

# **NASA AT 50 ORAL HISTORY PROJECT**

## **ORAL HISTORY TRANSCRIPT**

WOODROW WHITLOW, JR.  
INTERVIEWED BY REBECCA WRIGHT  
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WRIGHT: Today is May 9<sup>th</sup>, 2007. We are at the NASA Glenn Research Center in Cleveland, Ohio, to speak with Center Director Dr. Woodrow Whitlow, Jr., for the NASA at 50 Oral History Project. The interviewer is Rebecca Wright, assisted by Jennifer Ross-Nazzal. Also attending today is Linda Dukes-Campbell, Chief of the Glenn Community and Media Relations Office. In preparation for the space agency's fiftieth anniversary, the NASA Headquarters History Office commissioned this oral history project to gather thoughts, experiences, and reflections from NASA's top managers. The information recorded today will be transcribed and sent to the History Archives in Washington, D.C., where it can be accessed for future projects.

Are there any questions that I can answer before we start?

WHITLOW: No, let's get going.

WRIGHT: All right. Well, thank you again for providing us time. We'd like for you to begin by telling us briefly about your background and how you came to your current position here as Center Director.

WHITLOW: Okay. Well, I grew up in the suburbs of Detroit [Michigan] in the city of Inkster, and I was one of those who was inspired by the space program when we first started in the sixties. I was born in 1952, so in the sixties I was at a very impressionable young age. I decided

then I wanted to grow up and work for NASA and be an astronaut, so when I got to college, I actually tailored my programs toward that, so I have three degrees in aeronautics and astronautics.

Then I went to work for NASA, NASA Langley [Research Center, Hampton, Virginia], in 1979 as a researcher in unsteady aerodynamics and aeroelasticity, and eventually became a first-line supervisor. Immediately before that I actually spent a year at NASA Headquarters as part of what is now the Leadership Development Program (the Professional Development Program), and then I came back and became an Assistant Branch Head and later a Branch Head. Then I went back to NASA Headquarters as a Division Director, which is my first SES [Senior Executive Service] job, and then returned to Langley in a program management role, and then as a second-level supervisor, as a Division Chief

After serving in that position for a while, I came to what is now the Glenn Research Center as Director of Research and Technology, which is a third-level supervisory position. After five years I was assigned to [NASA] Kennedy Space Center [Cape Canaveral, Florida] as Deputy Director for two and a half years, and I find myself as Director of Glenn Research Center, so I think I hit every level of management, branch, division, directorate, Deputy Center Director, then Director.

WRIGHT: Tell us how NASA has changed over the time that you began at Langley to the where you are right now, just some of your general impressions of how things have changed.

WHITLOW: Well, if I were to look at my field, unsteady aerodynamics and aeroelasticity, when I first came to NASA we were still doing in aerodynamics a lot of what we call approximate

methods or things like panel methods or doublet lattice methods for aerodynamics, for aeroelasticity. We were just starting to do computational methods, and there was no such thing as a computer on every desk. I can remember we had four terminals in a common area, and you had to sign up to be able to use those terminals. Of course, now in those areas the computing power has changed drastically, has increased drastically. We also had a wind tunnel associated with the branch, and now we use the computer and computer simulations a lot more than we used to. We still rely on the test data, but that's one of the changes.

[interruption]

WRIGHT: When we stopped we were talking about how NASA has changed over the time that you've been part of the NASA community, and you were talking about the computer power, basically.

WHITLOW: Yes, the automation has changed a lot. I remember our first word processor we received in the branch, and I can remember days when if I wanted to fax something, I had to get approval from the Division Chief before I could take the materials to a central location at the Langley Research Center to be faxed. She's shocked by these things. [Laughter] You had to get approval to send a fax. Just the whole information technology, the computer capability, the automation that's occurred.

The workforce, the nature of the workforce has changed a lot. We still have some improvements we could make, but the diversity of the workforce has changed tremendously. I can remember talking to some of the more senior people at Langley when I got there, and there

were African American women who, in some cases, didn't have bathrooms in the buildings they could use. So that whole arena has changed a lot, even to the point where I'm in this position.

