

NASA HEADQUARTERS ORAL HISTORY PROJECT

EDITED ORAL HISTORY TRANSCRIPT

WILLIAM H. GERSTENMAIER
INTERVIEWED BY SANDRA JOHNSON
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JOHNSON: Today is July 9th, 2021. This interview with William Gerstenmaier is being conducted for the NASA Headquarters Oral History Project. The interviewer is Sandra Johnson and I'm talking to Mr. Gerstenmaier today over [Microsoft] Teams from Hawthorne, California. I appreciate you talking to us again.

I wanted to talk a about your position in HEO [Human Exploration and Operations Mission Directorate] today. I know you were in that position for a long time. But prior to the Jim [James F.] Bridenstine administration, there were some projects and things that were happening in HEO. Talk about that time period around 2018 and what was going on in the directorate.

GERSTENMAIER: Under Charlie [Charles F.] Bolden they combined two directorates. So Space Operations Mission Directorate got combined with the Exploration Systems Directorate into the Human Exploration and Operations Mission Directorate [2011]. So that combined all of human spaceflight into one group. Before, there was one group that focused on operations, which was the Shuttle at the time and [International] Space Station assembly and Space Station Operations, and then there was another group that was the Exploration Systems Directorate that was building the hardware to go to the Moon and do exploration activities on the human spaceflight side. Then under Charlie those both got combined.

Then the new organization had the responsibility for both of those activities. The near-time operational activities associated with human spaceflight as well as the future developmental activities moving forward.

Around 2018 I think the discussion was geared towards how do we keep Station functioning in an operational sense and how do we create a commercial market in space where others want to go ahead and utilize space other than just the government. Could NASA help facilitate essentially establishment of a commercial market in low-Earth orbit? Again, NASA can't do the work per se or do the activities that actually generate revenue, but NASA can create an environment that allows new private companies to utilize space in new and creative ways that actually bring maybe others into the space world.

For example pharmaceutical companies, could they do some research on Station that takes advantage of the microgravity aspects of Station and essentially maybe develop some new drugs or new concepts for drugs based on the way drugs perform in space, how the chemicals actually make crystals? The human body also loses immune system response in space. So could they use maybe rodents to go ahead and look at new pharmaceutical drugs to potentially find a new way to test drugs in space that would actually give them faster results?

We learned for example that potentially immune function degradation in space, and you could maybe use a rodent model to determine whether a new drug would be effective in providing some kind of antibody protection for potentially a mammal quickly in space, whereas a typical rodent test might take years on the ground for aging things, for like even bone loss. Bone loss is accelerated in space. If you wanted to test a bone loss prevention drug you might be able to do that in the rodent model and get a quick pass-fail thing in space.

The idea was to make Space Station available for these commercial companies to experiment to see if they could find a way that they could generate revenue or create a market in space. We were very focused I would say on trying to find creative ways to utilize Space Station, and we knew Space Station was a limited resource, it had a finite amount of life in it. How could we leverage the commercial market to find creative ways to use Space Station? That was clearly one activity that we were focused on.

Then on the exploration systems side we were trying to move forward towards the lunar program. We had started the Gateway activity which was essentially a module that was going to be around the Moon to essentially allow us to do long duration experimentation necessary to go to places like Mars. The idea was to create this Gateway module around the Moon in an orbit that would be compatible with leaving the Earth-Moon system if we needed to in the future. This Gateway module would also potentially be the precursor to test systems for a Mars transit kind of vehicle, long duration life support, and also being deployed around the Moon in this distant retrograde orbit around the Moon. That's a unique orbit that's stable around the Moon that doesn't decay, doesn't require propellant to keep it in that orbit. That was a special orbit. That orbit allows us also to maneuver to other locations around the Moon and service the Moon.

The idea of Gateway was to be a stepping-stone to actually test technology, test components, utilize the capability of Orion and the Space Launch System to support future activities necessary to go to Mars and other distant locations. This Gateway concept came around when we didn't have funding yet to go down to the surface of the Moon under the [President Barack H.] Obama administration. But also the Gateway could then serve as a way station for what the new [presidential] administration wanted to do, which was to get to the

surface of the Moon and acquire a lunar lander system that could go from the surface of the Moon to Gateway and back and forth.

Then Gateway could also be a piece of an infrastructure that could then be used to allow a reusable space system to be put in place. Just like you're starting to see reusable rockets, which first started with the Shuttle, and then SpaceX is utilizing reusable rockets, I think Blue Origin is also starting to do that as well. Then the idea was the next step is could we leave some component in space as a reusable piece.

Gateway was this key piece and key functionality. I think one of the problems was a lot of people saw Gateway as just another Space Station, and it's very different. It was not really intended to be a Space Station. It was intended to be international, involve the international partners, but it was really a system that allowed us to make that advancement in human spaceflight technology and risks, and reduce those risks and activities such that we could then go do bigger and better things, and eventually move human presence into the solar system, and eventually go to Mars or go to the Moon. It was the next step that we could make moving forward.

Just prior to Jim Bridenstine coming in we established this Gateway concept. We started putting together pieces for the electric propulsion system that would go with that, the habitation modules, those kind of things. We started laying all that groundwork together, starting to put together those proposals and those processes, and we were doing that on the exploration side. Then when Jim came in, he could take that and work with that to figure out what he wanted to do with the administration.

The idea again, what I saw as Associate Administrator through multiple administration changes, the new administration typically comes in. They see what the last administration had

done. They don't want to do that at all. They want their new vision. They want their new ideas, their new thing in place. So the tendency is to cancel all that activity and then start over again. To me it was tremendously inefficient, because these projects that we're trying to do with humans take decades. These administration changes just totally disrupt that planning.

The key was could we put in place some kind of sustainable system that would allow the next administration to come in, make their mark, pull their activities that they want to go do, their ideas that they want to move forward, but we'd have essentially a piece of infrastructure that they could build off of and then go achieve what they wanted to do during their administration, without rebaselining everything.

The key was could we put together a sustainable strategy that could survive multiple administrations, knowing that they still would be redirected probably at each administration change, but it wouldn't be a total cancel the entire program, start all over again activity. But that's probably not the most efficient way to build a large space system. That's the dilemma. You're caught. You're trying to build sustainability or you're trying to build something fast and quick.

That's the tension that was there, and I would say we tried to do our best to balance both of those and move forward.

JOHNSON: There was a period of time when Robert [M.] Lightfoot was Acting [Administrator]. The new Administrator wasn't sworn in until April 2018. Talk about your impressions of Administrator Bridenstine before he was confirmed, then those early days of his appointment. I know he went through some contentious congressional approval, and it was probably pretty tough on him. But how did that affect what was going on in HEO and also what your

impressions were since he was a politician and not necessarily a scientist or former astronaut or engineer like so many of the Administrators before him.

