NASA JOHNSON SPACE CENTER ORION ORAL HISTORY PROJECT
EDITED ORAL HISTORY 2 TRANSCRIPT

MARK S. GEYER
INTERVIEWED BY JENNIFER ROSS-NAZZAL
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ROSS-NAZZAL: Today is August 9th, 2016. This interview with Mark Geyer is being conducted at the Johnson Space Center for the Orion Oral History Project. The interviewer is Jennifer Ross-Nazzal, assisted by Sandra Johnson. Thanks again for taking time out of your busy day today. I know that you're filling in for Dr. [Ellen] Ochoa. She's out today.

GEYER: I think this afternoon she's out, yes.

ROSS-NAZZAL: So we really appreciate it. We know your schedule is very busy. We thought we'd start today by talking about the cancelation of Constellation. Did you have any inkling that that might be coming?

GEYER: Yes and no. The end of, let's see, normal life, which is hard to describe as normal, but in December of '08, I had three meetings in Washington, three separate meetings that I had to fly up for. They were all with Mike [Michael D.] Griffin. They were all about Orion design decisions. So it was a pretty intense December. That was the end of getting Mike comfortable with the Orion design. Mike had a lot of specific opinions about what Orion should look like, how it should function. I remember having the last meeting, I think it was like the 16th or something, it was very late in December, and he said, "Okay, I'm good; I'm comfortable that you guys are on the right plan." Then within three weeks Mike was gone, because the President had

already been elected, but it wasn't clear whether they were going to keep Mike on or not. It was clear in January that they were not, so Mike left.

Then we had a period where we had no Administrator. The Acting Administrator was Chris [Christopher J.] Scolese. We just kept working through the plan. Then Charlie [Charles F. Bolden] was confirmed and Lori was confirmed, Lori [B.] Garver. They also kicked off a commission, the Augustine Commission, which was intended to look at the human exploration strategy basically.

A lot of that work was in the summer of '09, and we were asked to generate a lot of data. We gave a lot of briefings on Orion and Constellation in general. Not to go too much into that, but you could tell [by] the tone of the questions and some of the discussion of the Board members, they were not very positive about Constellation. Since this Board was set up by and populated by people in the President's Office, and then you're hearing these comments, you got a sense it wasn't good, in my opinion, regardless of what we said at the briefings.

Then the report came out and if you read it in detail, basically said we need a Program that's worthy of this nation and right now Constellation doesn't have enough funding to do the job they've been asked to do. There was a lot more to that about the analysis they did and what the President's people had done to the budget before the Committee came out that a lot of people don't know, but I won't go into the details of that. That came out and it was not positive, I would say. But we didn't hear a lot.

I don't know if I mentioned this last time, I think I did. Charlie came in and Lori came in, and they were making the rounds of the different Centers. We noticed that they never mentioned the word Constellation or Orion. Here's the new leaders giving speeches and talking to the workforce, and you can tell they're not talking about your stuff at all. That's not good.

Even though I gave Charlie some tours at Kennedy [Space Center, Florida] of the Orion assembly area and other places, and Charlie is always very positive, really nice person, but the undercurrent just didn't feel right. It's just something you get.

But we kept working on our plan. Then we came into '10. We finished our PDR in '09, so in the midst of this environment we actually did a Preliminary Design Review, which was huge. Then the beginning of '10, we finished the detailed cost assessment of what we thought Orion would cost. We did that in January. We were getting ready. That's a big part of the Agency process where they take your design PDR and then they take your detailed cost estimate and then they make a commitment. They say, "We think it's going to take this long to do Orion." We were building all that data up. Huge amount of work. You're reading things in the press; there's a rumor, the whole thing is going to get canceled, but I couldn't tell whether it was the same rumor just repeated by many people.

My son was on a YMCA [Young Men's Christian Association] basketball team, and we were in League City at the YMCA on Saturday. Jeff Hanley calls me, so I step out; I go to this quieter area. He says, "Hey, they're going to cancel everything on Monday." "What do you mean everything?" "Everything. Everything is going to be canceled." "What are they going to do?" "Don't know." I'm thinking are they going to say, "I want you to scrub it. I want you to relook." No, they're going to cancel the whole thing. Wow, okay. He says, "Yes, only a few people know. They just told us today."

It was the 1st [of February], so I remember I came to work. I don't remember if I told anybody, because that was part of what Jeff wanted to make sure, not to get everybody spun up. I can't remember. I might have told the leadership team what Jeff [told me]. I probably did,

probably 10 people, but you have to be careful with that. You can get people spun up too soon. I really wasn't sure what they were going to say other than they were going to cancel it.

It was February 1st, and they had a press briefing. They also released a statement. Then they had question and answer later. Basically they said, "Yes, hey, we're canceling these programs." They talked about what they were going to do, but it was very hard to figure out what they meant, what was really going to be replacing this Program.

The team was pretty much devastated. Historically when people cancel stuff, they feel the need to justify themselves. They find reasons to say why it was all messed up. That's just what they do. They can't just go, "I don't like it; I don't want to go to the Moon." They had to find reasons why they thought it was horrible, which I get. I felt a lot of that stuff was not accurate, but it doesn't matter. Well, it does matter, but it's not going to change their opinion.

