staff, probably. “How about giving me a chance to restructure the Constellation Program, instead of just cancelling.”

They were hard-over about, “No, that's George W. Bush's program. We're going to cancel it.” Their rationale being it was underfunded, which it was, and why have an underfunded program? My understanding is that Charlie argued long and hard for it, and lost the argument, so they cancelled the program. Now at the time, it was cancelled, there was no Orion Program. There was nothing. There was no program at all, no human space flight program. We're going to pay the Russians to fly to Space Station until 2020, and that was the end of it. For about a month or two, there was nothing.

Then Congress objected. Of course we talked to them a lot, as best we could ... saying, “There really needs to be a United States human space exploration program. For a lot of reasons, but just to get out of the business is a huge mistake.

We had good, I think, bipartisan interest and support from Congress, and they basically told the White House, “No, you’re going to have an Orion Program and you’re going to have a launch vehicle program [Space Launch System]. You can have your Commercial Crew Program if that’s what you want, but we’re going to have a human space exploration program. If one of the things you’re asking there is, “What would I consider my biggest accomplishment?” It’s probably spending a lot of late nights talking to politicians trying to do my part to save the human space exploration program.

They didn’t need a lot of convincing. Remember, they were already ticked off because they’d been surprised. Usually the way it’s done is when the White House decides to have a major policy change, they will contact key members of Congress, especially the chairmen of the committees responsible for whatever agency they’re making a policy change for. At the time, the Democrats were in charge of all the committees. They had all the chairmanships. Not a single one of those chairmen was contacted by the White House. Everyone was surprised, and furious, absolutely furious. That is not the way it’s done.

Can you imagine, being the chairman of the NASA space committee and subcommittee, when reporters call you up and say, “The White House just cancelled the space program. What do you think about that?”

They go, “Huh? We don’t know anything about it. We’re Democrats, but we still don’t know anything about it. I’m chairman of the committee, but I don’t know anything about it.” They were humiliated, absolutely humiliated, so they were already furious. Of course

Republicans were anxious to do anything different from what the Obama administration wanted to do already. A lot of people wanted to talk to us. Johnson Space Center is the human space exploration center, and so a lot of folks wanted to talk to us.

Now, I was very careful to tell Charlie, “I’m getting a lot of calls, here, from politicians. Is it okay if I talk to them?”

He says, “As long as they call you, fine. You can answer their questions.” I’d make sure they asked the right questions, but I’d get my point across. That was a grim weekend, that weekend. I think someday when Charlie retires, I’ll be able to ask him some things, and maybe he’ll be able to tell me, but I think he was working as hard as he could with the White House. I heard there were some people—I think Rob Nabors was one of the White House staff that was actually helping Charlie. Some of them—Jim Messina and others—were really pretty hard on Charlie.

Charlie was viewed by the White House as not loyal enough, and he was viewed by Congress as too loyal to the White House, which meant he was probably doing the best job he could. He’s a member of the administration, so he has to salute and execute, but he was also trying to save the human space exploration program with an administration that wasn’t really too wild about it. He was in a very difficult position, I think.

ROSS-NAZZAL: How did you find out? Did Charlie have a telecon [teleconference] with you all, or did you find out when you read *The Houston Chronicle* [newspaper] that morning?

COATS: Boy, you know, I can’t remember how we found out. Charlie must have called, but I don’t remember that. It’s not like Charlie not to call. It seems like we heard something about it,

and then Charlie had the press conference on Monday where they got up and announced it. Charlie and Lori announced it, and we watched that. I can't remember how we heard that they cancelled the program. It must have been through a third party or something. I've just forgotten exactly how we heard, because I remember watching the press conference, and then we huddled very quickly to say, "Okay, how do we handle this with our people down here at the Johnson Space Center?"

I called a meeting of the Constellation Program, and we went over there. All I could do was say, "Look. I'm going to tell you exactly what I know and what I don't know, and I'll keep telling you what I know and what I don't know." I said, "We're going to work very hard to make sure we have a human space exploration program and JSC has a future. The staff is working on it right now, and we're going to keep you informed about what we know and what we don't know." It was obviously a grim time.

I remember being stopped by a young engineer—female engineer—outside the room after we walked out. She was in tears. Literally tears just rolling down her. She said, "You know, it's hard enough having a program cancelled on you that you've worked on for several years. We worked really hard." She said, "It's hard enough having the United States' human space exploration program cancelled, but we're being blamed for it." The rationale that the White House used was the program's over budget. Well, it wasn't over budget, they had cut the budget. And yet, they were using that as an excuse. They're over budget, the implication being because they've done so poorly, we're going to cancel the program. She said, "We're being blamed. We worked our tails off. We got a good program, and we're being blamed for it." I didn't have a good answer for her. That just broke my heart.

I had talked to several young people and convinced them actually to come to work for NASA. I said, “The future’s bright. We have the Constellation Program. We’re going to fly out the Shuttle Program, but we have the Space Station, and now we got Constellation. The future’s bright, and a lot of them quit good jobs to come to work for NASA, or for contractors directly for NASA. All of the sudden it’s been cancelled. That was a pretty grim. I felt like I’d been betrayed, and I betrayed them by portraying NASA as a good place to work with a good future, when all of the sudden it had no future, so that was a tough week after that.

ROSS-NAZZAL: Pretty quickly, you came up with something that was called “Plan B” in the media. You asked Steve [Stephen J.] Altemus to work on. Can you share some details about that?

COATS: We had a senior management meeting at NASA Headquarters. I remember we all had our computers out when they had these meetings, so we’re sending emails to different people. Charlie had basically implied that we were still working on a human space exploration program. Implied that he, at least, was trying to convince the White House to have a program. Congress, of course, was adamant that we have a human space exploration program. I, somewhat naively, raised my hand and said, “Okay. Great. We’re going to have a human space exploration program. I’m going to call that ‘Plan B,’ right? Plan A didn’t work out, we’ve got Plan B, here, right?”

Charlie said, “Oh no.”

Well, I’d already sent an email to Steve Altemus and a few other people saying, “Okay, we’re going to have Plan B. Let’s have Plan B ready, in case.”

Charlie said, “Oh, we don’t want to call it Plan B.”

I go, “Oops.” I hit send too quickly. Believe it or not, by the end of the day—the end of the meeting—word had already gotten out that I had told the staff to go work on Plan B. Lori Garver was furious. The White House was furious. JSC was working on Plan B already. I’m sure the White House wanted Charlie to fire me, and I don’t know for sure, but I think Charlie resisted that, and I suspect that Bill Nelson probably objected to that as well, but I don’t know for sure. But Charlie never said a word to me about it. We laugh about Plan B several times after that, but that became the standing joke. “Okay, well that didn’t work. What’s our Plan B?”

ROSS-NAZZAL: Nothing ever came of the Plan B after that?