GERSTENMAIER: I would say first some of the decisions we made on Gateway and the idea for the lunar activities and those pieces, ideally would have waited until we got the new administration in place, and then let them go develop and work some of those ideas and activities, and even some things on the operational side in terms of some of these commercial things we were doing with companies on board Space Station. We ideally would have waited. But we didn't get an Administrator. And there comes a point where if you keep waiting nothing will happen, and then all things stop. I think under Lightfoot we had to make some decisions that were probably a little more forward-leaning than we would have wanted to in the ideal world. We would have liked to have the new administration come in, get a chance to present to that new administration our ideas and concepts, let them change them around a little bit, tweak them to be exactly what they wanted to do moving forward, and let them get ownership.

We had to make some decisions earlier than we wanted to, but we tried to keep those decisions as minimal as possible to give the new administration as much ownership and ability to change. Because as I described to you, I really wanted this to be a sustainable transition, I did not want to do an end everything and start all over again. I think Jim came in and he brought a lot of good capability and the fact that he could communicate well with Congress. He was familiar with us. He was very attuned to public affairs and outreach and media kinds of activities, using new media to reach out to folks, using new methods to convey what we were doing moving forward. He had a lot of support from the [Donald J. Trump] administration. The administration was very supportive of exploration in space, so he got a lot of direct support from

the administration. He probably had the best communication with the administration, with the President and the [National] Space Council and those activities, of any administrator.

Other administrators, they were limited in their activity and meeting with the President or the Office of Science, Technology, and Policy or whatever. This new administration was very interested in space. They had very strong desires to get to the Moon in 2024, and they were pushing that extremely hard and moving forward. That was very positive for Jim to have that. I think Jim was good in the fact that he didn't come in and just absolutely change everything from a technical standpoint. He listened to what we had in place. He figured out ways to see the benefit of what we were doing and message it in a more positive way. But yet he also got to change some things and change the priority of how we were moving forward in space.

JOHNSON: As you mentioned communication, his communication with Congress was important, but also communicating with the bulk of NASA, which is already there when these administrations change. Talk about some of that communication and your interactions with him or the team of appointees and his Deputy. How quickly did they come up speed on learning? When I talked to his Chief of Staff [Gabe Sherman], he talked about how quickly they had to learn everything and get things going. But talk about so how you communicated with his staff.

GERSTENMAIER: I would say I think we had a very good communication approach with him and his staff. We met with them fairly regularly and moved forward pretty quick. We had some experience with Sean O'Keefe when he was Administrator, and he was also more of a political administrator, didn't have the same technical background. So we knew as an organization how to talk to Jim and his team. But they were very good and very responsive and very intuitive.

Jim [James] Morhard came in as Deputy [Administrator], and as he was going through the appointment process, we got to meet with him ahead of time. I remember a meeting I had with him where they get a chance to meet with NASA civil servants before he goes and does his hearing. I asked him why he was interested in the job. He was very interested in advancing human spaceflight and doing the right thing for the nation and moving forward. He was extremely positive in his response that he really had a passion for human spaceflight. He had known Sean O'Keefe, was in the aircraft accident with Sean, and his heart was in the right place. His motivation was in the right place. He was good, and his job was then to figure out how to help Jim be successful, and I think they worked well as a team back and forth.

Jeff [Jeffrey] DeWit was also new to us. He was the Chief Financial Officer. He's another one that would probably be good to talk to. He came in, he did things on the President's election campaign, and so he was very familiar with the President and that group. Again, he listened and worked very hard and defended NASA in a very strong way.

I would say the positive thing was they came in willing to listen, knowing that they needed to move forward in a very urgent timeframe. I think they worked very effectively with us to come up to speed, and they did a tremendous job moving forward.

JOHNSON: Talk about those first few months. I know you said that NASA had tried to get in a position that things would move smoothly, and they'd be able to continue with these programs. But they did have that push to go to the Moon. But were there any other changes that you could see coming in those first few months, or things that they may have been highlighting more that they wanted to see in human spaceflight?

GERSTENMAIER: I think their primary focus was I think they gained an understanding that a lot of the things that we were doing in human spaceflight were pretty well established. In other words they were pretty good, and they were not bad. But we were not communicating very well to the public about what we were doing or to Congress or even to the Office of Science, Technology, and Policy, or really in this case the Space Council got established. This was a new entity that we had to deal with, we had the Space Council now in place run by the Vice President [Michael R. Pence].

The Vice President was very interested in our activities. We met with him several times. I think the big changes were how we talked about it, how we messaged things moving forward. I think that was very positive for us because I think we were not used to reaching out in that way, and I think folks didn't fully understand what we were doing sometimes. Jim and his team very much clarified that communications. But yet he was still strong, and he changed some things, and moved some things around to get things organized in a better way to support him. But again I think he pulled together his inner circle of people to work forward, and he figured out how to move forward as expediently as he could.

JOHNSON: What changed, if anything, as far as what you had to do with that communication? You said that previously we weren't as good at communicating to the public or to Congress. Did you have to start doing more to do that or testify in front of Congress more than you had been?

GERSTENMAIER: Again, I think for me personally it was maybe realizing what Jim needed to do his job effectively, and then getting those products to Jim and his team in a timely manner so they could take those products and move forward. I think the biggest change for us was learning

to present things in a way that were more suitable for a lay audience and maybe not quite as technical as they were before. But then also making sure that Jim was aware of his responsibilities for the technical activities and the day-to-day safety and the day-to-day running of the Agency. We needed to get that in place for him.

Also the budget submits, we had to present data to him, justify our budget, and move forward. He and Jeff DeWit had lots of comments about how that budget ought to be put together and presented, and how we could resonate more with the administration. I think there was a strong desire on his part to really meet this mandate of the Moon in 2024, and to show credible plans to do that, and to describe that in a way that was meaningful.

I think it was hard for us to make that big a change as fast as Jim wanted, and to show it in the way that he wanted within the budget reality, because the problem again was the budget was not always there to go support these big visions. I think the administration was willing to support those kind of visions, but it's not just the Vice President, it's not just the Space Council, it's the whole of the administration needs to approve those things.

Probably one example was they asked us could we fly crew on the first Orion mission, on Exploration Mission-1. We put together a presentation to take forward to go see if we could fly crew on that flight technically. We identified what we needed to have done to go do that. Orion doesn't have a life support system in it, so we had to add a life support system. Then there's this risk of doing a first one-off mission around the Moon. The discussion was could we do like an Apollo 8 kind of activity where we do a flyby of the Moon and come back on a safe trajectory, and would that be safe for our crews on the first flight of an Orion vehicle.

We pulled together a team and looked at all that and reviewed all the data. This was with Robert Lightfoot. I think this was just a little bit before Jim came on board, or maybe right

around the time he was coming on board. This was to again show that we were moving towards the Moon in a real way, but could we do Exploration Mission-1 in the first term of this presidency with a crew to go around the Moon again.

