

INTERVIEW WITH

Christyl

Johnson

BY DON COHEN

Christyl Johnson has been assistant associate administrator in the Office of the Administrator at NASA since fall of 2005. She joined NASA in 1990, designing and building laser systems for remote sensors at Langley Research Center. She has also been associate director for exploratory missions in the Office of Earth Science and the deputy chief engineer for Program Integration and Operations in the Office of the Chief Engineer. Don Cohen talked to her recently at her office in NASA Headquarters.

COHEN: Tell me about the responsibilities of your current job.

JOHNSON: I am the assistant associate administrator for the Agency, so I am the deputy to the number three person. We are responsible for technical oversight of the Agency's missions.

COHEN: That means, in part, dealing with technical disputes not resolved at a lower level?

JOHNSON: Yes. It has been good to see the technical authority process working the

way it was envisioned: to see some real disagreements between the programmatic elements and the institutional elements like safety and mission assurance or engineering get addressed and resolved. These disagreements now have a path of adjudication all the way up to the administrator for a final decision. It's good that the issues are bubbling up and being discussed openly. We are working hard to create an environment in which it is not tolerated, when big problems arise, that the engineer with the concern gets stifled and his concerns are not heard and addressed.



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COHEN: What have been the most challenging cases?

JOHNSON: The engineering issues are probably the easiest. The most difficult decisions are the ones that affect people's lives and are more personal than technical. You can perform calculations and make reasonable trades regarding a specific technical issue, but when it comes to making a decision about moving a program from one Center to another, you have to deal with the political and personal fallout of that decision.

COHEN: Has that happened recently?

JOHNSON: SOFIA [Stratospheric Observatory for Infrared Astronomy] moved from Ames Research Center to Dryden Flight Research Center. In these types of situations you have hurt feelings, not just at the employee level but all the way up through the management chain.

COHEN: What was the rationale for the move?

JOHNSON: The Ames team was experiencing lots of delays due to technical and management problems. Dryden was determined to be better equipped and more experienced to be able to complete the mission successfully, so the decision was made to move it.

COHEN: So it was a technically easy decision, but ...

JOHNSON: ... but there were political implications associated with moving it from one district to another. Lots of people are affected by these kinds of decisions. There are those that have to uproot their families and follow the aircraft because they're the ones doing the day-in-day-out work. And you have a center director who says, "Believe in me, I have the ability to do this. You hired me to do this job; I've told you

how I'm going to get it accomplished. So give me a chance." There's a lot that the engineers never see.

COHEN: Do you see your main role as giving engineering advice, or using your engineering background as a foundation for these human decisions?

JOHNSON: Definitely using my engineering background to make sound, reasoned judgments. It is always better to have someone in a senior leadership position like this one who has experience actually building technical systems. You don't know how long it takes to do thermal vac if you've never done it before; you don't know what a reasonable estimate is if you've never made one. Because I started my career designing and building laser systems, testing them and putting them on aircraft, and doing field measurements in the deserts of New Mexico, I know what it takes to build systems successfully. When they say, "I can get this done in two weeks," you remember what it was like and say, "That doesn't sound right to me."

COHEN: It's wishful thinking.

JOHNSON: Exactly. As a technical manager you make decisions based not just on their assessment but on your experiences, too.

COHEN: You started out as an engineer.

JOHNSON: Yes, I was the lead engineer for the Chromium: LiSAF laser development project at Langley. I designed and built a Chromium: LiSAF laser oscillator that was the first to achieve 33 millijoules in a diode pump scheme. I also established

the first stress-optics laboratory at Langley. Universities and other organizations came or sent their crystals to be tested in this lab. I became the program manager for the Differential Absorption Lidar (DIAL) Program, which encompassed all the laser development research projects at Langley.

COHEN: So you combined engineering and management early on.

JOHNSON: Yes, because I had the ability to communicate effectively with both engineers and management.

COHEN: Did you know when you started at NASA that you had those skills, or did you think of yourself as a nerdy engineer?

JOHNSON: I have never viewed myself as a nerdy engineer. I love being able to create things with my own hands—my father and I rebuilt Mustangs together. Math and science came easily for me, but I'm really a people person. I like being in the lab, but I'm more in my element communicating those lab results in international forums or negotiating with the Italians for a spin table for Triana.

COHEN: Were you already thinking in that direction when you started at NASA?