When we look at the technical programs, we used to be an agency where we did space, we did the aeronautics, and we still do that significantly in both areas, but we're now more—I think we're more focused on development than we have been in the past, and that's because of the nature of the vision that the national leadership has laid out for us. We now have a focus. When I came into the agency in 1979, our big focus was Space Shuttle. I wouldn't say that Space Shuttle is a vision; Space Shuttle is a tool that we use to carry out and accomplish a vision. So we now have something that we're all aimed at again, and so for me that's been a big change.

WRIGHT: Well, tell us in your current position as Center Director how you will take this Center and help it become part of that vision and help to accomplish the goals for this new vision of exploration.

WHITLOW: Well, one of the things this Center has is—we're viewed widely as an aeronautics research Center—but we have a very rich history in space flight systems development, from Space Station power to its entire rocket upper stages to in-space propulsion, where the whole concept of the ion engine was developed at the Glenn Research Center. Over the years our research and development resulted in it being demonstrated as a primary propulsion system on the Deep Space 1 spacecraft. We've done over 130 microgravity experiments that have flown in space, including many that were human-rated. So we have a very rich history in space flight systems development, but we are thought of as solely an aeronautics research center.

With the way the agency is headed now with a Vision for Space Exploration that we have to implement, it was necessary for me to make some significant changes at this Center, and that included our senior leadership, and that included restructuring, and that included some retraining of the workforce. I will include myself, I think there is like thirteen or fourteen new senior-level managers at the Center, and of course, we have a new organizational structure.

The Center has goals in prioritized order that we're aimed at. That's to be known for excellence in space flight systems development, to be recognized as a leader in program and project management, to excel in aeronautics and space research. Then I like to say one of my pets is to be more of an integral part of the northeast Ohio, and the Ohio national community, to have people know our capabilities, to have people know what we do, know what benefit that NASA and NASA Glenn provides for the taxpayer dollars that we receive.

So those are just some of the things that I've managed to do in less than eighteen months.

WRIGHT: What type of challenges do you foresee that you might encounter as you're on your way to accomplishing these goals?

WHITLOW: I would think they're the same as other Centers, but one of my challenges is having the right workforce, one with the right skills. Right now, the work we have, sometimes we don't have enough people to put on all the projects, and that's because things have changed so quickly, and they changed faster than we were able to change the people. That doesn't mean get rid of a lot of people. What that means is retraining. I have a three-prong retraining effort that we've put in place, one aimed at enhancing systems engineering skills, aimed at enhancing our project

management capability, and enhancing our safety and mission assurance capability. So having the right workforce and enough workforce is one challenge.

Making sure we have the right infrastructure. We were established on January 23<sup>rd</sup>, 1941, so we have some facilities here that are a little older than maybe they ought to be, and maybe not in as good a shape as I would like for them to be. So getting the support and the resources to make sure we have appropriate facilities and appropriate infrastructure is a big challenge.

Making sure that we're working well internally, that we're all on the same page, and that everybody is thinking—first of all, everybody's thinking what's good for NASA, and not what's good for Glenn. What's good for NASA, and then what's good for Glenn, and then what's good for my organization. Sometimes that thinking gets inverted, what's good for me and then what's good for the Center and then what's good for NASA.

So those are a couple of challenges. Then I would say one other is we have a large research population, and sometimes in research, if you don't get it done this year, you can get it done next year. But doing more development, then we have to be cognizant of the tempo at which we have to work and the tempo at which we have to deliver products. So those are a few of my challenges.

WRIGHT: One underlying challenge that seems to affect everybody is budget. If you had an unlimited budget or you could ask for budget increase, would there be some new programs or some new aspects that you would like to see the Center get involved in?

WHITLOW: Well, as the Center Director, in our governance model, we have this separation. I'm in charge of institution. We have this separation of the institution and programs. I would love to see the agency, say, get an unlimited budget, and then maybe we could close some of the gaps that we have in capabilities. The agency and the nation are going to have some gaps, say, in access to space when the Space Shuttle stops flying in 2010, and it will, and we can't bring CEV [Crew Exploration Vehicle] online until 2015. That's five years when you've got this asset, Space Station, up there that you've got to count on somebody else to get you there.

So from a programmatic standpoint, I would love to see the agency get enough money so we can do all the things that we know we can do, and we can do a lot of good things, good things in science. There's a lot more in aeronautics that we can do. Of course, there's a lot more in space exploration that we can do, particularly in accelerating some of the programs, but we don't have enough money.