The answer technically was yes, we could do that. It would be high-risk. It would be similar to the risk that we took on the first Shuttle flight, when we flew crew before the vehicle had actually flown. But we reviewed with the Astronaut Office and all the technical people that this was a viable thing that we could go do.

We had some meetings with the administration personnel at the time. Our message to them was if we're going to do this we need budget, and we need budget assured to go do this, and they also need to be willing to accept the risk associated with this, because there would be a lot of pushback from the public and others saying, "You're putting the crew's lives at risk to go do this." It might be called a stunt, they're going to have to not only provide the funding, but they would also have to provide the political support to protect the technical group moving forward to say, "Hey, this was not a political stunt, this was actually technically viable, this is the way to move forward."

We briefed that to the administration personnel, and my feeling from that meeting was the administration personnel wanted us to go do this activity but I wasn't sure they were committed strong enough to provide the budget or to provide the political cover for us to allow us to go do this mission.

Again, my judgment was, I think the Agency's judgment was, if they're not 100 percent supporting us, we then go make this commitment to go fly crew, we then go get into the activity, the support isn't there, we are then now being forced to increase the risk on the crew to maybe

unacceptable levels, and then we were going to be put in the awkward position of telling folks, “Hey, we can’t go do this mission.”

It seemed that the political risk of flying crew was greater than the benefit that we would get from actually flying the crew. Again this is a really subjective discussion. It’s really hard, because technically it’s okay, but to be technically okay I need 100 percent commitment from the entire team. I need commitment from everyone on the political side. I need commitment from everyone on the budget side. We can make this happen.

If you go back in history and you look at Apollo, Apollo was successful because the country was behind that activity. In this case, for this to be successful, I needed everyone 100 percent behind it. I think we had the Agency. I think we had selected people in the administration. But we didn’t have everyone.

At that point we decided—and Robert Lightfoot can give you his perspective also—I would say we decided collectively that this just wasn’t the right thing to do, that it would put us in a situation that would have eventually put us in a posture where we’re going to have to say, “Hey, we cannot go do this or it’s unsafe to go do this because we didn’t get the support.”

That was probably one of the harder decisions that came in this timeframe that we had to make, and it was really pretty much a judgment call moving forward on what we were going to go do.

JOHNSON: You mentioned the budget, and you said that the Administrator and Jeff DeWit both had a lot of input when you would submit things. Was that unusual? Or was it just different from what you’d experienced? You’d worked under a lot of different Administrators, so was that somewhat different?

GERSTENMAIER: I think the thing that was different was that Jeff DeWit was probably more supportive of our budget requests and worked them harder than before. I think the thing that was unique was Jim and Jeff and Morhard all had the ability to go to the administration directly. So there's the Office of Management and Budget (OMB). They're very strict with the budget in general. This office is made up of civil servants. Their job is to create budget flexibility. In other words they see their role as not committing funds to long-term projects but keeping them short-term projects, so if a new administration comes in and they want to go do some new activity, there's funds available for them to go do that activity.

Their responsibility is to balance the budget across the whole of government, not just NASA. I would say the OMB examiners that reviewed NASA were very stringent and would not typically fund things, especially long duration things, either for the Science Mission Directorate or even for the Human Exploration and Operations Mission Directorate. They wanted to keep budget flexibility. I would say they also didn't feel ownership in making our project successful. So if we had some funding things, or we needed something for a contract to award and the funding wasn't available, there wasn't a whole lot of desire on their part to find funding to help us move forward. They were almost more obstructionistic than helpful.

I would say the thing that was good was that we had Jim and Jeff and others that could then go to the administration and provide some pressure on the Office of Management and Budget to help us with the budget moving forward. If you look at the NASA budget during this timeframe, our budget went up substantially under Jim. Again, I think that's a tribute to the ability of them and the administration trying to help us to be successful to move forward. I think that was a key piece of the administration, was that they helped us with the funding aspect. But

for a project to be successful it not only has to have funding. You also have to have a sound technical plan, and then you also have to have the political support.

If you don't have all of those three or four things all aligned, you're not going to be successful. We had budget in this case. Some of the technical things we could work on our own. But then some of the political support and some of the other things within other aspects of the administration were not as clear or as supportive as they'd like to be.

It was interesting. The President and Vice President were tremendously supportive of space. Then the Office of Management and Budget, they were not quite as supportive. That disconnect within the administration made for an awkward situation where sometimes we would get the funding, but we would get the funding almost too late to be effective to when we needed it to move forward on the timeframe that they wanted to move forward.

There were still disconnects, still inefficiencies in the bureaucracy operating in Washington. But it was I think better in the fact that at least we had clearer access to key administration personnel that we never had before. That was available through Jim and his staff and his team.

JOHNSON: When I talked to Kathy [Kathryn L.] Lueders she mentioned going to that announcement in March 2019 when Vice President Pence announced that NASA was going to put humans on the Moon by 2024. She mentioned that making those big announcements pushes the budget. That's what's going to push the budget. At least that's the way the administration was looking at it.

GERSTENMAIER: Yes. That's the dilemma. You need that pronouncement. You need to create that urgency. You need to create that focus. Go to the Moon in 10 years or by the end of the decade. Go by 2024. You need that. Then you need the funding. Then you need the technical plan. Then you need all these other pieces that all line up together to make that happen. They all need to be there. If you don't have that urgency and you're just doing technology development, that's not good. Just being sustainable like I described to you isn't good. You're not going to make progress. Or you'll make progress so slow, nothing ever happens.

If you set this milestone, and then you don't support the milestone, then you miss the milestone, then you get beat up and you lose credibility, and then you lose funding. This is the challenge of running these multidecadal programs in a political environment that changes potentially every four or eight years. It is not an easy process to do these complicated life-challenging events moving forward.

To be perfectly honest, what I was afraid of a little bit with the announcement in 2019 was we need to be very careful we didn't repeat Apollo. If you look at what happened with Apollo, we were tremendously successful in the fact we achieved the goal to put humans on the Moon by the end of the decade, but then as soon as that happened Congress, the American people, everyone got disinterested in the space program in a sense, and we went into a tremendous period of decline, where the budget went away, there was nothing. Then there was just this whole tumultuous period where we were debating whether the Shuttle should be there, should there be a Space Station. But there were tremendous layoffs at NASA during that timeframe.

I got hired in 1977 and I was one of two people that had been hired in the last I think five or six years. No one had been hired post Apollo. It was terrible. Then I had concern that if you

solely focused on 2024, with all the zeal to get there, do you maybe just repeat Apollo in some sense and then go into this other period. I was trying to balance a sustainability aspect with the urge to go to 2024. If you ask Jim, he may not have liked that in me. I got replaced. I didn't necessarily want to leave NASA when I left. I don't know what Jim's motivation was. But he, as Administrator, has the ability to replace who he needs to replace.