COATS: Well, not really. I came back and told the staff, “Okay, we can’t use those words anymore. Nobody use the term Plan B.” We still have to come up with a plan. What can we do? Let’s assume we have an Orion Program, because I couldn’t imagine that Congress was going to let it die. The question in my mind after talking to a lot of politicians was, “What kind of funding are we going to have? How stretched out is the Orion Program going to be? What kind of relationship are we going to have with [NASA] Marshall [Space Flight Center, Huntsville, Alabama], which is building this launch vehicle?” It appeared at the time, because of Senator [Richard C.] Shelby, who wanted JSC completely cut out of the launch vehicle business. He hated the fact that money for the Shuttle Program had flowed through JSC to Marshall for the boosters and the engines, external tank. Not a nickel was going to float through JSC for the launch vehicle.

I expected that we were going to have an Orion Program of some type. We might have to rename it, since that was still a Bush name. For a long time, they couldn't decide on a name. I think Charlie finally convinced them—well I know he finally convinced them—we're going to keep the Orion name, but they didn't want anything that Bush had put his stamp on.

Our plan was, assuming we have an Orion Program, what are we going to have? Let's start working on an architecture, a framework. What can we take from the Constellation Program, the work that's already been done, and make it an exploration program? Incorporating the fact that we have to have a Commercial Crew Program. How are we going to exist side-by-side and do them both?

At the time, there was no real talk about this asteroid thing. Who cares about asteroids? The idea was, let's have a vehicle—a deep space exploration vehicle—if that's what we're going to be allowed to have. Let's build a vehicle that can go beyond low-Earth orbit, can go to the Moon, can go to Mars, and go anywhere, and focus on that. That was our plan.

Steve was really good. Steve Altemus is an incredibly original thinker. He comes up with ideas that nobody else does. Very creative mind. We kept assigning Steve to these studies. You know, he's Director of Engineering, yet we kept assigning him to these studies, because he's such a creative mind. The poor guy could say, "Hey man, don't assign me to another study. I've got three jobs already." He was so good at it, that he's the first name you think of when you say, "Okay. If we're going to lay out a program, and we need some great ideas, where do we go to get great ideas?" Well, Steve's first on the list. He's just a very valuable asset to have at NASA.

He did a lot of very good thinking. I've forgotten the names of all the studies and the teams that he was on, but boy, he was very good. An awful lot of what we've got now came as a

result of Steve's work, and the Director of Engineering, and we had our Advance Planning Office.

ROSS-NAZZAL: Even though Constellation had been cancelled, the Center still continued to work on Constellation for a while, at least.

COATS: Well, I had talked with Charlie and said, "Okay. Are you telling me to stop work on the Orion program?"

He said, "No, I'm not."

I said, "But you're telling me to stop work on the Constellation Program?"

"Yes, I am."

"Okay, I'm not going to ask anything else." For a few months in there, we were continuing to work on the Orion Program, which I think irritated the White House a lot. They wanted to cancel everything, immediately. I think what Charlie was doing was trying to string it along enough until some support would rush in from Congress, that he could use as leverage to play the middleman with the White House. Okay, they've agreed to your commercial program if they can have the Orion Program. I'm sure I'm simplifying that way too much, but I think that's what happened, is the Republicans and Democrats in Congress basically said, "Okay, you can have your commercial program, but we want our Orion Program and our launch vehicle program." I think the White House finally just threw up their hands and said, "Oh, hell. We don't care."

You're right, for a period of time there, a few months, we were kind of in no-man's land, and we were using the argument, "This is what Congress has told us to do, what the

Appropriations Committee told us to do.” You need to be very clear if you, the White House, are telling us to kill this program that we’ve been told to do and funded to do. Are you telling us to stop or not? Through Charlie, at least, they wouldn’t tell us to stop it, because I think they knew that would really irritate Congress. I’m speculating on a lot of that, because only Charlie knows exactly what was going on behind the scenes. But talking to a lot of politicians up there, Congressmen, they were adamant, “Do not stop work.”

We’re part of the executive branch. We kind of have to do what the executive branch tells us to do, but we also have to do what the budget act every year tells us to do. They have authorization and appropriations. We’ve been authorized, and money’s been appropriated, to do an Orion Program. We’re going to do it until everybody agrees we shouldn’t be doing it. From our knothole down here, it’d seem like there is no agreement that we ought to stop this thing.

We’re playing dumb down here. “Until everybody tells us to stop, we’re going to do it.” That’s the way it was, for a while. I think Charlie probably played a heroic role back there, keeping it alive, and coming up with a reasonable compromise that both Congress and the White House would buy off on. Yes, you’re right. For a period of time, we felt like we were hanging out there. We were spending money that the White House has told us to quit spending.

ROSS-NAZZAL: Yes, I remember that. It was a confusing time for everybody.

COATS: Yes, and we took advantage of the confusion, because they were confused in Washington. “Do we stop?”

“Well—”

ROSS-NAZZAL: Did you play any sort of behind-the-scenes role in trying to save Orion and what then became the MPCV [Multi-Purpose Crew Vehicle]?

COATS: Only in that I was talking with congressmen about the importance of a human space exploration program. As far as the Johnson Space Center was concerned, the Orion was the human space exploration program. We had to have a space ship if we're going to be a spacefaring nation. We had to have a space ship, and that was it. The commercial crew vehicles were years away, and they were only going to go to low-Earth orbit.

I couldn't figure out at the time what their business case was. When you call it commercial, you usually mean there's a business case. Can you make money somewhere? I have yet to figure out how they're going to make money, other than the Space Station buying their services. When the Space Station goes away, what do you have? Remember at the time, the Space Station was going away in 2020. I've worked business cases. I was at Lockheed Martin. I know what a business case is. I've had to defend them and justify them, and I didn't see the business case, other than the government paying the same as a government contractor. The term "commercial" never made a lot of sense to me. We're essentially giving them money to develop a capability so we can buy the capability from them. It's kind of like a government contractor. In fact, it's exactly like a government contractor. I can't explain it to the laymen out there what the difference is, except they claim they can do it cheaper, and I'm sure they can with enough government subsidy, they can be pretty darn cheap out there.

ROSS-NAZZAL: Kind of a shell game, I guess.

COATS: Well it is a shell game, but that's politics. That's fine, that's the way the game is played. When the new administration comes in here—and a 2016 election may be different, because if Hillary's [Rodham Clinton] running, the country's going to want the first woman president, like they wanted the first black president, so we may have a Democrat administration, even though it's the Republicans' turn, if you will, after eight years. They may change direction again, I don't know. If Republicans come in, they'll probably want to do something different than what Obama's doing. I don't know.

