

NASA HEADQUARTERS ORAL HISTORY PROJECT

EDITED ORAL HISTORY TRANSCRIPT

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INTERVIEWED BY SANDRA JOHNSON
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JOHNSON: Today is June 29th, 2021. This oral history with Kathy Lueders is being conducted for the NASA Headquarters Oral History Project. Ms. Lueders is speaking with me today by telephone from Washington, DC. The interviewer is Sandra Johnson and I'm in Houston, Texas. I want to thank you for talking to us again. I know you've done this once before. When we talked to you before we talked about your background and how you started at NASA and where you came from. But I believe you were still the Deputy Program Manager for the Commercial Crew Program at that time. Let's just briefly talk about some of those projects you were responsible for in that six to seven years leading up to your job now as AA [Associate Administrator] of HEO [Human Exploration and Operations Mission Directorate].

LUEDERS: I'm not sure exactly when we transitioned, but I was Deputy Program Manager for the Commercial Crew Program and then became Program Manager for the Commercial Crew Program. I think it was April of 2014 that I became Program Manager of Commercial Crew Program. Then I was Program Manager for the Commercial Crew Program up to being assigned as AA for the Human Exploration and Operations Mission Directorate in June of 2020. That's really just one long place, and then been in HEO for the last year.

JOHNSON: Some of those projects you were working on, for one thing right at the end of your tenure there at Commercial Crew was the Demo-2 crew test flight for SpaceX's Crew Dragon. It

launched just right before you became AA. Talk about that project and that program and what you were doing with that.

LUEDERS: The Commercial Crew Program was really a unique way for NASA to work on development and the beginning of a services relationship with industry, with a commercial partner. The key thing in the Commercial Crew Program, we were working with SpaceX and Boeing to build and certify their systems to be able to eventually fly crew members to the International Space Station [ISS], our crew members and our international crew members too, to be able to provide a transportation service for the International Space Station.

Demo-2 was the culmination of a lot of that activity because it was the first crewed launch by a commercial provider off of U.S. soil ever. It was really the culmination of all the work and all the processes and everything leading up to that event. But when I left it wasn't just that one event, we were really getting ready to return regular services and get to a normal cadence for crew services to the ISS, and so we had multiple vehicles in flow, were setting up the steady production patterns for that.

I'll tell you one of the things I'm most proud of is after leaving we launched two more missions within a year. Actually with the structure that was set up we were able to, in our first year of operations, conduct three crewed launches in a year. Very proud of the team that was established and continued to execute a very tough mission. A new way of doing business, new role for the NASA team, new role for the industry team, but really what we're hoping to do is to set up this model as a future. If we can continue to do this to some extent, for a relatively lower-cost development, to bring on two commercial crew providers—it was \$6 billion to bring on two

new crew transportation systems, and the relative cost per mission is about \$350 million, so really a very cost-effective method of flying our crews.

JOHNSON: Commercial flight is something that President [Donald J.] Trump was a fan of, bringing the commercial and industry into spaceflight. You'd been involved in that for several years. Let's talk about your impressions of the direction that President Trump wanted to take NASA, and also the impressions of Administrator Jim [James F.] Bridenstine before he was confirmed and then in those early days after his appointment when you were still in Commercial Crew. He wasn't like the typical NASA Administrator because he was a politician instead of a NASA employee, or somebody that was very familiar with NASA. Maybe just talk about those impressions and how you felt about that direction that they were taking NASA at that point.

LUEDERS: I do think it was an interesting change for us to have somebody that came in that had a political background as Administrator. But I also think because he came from a place where he understood how to get support, how to have stakeholder support, how to gear up and be able to also lay a legislative agenda and work through that, which for some NASA people is a very foreign concept, I think it was very helpful between him and also Jim [James] Morhard, because Jim Morhard came from the Appropriations Committee side. Both of them had this extensive legislative experience of how to get things done and how to work the different relationships, and then also understanding how then to go work with the administration. These are very very tough jobs where you're bridging administration goals and legislative goals, the congressional goals at the same time, and trying to find a happy medium between the two of them.

I do think what was also very helpful was Jim's relationship with Vice President [Michael R.] Pence and the [National] Space Council relationship, and with Scott [N.] Pace, who was the executive secretary for the Space Council. Those were all very very very important relationships, and space policy and strategy was very preeminent in Vice President Pence's agenda. Because of that relationship between them, and they also had worked together and had a relationship, getting space in the forefront of an administration agenda sometimes is a struggle and in previous administrations had been a struggle, but returning Americans to U.S. soil was like a mantra for the vice president. Being able to deliver on that promise was a big deal.