I got pushed aside, assigned to Jim Morhard to go do stuff. I tried to find a place to go plug into the Agency where I could contribute. I was not able to do that. I was not able to find one. So then I retired from the Agency. But I think probably part of the problem was I wasn't solely focused, and 100 percent focused, on the 2024 date to make that occur no matter what. My concern was I was afraid that if I did that, I might repeat Apollo, or I would lose the sustainability aspect, or I didn't know what was coming afterwards. You don't know if the administration is going to continue. I don't know.

This is the hard world and the political world. I don't know. I don't know if I did the right thing or the wrong thing. But anyway it's what happened, and it's where it is.

JOHNSON: I think again Kathy described it as she was wearing her program manager hat that she had to be that political person when people would ask, "Are we going to make that date?" I'm sure it was difficult for her as it was difficult for you because it's hard. The only other time we've ever done that is like you said during Apollo, when the President proclaimed it, and we had to do it.

GERSTENMAIER: Yes. Again, I think the difference was in the administration in Apollo there was clearly a national push to go do that. It was maybe stronger focused. If you look at how

much budget we received during that time, during Apollo, it was huge. But we also had to build all these facilities and all these centers and all these things. But we were a large portion of the budget, I think 7 percent or something of the budget back in Apollo. Then we're less than, I don't know, I think we're maybe 0.4 percent or something. Really fairly small.

We needed a budget, but we also needed the technical stuff, and we also needed the other support. Then I don't think sometimes the political appointees appreciate how hard the technical challenges are. They do when the bad thing happens, during Sean O'Keefe's administration when *Columbia* [STS-107 accident] happened. I think that was tremendously hard for him to realize that. He kept us together moving forward. But I think prior to that he didn't fully comprehend how dangerous our business is and how tough every single flight is. As Associate Administrator you've got to balance that risk to humans and life against these objectives that you're being told to go do in very crisp terms.

That is not an easy call. That's the discussion I just had with you about putting crew on the first Orion flight. There's no right or wrong answer. But when that either works or doesn't work in the future, then it's very easy in hindsight to go back and say what happened.

Based on my own experience, and I've got to be careful when I say experience, could be bias, I'm careful to not put us in a situation where I believe we don't have the ability to safely—and safely is a tough word—execute what we're trying to go do. Where we operate is we're operating in an unbelievably high-risk environment every day. Much higher-risk than any other folks, except—how do you balance that against these other desires?

These folks that come in, they don't understand the technical side, they think you're trying to game them, they think you're trying to use fancy words and numbers and math to confuse them to get your point across. That wasn't my objective. My objective was to try to

meet what they wanted to go do but yet create a sustainable program moving forward. That's just an extremely difficult job to balance back and forth in a government political bureaucratic environment.

JOHNSON: When the President [John F. Kennedy] announced that we were going to the Moon, that announcement came as a surprise to a lot of people that we've talked to. They didn't realize it was coming, and then they were thinking, "Oh my gosh, now we have to make this happen." When you heard Vice President Pence make that announcement was that also unexpected to hear that 2024 date?

GERSTENMAIER: No, I think we knew that it was coming, and we knew the date was there. Again, I think in some sense it was welcomed. Because if you don't have a date and you don't have a goal and you don't have something to drive for, you're not going to achieve it. If you're just going to do technology development, then you dial in whatever budget you want, and you just slow down your development. Creating some urgency and some need to go do something that is big and visible is extremely important.

Sean O'Keefe did exactly the same thing. He wanted to have—he used to call it U.S. core complete on Space Station—by 2010. So he drove hard for us to go do that. Then in hindsight some people blame *Columbia* on the fact that we were driving to get to this 2010 U.S. core complete on Space Station. They blame the *Columbia* tragedy on schedule pressure, and I don't agree with that, but that's the message that comes out. But I think you need these goals; you need these urgencies.

I talk a lot about schedule pressure. I call it schedule awareness. You have to have some urgency or you're not going to do things. Every morning when my alarm clock goes off I don't particularly want to get out of bed, and I don't call that schedule pressure, I call that schedule awareness that says okay, I need to get up now if I want to actually make it to where I'm supposed to be in some reasonable amount of time. That's the same thing with these projects. You need to recognize that yes, there's a schedule, yes, there's an urgency, yes, I have to commit to those, yes, it's going to take hard work, yes, I'm going to have to work overtime. But there is a limit where okay, maybe I'm now rushing so fast that it's not appropriate and it's time to say, "Nope, I can't do it," and that's okay. That's the dilemma.

But I think you definitely need these things. When the Vice President said that I think we were well aware of it. We were ready to go move forward, and we were ready to go commit to that. The good thing was when you think about it this administration had the chance to say 2024, and because of what we had done with SLS [Space Launch System], what we had done with Orion and Gateway, we had a basic system in place that would allow them to achieve their lunar objective by 2024. We had a technical plan that we could take the systems we were building, because we were told under the Obama administration we were not to go to the surface of the Moon, yet we kept in place during the Obama administration the hardware and the systems moving forward that allowed that next administration to make a proclamation of 2024, and technically the capability was there to pull it off and make it happen.

So I think we succeeded in the fact that we kept this sustainable architecture open that allowed the new administration to go pick a very aggressive goal, and yet we had the potential of achieving that goal. But it was going to take a ton of work on our part. It was going to take a refocus. It was going to move forward.

In hindsight if I regret anything—maybe regret is too strong—but maybe I should have embraced the goal of a 2024 landing more. My concern with a singular focus on a landing in 2024 without a future vision is that we could land on the moon and stop. Best case we repeat Apollo without a vision towards the future. I wanted a longer-term vision of moving human presence into the solar system and not a one-time ‘stunt’ that replicated the feel-good mood of Apollo. I don’t know. So my judgment was to move as far forward and press and meet the administration’s goals as hard and as strong as I could, but to avoid being in a situation where I would commit everything to that goal that we might end up being a repeat of an Apollo situation. Maybe that was a mistake on my part, I don’t know.

JOHNSON: You can only do what you think you need to do with the information that you have at the time.

GERSTENMAIER: Yes. I can explain to you why we made what decisions we made when, and what the logic was behind them. I don’t know. Time will tell whether it’s good or bad.

JOHNSON: You mentioned a couple times the National Space Council, and that was something that I think in 2017 early on the President wanted. Talk about that decision because it was something that NASA had had before but then discontinued. What do you think were the merits of starting it up again? Or how do you think it was working?

GERSTENMAIER: I think the merit was that it created a focus for spaceflight, a single place to go talk to that was very visible and was very much out in the public arena. Also with the Vice

President chairing it, it gave the administration ownership in the space program. I think it gave a focus and a crispness to space exploration that was maybe lacking before when NASA was working with the Office of Science, Technology, and Policy. I think it was very positive in that respect. I think even President Trump's decision to create the [U.S.] Space Force was another step in that same direction that showed the administration's commitment and desire to have a focus for space. I think it was a very visible entity to move in that direction and it gave NASA a place to go work and defend things and move forward.