I'm hoping that because we have pretty good bipartisan agreement from Congress on both a commercial program and a human exploration program, that they will continue that. The commercial program to make the Democrats happy, the exploration program to make the Republicans happy. They won't fund either one like they should, and they'll be stretched out, and we'll pay the Russians for a lot more years. Unless relations continue to deteriorate with the Russians, and then they may say, "Well, we really need to have a commercial program earlier, or Orion Program earlier." I don't know what's going to happen. I suspect—but, again, it's all political. That's what the space program is. We just do the best we can, given the politics of the situation.

ROSS-NAZZAL: Can you talk about politics inside the Agency? You've shared a bit about politics outside of the Agency. What about inside, or even inside the gates at JSC?

COATS: Well, inside JSC, it's interesting. The Center Director, or at least in my case, I wasn't aware, and maybe I just wasn't kept aware of some of the politics going on. By politics, it really means the internal relations between people. Obviously, there were times when I would have a

staffer who just wasn't working out, and I had to make some changes, and I made a few changes.

...

We had a couple situations where I had to replace people that just weren't working out. It's not a case always of somebody being a level above them. It's just they didn't fit in that position. Their skills didn't match well. Sometimes they don't, and you have to make a decision, tough decision sometimes. You have to get on with it. The more you put it off, the worse it's going to get. That's hard sometimes.

The politics at JSC, though, I didn't see as many—again, maybe it's because it just didn't rise to my level—I didn't see the rivalry or resentment that I saw early in the space program between, for example, Mission Operations Directorate [MOD] and Flight Crew Operations Directorate. When I came in, the flight directors and the astronauts, there was a lot of tension between them. The astronauts and the flight surgeons, the Apollo astronauts would not talk to the flight surgeons.

When we came in 1978, we—the military astronauts—were sat down by Jack [R.] Lousma and told, "This is not the military. The flight surgeons and the lawyers are not here to help you. They're here to look out for the Agency. They have a feather in their cap if they ground an astronaut, and the lawyers have a feather in their cap if they make the Agency look good at your expense. Don't ever get that confused, because the Air Force and the Navy are different. The flight surgeons are trying to keep you flying, and the lawyers are trying to help you out. It's different at NASA. At NASA, we don't talk to the flight surgeons, and if we catch you talking to the flight surgeons, you're going to be in deep shit."

Now we're going, "What have we gotten into?"

Sure enough, and one of the first things that I was assigned as a support crew for STS-4, Ken [T.K.] Mattingly, Hank Hartsfield. Hank was from the Deep South, and hadn't learned to swim until late in life. When he'd get in the water tank, of course they only had two crewmen, so they both had to be in the water tank to learn to do EVAs [extravehicular activities] if they had to have an emergency. Well, Hank's heart would just race whenever he was in the water tank. I happened to be in T.K.'s office. I was the support crew for that mission. Well, the flight surgeon came in and wanted to talk about Hank's heartrate there in the water tank. T.K. just exploded. He started chewing him out. Now, I've heard Marine Corps sergeants chewing people out. I've never heard anything like this. I got up to leave, and he said, "You sit down, I need a witness."

I go, "Holy cow." The poor guy is standing there, and he kept trying to leave.

T.K. said, "You come back here, you son of a bitch." Just chewing him up one side and down the other. My ears were glowing, listening to all this.

I'm thinking, "Wow. Jack Lousma was right, they don't like astronauts."

Years later, we had a medical conference, and I had a bunch of the old Apollo astronauts in. These guys are in their eighties. They're retired, they're in their eighties. I had some flight surgeons in the room, because we were asking them medical questions. The very first comment I got from one of the guys—and I'm forgetting which one it was—was, "Are there any flight surgeons in the room?"

I go, "Yes. That's the purpose of this medical conference. We flew you in here at our expense."

He said, "I'm not talking."

I'm going, "You're 82 years old. I'm not going to assign you to another flight!" Believe it or not, it took a while to convince these guys to even talk to this guy. Things were bad back in the Apollo era.

I think we've come a long way. Well, I know we have. Some of the guys that were responsible for improving the relationship, Jeff [Jeffrey R.] Davis, for one. Richard [T.] Jennings, who was a flight surgeon. I think between Richard and Jeff, and a lot of the other flight surgeons worked very, very hard to gain the trust of the astronauts. In fact, I think if you ask the astronaut corps nowadays if they trusted the flight surgeons, they'd unanimously say yes. I think at one point I was able to tell the crews that we'd had 42 cases of astronauts potentially being grounded for medical reasons, and 41 out of the 42 they resolved and kept them flying, which is a pretty good record. I think things have changed 180 degrees from back in the Apollo era.

The same thing with the flight directors. All the Apollo-era flight directors have long since gone. Even with Tommy [W.] Holloway, when I was flying, there was some tension, I think. Tommy's a good friend, and I think the world of him, but there was some tension with Tommy and the Chief of the Astronaut Office back at the time. I don't see that anymore. I think the relationship is very, very good between the crews and the flight directors. I haven't heard any incidents of problems. They're always bending over backward.

I was surprised. On [STS-]41D, my first mission, we had a simulation where they shorted one of the electrical buses, and the trick is to identify if it's really a short before you tie it to another bus and bring down another bus, because that'll cost you an engine going uphill. They shorted a bus, and we correctly identified that it was a short, and the ground called up, and said, "No, it's not a short, go ahead and tie the bus." We actually questioned it. This all during

launch. They said, “No, we’re sure. Go ahead.” We tied the bus. Well, it was a short, and the engine failed. We thought, “Okay. They made a mistake. No big deal.”

You would have thought the world had come to an end. They were so embarrassed. The flight directors, en masse, came over. The Chief of the Flight Director Office. All the Flight Director Office came over to the crew quarters—we were in quarantine at the time—to apologize because his flight controller had made a mistake. They were afraid we’d lost confidence in the ground crew. We were shocked that they were so embarrassed. “So, you made a mistake. Big deal.”

Of course, they’re looking at it from, “We’re a week from launch, and we made a huge mistake here. We hope you haven’t lost confidence in us.”

I thought, “Wow, we’ve actually come a long ways ever since the Apollo era now, because actually have a lot of confidence in you guys. Trust you implicitly, and if you tell me to tie the bus, I’d probably do it again. I trust you.” That was quite an eye-opener for me, to see how hard they were working to gain confidence of the crews. I think it’s been reflected in the last 30 years. It’s a good relationship now. At least I haven’t seen any tension. There was always some personality conflicts between people. There’s some hardnosed, opinionated folks out there at NASA. Usually they’d argue out in the open. There were obviously some cases where people would come in and say, “Well so-and-so’s not treating us well.”

I went to talk to the women’s group, the ERG [Employee Resource Group], a couple weeks ago. It was funny; one of the questions we got from the audience, “How have women and men been different as far as managing them?”

Before I could say anything, one of the other guys on the panel said, “Women cry, and men don’t.”