Now, if I were given a new, let's say, unlimited institutional budget, I have a plan for the Center. I would like to see this Center get new buildings, and I've got a location picked out down the street where I'd like to have a new central campus. I would like to develop the property across the street in Fairview Park with new buildings and new places for the public to come and learn about what we do. I would like space research facilities in what we call our west area, which is down the hill over here.

I would upgrade some of the facilities at Plum Brook [Station] to make it more accessible to people to bring in their test articles, and that could include a runway, a runway right on the property, to make it accessible. There are lots of things I can do institutionally that I'd like to do to improve the quality of life for the people who have to spend more waking hours here than they do anywhere else. Those are just some of the things I'd do.

WRIGHT: You talked a few minutes ago about the rich history here at the Center, and before we were talking some about what it was like to grow up, those formative years with the first days of NASA. What do you believe to be NASA's impact on society as now and even in the future?

WHITLOW: Well, I'll go back; I believe I'll go back to the past before I start talking about now. NASA, when we were formed—and I'm talking about NASA, and I can go all the way back to NACA [National Advisory Committee for Aeronautics], NASA's predecessor and the impacts we had on the war efforts, but I'll just talk about NASA. The reason we were formed was in response to—at least partly in response to—Sputnik [Russian satellite], and we had to beat the Russians. So NASA has always been an intense source of national pride, and I'd say that's the case even today. Back during the Cold War when we were trying to beat the Russians, NASA could do no wrong.

So we provided this national focus. We were, and we are, about discovery, and we discovered a lot of new things. We learned a lot of new things as we were racing the Soviet Union to the Moon, resulting in a lot of I would say new products, probably new industries, and exceptional economic development. When you look at what we were trying to do and the resources we needed to do it, one of the big things we needed were people. So it provided inspiration for people to go into fields that would lead to innovation and discovery.

As I said, the reason I decided I'd have to be an aeronautical and astronautical engineer was so I could work for NASA, so that I could be an astronaut. And you get people who had that goal, so even if they didn't become an astronaut, maybe they became this scientist or a medical



researcher. Maybe this person is going to be the one that discovers a cure for cancer or a cure for heart disease.

So I would think just the inspiration that NASA provided, because people want to be a part of what we do because nobody goes out to try to do something else and say, “Well, I wanted to be *x*, but I ended up at NASA.” You don’t end up at NASA. You have to work hard to get here. So those are just some of my thoughts. The economic development and discovery and advances in science and technology, the spin-offs, those tremendous impacts. Then just the national pride that we inspire.

Before I close this question, when you think of what happened with the Hubble Space Telescope, a decision was made, that we weren’t going to service Hubble and when it died, it simply would be dead. When before have you heard of people in the heartland of America or just the common person rising up and saying you can’t let a telescope go away. So that’s unique, and just so many things that the Hubble Space Telescope has done is a source of pride for everybody.

WRIGHT: As kind of a follow-on to that same thought, what do you feel like NASA’s role is? NASA’s been around for fifty years next year, but what do you think its role is for the future, for the next fifty years?

WHITLOW: I think NASA’s role is to, again, be that catalyst for—not be a catalyst, but lead in discovery and exploration, and figure out how to get us off the planet; how to get us to other destinations. To get us to Mars is going to take maybe thirty, thirty-five, forty years from today, so that takes up 80 percent of it, 60 to 80 percent of it right there. NASA will have to be the

world's leading agency in human space exploration. It's more appropriate to say the world's leader in exploration—period!! We already have spacecraft that have left the solar system. We don't have any humans that have done that, but particularly human exploration, but exploration in general.

I think NASA will have a major role in advancing the aeronautical sciences. There's so much we can do within the atmosphere, and when you think of the economic impact of the whole aerospace industry, and that includes aviation. We have to lead in the mastery of aeronautical research. We've been stuck in this rut for decades with the aviation system. Nearly every airplane is a metal tube with wings sticking out the side. The system is overcrowded and inefficient. How can we make it better? And that's just, say, major-airport-to-major-airport transportation, but what I'd count is the entire trip. How long does it take for me to get from my house to the other person's house, no matter where it is? How can we revolutionize our whole aviation system? I think NASA has a role to play in that; how to make safe, efficient air transportation available and convenient for everybody.

WRIGHT: It has its roots in aeronautics, but why do you think NASA should continue—with so much out there to discover—why do you think it should continue with the aeronautics as well?