JOHNSON: The President issued several space policy directives during his time too.

GERSTENMAIER: Yes, and those were very good. If you look at those space policy directives, I think Space Policy Directive 1, and I don't remember the exact words, but it was 100 percent in alignment with what we were doing in HEO. This was the first time that I really had an administration that plans that the Agency had actually aligned with the administration. Before, it was difficult under Obama, because again we were directed not even to go to the surface of the Moon, but we were not given funding to do anything else, so then we were in the process of trying to create things. We had the Asteroid Redirect Mission and those kinds of things. Those were technology building activities that would allow us to do things future in space. But they weren't a direct or urgent activity. Then those clearly went away. They were not popular, and they were gone when the new administration came in, and this focus for the Moon came in place.

Again, I think all that was tremendously positive. The Space Council was a good thing. I think the other dilemma was there's a desire sometimes to focus human spaceflight in one direction, to be all exploration, all moving human presence in the solar system. Then Space

Station is interesting, but not important. I would say the Space Council had a desire to end Space Station, take that money and apply that money to the lunar activity, and move forward.

Again, this is my problem. I felt creating this commercial marketplace in space where NASA wasn't the only group doing low-Earth orbit stuff, that the private sector was now investing in space and there was ways for private companies to make revenue out of spaceflight, I thought that was tremendously important. Because then that lowered the burden for the government to fund everything. The vision was by creating a private sector that was strong and could generate revenue on their own, they didn't need government funding, so this was another way to essentially augment the human spaceflight budget by the private sector paying for things that they needed and wanted in services and goods and other things that then actually leveraged us to move forward.

The problem is that's a long-term vision. That's again a longer vision than what an administration really wants to go do. Their quick answer was okay, end Space Station now, take that money, plow it into the Moon thing, go do the Moon thing, and get the Moon thing done. My concern again, and maybe I'm overthinking, was I looked at the Apollo stuff and I did not want to get in that same dilemma again. I wanted to make sure we did not go through that period again, because I was afraid that if we lost human spaceflight and people routinely going to space as a nation, we might give up on that, and we might not continue. I don't think that's good for the U.S.

I think the United States as a leader in space is doing things that others are not ready to go do. We have a real threat today from China. There is no question China has got a plan and they're moving forward. Again, I don't worry about that threat as a leader. If you're a cross-country runner, you never look back to see how far behind the competition is. You got to keep

your eyes looking forward and your job is to run your behind off and move forward if you're going to be a winner. If you want to be a loser then you start looking back to see where the competition is. So we should not focus on China. We ought to be looking forward and doing those next things.

That's where Gateway is. Instead of going to one location on the Moon I have now a capability to go to any location on the Moon wherever I want. I can move this vehicle around very easily. This Gateway also allows us to get beyond the Earth-Moon system to go to Mars, to go to other places. We're creating infrastructure in low-Earth orbit through the Space Station and the Commercial [Crew] Program to actually augment our budget by having the private sector find ways to fund and move forward. So I'm creating a new vision moving forward.

My biggest fear is we end Space Station early, the Chinese come along with their space station that we've now created the market and the Chinese then use that market to go generate revenue, just like we moved manufacturing to China. So they benefit from all our up-front work and we paid all the prices, all the sacrifice, all the hard development stuff up front, and then the Chinese gain all the benefit in the future.

So we do not want to do that. So I felt strongly we needed to keep Space Station around, and that again was probably somewhat inconsistent with what the Space Council wanted.

JOHNSON: You mentioned that it was the first time that the interest from the Presidential administration and what NASA was focusing on was aligned. Why do you think that was aligned when they came in? Do you attribute that just to their ability to read what was coming, that they had advisers that were telling them this is what we need to do to get interest back? I know a lot of what the President wanted was that America first feeling from the country. Why

do you think it was aligned with NASA and it wasn't as big of a shift as maybe some other administrations?

GERSTENMAIER: Again, pretty speculative. But I would say make America great again. When was America great? America was great when we were a leader in technology, and we were pushing the lunar activities and the Moon and all those things. Kennedy's original idea was we were going to go to the Moon not to do exploration and move human presence in the solar system and create all these things I described to you. His idea was to show that American democracy was superior to Russian communism. It was purely a political move to show that America was superior to other nations.

I think this administration saw that as a highlight in America when we had a very positive feeling about ourselves. We were a nation that could, there was no limits to what we could go do, we could do great things. I think the President and the Vice President saw that as a really important time in our past and they wanted to bring that feeling back to the nation. They felt that if we could quickly do this lunar activity, maybe some of that positive America first, America feeling stuff, America in the leader in the world, as demonstrated by our technical prowess, would come back again. I think that was a piece of it.

I think they also grew up in that age, and they saw what it was like during Apollo, they felt what it was like, and they were honestly believers in the space program in that sense. I think if there's something that they didn't fully understand, it's I don't think they fully understood how difficult spaceflight is from a technology standpoint. I've got to be careful. I may feel that stronger than it really is. But it's not easy. I don't think it's easy to gain that appreciation. I think if they missed, they missed on how much commitment it's going to go take to go do that.

It's nice to set a goal, but then just like I described to you before, if you set that goal you got to be willing to make the sacrifices, you got to be willing to commit the resources, commit the political capital to make it happen, or it's not going to happen. That's it. It's not just sound bites. It's just not words. To make it happen you got to really commit.

I would say Apollo was probably also very unique in the fact that if Kennedy was not assassinated, I don't know that Apollo would have been completed. I think Kennedy on his own was looking at how much money we were spending on it, what was going on with the Vietnam War, how difficult it was going. I think he might have at some point decided that hey, this isn't the right thing to go do, I made too big a leap, we should stop this activity. But when he was assassinated [Lyndon B.] Johnson took over, and to honor Kennedy's legacy he felt an unbelievable desire to keep the space program moving forward irrespective of common sense and the challenges that were in front of him. But it was to honor Kennedy, so he kept things moving forward.

But as you know, even before we landed on the Moon there was discussions about what flights were going to be canceled, what things were going to be cut back. Even before we got to the Moon that was waning. But I think Apollo is seen sometimes as the model of how you do things moving forward. I think it was very much almost anomalous. It was circumstances that came together that just allowed these things to happen.

I think when the politicians come in, they want something big that they can take credit for that's going to be theirs, that's going to bring pride back in America. I think this administration grabbed the lunar activity as something they wanted to go do. The fact that it didn't occur in their administration—or maybe it still happens in 2024, I don't know, we'll see—but if it doesn't

happen then it was NASA that didn't deliver and it's NASA's problem. We gave them the funding, we did these activities, we did whatever.