I'm thinking, "Yes. That's kind of right. I'm not going to say it, but it's true, what he said." It's usually the case. When you have to replace a woman, they'll cry. I laugh, because one of our good friends is a coach at Clear Lake High School, a football coach. He also was told to coach the women's basketball team.

He said, "Well, that's different than coaching the boys. He said, "The girls cry when they lose. They cry when they win. They cry when they're fouled. They cry when they foul somebody else. They cry all the time." I've had to get used to that. It's a little bit different. That's different, that's for sure.

There's personality differences. There's always, I guess, politics, but it's really the personality difference within JSC. Within NASA, I think the problems that we had is what I mentioned before, which is this administration came in, and Lori Garver, and her focus was everything's political. What's good for the Democratic Party? Every decision. Does it help the union or does it help the Democratic Party? Charlie was a very good buffer about that, whenever Lori would question why there weren't more women and minorities on a crew. We'd explain why we assigned the crew. Sometimes there were more women than men. Sometimes there were more minorities than white people. Sometimes there weren't. If you want a quota on every crew, tell us, we'll certainly do it that way, but it's not the way to have the strongest crew. Charlie was very good about that. Her focus was what's politically correct.

The Center Directors got along very well. I think the Associate Administrators got along very well. We always argued about money. Who's going to pay for this? Who's going to pay for that? We're testing the James Webb Space Telescope out here in our vacuum chamber. The cost for modifying the chamber grew tremendously, because the requirements kept changing. The Associate Administrator at the time said, "I'm not paying for that. JSC should pay for that."

I said, “Well, good luck with that. We haven’t got that kind of money. Ain’t going to happen. It’s your telescope. You want to test it; it’s our chamber, you asked us to test it.” We’re talking about 18 million bucks in growth. I said, “We don’t have the \$18 million. We’re not testing.”

He [finally] said, “Oh, okay.”

We had those arguments, moneywise, because our budgets were always under pressure, but I think the Center Directors got along reasonably well. [S.] Pete Worden out at [NASA] Ames [Research Center, Moffett Field, California] was the lone wolf, but I’ve known Pete since he was in the Air Force. He was always a lone wolf, so everybody just expected that from Pete. Ames ... didn’t have much to do with the Human Space Flight business at all. But, the other Center Directors worked together, I think, pretty well, as a team. Very well as a team.

ROSS-NAZZAL: Any tension between JSC and Marshall? That’s always been the documented rivalry.

COATS: You know, it’s funny. I was there after *Challenger* happened. There was a period of time when they didn’t talk to each other. We had some very ugly situations. The rivalry is funny, because it’s not at the senior level. The Center Directors got along very well. The staffs got along very well. Middle managers, not so well. Even today, there’s some suspicion, I think, there. Senator Shelby from Alabama was very anti-JSC and wanted to protect Marshall. Didn’t want money flowing through JSC. Of course, he was chairman of an important committee for a while. He would talk to some of the middle managers, from what I heard, at Marshall, and they’d reinforce their paranoia about JSC. I think we went out of our way—I certainly went out

of my way—to say, “Look. I don’t know anything about launch vehicles. It’s not our business at JSC. You guys do them. I don’t care if the money for the launch vehicle flows through JSC or not.” That’s what I told Senator Hutchinson. “Let them have it. I don’t care. I’d just like to have a program.”

When I left a couple years ago—and I think now—things are on reasonably good terms. I think there’s still some suspicions about JSC, because for years, all their money came through JSC. The program managed essentially Marshall’s budget. I can see why there would be some suspicions there, but essentially they’re doing their own thing, and I think they’re doing it well.

ROSS-NAZZAL: Were there any joint projects you worked on with some of the other Center Directors?

COATS: Yes. One of the things the advanced planning group did was—I told them, “Look, if we’re going to have deep space exploration, we know human space flight, JPL [Jet Propulsion Laboratory, Pasadena, California] knows deep space. They send the probes to Mars. Why don’t we team up with JPL and let’s get together and talk about how we can work together for a deep space human exploration program. Use our experience with these two Centers.” A JSC/JPL team seems to make a lot of sense to me.

Politically, there were advantages as well. Adam Schiff is their congressman out there, Democratic congressman. He was the ranking member on the appropriations subcommittee, and worked with John Culberson, who’s our Republican here, who’s now the chairman of that subcommittee. Even though they’re different parties, they seem to be good friends and work together well. I said, “Why don’t we take advantage of that?” We were teamed up. We worked

on a lot of things. I think when I retired we had a very good working relationship. Dave [David C.] Leestma was my point man on that relationship and I worked closely with the Center Director out there. We went out there many, many times and they came here several times to see what our capabilities were. I think that relationship made a lot of sense.

We worked pretty well with all the Centers. [NASA] Goddard [Space Flight Center, Greenbelt, Maryland] does their own thing, and it's because they have a bunch of programs—not human space flight programs—that we don't have a lot to do with. We'd say, "Anything we can work together on?" They'd say, "Yes, let's talk about it." But, there wasn't anything we could really work on with them.

Chris [Christopher J.] Scolese, of course, is the Center Director there, and is a really good friend. Chris was my customer when I was at Lockheed. He was a program manager at NASA, and a huge program. Terra Program, they call it now, a multi-billion dollar program, and he was just a fantastic program manager. I'd known Chris for many years before he came back to NASA. Outstanding. Not only a superb engineer and program manager, but he's got administrative skills that are superb. He did a great a job. He was Acting Administrator for about six months, and he just did a wonderful job. I never heard Chris raise his voice, no matter how stressful things get. He just says, "Okay, well, let's make sure we understand it, and then decide what we're going to do about it." Very methodical, and very well informed. Smart as a whip. He was a Navy submariner type. He'd been through the nuclear power program in the Navy. He has a first-class technical background. He was a great guy to work with, but it's hard to team up with Goddard [since their business is so different]. I think we teamed up with most of the Centers, one way or another, but Goddard and Ames were a little bit unique, I think.

ROSS-NAZZAL: Can you talk with us a bit about your role on the Office of Space Flight Management Council and some of the major issues that you would work there?

COATS: Are you talking about Gerstenmaier's group?

ROSS-NAZZAL: Yes. Yes, because it probably changed names at some point.

COATS: Yes. We'd get together as a senior management group to talk about the issues. Again, it changed flavors when we changed administrations. Mike was very much involved, and Mike loved to do the technical end of things. The joke used to be, he secretly wanted to be the Orion Program Manager. Since he wrote the textbook on spacecraft design, he would like to be that program manager. It's too bad he got stuck in the Administrator job. He was very involved with all the discussions and technical discussions. Charlie came in and was a little bit different. He basically told Gerstenmaier, "Okay, you run human space flight, and we'll combine things to make it easier for you. Bill is superb at what he does. Very knowledgeable, very calm, very methodical. Congress has tremendous trust in Bill. I actually think the Office of Management and Budget actually has trust in Bill too, which is unusual. They don't trust anybody.