That happened in the morning, and we listened to the questions. I just was stunned by some of the responses that Charlie and Lori said and the way it was done. That we were totally in the dark. All these people, they work for them. We're NASA people. I wasn't born thinking, "Gosh, I can't wait to build Orion," I came here to work for NASA. I just felt like here we work for them, all these people have been doing is trying to do the best they can for what they believed the country and the Agency wanted. Then I just thought we were treated horribly. That was my personal opinion.

The team was pretty devastated. We weren't getting any help. This was the other part of the problem I saw in the leadership. We weren't getting any help describing to the people who worked it every day why we did this and what they want us to do now. You know what I mean? Transitions happen all the time. You guys are describing one, right? People are trying to figure out what the hell is going on. It's hard. To your level, "It's like well, I thought I was doing a

good job. I thought it was important." Well, yes, it is important, but then—you're going, "Yes, I know exactly what that's like."

ROSS-NAZZAL: We've been hearing that all summer, yes, exactly.

GEYER: It's like okay, "What do you want me to do. If I've now been doing that, what is it you want me to do?" Because part of it was not just the money. There was I'd say an undertone of this was old NASA, old bad NASA too. That's the way it came across. We're going to do new ways. It's like okay, all these people that have been working their ass off. It wasn't just a money thing, [it was that we had been doing something bad. Our work was characterized in a very negative way.] That was really really hard.

I thought it was inappropriate, my opinion. The Program was here, so Hanley was still the Program Manager, and I was running Orion, and then Doug [Douglas R.] Cooke was at [NASA] Headquarters [Washington, DC]. Headquarters was so—what would I say? There was so much churn at Headquarters over this. Remember, we were still flying out the Shuttle. Gerst [William H. Gerstenmaier] and those guys with Station still flying were very busy, and all this is going on.

I felt like we really didn't get any help. I didn't feel like Headquarters could help me. I thought Doug Cooke did everything he could, but they couldn't really tell me what to do. What do you do next? Other than hey, "Just keep doing your job, and we'll work it out." That's good.

The night of the 1st I called an all-hands for our team the next day so we could talk about what we had heard and what the team should do, because we had to come up with a plan. What do we tell people on the 2nd? It's like okay, there's all this stuff, some of it is very negative.

What do you do tomorrow? We had to do that on our own. Jeff and I talked, and he had one for his team, and then he came. Mike [Michael L.] Coats came and supported our meeting with the Orion folks.

We had all the different Centers tied in on the phone in Building 17. We walked about what we know. Here's what we heard. Part of the message was fairly clear. It's the best we could do. Said, "Look, this is part of the political process. This is the President's proposal. Congress clearly doesn't agree." Congress threw a fit because no one told them either, which I can't imagine why somebody thought that was a good plan. They were furious.

We're like, "Okay, look, we're in the middle of this political process. I don't know how it's going to end up, but we have a job to do. We've been given money to do work. We need to keep moving on that work." Which is good at the beginning. That works at the beginning. I'm trying to think.

ROSS-NAZZAL: There was an effort to introduce a plan B by Mike Coats that was talked about in the press. Were you involved in all that?

GEYER: There were a couple of plan As and plan Bs. I don't know what I should say actually. It was a very weird time. I think people felt like there was a big void in the President's plan going forward. What did they want to do on exploration? If you looked at the budget, it was mostly commercial crew to Station and technology. There was no exploration in that plan. None. If you're a believer that the commercial guys are going to do everything and we're just going to do technology work, then I guess you could call that a plan. It just looked like a huge chasm. It's like, "They don't want us to do anything."

I think there were people, Center Directors and others, who felt like "Look, okay, you don't like Constellation, but there should be some kind of plan, maybe Shuttle variant, maybe ELVs [Expendable Launch Vehicles] maybe something. We should be exploring space, so can we restructure things and do it differently?" I know some of the Center Directors talked, and I supported some of those discussions. The problem was it was so politicized back then that any discussion that there was a plan B that looked anything like Constellation was like a third rail. You couldn't talk about it. I felt that the atmosphere was poisoned back then. Really, it was very stressful.

I remember there were discussions. I remember Charlie saying, "Hey, there's no plan B." I don't want to get in the middle of that. But I would say people were certainly trying to find some middle ground, and there was a point where I felt like really at some parts of [HQ], they did not want to hear any middle ground. That's the way it felt, to me. It's like, "Shut up and operate the plan. I don't want anybody talking about any other plan." We were like, "I don't know what the plan is, so that's going to be hard for me."

The only plan we had really was what we were appropriated to do. Congress is the only ones who can appropriate dollars, and they had appropriated dollars to build Orion. By law we were required to spend that money on Orion. It wasn't long after this I think—two things happened in the early spring. Congress was furious, in my opinion. They could not get clear answers out of the President's folks about what the plan was. So they were nervous that those folks were going to make us spend Orion money on something else, and they said, "We're the appropriators. You can't do that." They sent the IG [Inspector General] down to watch us, even though we were just doing what we were told to do. We were doing Orion. So we had no problems with the IG. But here we are in the midst of getting slapped upside the head and

putting a plan together ourselves, and the IG came down to make sure we were spending the money right. It was funny. I wasn't worried about the audit because we were doing exactly what [we were expected to do].