But as I described, it's not only the funding, but then I need the whole of the administration. I need not only the President and the Vice President. I need the Office of Management and Budget recognizing that this is a priority. When I tell them we need funds for this contract at this time, they need to provide us those funds for this contract at that time, if we want to meet that urgent goal.

JOHNSON: As you mentioned, and we can talk about this as much as you want to or as little, but in July 2019 you were reassigned as Deputy Administrator Jim Morhard's assistant. Bill [William] Hill was also reassigned. You touched on what you think some of the reasons were. But talk about that period. You were testifying before Congress the day before. From what I've read in trying to find information about it, everyone was extremely surprised and disturbed of course as NASA people. We were disturbed when it happened. Maybe just talk about that decision. You said that you were not sure exactly, and you can't speak for the Administrator I know. But talk about that reassignment and when it happened and if you knew it was coming, or when and how you were told.

GERSTENMAIER: Yes, this is hard. I would tell you that I knew all along that I served at the pleasure of the Administrator. I fully believe it's his right to choose who he wants to be on his team. I thought that I had passed all those things and I was okay, and we were through a large portion of his administration. So I don't really know the reason why. But it was a total surprise to me. It was fully within Jim's authority to go ahead and relieve me. I've seen others. I saw

Gene [Eugene F.] Kranz leave. I saw George [W.S.] Abbey leave. You can go on and on and on.

The fact that I was in Washington [DC] for 14 years is some kind of miracle. I made it through a couple administrations, so I probably outlived my longevity. They want somebody new; they want somebody that's young, vigorous, has a big vision, moves forward, salutes the goal with 100 percent. I was maybe not as 100 percent as they wanted, I don't know.

It was total surprise. I got called in to Jim's office. Matter of fact, I was scheduled to go to Cleveland [Ohio, Glenn Research Center] to do a meeting that day. I had just testified for Congress; I don't know if it was that day or the day before. I thought I had done a very good job in that testimony. You can go back and look at it. I was 100 percent supportive. Like I described to you before, I was 100 percent behind what this administration was doing, there was no question there.

So it came as a total surprise to me. I think the thing that personally hurt was I was not prepared. I was also scheduled to go to Russia that Sunday. So I go into Jim's office, he tells me basically I'm being reassigned, "You're not going to Cleveland, you're not going to Russia, you're no longer allowed to do anything in human spaceflight, I want you to go down to the fifth floor, move your office, and you're not allowed to talk to anyone that you used to work with, and you're done." That's what he told me.

Then my response to him was I thanked him for allowing me to work with him as long as I had, I appreciated everything he had done for me, and that was kind of it, and then I left. I went home. My wife was shocked, I'm coming home instead of going on travel. I'm not going to Russia. So I tell her all this. It was probably more traumatic to me than I had ever envisioned.

That's a caution to me, a caution to others, is that I was so blessed to be in the Agency and to get a chance to work with all these talented folks, and to do what I did was great. But then part of my self-worth maybe got tied to the job a little bit. Then when the job got taken away that just devastated that whole aspect, and that's a mistake. It shouldn't have been that way; I should have been more it's okay. I shouldn't have been. But then that taught me a huge lesson that you got to be careful how much you commit to these bigger goals and these challenges and how much of yourself you commit, because you do work at the pleasure of someone else somewhere no matter who you are, where you are, and it can go away in a heartbeat. I should have been better prepared.

But it was extremely hard for me to do that, and then afterwards I was offered a couple opportunities in the Agency, I really wanted to stay in human spaceflight. But I think it was clear that Jim did not want me in human spaceflight for whatever reason.

It could be the fact that—I'll say this—but he couldn't lead the way he wanted to lead because I had been there so long, I was a strong technical authority, so he would make a decision and then by default people might attribute it to me just because I was there and he was not getting credit for what he was doing. He was doing a lot. So maybe that didn't work for him. I don't know. Or maybe someone told him that it was time for me to go, because I'd been there so long. I don't know. Maybe I got crosswise with the executive council. I have no idea, to this day I don't know, and I don't care. It was Jim's decision, and I fully honor his decision and I fully respect what he wants to go do, and that's fine.

Then it's up to me to figure out where I can contribute. So then I tried to figure out ways I could help, what I could go do, where I could benefit the Agency. I think I took some vacation, which was planned anyway, and then I came back in the fall. I struggled to try to figure out

where I could go, what I could go do. It seemed like wherever I wanted to go I was not going to be able to go contribute, so then I decided well, it's time to leave.

That's when I decided to retire in December. I then did consulting for a little bit. I started my own company. That was interesting in the fact that it was pretty lucrative. But I didn't like that very much, and the fact that I was making a lot of money but then I would make recommendations and I wouldn't get a chance to see how those recommendations got implemented. I like having ownership of the decision I make.

Then I started looking around to see if I could find a place to go work and still stay in human spaceflight. Then I was able to go to SpaceX and support their DM-2 [Crew Dragon Demonstration-Mission 2] launch with crew and their Crew-1 and Crew-2 activities. So now I'm at SpaceX in build and flight reliability, and I'm able to stay in human spaceflight. I'm going to be working the Inspiration4 mission, which is a private astronaut mission in September that SpaceX is launching. It's a four-day mission at 575 kilometers above the Earth with a Dragon capsule with a cupola or window on top of it for the private folks to go fly in, and I'm getting a chance to be chief engineer on that flight. So I've figured out a way to still go contribute and go do things and work again and it's fine. In the end I think it all came out good. I'm still back in the game again.

I am getting older, so there is a real time to retire. I think maybe another year or two is time to retire. In my old vision when I was at NASA, I thought when the administration change occurred again, whenever that was, it was probably time to retire, again because administration changes as we discussed earlier in this discussion are extremely hard in Washington. So I didn't particularly want to go through another administration change. They are not easy in any way,

shape, or form. I probably would have retired from NASA naturally maybe at the next administration change, whenever that was, in 2020 or 2024.

But now I'm on a different path and things are fine and things are back again. I think it's still hard for me because I have all kinds of restrictions where I cannot represent SpaceX back to the government because of ethical things. That makes it tough. I've lost contact with a lot of my friends at NASA. I don't talk to them hardly at all. That I miss a little bit. But I'm able to find some new folks here. I'm working with the new younger generation here at SpaceX and I think I'm able to contribute and keep up with them and learn and keep contributing and move forward, and that's all I care about.

Again, I look at that period as an interesting period in my life. I think we all go through those. In hindsight maybe I should have been a little more prepared. But in the end, it came out okay and I don't regret at all what Jim decided to do and what he wanted to do. It's his decision and it was fine, and I don't care if I ever know why or whatever. That's where it is. That's that period.