He's a unique individual that Mike had to basically tell to take that job. He wasn't anxious to go take that—he was happy to be the Space Station Program manager—but he's been fantastic at it. We'd get together and talk about the issues that Bill was faced with, which is human space flight. He would be very good about saying, "Okay, here's my big picture. Here's what I'm trying to do. What do you think? Do you have any other ideas?" He was very open to

ideas. He was very good about acknowledging the political constraints. “Okay, I’d like to do this, but budget-wise, I’m not going to be able to do this right now, but don’t put it aside.”

One of those things is the advanced EVA suit. We really wanted a new space suit to do EVAs. Wanted to continue developing a new space suit. I had a contract out that budget-wise got lost when the budget got cut. Bill was very anxious to keep it alive somehow. We’ve got to keep working on it, because someday we’re going to need a new space suit. That technology is getting pretty ancient out there, and we can do better and need to. He scraped together money to keep it alive one way or another, acknowledging that, “Boy, this is something we have to have. We don’t have the money for it now, but let’s just see what we can do to keep it going, so that someday, when we have the money, we don’t have to start over from scratch. He really is good at the big picture, and the same thing with working with the Russians.

Working with the Russians can be frustrating at times. They have the leverage. They have the hammer. They got the product that we need right now—the launch vehicle to get back and forth to the Space Station. When the Russians have an advantage, they really enjoy having an advantage, and we pay through the nose for it, so working with the Russians can be frustrating at times. I think we have a good working relationship with them, astronaut to cosmonaut, and engineer to engineer. Bill has to work the politics side of it constantly, and I think he does a pretty good job at that.

Again, he never gets ruffled. I’ve never heard him raise his voice, which is good. I’ve seen the Russians get exasperated when they try to stir him up sometimes, and they don’t succeed, they get upset, which is kind of fun to watch. He’s another guy that’s the right person in the right place right now. I hope he stays in that job. If he gets burned out, I don’t know who’s going to replace him. Won’t be nearly as talented as he is. He was very good at

communicating, as best as he could, to all of the Centers, and to the programs, what he was trying to do with the human space flight, given the changes and the constraints that we had.

Of course, it's been a very fluid situation. Especially the budget would come out, and we'd go, "Oh, jeez. What are we going to do now?" He'd say, "Okay, well, let's come up with a new plan. Let's see what we can do for the money we've got." Communication is the secret, obviously, and Bill is very good about communicating. I think both Mike Griffin and Charlie were very good about communicating if you were listening and if you were willing to communicate with them. In all of their cases you couldn't be bashful. You had to say, "What about this? I don't understand why you're doing that?" Sometimes the answer would be, "Because I have to. I've been told to." Well, okay, that's a good enough answer. That's the way it is.

I think we're fortunate, given the turbulence we've had in the last six or seven years, that we've had some pretty good people in place to deal with it. I would have liked to have had a lot more stability in our direction, in our guidance, and in our funding. I think we could have done a lot more. We wouldn't be paying the Russians \$75 million a flight right now that employs a lot of Russians. I'd rather be employing Americans. That's the fall-out from it.

ROSS-NAZZAL: Now, of course, when you came on board, the plan was to retire the Shuttle in 2010. Can we talk about the transition? You were from this very large program. You had to keep people on board the program through the end. What did you put in place to ensure that people would stay put? You would have all these qualified people working for Shuttle to the end.

COATS: It's funny you say that, because I had just the opposite problem. I was trying to move people off the Shuttle Program.

ROSS-NAZZAL: Oh, you were?

COATS: When I had jobs available for them, and John Shannon would say, "Yes, I can afford to cover for them, if you want to move them to those jobs." People would refuse to leave. They wanted to be there through the last Shuttle mission. They assumed there'd be a job for them some place, but they were determined to work right through that last flight, which was really heartening and encouraging. These people were totally dedicated. They'd worked the Shuttle Program for much of their career, and they wanted to work it right through the last mission. We had jobs for them, in most cases, and the transition was actually—from the civil servant's side—I think was much smoother than I was worried about. It made it more difficult when Constellation was cancelled, obviously, but we had the Orion Program still, which from our point of view, made up for a lot of it.

Now, the contractor's side was obviously painful. We were laying off an awful lot of folks, which was very painful for me. Again, a lot of the contractors I had encouraged to come to work for contractors, thinking we'd have a good future. That was painful. We learned—like one of your questions implies—we learned a lot from the Apollo Program. We worked a lot with the state of Texas and had a lot of help on transitioning people. Finding jobs elsewhere. I met with a lot of companies out here in the Houston area.

It's interesting. They had the impression that all we had at JSC were aerospace engineers. They didn't have jobs in the oil and gas industry, for example, for aerospace

engineers. I said, “No, no. Our people are electrical engineers, mechanical engineers, systems engineers. They can fit in anywhere.” They go, “Really? I had no idea.” We had an education process with them.

Chrysler [Corporation] came down here and was offering hundreds of jobs to people. They were hiring after they got saved by the government. They were growing. The state of Texas did a good job. Nancy Tootle, working with the state of Texas, who had actually worked with me at Lockheed at one point, was really good about working with our folks and helping with resumes. They had the [transition] office open up near the HEB [grocery store] out there [close to JSC]. We worked it as hard as we could work it. I think the transition was hard. I mean, we went from 17,000 down to about 14,000 people working at JSC, so we lost 3,000 people, contractor work force. That’s hard, because that’s a lot of talent and experience walking out the door. I think most of them found jobs. Not all of them, and I heard some really tough situations. Several people came up to me, when I’d go to retirements, and say, “Well, I’ve been out of a job now for six months or a year, and I’m really desperate.” It just breaks my heart, because they thought they’d have a good career in the space program. That’s why we desperately need some stability. Quit changing directions and give us some predictable funding, that would be nice.

ROSS-NAZZAL: Would you talk about that? So many years when you were Center Director you were funded with these continuing resolutions. How did that impact what you could do at JSC?

COATS: Well, as I’ve said before, the problem with a continuing resolution is that it allowed the finance people who were really OMB people, working for the White House, to say, “Well, we

have to set aside a certain amount of our budget in the continuing resolution, because we have no idea what the final budget's going to be." In other words, if we have a continuing resolution that takes us through the first of August, and then they pass a budget finally for the year that actually only counts for two months, August and September, and it's less than what the continuing resolution was, we're in deep trouble if we've spent too much, so we've got to save a whole bunch in a continuing resolution. Then when they would pass the budget, and when there was always enough money in there, then they'd say, "Well, it's too late to spend this money, so we'll give it back." We lose the money, which is what OMB loved to see. A continuing resolution hurts us. We actually lose money in that situation.

That was very frustrating. It's a way of life. Now we have a continuing resolution every year. They don't pass budgets anymore. Hopefully that's going to change soon. It's very, very frustrating that we don't have dependable, predictable funding, so we can't even spend the money that we're finally budgeted because we have to set aside in case they don't come through at the end of the year, if that makes any sense to you.