But Jim also realized having a key focal area and direction was very important. Even though there was a lot of consternation about boots on the Moon in 2024, I do think the fact that there was a goal and it was an immediate goal also created an immediacy. I think we did within NASA have a goal, but it was over time, and I think what was very important was that the vice president came in and they tried to make it an immediate goal to really have the endorsement of their administration. It's always a tough challenge.

I'd had a similar experience when I was in the Commercial Crew Program or in the development phase of the Commercial Crew Program. Actually under Charlie [Charles F.] Bolden—and it was during the [President Barack H.] Obama administration—we were putting together the goal of returning crew members back to U.S. soil, and we were told we had to have this requirement of flying people in 2017, and for letting the contract and awarding the contract in 2014; to legitimately say you're going to fly something in 2017 is very very tough. But what you've got to do as program manager is understand that the immediacy of the goal is very strong. It's what gets you funding and the appropriations, because there's always this battle over money is scarce and you have to have a very immediate need for your need to be appropriated.

Jim understood that, and the White House understood that. They knew if you're talking about going to the Moon in 2026, you're going to get \$600 million a year, they understood you've got to have this be an immediate goal and say, "I need a bunch of money," and be able to go work it.

The big challenge, and this was a big challenge internally and it was a challenge that I had as Commercial Crew Program manager, is you've got to bridge these big goals that are based on the appropriations with executing your strategy that's ensuring that you're making the right decisions at the right time based on the pace that the hardware is being developed and delivered. Continuing, something that I had to keep saying was we're going to fly when we're ready, we're going to fly when we're ready, yes, this is our goal, but we're going to fly when we're ready, because we're not cutting corners on the safety for people.

Jim supported it too when I came up to HEO, my first news conference, and Jim was there with me, and Keith Cowing [*NASA Watch* editor] said, "Kathy, I want a yes or no question. Are you going to put boots on the Moon in 2024?"

I think I was almost the shortest-lived HEO AA at that time because I was like, "Uh." I said, "You know what? It's always good to have this great goal, immediate goal, to get out there."

Jim came in and said, "Her answer is yes." He saved my bacon. The program manager in me was like, "Uh." He came in yes.

I'll tell you the story because I think it's a great story. Every once in a while, when you're in these jobs—he told me this story, "Kathy, do you remember the Ghostbuster movie?"

I said, "Yes."

He said, “Remember at the end when Sigourney Weaver is up there and she’s turned into that demon and the four Ghostbusters are there and she looks at each of them and she looks at the Dan Aykroyd character and goes, ‘Are you a god?,’ and Dan Aykroyd goes, ‘No,’ zap! Then Bill Murray is there and Sigourney Weaver’s character asks Bill Murray, ‘Are you a god?,’ and he goes, ‘Oh yeah, I’m a god?’” Jim told me, “If anybody asks you again, ‘Are you going to put boots on the Moon in 2024?,’ you say yes. There may be a small probability you’ll be doing this, but we’re going for it.” That was my “I’m a god” speech.

But I always said, and he always let me say it, “We’re going to go when we’re ready.” You’ve got to run. If you’re not running fast and you don’t know where you’re going, you’re not going to get there. The story will get spun a little bit differently in this administration, but I think that’s the normal cycle. Each administration has got to own it. I think Jim bridged that for us and created that immediacy. It was really what enabled the Human Landing System Program to make I think tremendous progress in the first two years that they were going.

JOHNSON: That’s a good story, a good analogy. Was this your first experience as AA?

LUEDERS: Very first, two days in the job. My entry press conference.

JOHNSON: Had you dealt with the press much before in the position you were in?

LUEDERS: I had, but it’s more like preflight press conference, postflight, contract awards. When you’re HEO AA it’s just a different rhythm. You do learn part of this is about figuring out what’s the strategy, what’s the story, how do you have continuity. But you also find out, and this

is something that Jim understood, that Congress' timescale and the administrations' timescale are different than the timescales that we are working on at an execution level. What's always a challenge is to bridge that timescale when people are really only touching base every six months and don't necessarily have the development background or understand when you're trying to do things that are really really hard, which is what NASA is supposed to be doing, things don't go perfect, and it's sometimes through the mistakes that you learn the most. It's that bridging that's very important.

But he understood that. There were a few things, but him coming in really quickly and setting that vision and weighing in I think was very important. He really understood that.

JOHNSON: I think it would make a difference to have that ability. That was in March of 2019 that Vice President Pence announced that the date would be 2024. Like you said, we'll get there when we get there. But did you feel that it was realistic? Did you feel that you could move that fast if you had the funding and if you had the support that you needed?

LUEDERS: I think people realized it was so challenging, but it was interesting to see what a big difference two years meant. Hearing it from the vice president, people really were moving. People put together a procurement instrument in six to seven months. That team that was working HLS [Human Landing System] hit every single one of their milestones in the first two years of the contract.