Something else happened in April. We're given a certain amount of money. February is like three months into the fiscal year. We still had a lot of work we could accomplish on Orion in this year, and we thought the best thing we could do was keep building hardware. Headquarters changed policy in April. Some of them would argue that there was no policy before, and so they needed to have one, but it depends on how you look at it.

They changed a policy we had been executing for years, which said that the contractor—in this case Lockheed—is at risk if the contract is terminated. They should hold back enough money so that if the contract is canceled the contractor has enough to close out its contracts and doesn't have to come back to the government for any money. That's like $250 million. They're saying, "Hey, you guys have to do that. You better read your contract." So Lockheed is basically ordered to pull out [that money].

People argue with me, but we scared the hell out of them and said, "If you get canceled," and here's the President's side saying you're going to get canceled, "you better be able to protect yourselves for your termination liability, and that's $250 million." We had to show that they did it. So we basically took the budget for '10 and pulled out $250 million and said, "We're not going to spend it this year." Here Lockheed is ramped up, they got all these people, they're buying all this hardware, they had to cut it by $250 million to meet this new rule. Again others would say we weren't meeting the intent of the law in the past, but we've been doing that ever since I've been at NASA. It's debatable by some. So we got whacked another $250 million in

the middle of the year. Lockheed had to stop procurements, and they did some layoffs too about that time.

There's a period of time, and here we were about two months in, where the team will keep working if you say, "Look, we've been told to keep working, and we believe it's important." They'll keep doing that even if the bosses in Washington are telling them, "You're on the wrong plan." They'll do it for a while, but there comes a point where you need to give them a better focus, something that is more near term. They're human. Also give them something they feel like they can help contribute to have an impact on this debate.

Lockheed is really good actually at sensing this kind of thing. They came up with an idea and worked with our guys to not just keep them working on the generic Orion, but let's work on a streamlined design. Not changing the design, but deciding to fly—not flying all the systems, but flying fewer of the systems, but still being able to fly people, so we could fly earlier even with this reduced budget. You try to keep something in front of the people. We called that a Block 0 Orion, which is basically a streamlined version that would go to ISS [International Space Station] and could fly earlier.

Now this team has a challenge in front of them. Let's get the costs down. Let's scrub content. We'll fly Orion earlier. It gives them something to focus on. Maybe that'll be enough for people [in DC] to go, "I want that thing; I want Orion." We did that first in the spring and summer of '10.

Then a lot of people forget that we actually flew Pad Abort 1 [PA-1] in May of '10, which was a huge test for us. It's a very difficult test. We'd been working it for a long time. I actually had to go to Washington and convince Charlie to let us fly this flight test, because again in their mind Orion didn't exist or it was going to go away. I had to show why we thought it was

valuable to anybody. Why was this test data good for anybody, whether Orion existed or not? They finally approved it. When we flew the flight in May of 2010, I remember there were only two Headquarters people that came to the launch. One was Bryan [D.] O'Connor, and one was Doug Cooke. It was like we were on our own. First of all it's in New Mexico.

ROSS-NAZZAL: Out at WSMR [White Sands Missile Range].

GEYER: It's out in the middle of nowhere. We had two people from Headquarters. The rest of Headquarters just ignored us. It's a thing that's happening. We had three press people come. I remember we had a press event and we were supposed to have five people come, but there was a dead [body] found on a track somewhere near WSMR, so three of the news organizations didn't come. That's the way it was. I remember that. It was so weird.

The test itself was just incredible. It worked perfectly, so the team was jazzed. They were very excited, and it really helped our team. I remember looking on the Internet and other places and hardly even a blip. It's like okay. The environment is tough. I contrast that with EFT [Exploration Flight Test]-1. I know Kennedy is different than New Mexico, but everything else was totally different; it was just like another world. People forget. In the middle of Pad Abort 1 was all this stuff going on.

We did Block 0. We were again on our own. The Constellation guys, Jeff was doing his best to hold things together in a very difficult environment. He fully supported our approach to do Block 0, because it was cheaper. It could be faster. He completely recognized that was a good idea. It was in that summer. I can't remember if it was August or not, maybe it was earlier, that Jeff got relieved of his job. It was partially around this term liability thing. He did

such an awesome job of not taking the bait and being bitter and arguing with the people in Washington. He was always trying to say, "Hey, what can we do to help? Is there a way we can restructure this to help you?" He was awesome. He was very good at supporting all the programs, all these poor people that were worried about their jobs. In the end he got frustrated with Headquarters on this term liability. He didn't think it was—well, I won't speak for Jeff.

He made some comments about how—I can't remember his exact wording—but it pissed him off enough. They said, "You got to go do something else." They relieved Jeff. That was hard. I don't know that I was ever worried about my job. It's different than what we're talking about. I didn't feel like I was going to be on the street. I don't know, I don't know, but you work at a job, and you came here to NASA to do something, now Jeff is basically persona non grata, he's gone. So I'm worried about that a little bit, but on the other hand when he got relieved I was actually more determined to keep this thing going. I don't know. I was really upset when they asked him to leave, but I figured it would happen eventually. I figured we were all on that track. We were all going to be relieved eventually.