ROSS-NAZZAL: No, that does make sense. Did you have a chance ever to sit down and talk with Chris [Christopher C.] Kraft or some of the other Center Directors about some of these challenges that you faced and how they dealt with similar issues?

COATS: What I did when I came into the job was I sat down and talked with some of the guys whose opinions I respected, Chris Kraft, Roy [S.] Estess, Carolyn [L.] Huntoon, certainly Beak [Jefferson D. Howell], to understand what their problems had been. It was interesting that the general feeling was everybody has had, obviously, budget problems. Even the Apollo Program,

Chris, had budget problems. We'd like to think, "Oh, those were the golden years. They had all the money they could spend," but they had a lot of constraints that we don't have. All of them had been involved with politicians and playing the politics part of it a lot. They said there's no way to get around that, might as well learn to do it.

A lot of their advice was JSC-centric. In other words, here's the problem at JSC. The biggest problem was the arrogance of "not invented here" attitude at JSC. We're the premier human space flight center. We know it all. We're not going to listen to anybody, type of thing. Several of them made that similar-type comments there. That's why I tried to stress the importance of innovation and being open-minded, and listening. Learning from other people.

Go out and compare yourself to what other similar organizations are doing, and see if you're the best. If you're not the best, why aren't you the best? What can you do to be the best? Whether you're engineering, or human resources, or finances, or whatever, go learn. We can do that, and it doesn't cost us, because we can use the NASA name. All these organizations, whether it's government, or private industry, love to be able to tell their board of directors or whatever, "We're working with NASA. We're teaching them things."

I think we learned a lot. I think the attitude has changed a lot. I'm not a good one to judge, because I've been telling people we got to do this. It takes several years to figure out if it really was a change or not. If you ask the people at Marshall, they'd probably not have positive things to say about JSC, but I think most other Centers would say we've been anxious to be partners and teammates much more than we'd been before. I stressed benchmarking from day one, and they did. I was very impressed. Some of the organizations did it better than others. Engineering did it well, MOD did it wonderfully. Paul [S.] Hill was just fantastic about going out there.

Turns out, some of the best control centers in the world are in New York City after 9/11 [September 11, 2001, terrorist attack]. The city of New York spent an incredible amount of money on a terrorist control center there. We went out and visited them and said, “Wow, you must work closely with the CIA [Central Intelligence Agency], FBI.” They said, “No, no. They’re way behind us.” We learned a lot from them. It’s valuable to go out and compare yourself to other organizations and learn from their problems. Learn from their mistakes as well. They’re surprisingly open with us because we’re NASA. A private company wouldn’t do it for another private company. Government agency will do it because we’re NASA, which is wonderful because we can’t afford to pay for it.

It means we got to make the time and make the effort to go contact these folks and talk with them. I think it’s paid off. You give the impression to the young people that it’s important that they go, that they be open-minded and receptive to new ideas. That may be more important than ever, is just to create the right attitude. I hate the word “culture.” I’m not sure what “culture” means, but you got to have a culture of open-mindedness.

ROSS-NAZZAL: One of the things that popped up during your administration was the idea of an Innovation Day. You had a couple of those. Where did that idea come from, and what were the outcomes of that?

COATS: When I came in, I asked several questions. I gave you the list of stuff I was anxious to emphasize. One of them was, “Are we a representative workforce?” Because I’m anxious to compete and win, I want the best team here I can possible get. I need the best players from every segment of our society. I want the best minorities. I want the best females. I want the best gay

and lesbian. I want the best from every group. I want them to feel like they're welcome, and they fit in immediately here at JSC.

You can call it diversity if you want. I don't like the word diversity because it has a lot of negative connotations for people. We, even though we originally set up a Diversity Council, we soon changed it to Inclusion and Innovation Council. One of the ideas the Inclusion and Innovation Council came up with was the Innovation Day idea. That was the council. I had nothing to do with that. They told me about it, and I said, "Well, you sure?" They convinced me, and I think it was reasonably successful. Lot of enthusiasm for it out there. I was impressed. The young people took the bull by the horns, and organized it, and pulled it off. Kept informing me of what they're doing. I'm going, "Man, go for it. I'll keep up if I can."

Of course, they also came up with the idea of the Employee Resource Groups, which I was very much opposed to initially. I said, "If the name of the group is Inclusion and Innovation, how are we being inclusive if we're setting up separate groups?" It didn't make sense to me, and I had seen it fail before, including here at JSC, with what they called Affinity Groups back then.

They convinced me to give it a shot, and we went around, as I've told you, and compared ourselves—benchmarked against a lot of other organizations, and learned, I think, a good way to do it. At least when I left, I was impressed with the results so far, and they've formed several Employee Resource Groups since I've left. The women's group is one. Again, the idea was how do you make people come in and feel like they're a welcome and an important part of the team—contributing member of the team, and responsible member of the team, right off the bat? They have a responsibility to ask questions, and learn, and speak up right off the bat. The teams have

done a pretty good job, I think, about coming up with ideas of how to make these folks feel welcome and included as part of the family as early as possible.

It's hard to step into a new organization, especially for a kid right out of school. Good grief. They're scared already about "how do I keep my job? How do I learn this job? I'm not going to speak up, that'd be crazy." And it's probably harder for a minority, or maybe a female to do that. I think the groups have maintained that focus. They haven't gone off and developed into, "Well, let's go gripe about something." The charter for each of them was, "How do we help JSC accomplish the mission?" In other words, not, what's in it for us? How can we help JSC?

I was not a fan or an advocate. I was a skeptic originally, and they convinced me that it was a good idea. Some of the things, like the joint leadership team that Beak and Bob Cabana had put in place, I thought was a great idea and we just kept it. It wasn't my idea. I used it for communications reasons, to get information out to the contractors and then listen to their concerns, but that was Beak's idea, and I thought it was a pretty good one.

ROSS-NAZZAL: Under your leadership, I have to pull this one out. They worked on rolling out four new messages to the Center, and they were JSC's expected behaviors, effective team development, a working guide to contract relationships, and closed-loop feedback. Was that something that you helped to foster, or was that just something that they did, and they presented to you, "These are the things we think we should explore?"

COATS: Well, mostly it was them presenting to me, and coming up with ideas to do that. I had some opinions. I learned a long time ago, if I listen and ask questions, things work out better, and I can influence things better than if I start off giving my opinion on things.

Now, it's hard to do, because you want to say, "Wait a minute. I think this." You got to keep your mouth shut, because you've got so much talent there. This is an incredibly well-educated, and highly motivated, and smart group of people. If you point them in the right direction—the direction you want them to go—and set out clear objectives that they agree to, well you just get out of the way. Go find the resources they need to get the job done, but get out of the way, and then listen to them. You can influence the direction just by the way you ask questions. If you start off saying, "Here's what I think," there'll be silence in the room, because they're going to go, "Okay, that's what we're going to go do."