Just recently when they made the award in March, they were only three to four weeks off of what had been their schedule two and a half years ago. The providers gave us schedules that showed that you could, but I would say it's pretty sporty. You really don't know until you get

that movement going and you get proposals. Everything up to that point is theoretical. What I have seen is that instead of us continuing to ask, “Is that really real or not?” what we instead should be saying is, “How do we realistically get to the next step as fast as we can?” That’s what enables us to maybe have a shot as close as possible to it. We didn’t fly our first crewed mission—it was two and a half years after 2017.

At the end we said, “It’s the very very end, almost 2018.” We flew our first crewed mission in March of 2020. I think there’s a debate going on about we need to meet our deadlines and everything else, but the problem is that we have this political reality that when the president says, “Here’s your date,” it’s really really tough from an administration standpoint to go, “I’m not going to do what the president says,” because that’s who I work for. What we’ve got to do within the administration is be able to then go say, “Okay, how do we take the best out of this initiative to get going? How do we get there? What’s the best way for us to get there?” Understanding that now we have this certainty of purpose to be able to go focus on and get us there. We’ll get there when we’re going to get there, but at least if there’s this alignment and people know that this is a priority, then that’s going to give you your best shot to get there.

I think the worrying, am I going to get there, am I going to get there, is like hey, you’re three years out, what’s the next step, get to the next step. I used to deal with this in crew too, and even in cargo before. We had a delivery date of 2010. We ended up getting there in June of 2011. We did their first missions. People would be like, “Are you going to get there?” It’s like well, first let me get to the next milestone, that’s what we’re working on, the quickest way to get to know if you’re going to get there is to make progress. But we do spend a lot of effort wringing our hands on are we going to get there. It’s like you know what, when you’re doing development, you really got to lay out your plan and then try to get to the next milestone as quick

as possible within your plan, and along the way if there's something that's telling you you need to do something different along the way, you've got to trade it with what you're doing.

But we are doing hard things. I've learned that you can have this beautiful plan. If you have a test failure, you're going to do something different. So don't kill yourself continuing to overwork the out-years. You've got to really work your near term, you got to really make sure you're setting yourself up for the next steps to enable your out-years. But if you keep overworking your out-years you're going to suck up a lot of energy. I think Jim understood that a little bit.

JOHNSON: Let's talk about the transition that was going on in HEO while you were still at commercial crew, and then your eventual move there. Because in July 2019 Bill [William H. "Gerst"] Gerstenmaier was reassigned from AA to Deputy Administrator Morhard's assistant, and subsequently after that he retired. Then that December Doug [Douglas] Loverro took over as the AA. He was there about six months and left because of the issues that surrounded some things he was either doing or not doing. Then you were asked to be AA. Let's talk about that year when HEO was in flux before you got there. I would assume commercial crew and HEO is working relatively close together. Talk about how those changeovers affected anything that was going on in commercial crew at the time.

LUEDERS: It was huge. I had worked for Gerst for 20 years in some capacity, and probably had been talking to him about the last year before flying people again and how we really had to get the Agency ready and I needed his help to get the Agency ready to go fly people again and to get over that step, and then he's gone. He was gone. It was horrific. It was horrific.

Really for the two or three years before, and the great thing was when we knew I was going to have to do this, I was going to have to do it on my own, we'd had a great network, we'd been working with the center directors, we'd been dealing with everybody, continue to keep working that. But what it meant was that the load was even more on making sure that we stabilized things. I will tell you it was a very tough year for us. We had two pretty significant failures. We were dealing with parachute redesign issues, and then after Doug came in too, OFT [Orbital Flight Test-1], our first uncrewed mission of the Boeing mission, luckily, we saved the vehicle, but we had to abort the mission and have it come back.

The problem was that probably if Gerst would have been there for at least the OFT piece there would have been some continuity and we would have worked through it. With Doug being brand-new, it really blew up. We worked through it, but it just made it really really tough. Working through that anomaly and getting ready for the first crewed mission and with a new AA then in that position, and then honestly Doug got removed three weeks before our flight. It was a very hard year. It was a very hard year.

Honestly, if it wasn't for Steve [Stephen G.] Jurczyk and his continuing [as NASA Associate Administrator], luckily, I'd been working with Steve to some level and really been briefing him and had been briefing Robert [M. Lightfoot] before him, and had this group of folks that continued to support manned activity. But it was really tough with Doug coming in because he really was not paying attention to Commercial Crew because he was going to figure out how to get those boots on the Moon in 2024 and this immediate thing, and then dealing with OFT-2, with the OFT failure, it was just in and out.