JOHNSON: I have always been a people person and communication came easily, but I never dreamed I would be presenting papers in international forums when I started at NASA. When I first came, the organization I was in was trying to create and discover new laser crystals that could achieve greater efficiencies and greater power output—which we

need for remote sensing. It's very difficult to find the combination that gives you high efficiency, great output power, the wavelength that you need, and the right input stimulus. Listening to the discussions in meetings when I first started, I remember thinking, "Oh, my God, this stuff is Greek to me! How am I ever going to get to be as smart about this stuff as a Norm Barnes," who was the guru of the laser design world? As an engineer, I was just focused on this Chromium: LiSAF system and in the laboratory tweaking knobs. When I couldn't get it to work, I would brainstorm with other design engineers to try to figure out what to try next. This was my baby. They had their own research to do, but they'd sit down with me and brainstorm. This was a very helpful practice that we all benefited from.

COHEN: That was your first assignment?

JOHNSON: No, I had been a summer student starting in 1985, so I had numerous smaller assignments prior to that. I also did my master's thesis research at Langley, so I was very much a part of the team before I started working there officially in 1990.

COHEN: The student work wasn't in a co-op program?

JOHNSON: No, the Lincoln AeroSpace Engineering Recruitment (LASER) program that I was selected for required you to work at a NASA Center for one summer. I did that assignment in 1985 and really enjoyed it. The Langley people hired me back the following years as a

summer hire so I could continue to do work for them.

COHEN: Were your first months at NASA sink or swim, or did you get guidance and mentoring?

JOHNSON: I got mentoring that was absolutely critical. It is crucial for anyone responsible for a research environment to make sure that they spend that time up front giving new hires some kind of guidance. There were several people who came in and didn't get that kind of mentoring. They sat around and didn't know what to do. They weren't getting much out of the work, and they weren't contributing much to it. Because I had been there those previous summers, I had already established relationships with people in the organization. I could go to them and ask, "What do you think about this?"

COHEN: People who are less outgoing might not be able to do that.

JOHNSON: True. That's why, later, we made sure that anyone who came in did have mentoring. It's critical. You can't just throw people in the water and say "Swim!" if you want them to contribute.

COHEN: What kind of mentoring did you get?

JOHNSON: Some was technical advice, like pointers and guidance in my laser design and development efforts. Other mentoring was of a political nature, like a challenge that I faced as the subsystem manager of the LASE [Lidar Atmospheric

Sensing Experiment] program when a person tried to throw a monkey wrench into the laboratory operations. Then there was career advice like what kind of job to take next and what kind of experience I needed before going to the next level.

COHEN: Can you tell me about the problem with LASE?

JOHNSON: I was subsystem manager for the diode-seeding subsystem of the program. We had established an autonomous lab to do characterizations of the diodes that we needed to seed the system. I had engineers and technicians working long hours to address a line-locking problem that was threatening the delivery of this critical system for the mission. The chief engineer of our division would come in the lab and try to take the engineers off task to try his ideas. I went to him and I said, "You cannot redirect these engineers. We have a task plan and a very tight schedule." He wouldn't listen to me because he was a senior-level manager and I was just a program manager.

Finally, I went to my branch manager, who called a meeting with all the senior managers in our division. In the meeting I let them know what was going on, and I asked them to ask the chief engineer to stop interfering with our efforts. The management team asked him to stop going into our lab. He replied, "I can do whatever I want, I'm the chief engineer." The team was outraged by his response and started arguing with him. I interrupted and said, "As long as we know what the rules of the game are, we can play the game. If he wants to redirect the engineers, all we have to do is tell them

not to listen to him." We ended up doing just that. The division manager later told me that he had heard of how I handled the situation and that my tact was exactly what was needed in our managers. He also said, "Christyl, that is exactly the approach you need to take. It doesn't have to be a fight. You keep on going down the path you're on." It was good to get that kind of affirmation.

COHEN: You got both advice and support.

JOHNSON: Yes, and it turned out well. We identified the problem, fixed it, and delivered the system on schedule.

COHEN: So that's a case where the problem had more to do with human interaction than technical issues.

JOHNSON: When engineers become frustrated and can't think, that takes away their ability to get the job done quickly. If you want them to focus on the issues, you can't have extraneous stuff interfering.

COHEN: Do you think being black and a woman has influenced your career at NASA?

JOHNSON: I don't view it as a negative. I don't see it as a positive, either. It just is. I've enjoyed being not just the only black female, but the only female in some arenas that I'm in. I have found that most men are comfortable working with me. Sometimes men don't view talented women as a threat like they do their male counterparts. There have been times when I had to deal with people who were not accustomed to women being in

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engineering or to having women as their equals or their supervisors. That can cause problems. There have been some guys that really struggle with acknowledging a woman in a prominent role. They won't look at you during discussions at meetings. Even if you are the one that is asking the questions, they'll give the answer to one of the other males at the table. Those things happen. I chalk it up to the guy being ignorant and keep going. It's not personal.

COHEN: You also got mentoring that was career advice?