JOHNSON: After you left, they appointed Doug [Douglas] Loverro, who didn't end up staying very long because of other reasons. So there was a lot of fluctuation until Kathy Lueders was nominated and named in June of 2020. What were your thoughts during that? Were you worried about HEO at that time? I know it was probably difficult for the people that were left behind working there. But were you aware of what was going on or did you worry about the directorate?

GERSTENMAIER: Again, I think that I left HEO as good as I could, I think I had a pretty strong team in place that was able to continue and move forward. I don't think I worried too much. I felt they were in good hands. Again, no organization is dependent upon any individual. I think they were ready to move forward, and I felt like the directorate was in good hands. When I was told I can't do that anymore, okay, then fine. I'm not going to do that anymore. So I didn't worry too much about that.

Then I would say I went to work for SpaceX in like January, February 2020 and I got fully absorbed in that, so then I didn't really have much chance to think about things. The big thing was were we ready for DM-2 taking crew, Bob [Robert L. Behnken] and Doug [Douglas G. Hurley], to space for the first time and how could I help SpaceX through that activity and contribute again to human spaceflight. So I got pretty engaged in the SpaceX activities and the work that was associated with that, and I didn't think too much about the directorate and where it's going. I still read things in the press and see things.

Then like I said, I have all these restrictions, so I can't really talk to anybody to find out what's going on and what's happening. I looked at that as that was a phase and it's there. Now I get to see in detail what the private sector is like and what it's like to work in a private sector company, which is really good and interesting.

Also I'm back doing real engineering again. In SpaceX I'm forced to do much more technical things than I've done before, so that's a big challenge to me to retool and get all these things up to speed and learn how to do engineering. So I'm pretty engaged in what I'm doing and I'm happy where I am. Again, I think I'm blessed, I get to see now and experience something in a firsthand way that I would never have got to experience otherwise. My only question is again I don't want to do this too long. At some point it's going to be really time to

retire. My wife thinks I should have retired I think when I left NASA. She was thinking we were really going to retire. But I wasn't quite ready. But I may be getting close.

JOHNSON: I can imagine SpaceX is pretty exciting. You had not necessarily worked with them, but we've got the interview on the COTS [Commercial Orbital Transportation Services] Program that we did with you. I know in 2008 there was the decision to award the contract to SpaceX—there were two of them, but SpaceX was one of them. That made a difference in that company, and from what Elon Musk has said it saved his company. I guess it's full circle that now you're getting to work alongside of him and see that side of spaceflight, which is a different attitude I would expect than NASA.

GERSTENMAIER: Yes, and I would say one thing that I think also I see is when I first came to the Agency in 1977, the Agency was a lot like SpaceX in many ways. We did a lot of things in-house, where we didn't have contractors like in the machine shops in Cleveland when I was there. They were civil servants. If I wanted a part to go in the wind tunnel, I could essentially get that part machined overnight and have it in the wind tunnel the next morning. I can now do that same thing again at SpaceX. It's kind of interesting, it's gone full circle. That young NASA where we were very much a can-do, small, lean, move fast organization where we didn't have to contract, and there wasn't so much political overhead, at least when I started as an engineer, that same spirit of innovation and understanding the technical challenges and having the authority to go do things, make things happen, is present in SpaceX. So I see SpaceX in many ways as an early NASA moving forward.

Even the early Shuttle Program up to *Challenger*, we were really leaning forward on Shuttle. If you think about flying crew for the first time on a vehicle that had never flown for STS-1 with Bob Crippen and John Young, that was a huge risk for the Agency, and that was just something we did. I think I told you before maybe I worked with all the Apollo folks. They didn't see just—an orbital flight of a winged vehicle for the first time is nothing compared to going to the Moon, so this is trivial. The Kranzes of the world and Krafts and others, they didn't see it as big a deal. As a new engineer, if they didn't see it as too big a deal, I didn't think it was too big a deal, so we're going to go do this. But now in hindsight you look at that and that was a tremendously risky but rewarding activity to move forward.

Now I see some of the decisions that SpaceX makes exactly the same way. They're no different than what NASA would have made in its youth. But then the outside world looks at it as a new entrepreneurial innovative crazy company trying all these things to go push new frontiers. No, that's exactly what the NASA Agency used to do in the past. Then I think we forgot that. We started focusing more on the risk rather than focusing on the reward. I think we've got to get that back to where you think about what that reward is. Yes, the risk is there, but that reward is what drives you. That learning that you gain from taking those risks is well worth the other problems. But I think we've come the other way. We tried to say spaceflight is safe, spaceflight is routine. I don't think spaceflight is safe. Spaceflight is not routine.

It may be someday, but it is not there. We just don't have the time in space. I think we need to recognize that. Going back to the earlier discussion today, I think the politicals, they don't understand that. They see the benefit, they see the goal, they see the motivation, they see that, but they don't see the risk and the danger. What happens when you have a *Challenger* [STS-51L accident]? What happens when you have a *Columbia*? What happens when you have

an Apollo fire [Apollo 1]? Those are real. We can do great things. But we can also have really bad days. There are tremendous highs and tremendous lows in this business. You've got to be willing to take both of those. I don't think the politicals in general want to take those lows, they want to have all the highs. But they got to recognize with those highs come lows.

The exciting thing now is I'm getting a chance to experience that same zeal, that same move forward, that same it's not about the risk, it's about what can we learn, how can we move forward, how can we get smarter. It's tremendously satisfying for me to do that. My only concern is it's a little late in my career and maybe I don't have quite the energy and the drive to be as effective as I was when I was 22. But we'll give it a shot here for a while.

In the analogy, I'm off the porch with the big dogs, and we're going to go run for a while, so we'll see how long this is, and it'll be fun.

JOHNSON: I think people forget that the average age during Apollo was 26 for the people working. SpaceX seems to me to be that same type of young, it's okay if we make mistakes as long as we learn, that type of environment, the same way NASA was early.

GERSTENMAIER: Yes. I think the trick is it's okay to learn with the hardware, but then when it's crew time then human life is a different thing. We got to be a little bit extra careful there. That's the thing that I think I can help. But anyway again I look going to how this all started. Yes, it was a pretty exciting day when I essentially got reassigned. I had no idea it was coming, and it was unbelievably traumatic initially. But heck, it's happened to everybody, I'm no different than anybody else. When life gives you bumps you figure out what to do with it, and you figure out what you want to go do, and you move on. Again, I'm happy where I'm at, I'm happy where

things are. My wife is still in Virginia, which is not so good, and then the COVID thing was also a mess as you can imagine. I don't know what it would have been like to even be at the Agency during that whole COVID time. But I think that's also another really hard thing for the Agency, for the government, and for all of us as humans.

JOHNSON: Yes, it's amazing how much I think NASA has been able to accomplish when the majority of people are working from home. But things are still moving, which is exciting. You were at NASA a long time, over 40 years. Based on your experience with NASA, and as you said 14 years at Headquarters, what do you think are some of the lessons learned from the Trump administration and the Bridenstine administration? What do you think were some of the accomplishments that were good and maybe some of the things—we talked about some of the things you worried about. But talk about those lessons learned during that time for NASA.