ROSS-NAZZAL: I understand you went around though and encouraged everybody, raised morale, "We're moving forward."

GEYER: Yes, that's a good point. Actually I think it was Mark [A.] Kirasich's idea. The thing about Orion is we have people at nine Centers, and Lockheed has facilities and subs [subcontractors] in a lot of different places. We knew it was really important to get out to the sites and talk to them. They could hear it from us. The message was pretty simple, said, "Hey, the political process is working its way out. We believe that what we're doing on Orion feeds

forward for any exploration plan. The work you're doing is valuable for engineering and technology. We're being told to keep going by Congress."

The longer we lasted, the more that people were going, "I think this has got a shot." Often when a big thing gets canceled, it happens pretty quickly, but we went months and months. Congress was so pissed.

That was really important. Actually what we did when we went out, I remember Ames [Research Center, Moffett Field, California] was one of the first ones. Kirasich suggested, "Hey, maybe we should go see Pete [Simon P.] Worden." He was the Center Director. Pete is not a real big human spaceflight guy. He's more technology [focused]. I always liked him. I respected him, but he's not really [into] human spaceflight. It was a great idea because we got to have a conversation with Pete about what he was hearing and his vision of spaceflight, which is not necessarily Orion. But he had some ideas. It really started a dialogue where we could stay in sync.

There's some point as to whether he trusted us that as we were working through this we were going to keep his people in mind. Then we did that with [Marshall Space Flight Center Director Robert M.] Lightfoot, we did it with [Kennedy Space Center Director Robert D.] Cabana, we did it with—it was [Center Director] Woodrow [Whitlow], I think, at Glenn [Research Center, Cleveland, Ohio]. [Center Director] Lesa [B.] Roe at Langley [Research Center, Hampton, Virginia]. We'd see their people and then we'd sit down with the Center Directors. So that was really really huge. It was good for me that they were going, "Yes, you guys are doing a good job, keep going. We support you guys."

When the budget cuts continued to come, then it was a way for us to have a dialogue, and there was a trust between us. I remember one particularly difficult time where we actually laid

off—I think we laid off 3,000 people. A lot of them were in our building, in 17, people we worked with, but it was happening across all the Centers. I remember we walked through [the Ames cuts] with Pete Worden. His main thing was, "Are you treating Ames fairly?" So we showed him. It was honest. We showed him what we cut at JSC, and he wanted to see the percentages. It's one way to talk about it. You could see that Ames actually percentage wise was coming out better. They were still getting hit.

I remember him saying, "I really appreciate it." At the end he says, "We're with you," which was huge. I remember him saying that to me in the middle of all this crap, and I think, "Wow, that means a lot, coming from Pete." That was really big. It helped me. I know it helped the team, but it helped me a lot too. That was really good.

Then the authorization act came out where Kay Bailey [Hutchison] and—

ROSS-NAZZAL: Was it [Bill] Nelson?

GEYER: Yes, God, I can never remember, because I met the guy actually several times. [Richard] Shelby and all those guys, they came up with this plan. It was basically hey, we need an exploration plan, and here's what it is. If you remember, that was a really big day, and I remember getting called by somebody I knew. I was on vacation. I'm in a restaurant, and they called me and said, "Hey, this is going to get passed tomorrow. This is what it says." I said, "Okay, cool."

It had a thing called MPCV [Multi-Purpose Crew Vehicle] in it and a thing called an SLS [Space Launch System] in it. It was an attempt to say, "We're going to keep exploring." That was huge. The interesting thing is that originally I assumed that MPCV was Orion, and it would

be simple. That was not the assumption at Headquarters, so we had to go to Headquarters over a period of several months. This would have been late ’10, early ’11, to show why we felt Orion met the requirements of MPCV, and why it made sense not to stop the Orion contract and start a new MPCV contract.

That was a good lesson for me because it seemed obvious to me when I looked at the requirements and the language, but we had to go back to simple rocket equation kind of things to build it up again. SLS had a really hard job to show what the configuration ought to be for SLS. This was all happening about the same time.

I would say early ’11 we got approval that we were MPCV. I can’t remember the exact date. I have it somewhere. Then we were required to put a budget together, and that’s the budget we’ve been held accountable for since that day. I think I had a month and a half to put it together. Lucy [V.] Kranz did a great job, but there was all sorts of weird constraints on it. It was flat. You’ll see in the charts. It was hey, here’s your money, and it’s flat. No DDT&E [Design, Development, Test, and Evaluation] is ever flat. It’s like okay, I get it; we’ll be flat. Here’s how we’ll do it.

One of the funny things. People worry. You read in the press. Gosh, I read that they’re not going to launch till 2021. We picked that date in 2011, so that’s been our plan since 2011. It’s not like oh, we just had bad performance. When you smash the budget and you cut it like that, you got to spread it out. That’s been the plan since 2011. That’s where that came from.