It was very very tough. They had a really hard time. This HEO job is very hard. They had a really really hard time getting somebody to take the position after Doug. If somebody gets

fired—basically Gerst got fired—guess what, there’s not people clamoring [for the job]. It’s tough. I think Doug came in, Doug had some great ideas, came in new. One of the problems we’d had was Doug came in and tried to change everything up during this period too.

You already have a stressful mission with the folks. We were in the commercial crew area working through. Doug was changing up a lot of the strategy with HLS at that time too, and then redid all the budgets and said, “Money is no issue. The Administrator said I’m going to get \$7 billion next year for HLS no problem.” Really tough year. Tough year just for me and Commercial Crew, but I would say an incredibly tough year for HEO. Very very tough year for HEO.

Honestly, when Steve Jurczyk called me up, I was not thinking this was a great move. I was like, “Being the third HEO AA in a year?” Honestly, after the tough year I had, I was pretty tired. It was a tough year. It was a really really tough year.

I actually said, “Hey, I want to think about it.” Jim [Bridenstine] called me. I thought about the team and talked to some folks and they said, “You know what? We need somebody that’s been here. We need somebody that’s got some constancy. We need somebody that people know and from a HEO perspective have things settle down.” Because it was really really tough.

I will tell you I had that fun press conference two days later, and then this is the other thing. Jim Bridenstine goes, “Kathy, you will have all the money in the world. You have all the money in the world.” Then that next week I had to do my HEO submit to the ninth floor and Jim Morhard is like, “Where the hell do you think you’re getting this money from? You’re supposed to come in in guide.” The honeymoon was over within a week.

I was like, “Okay, here I am, I’m HEO AA. This is going to be fun.” But on top of all this, so on top of missing two, we had COVID in March of 2020, two months before we were

going to go fly. I had to tell my team, “You all need to go home.” Even before the Agency told us I said, “You all go home, because we’re going to have to do this mission different. I want us to practice how we’re going to do it. I want us to do it now so that we’re ready and we’re operating this mission and we’re practicing for this because we will be flying like this in May. We will be flying like this.” We had to do heroics to get crew training done and to make sure we had people, that the crews were safe, and the crews didn’t want to fly. Everybody was just so worried, and we had to just keep everybody going. We kept our launch date; we didn’t move a day. We didn’t move a day.

Then starting in HEO that first, second week in June, under COVID conditions too, and trying to keep Demo-2 going, trying to keep [SpaceX] Crew-1 on track, trying to keep Artemis Green Run [Space Launch System (SLS) hot fire test] going, because we were down for two and a half months, and I had to finish my reorganization that had been in work for two years and to settle everybody down.

I think the fact that I will look back and look at this, and we made it, and then we lost Jim. We lost Jim in January [2021], which to me honestly was a big impact. Steve Jurczyk, I think it was very important that both he and Jim and Jim, it was like a partnership there, and we got through the tough stuff. We got through Crew-1 and we got through Artemis Green Run. I’m really happy I was able to do that for them before they were gone.

JOHNSON: You did walk into quite a lot as you were saying. The scope for the AA for HEO is a lot compared to what you were doing for Commercial Crew. Part of that is you oversee a portfolio of roughly half of NASA’s annual budget. Even though he was telling you you’d have all the money you needed, obviously you didn’t.

LUEDERS: Not enough.

JOHNSON: Those budget changes that you have to deal with as part of this, just talk about that for a minute. As we know, the budget is a constant struggle with NASA in trying to get things done within that budget. It affects the timelines, it affects everything. Talk about some of these things you mentioned when you were talking about what you walked into, the budget and some of the things you had to do, especially if you had to go up to the ninth floor, a couple weeks after you started, with a plan.

LUEDERS: I had to go in with Loverro's plan, and then I had to revise it after I got kicked out. I had to go back and go, "Okay, we got to go work our new plan."

There were a few things that we tackled right off the bat to help things out. One, the team had been covering multiple contingencies and configurations in their budgets. So the number one thing I said was we've got to all agree on our manifest, and get consistency on our manifest, so that I can see if you, as a program manager that's executing, how do I take some of this uncertainty out so that you can optimize your planning for this year to be able to stay in guide. Because honestly, the program managers had these impossible jobs where they were having to cover three or four different contingency positions, and it was just killing them. Having that program manager experience and being able to go, "Okay, tell me where do you need certainty?"

The other thing that I worked with Thomas [H.] Zurbuchen was we had this uncertainty in our manifest for the [Europa] Clipper. I had to go work with my congressional stakeholders.

Their primary concern was we want to make sure that SLS is maintained and we want Block 1B configuration to be maintained. There was a huge battle between OMB [Office of Management and Budget] and the [Capitol] Hill on the Block 1B configuration, and so I had to go tackle that. A lot of people honestly said, “Hey, this is a big issue with OMB, this is a huge issue.”