WHITLOW: Well, we have the knowledge. We have the expertise to provide that technology development, though we have to be careful, at least right now, about not subsidizing industries. But, as a U.S. government agency, we still have lots to offer that private industry cannot or will not do. So there's a lot of people depending on things that we can do that can advance the

aviation or the aeronautics industry. So I would think we ought to remain in a major role in aeronautics research.

But if I were to look at that piece, the aeronautics piece, and then I go back to the space piece, I think I've said that one of the things that NASA could do in aeronautics and in the space exploration is again to inspire our young people, provide something that's visible, something we see every day that makes people say "I could do that." Not only "I can do that," but "I want to do that. I want to be a part of that," something that's exciting, and there's just all kinds of intangible benefits that I can't even begin to imagine or describe that comes from that.

WRIGHT: Constellation Program is going to take lots of technology and there is already a lot of discussion about human and robotic being mixed and blended. What are your thoughts about the importance of using both those technologies to accomplish the goals for the Vision for Exploration?

WHITLOW: Well, one of the things we have to make sure we do is not lose sight of the fact that I'd say the number one priority is to do exploration safely with minimal or no loss of human life. That's where, until we develop systems that are qualified for humans to fly one or to go to certain destinations, we could use robots or robotic spacecraft to go to learn things.

We have spacecraft going to Mercury, spacecraft at Saturn, spacecraft at Mars, and learning things, so that about—or even send spacecraft to the Moon to learn all we can or as much as we think we need to know about these destinations where we're going to send humans before we send humans, so that when they get there we maximize the opportunity for mission

success. To land a person on Mars would be great. To land a person on Mars and have the capability to bring them back safely, that would be mission success.

There's some places right now where maybe it's not appropriate or safe to send people. Say if we wanted, for example, a probe that goes down through the atmosphere of Jupiter; it's not a safe thing for humans to be doing. We don't know how to do that yet, but we can try it with robotic spacecraft. Or maybe it's something where you traverse the rings of Saturn. There's a lot of debris there, and you could collide with something and have catastrophic damage to a spacecraft. With robotic spacecraft you can learn a lot. I don't know; we haven't collided with anything, but if it happened with humans on board, that would be a catastrophe. If it happens to a robotic spacecraft, we've learned a lot before we've lost the mission.

WRIGHT: Well, speaking of learning, you spent not quite three decades of your life with NASA in a number of positions on a number of Centers. Share with us some of the lessons that you've learned that you're now applying while you're sitting in this leadership position.

WHITLOW: Okay. Well, I would say that I've spent more than three decades with NASA. I had four years supported by NASA as a graduate student, so add them up, that's thirty-two. But, yes, I have been at Langley three times; I've been at Headquarters twice; Glenn twice; and Kennedy once.

So I've learned, one, I've learned that in terms of advancement that the ability to be flexible opens up a lot of opportunities. So when I talk to people, counsel them about career development, career opportunities, career advancement, that's one of the things that I tell people.

If you want to only stay in one location, the opportunities are fewer than if you were willing to look at the nine locations.

So when I set the strategy for Glenn, having been a lot of places, I now personally know a lot of people, and that has helped me a lot in recruiting and developing my leadership team, because I've been able to use some personal contacts with people in places that I would not have had those contacts if I had not been several places. So that has helped a lot.

In terms of developing my strategy and my vision for the Center, I've been helped by seeing what goes on at Kennedy Space Center, what happens at Langley, or interactions I have with people at [NASA] Johnson [Space Center, Houston, Texas] and [NASA] Marshall [Space Flight Center, Huntsville, Alabama]. One of the things that I learned as Deputy Director of Kennedy was the importance of partnerships, partnerships with other Centers and particularly partnerships with your stakeholders in your local communities, and that's why I set a goal here for this Center as an entity to be more engaged with the local and the national community.

I learned a lot about communication, particularly in working with Jim [James W.] Kennedy at the Kennedy Space Center, the importance and the value of timely and open communications. I actually have received quite a few comments or compliments about receiving timely information or people being surprised at some of the things that I share with the workforce and the timeliness with which I share information. I think that's probably the most important element of leadership is communications, because if you don't communicate with folks, they'll make up their own story, and it's usually a lot worse than the one that it actually is.  
[Laughter]

WRIGHT: After [Space Shuttle] *Columbia* [STS-107 accident] especially, there were a lot of discussions about the culture of NASA and possible changes or ways to enhance it. What are your feelings and what are your thoughts, basically your perception about what NASA culture is and what it is especially here at Glenn?