JOHNSON: When I was program manager for the diode program, the laser engineers did their performance planning through me. Then I would sit down with the deputy branch manager and talk about what each group was going to be doing, and what I thought were their success criteria. He would sign off on them or talk to the branch manager. He was the person I worked most closely with in the management chain. Once, when the branch manager had gone on vacation, an assistant branch head position in the electro-optics and controls branch was advertised. The deputy branch manager said, "Christyl, you are already performing

many management functions, and you are good at it. You really should consider applying for the job." The branch manager who was on vacation had been telling me, "It's not good to get out of the laboratory until you've been doing this for fifteen years and establish yourself in the engineering community as an expert in a specific field. Then maybe consider going into management. You'll never be able to succeed if you're not established as an expert first." But the assistant branch head said, "You don't have to be an expert to make progress in your career. Your career path is completely up to you." He wrote my recommendation, and I got the job. That ended up being a really positive experience for me.

COHEN: Is it important for most engineers to develop some of these people skills or does it make sense to say, "We'll let this introverted genius engineer just focus on his own work?"

JOHNSON: I think there's enough room for everyone to be themselves. It's good to give those total introverts some exposure that can help them to grow. If they're comfortable doing things that can stretch them, that's great. Their supervisors should look for opportunities to present

to them to give them the choice. Sometimes those introverts come up with the most creative ideas. As an engineer and physicist, I know you need the space to let your mind function the way that it functions. If you try to take a square peg person and force him into a round hole, you're not going to get the best that person has to offer you.

COHEN: How would you describe NASA's challenges today and the challenge of a new administration next year?

JOHNSON: We don't know what's going to happen with the presidential election. That could be a whole new set of challenges we'll have to deal with. As for now, we know that we have lots of challenges making sure that the Ares launch vehicle will be ready for flight in 2014. We know we have a gap between the planned retirement of the shuttle in 2010 and the maiden flight of Ares. There are many hurdles that we need to overcome to meet the milestones before us. In order to maintain support for our mission, we've got to deliver on the first few milestones in the queue for Constellation. We are constantly criticized for schedule slips and cost overruns, so we must be realistic about what we are

committing ourselves to and be able to deliver on those promises. That's the only way we'll get the commitment and support we need from the Hill and our other stakeholders.

COHEN: That may involve speaking some hard truths, like saying, "You want us to do this by a certain date but it can't be done with the amount of money you're giving us."

JOHNSON: That's always a challenge, but Mike Griffin is the kind of person who can communicate very bluntly.

COHEN: Does NASA have the skills it needs?

JOHNSON: I think we have a wealth of talent within NASA. As long as we continue to do the things we need to do to fill the pipeline in the STEM fields—science, technology, engineering, and mathematics—we'll continue to have the kind of people we need. It's also a matter of enticing good people in those fields to come to NASA. They won't want to come here if they're going to be contract oversight managers. I know I would not have chosen to come to NASA if I'd been told that I was going to oversee a contract for which someone else was doing the fun engineering work.

COHEN: How do we avoid that?

JOHNSON: We have to strategically assign centers to do in-house work to maintain the competencies we need for the future. We want to develop our engineers with these critical skills and we want to be smart buyers when we contract work

out. How can we be smart buyers for procuring systems that we don't have experience building ourselves? How do you have quality engineers if you don't have quality work for them to do? You have to make a conscious decision to ensure a healthy balance between those things you do in house and those things you contract out.

COHEN: Do you think today's engineering students look at NASA as an exciting place?

JOHNSON: It's a mixed bag. There are many students who get excited at the mention of NASA. They are intrigued by space and the research we do. On the other hand, many students have been to career fairs and seen a decline in the hiring opportunities at NASA. We have to make sure that we do a good job establishing the kind of work that would draw good people and then we have to have the flexibility to bring some of them in.

COHEN: Is NASA going out to make the case, to communicate the excitement of the work?

JOHNSON: Yes, we are doing this in many ways. When I do personally, the message is received overwhelmingly well. I have engaged some of the students in dialogue, and I have heard that they are surprised when they visit some of the NASA research facilities. Their school laboratories have the latest equipment so they expect NASA to have at least the same caliber if not better. That is not what they see when they go to some of our facilities. We must do what is necessary to

provide them with challenging work and the necessary tools to get the job done. Our laboratory facilities and equipment are important elements for sustaining the capabilities we will need for the future.

COHEN: As a young engineer, your experience with NASA was very positive.

JOHNSON: Yes, the LASER program was designed to give students exposure to engineering in practice. Those kinds of programs are invaluable. When I went to Langley that first summer and got to work side by side with practicing engineers, I was sold. I had opportunities with IBM and others that could offer higher salaries, but I was sold on NASA. After they gave me the exposure and the experience, I didn't want to go anywhere else. I found that once you are on the NASA team, the opportunities are limitless. There are so many parts of NASA, with such a variety of work, that you can move around and have a couple of careers without ever leaving the Agency. ●