There was a few issues that people said, “This might get you fired,” that I took on. One was hey, I need to get the Block 1B into the manifest, and I need to get this manifest certainty. Between OMB and the congressional folks, you guys need to understand that OMB, you can keep telling the SLS guys that they’re only going to have \$2.2 billion, but the problem is, appropriators. As long as you have the head of the Appropriations Committee being from Alabama, I’m going to get \$2.6 billion every time. Either I use it to do something good with it or we can keep playing this game where we’re wasting money.

To their credit, they didn’t cap my Block 1B development dollars. They let me go run with it. They let me baseline Block 1B. They let me be able to baseline flying the I-HAB [International Habitation module] vehicle for Gateway [orbiting multi-purpose outpost] on Block 1B. So I had these key things that I had to get agreement on from an administration standpoint to stabilize the manifest so that my program managers had a shot at making it through ’21 on their smaller budget. That’s what I had to do.

It wasn’t easy, and it’s another place that Jim really helped out. It was one of those places where it took collaboration where Jim tried to get the White House to agree to it, but it wasn’t going to happen. But he also knew legislatively he couldn’t tell me this, but we knew the appropriations are the law. If I’m being told by the law to go build a Block 1B, it doesn’t do me any good to just keep having these parallel paths, I need to just go execute on it. He at least let

me have the discussion with OMB that said, “Yes, I know the administration, this is not a popular thing, but we have the reality of the appropriations over the next few years.”

We actually did get the Clipper manifest, and we got language in the Appropriations Committees to clear that up, and we actually did get appropriations language too that cleared up Block 1B certainty and then allowed us to start working the comanifesting of the Gateway elements on Block 1B. And we were able to solidify the Gateway MOUs [memoranda of understanding], which Jim absolutely saw as a certainty too. I really in my first year wanted to make sure that Gateway was solidified. Jim was very good about going, “I’m at the end of my term, I don’t know what’s going to happen, how do I create constancy of purpose going forward?” He was very very good about that.

Huge thing. I tell you in my first year I felt like I hit the lottery on the things we were able to do with solidifying Gateway, solidifying my Block 1B manifest, getting out some of these peripheral payloads that we did not want to fly on Block 1B. Then really the fourth one that I’ve gotten is extension of Station. Huge piece. We actually were trying to do that last fall with Jim but weren’t quite there.

I will tell you one of the things that really taught me about what Jim Bridenstine, Jim Morhard, the integrity they have, and how they were thinking about this Agency. Prior to the [presidential] administration change they were really thinking about how do we keep our mission? We’ve got to keep a consistent missions; we’ve got to keep bipartisan support. They were reaching out to both sides of the aisle to maintain a consistent vision of this Agency because they really felt like that was what was important for us to continue to make progress. They wanted to have this next phase be as constant in purpose as possible so that the Agency wasn’t square waved. From a HEO perspective that’s huge. That’s huge.

We have huge challenges trying to operate the missions that we have in flow, bringing on new ones, trying to get savings in our operations to be able to afford new ones, but it's a tough job.

JOHNSON: Having that continuity, that doesn't always happen between [NASA] Administrators, and between presidential administrations.

LUEDERS: No, and we'll wait, we'll see where we are for this administration.

JOHNSON: Hopefully they'll continue. That's what we're hearing that it will continue. But I know everyone sometimes wants to put their own spin on what's getting ready to happen or what's going to happen.

You mentioned that Doug Loverro was also working on a reorg and you walked into that. I was reading that Jim Bridenstine when he was asked about it said that nothing was going to be done with that until the new person—meaning you—was in place. Talk about that because you worked through that and you did get that reorg going. But was that something that you felt really needed to continue? Or did you make any changes to it? Was it a top priority within the directorate?

LUEDERS: I would tell you what we needed to do was get to an end. Part of the problem was Doug had set it up, and so probably my first three or four months we were dealing with personnel issues that were remnants of an organization that was partially in flow or to an end but wasn't really there yet. The other problem we had was really the Agency didn't have the SES

[Senior Executive Service] head count to even, I don't think, have implemented what Doug had had in mind, because the head count of the Agency is very very restricted right now.

One of the things we had to stop and think about was looking at the goals of the team that Doug had put together, the independent team, and saying one of the key things was making sure people understood accountability, making sure that we had organizational responsibilities defined and cleaned up. Gerst wasn't a great organization person. If you looked at his organization structure it was like spaghetti. He honestly was fine with that. He was like the spider in the middle of the web. As long as all lines went to him it was all good. He could handle that.

One of the key things was to really align the divisions, to me align the responsibility of the program managers with the center directors, and with the division managers within HEO, and make sure we had consistent accountability and responsibilities across the board.