So that was the really good news, we were in, back in the plan, but we had a very challenging budget. The target date at that time, if I remember right, it’s coming back to me, was we agreed with SLS that we could launch in 2017. We felt like with the budget we had in ’11, we could be five, six years away from launching an unmanned flight.

Remember, Orion originally was in ’14 and then ’15. It was a couple-year delay based on the fact they whacked our budget. We said ’17. That’s where that date came from. That was great. Huge news for us. New rocket so a lot of our requirements changed. Not a lot, but there were environments changes from SLS and other things, and we were no longer going to Station at all. That was a big change. Now we’re just going to deep space around the Moon. So there were some requirements changes, not huge.

But still we looked at it, and we go, “Man, this is five years from now.” This team is pretty tired, working hard. It was clear to us that we really needed a near term milestone to keep the team excited, and we really thought it would be important for the country to show progress by having a launch. That was really our rationale, that it could save the Program if we were launching.

We came up with this idea, and again I’ll credit Lockheed with the specifics. We came up with the idea of launching the crew module [CM] basically, which we felt we could get ready and do a very high altitude test. We felt like we could do it in 2013. In late ‘10 I think we proposed that we could launch in 2013.

But we needed an ELV, and we needed approval to do it. Make sure I’m piecing the right pieces together. It made a lot of sense here, and technically it made a lot of sense too, because if you can fly more often and test your systems rather than just doing more analysis and building the full system, you can actually reduce a lot of risk. It’s better to fly and test, fly and test, than try to get it perfect and fly once, so it made a lot of technical sense.

I got in trouble originally for proposing the idea. Actually Lockheed, who did a great job, they came out and talked about it early as, “Hey, here’s an idea,” which I thought was perfectly reasonable, but Headquarters didn’t like it. They didn’t like Lockheed talking about it.

I remember I got called to Washington to a meeting. It was with Lori and Gerstenmaier, Doug Cooke. I think those were the principals, those were the key guys. Of course I had talked this with Doug. He knew what we were trying to do, and Gerst also. Lori was very upset about what we were working on, and she asked, "Who has been working on this?" I said, "Well, I've been working on it, and here's why I think it's a good idea." She says, "Yes, I know you've been working on it." Her real intent was to push on Doug and Gerst for having worked on it. So she got pretty mad at them. That was the environment; there was really not much support in Washington for the people who were going to finally decide.

ROSS-NAZZAL: What was Charlie's opinion?

GEYER: The one time I heard from Charlie on this issue he was upset that Lockheed had really gotten out in front, I think, that it looked like a Lockheed thing. My sense is he felt like Lockheed was pushing for more money, when it was a sensitive political time. I knew he was upset about that. That was my sense, but I never talked to him directly that I remember. I would not have talked to him directly.

It's funny, I got e-mails and I had conversations with Mike Griffin maybe once every three weeks about something he wanted me to do on Orion. I think in the first three years I might have talked to Charlie twice. It's different, just different. It's different how they manage. That was fine. I understand it's different.

We really felt like this was the right thing to do. We did it in pieces while we couldn't get full approval. The first thing we had to do was restructure the crew module work to basically focus the crew module work not on everything to build the perfect crew module for '17 but on a

test flight crew module I would say. We could use that crew module for either an EFT-1-like thing if we ever got approved or an ascent abort test, this AA-2 that we're working on now. It applied to both.

I put in a contract mod [modification] to restructure the crew module for this test flight CM, but I had to get that approved, and we got that approved. That was early in '11. We got that approved. So that was huge because that was most of the work. I had to get the team turned around, so that got approved, I wouldn't say under the radar, it was open about what it was, but it wasn't overtly an EFT-1 thing. I had to do it to make EFT-1 possible, but I would also use it for AA-2 if EFT-1 was never approved, so I was honest about that.

That was something I had to do, stick my neck out. "Hey, I'm going to do this thing." Gerst had to approve it. Gerst had to justify it, because by that time Doug had retired, I think. Gerst had to get it approved. He did, he did. It took us another nine months to get the rocket approved.

We had this rocket idea. So I have to get a rocket [for EFT-1]. SLS was not very supportive, not because they didn't think it was a reasonable idea, but they did not want themselves to pay for it. They had their own problems, they're starting from zero building a new rocket. They were afraid that if we got this approved the money was going to come out of SLS, so they said, "Fine, but don't take it out of SLS." I understand that completely, because they were starting from zero.

It used to be OFT-1. It was Orion Flight Test-1. Then it was a discussion we had with the team, and we worked with [Daniel] Dumbacher where we said, "Actually this is an exploration flight test because there's ground ops systems like recovery we're going to do.

There's actually this interstage adapter that SLS is going to build that's exactly like they're going to fly on EM [Exploration Mission]-1. And then of course Orion has a lot of work in this thing." It really was more than just Orion, so we named it Exploration Flight Test-1. So that helped a lot. Then the environment got a little more positive, and we were able to get it approved in the late fall. By then we were clearly not in '13. We weren't going to fly in '13, but we could fly early '14.