WHITLOW: The NASA culture is certainly one that values—it values knowledge. The NASA culture—while the people respect positions—they value and respect the people in those positions more if those people are viewed as experts or as knowledgeable in their chosen fields. NASA respects knowledge and capability, and that's good. I think that's good, in a way, where people will respect position, but they really will value and they will follow the person that has the knowledge.

Let's see. Maybe I've forgot the question.

WRIGHT: We were talking about just your perception of the state of NASA's culture and even at Glenn.

WHITLOW: Well, at Glenn, which we've been a research center, and so in a research world, you advance on—at least in the old culture—you advanced on what we call personal impact, which means “what did I do?” Whereas now, and you see it in the space flight world, it's more “what did the team accomplish and how did I contribute?” It's more the team and not personal impact. So changing the culture at Glenn from that less focus on personal impact, because people will do what they get rewarded for, to put more emphasis on team and team contributions, that's one

change. And that's the way we're going, and I think other parts of the agency, particularly the human space flight part, is ahead of us in that respect.

Now, if I were to say, well, one of the things that came out in *Columbia* was an issue of communication or a reluctance to communicate, which is one of the things, for fear of reprisal. Now, I think at Glenn we are far ahead in that area, is that our workforce is certainly not reluctant to share their opinions with management, and that's a good thing when people feel like they can be open and they can be honest. They can tell you if they think what you're doing doesn't hold water, and not have any fear of reprisal. So I think that our communication—and it's nothing that I've done, but the people of Glenn have always been willing to tell you what you should do or their opinions of how they think you ought to do things. So I think that is a part of our culture that's, rightly or wrongly, I think it's beneficial.

WRIGHT: One of the last questions I'd like to ask you today before our time is up is that you talked earlier about how inspired you were as a young person to want to work at NASA. What would you tell someone today? Why would you encourage someone to consider NASA as a career choice?

WHITLOW: I would tell any person, not a young person, old person, I'd just tell any person, that the opportunities to do things at NASA are unlike any other place. There's no other place you can go to work where you can say, "My company has put people on the Moon."

Or when I wake up in the morning and people ask me, "What are you doing?"

"Well, I'm going to work to figure out how to put people on Mars."

Nobody else can say that, and the work is exciting, is cutting-edge. You get to do things that nobody else gets to do, and you get to do things that you can't do anywhere else.

I also tell people that, if I'm out recruiting, that I'm not just looking for anybody. I'm looking for a special person, that person that's driven and committed to aeronautics and space research or space exploration. You ought to come to work for NASA if and only if you have that same drive, that same passion, if you want to do new things, if you want to do innovative things and not get stuck in a rut, and always have a challenge every day. So if that's what you want to do, then come work for NASA.

WRIGHT: Well, why don't we stop for now, and then I just wanted to ask if there were any more thoughts or any more pieces of information that you'd like to share with us for this project.

WHITLOW: Well, I would just like to say that, from the Lewis/Glenn Research Center standpoint, that I would like to just briefly say a little bit about our history. We were established here in 1941 and we were actually support for the war efforts in helping to make improved aircraft engines. We were here as an engine laboratory doing engine research, and our work did improve the performance of warplanes, so I would like to say we had a significant hand in our safety and security of the nation.

We pioneered the use of liquid hydrogen as a fuel for rocket propulsion, and, of course, I would like to think that that enabled us to get people to the Moon. Of course, we now use liquid hydrogen for Shuttle propulsion.

Neil [A.] Armstrong started his career here as a test pilot, and I'm sure at the time we didn't know all the things that he was going to go on to do.



Again, we have lots of experience in space flight as well that I covered earlier, so a rich history in aeronautics research, space flight systems development. You might have to look this up, but we have won an Emmy for our communications technology, and I think it's the agency's only Emmy for a technical contribution, and we're proud of that, too.

I think that's it.

WRIGHT: Well, thank you, and I'm sure that there will be many, many more years of rich history that the Center's going to contribute. We thank you for spending time talking about it, and we wish you the best of luck.

WHITLOW: Oh, thank you.

WRIGHT: Thank you.

WHITLOW: Thanks for coming.

[End of interview]