I was working for a president out at Lockheed Martin out at Sunnyvale. ... Big guy, gruff guy. Everything was loud. Full volume. He wanted everybody's hair to be on fire all the time. He'd start off a meeting, "Well here's what I think. We're going to do this. What do you all think?" There'd be absolute silence in the room. Then he'd say, "What a bunch of weak-kneed rahrahhrah.""

I finally pulled him aside and said, "If you'd phrase it differently, if you'd ask for input instead of giving input, you might get more feedback."

He said, "Really?"

"Yeah, you might try it sometime." He tried it for about a week, then he couldn't help himself. It was full-broadcast all the time.

I learned that learning to listen may be the toughest skill any of us learn. You really have to listen to what people are trying to tell you, and ask questions to help you understand what

they're really trying to tell you. Maybe it's good because I was at a point in my career where I didn't care if I asked a stupid question. A lot of people care about, "I don't want to appear stupid or ignorant, or I probably should have known that. I shouldn't have asked." I was at the point I didn't care anymore. I didn't want to appear foolish, but I also wanted to learn. I learned if I ask a question that might appear foolish or ignorant, frequently I found out that nobody knew the answer either. Somebody was blowing smoke. I learned to ask questions. Dumb questions. Sometimes the simplest questions. "Why are we doing this? Tell me again, why are we doing this?"

An example—and I'll digress a little bit. My daughter is a counselor at a private high school. She has been arguing that they ought to have drug testing in the school. A lot of private schools have drug testing. She thought it was probably a good idea because she had had a lot of classes and been to a lot of conferences where they are emphasizing the effects that drugs are having on young people's brains. Teenagers' brains are in development stages such that drugs can really set them back for life. They're just learning this in the last several years. It used to be people thought, "Oh, you do drugs and you grow out of it." Well it turns out, those drugs are going to affect you forever. They got a lot of data now to show that.

Laura was trying to convince the school to have a drug-testing program. I said, "Well, the very first question you're going to be asked is, 'Why?'" ... The usual attitude is, "Kids will be kids. They're going to do drugs and alcohol. Just don't overdo it."

Her attitude is, "Okay, I may be perceived as an ultra-conservative type, but the data shows that this is harming the kids, and I think we need to tell them that. I think as educators we have the responsibility to educate the kids and the parents about the effects of drugs and alcohol,

because physically, it actually harms you for life. Now if you want to do it, fine. We're not in a business of being your mother and father. We are in the business of educating."

She was able to replace some of the people who had been coming in every year, who had been basically saying, "Yeah, drugs are bad, but don't overdo it. Everybody does it, just don't overdo it." She was able to replace some of the people who had data that said drugs can really hurt you at the stage you're in, and have courses for the parents, too. She's been pretty successful. The head of the schools initially said, "Hell no, not on my watch." She was able to convince them to have a drug testing program.

Some of the parents objected strenuously, but most of them said, "Sounds good." I've learned a lot about drug testing. A lot more than I did when I was Center Director. They cut hair now. Instead of urine samples, they take hair samples. By taking a little snippet of hair, and they can actually take your arm hair, they can tell if you've done drugs in the last six months. Yes. It is 100 percent accurate. Now, it's more expensive, and a private school can afford that.

So ask, "Why?" That's the first simple question, "Why do you want to do this?" Then it's, "Okay, what's the next simplest question?" Again, I had a wonderful position that I could learn a lot by asking really dumb questions, and sometimes I learned it wasn't such a dumb question.

ROSS-NAZZAL: It's interesting that you say that, because I'm thinking back to some of the interviews that we've done over the years. One of them was with a female engineer who worked for NACA [National Advisory Committee for Aeronautics] and had worked with Bob [Robert R.] Gilruth who was our first Center Director. She said that she was really impressed that he would just ask a question, and it would change the whole line of thinking the way they

approached a problem. He never told anybody what to do, but he just asked a question and left. I think that that's a powerful message.

COATS: Well, it's a little bit of a skill you got to develop, but you can influence things just by asking questions, but you have to be real careful about accidentally giving direction. A lot of the things that the staff came up with, all I said was, "Well, I'd like to improve the training for program managers." Wonderful PPMB [Program and Project Management Board] program.

ROSS-NAZZAL: I don't know if you want to finish talking about questions and leadership, if you want to talk about another topic.

COATS: I probably ought to talk about the Lisa [M.] Nowak and the drunk astronauts.

ROSS-NAZZAL: That was one topic that I had considered asking about, but I wasn't sure how much time we would dedicate to that.

COATS: Well, again, from my perspective, the toughest situation I had at JSC was obviously the murder-suicide that we had. That was heartbreaking. Having to go tell Linda [the victim's wife] that David [Beverly] was dead was one of the toughest things I've ever had to do. She was fantastic. She was the most empathetic and caring person I think I've ever met. Very, very strong faith, and when I walked in to tell her David was dead, she said, "Oh, this must be so hard for you." I'm going, "Oh, boy." She's just a remarkable woman, she really is. She made it so much easier for everybody.

I'll never understand how Bill [William A.] Phillips could have been that much of a loner. His job was everything to him. He had no family, no friends, no nothing. He had a nice house that he didn't ever get into most of it. When they went into his house, most of it was covered with dust. He lived in the kitchen and the bedroom; that was it. Most of his clothes were covered with dust that he never wore. His job was everything, and he thought it was threatened, and he just flipped out. I'll never understand that. He and David went to lunch that day, and how you can have lunch with somebody and then shoot them just astounds me, but obviously he was planning it.

That was tough because it had the possibility of straining the relationship between the contractors and the civil servants, and I worked very hard to make sure everybody understood that was not a contractor versus civil servant issue, even though Bill had been a contractor and David was a civil servant. I think that was a personality issue. I spent a lot of time with Jacobs Engineering [Group, NASA contractor] people, as well as our people, talking to them about that. That was a huge regret that that had to happen. I don't know what we could have done to head that off or prevent that. That's bothered me for a long time.

The Lisa Nowak thing. I drove to work that morning and had Ellen Ochoa standing in my parking place, like at 6:00 a.m. I'm going, "Oh, Ellen never gets here at 6:00 a.m. This can't be good."

I got out, and she said, "Well, you won't believe this."

I said, "What?"

She said, "One of our astronauts is in jail in Orlando [Florida], charged with attempted murder."

I go, “Well you’re not smiling, so this can’t be a joke.” I said, “Tell me about it.” She told me what she knew. We spent much of the morning, first few hours, trying to gather information on what had happened. It just didn’t make any sense.