That's how it was. I remember there was a time in that summer I thought we'll never get this approved. But we were working [hard]. That's part of what you need to do. You got to have a vision, then you do the things that you can do today that keep it enabled in case things change. And it worked.

Then the hard part, once we got it approved then, was actually executing the plan. It turned out that when we got EFT-1 approved we took reserves out of the EM-1 plan to make that happen, and we pushed the AA-2 flight past EM-1. That was part of what we had to do to make it work. It put a lot of pressure on EM-1. It wasn't long after we'd gotten it approved that I knew we weren't going to make '17 for EM-1. That caused some consternation I know at Dan's level, although I think Gerstenmaier understood it.

It's hard to explain to people. They just see EM-1 moving, but if you look at EFT-1 the amount of risk reduction we ended up doing on that flight, most of the risk reduction was actually prior to launch. It was getting the factory ready, the subcontractors lined up, and then the design issues we found even before flight that if we had not done, we'd be on our happy [clueless] way to a '17 launch. We'd have a heat shield that didn't work, and we'd have software that wasn't going to work. All those delays would have lined up with everybody else waiting for us. That's the [hard] part. People know it, but they forget it.

That [benefit] was [much] more than just the fact that [Orion worked great during the flight test]. We learned so much getting to [the flight] that now we've taken 1,000 pounds out of the crew module for EM-1. All these things we wouldn't have learned if we hadn't built the first one on EFT-1. Wow, this one is heavier than I expected. Here's why. Oh, now we understand the loads better so I can take that out. Here's manufacturing things that looked cool when we did it but now it's actually hard to make, so we got to change tooling. All those things we did to go from EFT-1 to EM-1 were huge. They wouldn't have happened if we hadn't flown EFT-1.

Now EM-1, if you look at the Lockheed progress, they held the pressure vessel to the same date for two years. In a year and a half we've only moved the delivery date to Kennedy by 14 days. A year and a half, which for human spaceflight programs is really incredible. Now ESA [European Space Agency] is a struggle. It's their first time. They're learning what it means to go to deep space compared to low Earth orbit, and they're struggling with some of that. They'll do fine, but that's going to be the pressure on EM-1. Anyway, that's why. Those are the technical reasons why it made a lot of sense.

Emotionally when it actually launched and worked—I talked about PA-1 where we were just there with two guys from the New Mexico news and Bryan O'Connor, who was huge. I have so much respect for that guy for coming to that launch in the middle of all that. He was just awesome. But then EFT-1, we were everybody's buddy.

ROSS-NAZZAL: That was a big deal.

GEYER: Oh yes, [Barbara Zelon (our external communications person)] and PAO [Public Affairs Office] did awesome. All the video and how they got it out. Then the reaction. I never would

have expected that compared to where we were on PA-1. It was like night and day. That tells you what launches can do for you, especially if they work [well]. This was almost perfect.

That was a huge day. At that time I was thinking about February 1st of 2010. I thought about that [day in the context of EFT-1] and how well it worked. I didn't want to say that at the press conference, but I certainly thought about it. All the people that worked so hard and that hung in with us when we went through that. It was a really really big deal. Trying to think what else would be good to say. There was a lot about EFT-1 about how we tried to do some contracting differently that a lot of people forget, to save money.

ROSS-NAZZAL: Can you talk about some of those affordability initiatives you came up with?

GEYER: Yes. So I really wanted to get the ULA [United Launch Alliance]—this is the rocket guys—cost and the Lockheed cost down for the flight, because crew module is pretty expensive. It's a first development. It's a very dense piece of equipment, and we'd been working with them a long time.

The stuff that was only going to happen once, which was the rocket and the integration with the Delta IV, I wanted to pay [as little as possible] for that. I wanted it to work, but I didn't want to pay a lot for it. We actually came up with this idea, we called it "buying data." I don't want to buy a certified launch on a Delta IV Heavy. I want to tell Lockheed, "Here's the objectives that I want, and here's the data I want from the flight. I will let you use our Orion that you're building for me, this Orion capsule, I'll let you use it. You instrument it. You put it on a Delta IV. You integrate it. You go figure out how we're going to take the data, how we're

going to reduce the data to get this information I want. I'm going to buy data. Here's the objectives. Go do it."

It was a different way of coming in as opposed to us managing the whole launch and us doing the integration and us going and buying the rocket and having LSP [Launch Services Program] certify the rocket. Who knows what we would have paid for all that? It wasn't things I cared about. I'd say, "I want it to work, but I don't want to pay for all that other stuff."

Lockheed, they integrate payloads all the time. That part was very low risk. The rocket, ULA does an awesome job. They're not real real cheap, but they also have high quality. So I was confident they could integrate Orion. It was the heaviest thing they'd launched. It had different aerodynamics, so there was some work there that was new for them. What we agreed to with engineering and with LSP was that we would only focus on those things that were fundamentally different. There were wind tunnel tests we had to do with this new shape, and there was guidance and navigation algorithms that were different that LSP did some independent look at. Those are the only things we really delved into.