GERSTENMAIER: First of all, I think we clearly learned that we need to communicate more with the public about what we're doing and why we're doing it. I think Jim did a great job of helping us to do that. I think you also need an urgency with what things you're doing moving forward, so creating that push towards 2024 was a good thing, creating that urgency is there.

I think also we got the budget increases, which was very positive, allowed us to move forward. We were basically able to keep a lot of our contracting stuff in place and move forward. I think that all worked well. We made progress during that phase. I think we've been able to make Commercial Cargo and Commercial Crew more of a reality. We're utilizing Space Station in new ways. They were very supportive about making Space Station available to the private sector to use as a place for folks to go. Axiom [Space] is now kicking off a bunch of

activities to go to Space Station with private citizens that'll start next year in January. I think that's a big step forward.

I think the commercialization of low-Earth orbit and making that available to the commercial sector and getting the chance to actually fly crew from private vehicles, from vehicles that were not designed by the government, this administration was able to follow through on all that and make sure that it got executed. They took what came in previous administrations and they followed through and they executed those pieces. So I think that's a very positive thing that they did.

I think spaceflight is in a good posture now. I think we're in an inflection point where things are going to potentially be changing where maybe the private sector can do more. That vision I described to you before, I think it is as close to being realized as it's ever been before. I get scared a little bit because I think we were there in some ways with Shuttle just before *Challenger*. We were flying the first teacher, the first payload specialist, those kind of things. Then we had the *Challenger* disaster and then that reset all that and took it away.

We're now starting to potentially fly private citizens to space again. We're starting to see the commercial sector. So we're at that point again. But I think this time this inflection point is real. I think this time hopefully we'll be successful going through that again. But I think we've got to be cautious that we don't have another *Challenger*. Or if we have some other kind of mishap, how do we fly through that? How do we keep operating through that?

I think this administration did a great job of continuing the vision for human spaceflight, advancing human spaceflight in a real way, and I think making the American people aware that hey, spaceflight is important to us overall. I think very positive with this administration, and even some of the earlier administrations before.

JOHNSON: We've got just a few more minutes, and I wanted to ask you about the May 30th launch of the Crew Dragon spacecraft. It was the first time Americans have launched from American soil to the ISS. Talk about that launch and what that means having Americans launching from American soil again, being a part of SpaceX, and having that lead to that launch.

GERSTENMAIER: I think for me personally what was really cool was I got to be in the control center for that launch here in Hawthorne [California], so I was actually in the back room monitoring. Just like I was on console for STS-1 in the back room monitoring on the propulsion side, I'm in Hawthorne on console in the back room again monitoring the launch from here in Hawthorne.

Again, I feel that here I am blessed. I get to be doing a real role in two different entities, one on the government side on Shuttle, and then now on the private sector as Bob and Doug went to space. It was pretty special for me to get to do that and to be comfortable enough in understanding the displays and systems and data and be able to talk on the loops and interact with folks again was good.

So again, tremendously blessed to go do that and contribute in a small way to both these activities. I think it's really neat that again it's the U.S. having an ability to get crew to Space Station on their own without dependence upon the Russian, so it's a big deal. I think again the neat thing there is that we really need more than one way to get crew to Station, so having a U.S. capability and a Russian capability, we're not replacing the Russian capability, I think we honestly need both, and so this is a way that we're able to do that and move forward.

I think it's also a tribute to the administrations and all the other folks that allowed us to continue with this commercial program all the way to where we could actually go execute this and bring this back. Again, I think each administration would like to take credit for it. I would tell you if Lori [B.] Garver or the Obama administration was here they would tell you that they started all this and they're the reason that it's there. It would have never happened if the Trump administration wouldn't have continued that activity and moved forward. So as much as these individual groups want to take credit for things, it's actually the combination of them both moving forward that allowed us to be where we are and move forward.

It was an exciting time to get a chance to see that again for me personally. Again, I'm tremendously blessed. God has been so good to me to let me stay in this business, get to see all these aspects, and contribute. I don't know exactly why. But maybe someday I'll know. But anyway maybe I can just help contribute, and it was cool. It was very very exciting. Maybe even better than being on the NASA side for this event, because now I was actually down and in with all the details and all the data and all the information that I would have seen more remotely from the NASA side, so actually to be here and be entrenched with the detail stuff is really good.

JOHNSON: I would imagine for an engineer it's fun to go back and do what you wanted to do to begin with.

GERSTENMAIER: Yes, there wasn't the political aspect. I wasn't worried about what I'm going to have to say to Congress or how I'm going to have to go talk to these politicians or go sell this to this administration. This is the math that sits behind it, this is the physics, this is

thermodynamics, this is the physics, this is the stuff that I can still do, so I get to go do those again.

JOHNSON: Yes, I bet that was a relief. And I bet the actual technology and comparing those two control rooms from the first flight of Shuttle to now was quite different too.

GERSTENMAIER: It's extremely different, yes. That's what's really cool, is we've got the ability now to do things much faster than we did before, and to bring tools that were unheard-of compared to what we had back prior to the Shuttle activities.

JOHNSON: Is there anything we haven't talked about that you want to mention?

GERSTENMAIER: No, I think this is good enough.

JOHNSON: Okay. I appreciate you taking the time today, and to work through all the technical issues we had to work through to get this done. It's always good to hear from you and your perspective.

GERSTENMAIER: It's a pleasure. It'd be interesting to see, because like I said all these others went through this dramatic change. It would be interesting to see what they thought. I saw it from a distance, but I don't know if they've ever addressed that in any of their oral histories.

JOHNSON: Yes, it's going to be interesting.

GERSTENMAIER: It would be interesting to see what Mr. Abbey would say or Mr. Kranz would say.

JOHNSON: Yes. Mr. Abbey is the one that started this project back in '96 but he doesn't interview.

GERSTENMAIER: That's what's funny, is I will tell you my management style, my learning comes from all of them. I was mentored and trained by that whole crowd and I carry all those lessons learned deep.

JOHNSON: I can imagine. If you were going to be trained by someone, they were the best ones.

GERSTENMAIER: Yes. What would be cool is when I'd talk to the Apollo folks, what do they say? Ordinary people doing extraordinary things. That's what our business is. We're all ordinary folks. By the United States of America we've been given a chance to do extraordinary things. It's pretty cool, and that's why I like this industry.

JOHNSON: It is special.

GERSTENMAIER: It sure is.

JOHNSON: Hopefully you can be that mentor to those folks at SpaceX now.

GERSTENMAIER: Yes. All right. Cool.

JOHNSON: I appreciate it. Thank you, sir.

GERSTENMAIER: All right, thank you.

[End of interview]