If you look at [Lisa’s] background, it’s essentially the same as mine. She’d gone to the Naval Academy, test pilot school, was a Naval aviator. She’d been through all the stress situations that you could possibly put people through. Training for a mission, flew a mission, did a wonderful job. She was a CapCom [Capsule Communicator in Mission Control Center]. Yet, she obviously flipped out and had a problem that’s hard to understand even to this day.

I immediately called in Steve [Steven W.] Lindsey [Chief of the Astronaut Office at the time] and said, “This doesn’t make sense at all. I want you to go down to the Cape and—take a [Northrup] T-38 [Talon, astronaut training jet aircraft] and go down there, and drive over to Orlando, and see what’s going on. It’s got to be a mistake.” In hindsight, I should have paid out of my own pocket for him to fly commercial instead of taking a T-38, because we got a lot of grief from a lot of different sources for using government resources to help a “criminal”. Mike Griffin was wonderful about backing us up on all that. He was terrific.

Steve did it and did a fantastic job. He went down there and escorted her back out after she got out on bail. Flew back with her, commercially. Local Constable Bill Bailey did a really terrific job about meeting them at the airport, [Houston George Bush] Intercontinental [Airport], bringing them back here. We were told by NASA Headquarters, a lawyer, “You cannot let her stay overnight in the crew quarters. It looks like we’re hiding her.” The media was surrounding her house.

I went over to meet with her and her family. Her parents had flown in, and her husband—she was estranged from her husband—with her children there, too. She was in a daze.

She didn't know what was going on. It got to the point where we said, "Well, I have to take you home. I will drive you home." I contacted Bill Bailey, and asked if he could escort us, and he said, "Of course." Because her street was lined with TV trucks, hundreds of people out there, they arranged for us to meet in front of the fire station over here on Pine Brook. Met with the constables to escort us to her house. She lives over here in Pine Brook.

I had her parents and Lisa in the car, in the back seat, in my car. We're sitting there, waiting for the constable at the fire station. It was very quiet, and her mother—and it's absolute quiet in the car—finally her mother says, "Lisa, how could you?" It'll break my heart to this day to think about it. Lisa said, "Mom, I don't know. I don't know who that was that did that. I just don't know." She was obviously just totally lost. Almost like a Jekyll and Hyde. Who was that person that did this thing? I don't think to this day she understands exactly what that person was doing in her body out there....

I met with Lisa several times, and I had to work with the Navy. The Navy insisted on bringing both her and Bill [William A. Oefelein] back to the Navy, because they have a judicial system. We don't. What they did, essentially, while she was being charged with a crime in Florida, they both had violated Navy rules—adultery rules. Of course, we didn't have any rules like that, and we had no judicial system for it anyway. Since they're on loan from the Navy—all of our military astronauts are—we have no choice but to send them back.

I had to meet with the Astronaut Office and explain I've got to send them back to the Navy. Then I had to go meet with the Chief of Naval Personnel. Steve Lindsey and I went up there and met with them, and it was interesting. He is a vice admiral who seemed irritated that this problem was in front of him, and was implying, "What have you done to my Navy officers

down there?" I bit my tongue and almost, almost, kept my mouth shut. He intimated that maybe we'll quit sending astronauts from the Navy.

I couldn't help myself. I said, "I will certainly understand, and I will inform the NASA Administrator that's your position."

He said, "Well now, wait a minute, wait a minute, wait a minute." Then he backtracked big time, and stumbled all over himself doing it. Steve Lindsey got a kick out of that. He was bluffing and venting, and I thought he'd gone too far.

We had to send them back to the Navy, and of course, then they had judicial procedures as well. Reduced them in rank. Got to keep their retirement which was a big deal. Met with Lisa several times afterwards. She came up to my office every few months. She was looking for help in finding a job. She needed to support her family. I tried to do what I could, but everybody knew the name, and nobody was interested in helping out. I know she was struggling. I'll never understand how that could happen. We teach our engineers and astronauts to compartmentalize and keep their personal affairs separate, and she did a wonderful job of that. She worked as a CapCom all day Friday, and then drove straight down through to Florida and nobody suspected anything. Strange case.

The drunk astronaut one really, really bugged me. Jim [James P.] Bagian caused that to happen. I'd flown with Jim on my second mission. He was working for the VA [Veterans Administration] and was on this study group, and we'd put him there. Asked him to be there to basically screen ridiculous accusations if any of them came up. Instead, he decided to exaggerate one. He came to me actually and told me ahead of time, "Yes, I've had this guy tell me that he saw drunk astronauts flying."

I said, "Well you know that's not possible. There are dozens of people that look at you before you launch and inspect you, and there's no way in the world you could fly drunk."

He said, "Well, but it's what the guy said."

I said, "Jim, you're put on there to screen this sort of thing out, not to magnify it."

"Well, but it's what he said so I'm going to report it."

I said, "You know, all hell's going to break loose. We're going to become the laughing stock of the comedy shows at night, and we'll have congressional hearings and everything."

"No, no it won't. No, it won't."

Well, that's exactly what happened. It bugs me to this day. Jim was always one of those guys that wouldn't listen to anything. Did everything his way. To warn him ahead of time this is going to happen, and then to have it happen, just grated on me. It's not possible for an astronaut to fly drunk. It's just physically not possible. A lot of people have speculated that Jim was looking to be the Chief Medical Officer at NASA. I don't think that'll ever happen. That one really disappointed me and besmirched the reputation of the astronauts for absolutely no reason.

ROSS-NAZZAL: There was an investigation, wasn't there, that said there was no such proof.

COATS: It can't be. If you knew how things worked, pre-launch, it's just not possible. If a guy's not absolutely stone-cold sober, nobody's going to put him in a spacecraft, and no other crewmen would fly with him. Your life depends on it, for heaven's sakes. You got to go through a lot of checks. The doctors look at you and everything, and their jobs depend on

signing off on you being ready to fly, so it's physically not possible for that to happen. That's just incredible.

I enjoyed Ralph [M.] Hall at the congressional hearings. Ralph, bless his heart, I love that man. He was an old Navy pilot, World War II. In the congressional hearing, he'd basically interrupted and said, "You know, this is all bullshit."

Everybody's going, "This is a congressional hearing; you're not supposed to talk like that."

He said, "That's the dumbest thing I ever heard."

We're going, "Yay, somebody's said the right thing." Bless his heart. That was a disappointing episode.

ROSS-NAZZAL: Those seemed to all happen back-to-back, as well.

COATS: I noticed that. First year was very quiet and very enjoyable, and then all hell broke loose.

WRIGHT: Calm before that storm.

COATS: Yes.

ROSS-NAZZAL: Well speaking of storms, I thought next time we can talk about Hurricane Ike, and we've got some more to talk about, about Shuttle and COTS [Commercial Orbital

Transportation Services]. There's quite a bit more to talk about, so if you wouldn't mind having us back.

COATS: Sure. Yes, Hurricane Ike was interesting.

[End of interview]