Then LSP could have certified this rocket for me, but we agreed we didn't want to pay the money for that. I had to get Ralph [R.] Roe and Gerstenmaier to agree we didn't want to do that. They were cool with it. LSP gave me a rough look at the engines and other things, and that was about it. We took some risk there. If it had blown up they would have gotten all over me. "How the hell can you do that? It's a huge launch." But you have to take some risk somewhere. We got a really good deal on the Delta IV Heavy and the integration. We were able to do a lot of that in a fixed price contract too. The more you can do, [the better].

It was some innovative contracting mechanisms and techniques to try to not pay money for things that are not fundamental to the work of Orion. That was a big deal. Those are the biggies.

ROSS-NAZZAL: What were your feelings that day after it was all done? Certainly there were tons of interviews that day. There's videos of you being interviewed by NASA PAO. But what were your feelings? What do you remember from that day?

GEYER: I couldn't stop smiling. I remember that. It just was a really really incredible feeling. I remember [my ISS experience] when we had worked so long with the Russians. There was a time in '96 we thought the whole Station was going to get canceled again, because the Russians didn't have any money. We gave them some money and other things happened. I remember when FGB [Functional Cargo Block, Zarya Module] launched, and we docked with the Node [Unity]. That was a really big day. That was one of the most fun exciting days I can remember. EFT-1 was different because of the struggles [we went through] and because of at some point feeling like we were on our own. You know what I mean?

It's one thing when [the work is hard, but] everybody is supporting you. There was a point where we felt like we were by ourselves. When it works, there's a little bit more satisfaction I guess. I don't know how to say that.

ROSS-NAZZAL: Isn't there that phrase? The best things in life are the things that you have to struggle for.

GEYER: That were hard. Absolutely. Yes, I think that's true. It made it a lot sweeter because of how bitter things were for a while. I know how that feels. This feels a lot better. That was good.

My favorite memory, my family got to go. My wife and my boys got to go to Pad Abort 1. That was nice. They were young. My whole family got to go on EFT-1. I would see them every day. I went to a couple of gatherings with people, and that was fun just hanging out with people. My favorite moment was we went to dinner, just the five of us, and said a prayer. We were just really really happy. That was really fun. Because they were there, and they were there when it all went to hell.

I don't know if I told you the story. On February 1st, [2010], the evening of the 1st, I go home, and I'm in the den. My daughter is on her computer. I don't know how old she was. She was maybe middle school. I'm talking to my wife, "What am I going to do tomorrow?" My daughter says, "Hey, my friend just texted me that Orion got canceled." I'm like, "Oh, crap, I didn't tell the kids." Here I was consumed by this thing. I was like, "Oh my gosh, okay. Well, here's the deal." Had to sit them down, talk about it.

My daughter, she says, "Well, in your meeting tomorrow," it's funny how kids are, she's in communications [as a career], so she also has a sense for these things, "You should play this song." It's "Three Little Birds" by Bob Marley. It's about everything's going to be okay. So we did. At the all-hands [on February 2nd, 2010,] we played the song. It's an innocent [view]. People, look up, it's going to be [okay].

I thought about that too on that day, after all that. That was a good [idea]—focus on the right things. Yes, so that was a big deal.

ROSS-NAZZAL: That's something that people don't consider when they're looking at overcoming challenges, the impact that it has on your personal life as well. That obviously must have had a big impact on your family.

GEYER: Yes, it was hard for them. I go back to work every day, and I'm trying to do something about it. They're just at home going, "What's going to happen to Dad? He's working on this thing." Yes, in some sense it's harder for them.

That was just awesome. The ego part, their friends are just like, "Wow, your dad does that? I saw your dad on the news." That's fun. That doesn't last too long. I've been there too. Pretty soon you'll be on the news for something that's not good. That's cool too. A lot of their friends came to the launch, and they were excited. That was just a really fun day.

But now I don't know what's going to happen; who's going to win [the presidential election]. Even depending on who wins, I don't know that either one of them really cares about NASA. You could look historically on either side, you've see things that weren't necessarily positive for us. Even though Orion succeeded on EFT-1, we have a ways to go. If you're not a supporter of that kind of thing, you can find reasons why you want to stop something. I worry that that's still possible. It'll be an interesting year.

ROSS-NAZZAL: We had talked with someone over at Lockheed. They had mentioned that some of the players that were naysayers are back in play again.

GEYER: They can be. I think they won't have the same role, but they could be advisers. Then the question is what's Congress look like again too. They're different. It was interesting that we had Senator [Ted] Cruz here yesterday, which surprised me.

ROSS-NAZZAL: Yes, I heard a little bit about that.

GEYER: He came specifically to talk about space and about JSC and about transition. It's interesting to be up here on the ninth floor too and to see how you interact with Headquarters and Congress in a time like this. There are rules. What kind of messages Ellen can and can't talk about is really interesting. Still figuring that out.

Here the [Orion team has still] been working [very hard]. It's not like they put their feet up after EFT-1. They've been killing themselves to get EM-1 out. Like I said, they've been really doing a great job. Here they are now. They got ESA to work through, which has been a challenge. I don't think people realize how complicated it is to work with a partner; how much time it takes from the management team, because your whole interface is at a much higher level now. Where if it was all Lockheed then the integration headache is Lockheed's, but now you pull out a piece and give it to ESA. Now the integrate headache is at the higher management level. Kirasich spends a lot of his time talking to ESA. I don't think people realize that.