The other thing that was important for me was a lot of work would come into HEO in weird places, and where we were working strategy and architecture was dispersed across the directorate. The one big addition we made was to set up an SE&I [Systems Engineering and Integration] organization at a HEO level so as architecture things came in there was consistent direction and requirements and constancy of what are we trying to do and how that then got worked across each of the platforms. Because really when I stepped back and looked at HEO, it's like we have this goal to explore, then it's about how do you buy down risk across the different platforms, and what you're doing to get ready for that exploration.

That was a big challenge at the beginning, working through the promises that had been made to people and maybe were changed a little bit over time, working through realignment, making sure that the organizations that were left there, we were understanding the

responsibilities and how they fit together and then how things were going to work together. I had the goal, I told Ken [Kenneth D. Bowersox] and Toni [Mumford], I said by beginning of September I wanted to have this organization finalized, to have the team then be stabilized and off and running. We had it done, we had the org [organizational] charts, we had to actually get congressional buyoff on it, and then went forward on the overall plan.

The thing that's difficult too is we're moving away from these big program structures and we're trying to figure out a way to be able to start looking towards as you're doing these missions how you're getting ready across the different platforms. Doug had said, "I'm going to have a big Artemis Program that's managing missions one through three." But the issue is that we needed to have a strategy for how are we going to bring online each of these capabilities, and then how, when we go fly crews, you actually are flying across multiple capabilities. You're flying up on SLS Orion, which are programs, and guess what, you will fly to a Gateway, which is a program, and then you may fly to the lunar surface on an HLS, which is a capability. So really, we're starting to build these capabilities, but because our missions are starting to get so vast, we actually are developing a different way for us to be able to manage those missions across the different mission profiles.

But there's a lot to go. There's a lot to go on this. We're still figuring that out. People tend to be used to the Shuttle Program or the Station Program or these things, and they forget that we did missions with joint Shuttle-Station Programs. We forget that. Actually right now we're doing Commercial Crew and Station Programs together. We are actually doing this kind of model where you pull across different programs and you're following the crew across the way. It's just now we got to take that to the next level.

JOHNSON: It's hard to figure out what all those parts are when it's just being built too, as opposed to something that's already running.

LUEDERS: Yes.

JOHNSON: You mentioned COVID, and coming in of course when COVID was already happening, and having to come into this position with COVID affecting the workforce and affecting a lot of things about the workforce. This is one of them. We're talking over [Microsoft] Teams. All of a sudden Teams became the option for meetings. But you still had deadlines to meet. Let's talk about those deadlines for work on Artemis and how they were affected. Also during that time with different Centers being close to the Gulf of Mexico we also have to deal with storms. There was a lot going on in that first year besides COVID, a lot of natural disasters. Let's talk about that and how that affected those deadlines and the workflow.

LUEDERS: We had seven named storms hit MAF [Michoud Assembly Facility, New Orleans, Louisiana] or Stennis [Space Center, Mississippi]. I joked with [Jay F.] Honeycutt, I said, "If that core stage comes over here and we start having hurricanes in Florida I'm exorcising that vehicle. I'm calling a priest." I said, "I'm calling a priest, because this is crazy." Even a storm in February this year.

I was just incredibly proud of the team, I will tell you, because they were down. They were down for two and a half months. The SLS Orion team was down for two and a half months. I think honestly Demo-2 flying got them going, because holy crap, there they are. Here's a program. It's really hard to build this rocket, the Artemis I rocket, it's a big rocket. But

I think people got a taste of what it's going to be like when we fly when we saw Demo-2 fly. I think talking to Tom, he's like—and when we did Crew-1, people were like, “Hey, we're flying again.” I would tell them, “You fly next. You guys, you're getting ready to fly. You've got to keep going because you're getting ready to fly.”

We started this checkmark chart, and I'd be like, “Instead of I'm worried about where it's going to go at the end, the same thing, just get that next checkmark going, you guys. Realize you got to start recognizing what you're getting done, and you got to take it a bite at a time. ” I tell people we're running a marathon, anybody that runs a marathon that's thinking about mile 25 is stopping. You always hear people talk about that. They say, “I think about getting to that block, and then I think about getting to the next stop, and I think about getting to the next stop.” It's always about these intermediate milestones. Nobody starts off going, “Ah, 26 miles, yay.”

Now it's also a marathon where I'm hoping to look a little bit like a Kenyan, not like me out there. They were really good. We would meet weekly and go through and it would be like hey, how are you guys working through stuff, what are you doing. It wasn't like they didn't have problems because they did. Every time we'd have a storm and you'd have to button up, get back, it's okay, go figure it out, and get started again.