There's a lot of extra stress on that, and then there's a transition coming. So this team has been smacked upside the head a few times. It's natural to have a twitch.

ROSS-NAZZAL: I think I'd be a little gun-shy as well. We talked about so many of those obstacles that you faced. If you had to pick your greatest challenge while you were working on this effort, what would it be?

GEYER: I would say it's not let your personal feelings dominate the fact that you need to provide a positive vision for your team. I don't know if I said that right. You may feel a lot of things like anger, hurt, [and] irritation. When you speak to your team, when you put a plan out, you need to really focus on—people want a positive vision. They want to succeed. They need you to give them that vision.

I'm a sarcastic person by nature. It's easier for me to make fun of Headquarters, "This is stupid and did you hear what they said." You can't do that. You cannot do that when you're the boss. At least you can't do it to other than just your friends. You can't do it to your own management team because they're dying too. You have to put things in a positive light.

Even if I fundamentally disagreed with the approach of the new administration, I had to say, "Look, we don't set policy. That's what they get paid to do. They get paid to set policy. I don't get paid to do that. But I feel like there's still a debate, a dialogue, on what the details of the policy should be, and I want to make sure that we support that. I think our work here is doing that." That kind of thing. … I'd say that's the hardest part. You got to be careful of your own stress level and your own way to release that. You know what I mean?

You have to do it. No one else is going to do it. You have to do it. I thought Jeff [Hanley] was always very good at it, but then they took him away. Doug, he had other things; he was consumed by that. Bill was busy with Station. There was a point where it was just us. I felt like we had to do that.

I really relied on people like Kirasich, who had some of these ideas. "Look, I think we need to go out, talk to these people." People like Lockheed, who said, "Hey, here's an idea of how to focus the team." I didn't come up with those, but I could tell the ones I thought would work. "Oh, I think that one will work, and I think I can sell that one." But they often generated the ideas. That was the biggest challenge.

It was obvious to me it was critically important, but it was hard for me. It was hard for me. I had always had bosses who usually did that part. Then my job was just translate that part to the team, go, "Here's what I think they mean." But up here, you can't make any sense of it, then you're like, "What do I say?" I can't say, "That's just stupid, and I don't know what to do." You can't do that. That's not going to help anybody. You had to put it in a context, even if you don't know. Not "Well, I don't know," but "we're going to do this today. We're going to check, see how that works." That's okay too. Be honest with the people. I don't have trouble being honest. To me, when you said the hardest thing, the hardest thing was creating a positive forward image. We were on our own. Having to do it ourselves, that was different.

ROSS-NAZZAL: Is there anything that you would point to as your significant accomplishment in working towards EFT-1?

GEYER: I think it was providing a steady, calm vision. That's what people tell me. That was the role that I provided. Yes, all the stuff is going on, cancelation, term liability, Doug leaves, Jeff leaves. All the stuff is going on. "Look, we're on this plan today. We're going to do what we can do," was very helpful. That's what people tell me. The calm positive vision was really important to them.

They did the work. They did the work. If they hadn't executed the plan it wouldn't have mattered what I did. If Congress hadn't passed the authorization bill none of this would have mattered either. It still would have been canceled. I got to recognize that too. Some people say we saved Orion. I say, "I don't know. We didn't save Orion. Congress, the authorization act, saved Orion, but I think we could have screwed it up if we'd done a bad job." If we said, "No, we're only going to do what we always did. It's going to take forever, and we're not going to try hard to get EFT-1, we'll just launch in '18." I think the whole thing could have gone down the tubes. I think we did a part of it, and this team did a good job for the part we could do, I thought, yes. That was very satisfying.

I do struggle with worrying about the legacy in the long run if something happens to Orion, but I have to let that go. I can't control next year. I can't control five years from now. Who knows? I think we've just got to recognize what the team did in that environment, which is good, important.

ROSS-NAZZAL: I imagine it's one of the proudest days of your career.

GEYER: Oh yes. I don't think there'll ever be another one like that. I can't imagine. I hope there's nothing as painful as 2010. It's hard for me to imagine you'll have as high as 2014. Yes, I don't think that'll ever be the same. That'd be fine with me. If other things went and they were easy, that'd be cool.

ROSS-NAZZAL: I think we've touched on a lot of the themes that we were looking for in the Project. We appreciate you sharing those details with us.

GEYER: Thanks for asking. The way you asked me made me think of it in a different way. Some of it is still emotional. It's funny, it's been so long. But still I can feel it.

ROSS-NAZZAL: I have no doubt that it is. It's probably still there in your heart and in your mind.

GEYER: Yes. I got to watch this year not to get too tied up in that. I got to do the same thing here that I did there, for the Center. "Let's do our job. Let's figure out how to make sure the messages are accurate. We don't set policy, but let's try to influence as much as we can." We'll see. We'll see.

ROSS-NAZZAL: It's trying times, that's for sure.

GEYER: Yes. Thank you. Appreciate it.

ROSS-NAZZAL: Thank you again.

[End of interview]