They just really did a phenomenal job. I was so very proud of them that they just kept it going. Even through some really disappointing things. They were very disappointed where they did so much hard work, started that first Green Run, and when it shut down early the team was just so disappointed. I called up Honeycutt and I'm like, “Hey, this is about learning. You did not fail today. You did not fail today. You're going to learn something out of this and you're going to be happy and this is why you're doing this test. You're doing this test so that you can learn something about the next time.”

They found out “Guess what, I got some of my parameters on my ground stuff, my fitters, it’s too tight on some of these things.” They learned some other stuff too. We learned about stuff on the prevalves, we’re changing out prevalves right now getting ready for the next one. I do think it’s getting the team to be able to step up and stop and then go, “We’re going to learn and we’re going to be okay and go to next steps.” It’s very very important. I will tell you they did that every step along the way.

I had the teams together; they were all together. I can’t remember if it was December or January, but the whole ESD [Exploration Systems Development] team was there and I told them, “I know you guys are sitting here and you’re really really worried about flying. Let me tell you a story.” April of 2019 we’d just flown Demo-1, SpaceX. Made it through a very very tough premission countdown, closeout, everything else, very very tough. Mission went great, got the vehicle back, everything was great, we were going, “Whew, we’re going to fly crew by the end of this year no problem.” We go get ready to static-fire the Dragon; we lose it. It’s gone. In seconds it just disappeared before our eyes. My team, I got this phone call that it’s gone. I’m like, “Hey, somebody start the mishap. Call me right now. But we’re going to go figure this out. We’ll go work through this. It’ll be okay. It’ll be okay. No matter what we’re going to learn through this, and it’ll be okay.” And we flew a year later.

I said, “Did I know in April 2019 what it was going to take for us to go fly a year later? No. But you know what, we said, ‘We’re going to go figure this out. We’re going to go figure it out as quick as possible. We’re going to go do this.’ You’re going to do it one step along the way.”

We had huge challenges. We had huge challenges that year before we flew. Sometimes I think some of it is just getting everybody to focus on the really cool stuff we’re doing. You

cannot believe how I was out there with the team in the VAB [Vehicle Assembly Building, Kennedy Space Center, Florida], and just seeing the rocket stacked, and it's like this is the coolest thing ever. They were bringing the core stage over to fit in between the solid rocket motors. They were like, "Hey, you want to be here with us and watch it go in?"

I said, "No, my heart can't handle that. I'll watch the video afterwards. Because I know it's got to clear five inches and I know you're going to be lowering that in with a half an inch on each side between those rockets. Then you have these straps that had pulled it apart, and then you're going to let it go slowly, and then you do the mates." I said, "I can't watch that, it's like watching my kid pull out of the driveway the first time they're driving. Seriously please don't let me see this."

They did a beautiful job. They did a beautiful job. That's the team we have. All you have to do is just keep telling them they can do it.

JOHNSON: And overcome a lot of obstacles on the way.

LUEDERS: It's okay, it's okay, it's okay, it's okay, we're going to get through this.

JOHNSON: You mentioned the National Space Council earlier, and that's one of the things that the Trump administration brought back. What impact do you think that had on NASA and HEO in particular by having that reestablished? You said that you thought that Jim Bridenstine's ability to work with the vice president on that council made a difference.

LUEDERS: Yes, and I think a lot of the credit goes to Scott Pace for his being executive officer too and the relationship. But also Scott's relationship with the vice president. When you have to do White House coordination it's very very helpful to have this strong focal that can work through policy issues and round everybody up a little bit, and Scott really served that purpose, especially when it was something that was a vice presidential priority.

First few weeks on the job, Scott and I even were calling already. Actually during COVID I had come up to meet the vice president, and then Scott and I were able to have coffee. But just having somebody like Scott that you could call and periodically talk to and talk about policy and where we needed to go work things, was just very very helpful. The White House is not a monolithic organization, just like NASA isn't, and so there's lots of different constituencies. When you're trying to deal with [the U.S. Department of] State even, [the U.S. Department of the] Treasury, when you have to go get a major policy through, which we had to do, we had to get a couple different major policies through. We had a horrendous experience of almost getting a policy through and missing the last signature the day before the administration changed. It was horrendous. Then having to start the cycle again with a whole new administration. It was horrifying.

It was a big help; it was a big help. There were a few times that it was a big help having somebody over there that you knew you could reach out to that would herd the cats a little bit, especially if it was something that was consistent. There's always places where the Agency and the administration from a policy perspective just don't align sometimes too. You at least knew who you could go talk to to say, "Okay, what would make this palatable for you? Who's having a rub here?" There was a focal for these discussions.

We're missing that a little bit now. We're missing that a little bit now. I think they're trying. But we don't have this very strong executive secretary and experienced person like Scott to go drive things through. It was a little tough. Now it could happen. They're keeping the Space Council. There's been discussion of that. We'll work through things.

JOHNSON: Let's talk about, before we go, as the first woman to lead HEO and also under Bridenstine it was decided to send the first woman and the next man to the lunar surface by 2024. Let's talk about that, being a female, and any kind of responsibility you might feel toward the women out there or the young girls in STEM [Science, Technology, Engineering, Mathematics]. Do you participate actively with trying to encourage young girls to pursue NASA careers, and how you feel about that decision to put a woman on the Moon.

LUEDERS: After I got off the phone with Steve Jurczyk and I told him, "Hey, can I think about this for a little bit? Maybe I'll get back to you this Thursday or Friday," I was talking to my husband. Because it was very hard. When I started in Commercial Cargo [Program] I'd just started flying the missions, which was my favorite part, and getting into the mission area. I got asked to be deputy program manager for Commercial Crew, and I had to start the whole development cycle again, and I thought, oh gosh, really, I just got to [the mission]—I hate requirements reviews, I hate this policy.

I started up again, working through the whole thing, and just got my first launch off, and I get this phone call, and I was like, "Really? I'm getting ready to fly people again. I'm getting ready to fly, and this is my second time in 14 years where I've brought on a new capability and I'm not going to get to fly it, seriously?"

But my husband said, “What are you doing? This isn’t about you. You’re going to be the first woman AA of HEO.” I’m going to get a little emotional. Sorry. I had to really think about it. I had to really think about what that meant. You know what? I will tell you I got so many letters. One of my favorites was from a nine-year-old girl from India who said, “Because I see you, I see me.”

I said, “You know what? All this crap about reorg and all the personnel stuff and getting yelled at about budget and everything else, it was like okay, I can do this.” I do a lot. I’ll talk to anything. You got female, women, or students. I’ll do it. My PAO [Public Affairs Office] folks and my com [communications] folks are like, “Hey, you got to stop this.” But honestly the really great thing about COVID was it was pretty easy for me to do three or four engagements over Teams or Zoom. I did a bunch of library kids in Florida, a bunch of 9-, 10-year-old girls, an hour Zoom call. It’s huge.

One of my favorites was a group in Mozambique. It was a group of women who had decided to really go—and living in conditions, 70 percent of women in Mozambique in the inner city have one child, multiple children, before they’re 17. This whole concept, I think me being a woman and a mother and a wife and having four children, being able to talk about the challenges of having a family and how do you do this, and how do you become HEO AA, and how do you work through this. Having this discussion about hey, we’ve got to help each other. We’ve got to figure out how it’s not just one person doing this.

Because guess what, even the NASA workforce in the ’60s, it wasn’t one person. Those guys were at work because there were women that were watching the children at home and enabling them to go to work. This is like we’re going to have to go figure this out together about how we go do this.

I feel incredibly responsible for as long as I'm in this position that if I can make anybody, because they see me, think they can be this, I'm going to let them do that. Very very very important to me.

JOHNSON: That's good to hear. I've got a few more questions. But I think I want to end it today with this. What do you think is the chief accomplishment of Jim Bridenstine's time as the NASA Administrator, if you had to pick one?

LUEDERS: Vision. I think he gave us a vision. I don't think people thought we were really going to do anything. I think people at a point, we kept trying to figure out what we could afford to do, we tried an asteroid, we just kept looking around. I think I can today tell people, based on the program that I've helped set up, and he helped me set up, that we're going to the Moon. We're going to the Moon. And we're going to Mars. But we're going. We're going somewhere definite.

I will tell you Gerst had a huge challenge. He couldn't get people to agree on what we were doing. There was a long time he was just building capabilities, and it was a big challenge for him. Guess what. Based on what Jim solidified, we have Gateway, we have a lander system, we have a crew transportation system, we're laying in the rest of the framework. Don't have a crapload of money for it, but we've got it. And we're going to the Moon. Might take me a little bit longer. May take the person after me a little bit longer. But we're going to the Moon.

We for a while didn't know what we were doing in HEO, we were really struggling. Gerst would say, and I think it's a big job that we have, and he'd say, "Human spaceflight is dead if we don't have a human mission going before Station ends." People are just going to say,

“Why am I spending \$10 billion on this?” He would love to have had \$10 billion, first of all. He was looking at \$6 billion and \$7 billion or whatever.

I think Jim gave us that vision. It was why it was so important. Even though 2024 maybe sounded like a crazy goal, but it was a goal, and it was like the vice president is telling you to do this and here we go. There was no fuzz on it. There was no fuzz on that. We’re going to the Moon.

JOHNSON: I think that’s a good place to end today, and I appreciate you talking to us.

[End of interview]