

NASA AT 50 ORAL HISTORY PROJECT

ORAL HISTORY TRANSCRIPT

JAIWON SHIN
INTERVIEWED BY REBECCA WRIGHT
WASHINGTON, DC –25 JUNE 2008

The questions in this transcript were asked during an oral history session with Jaiwon Shin. The transcript has been edited for a publication and does not exactly match the audio recording.

In the summer of 2004, Dr. Jaiwon Shin was named as NASA's Deputy Associate Administrator for Aeronautics and in February 2008 became the Associate Administrator for the Directorate. Prior to these positions, he had worked as a researcher in aircraft icing, a manager, and as the person responsible for all aeronautics projects being conducted at the Glenn Research Center in Ohio. His technical background includes aerodynamics and heat transfer. He earned his doctorate in mechanical engineering from Virginia Polytechnic Institute and State University and his undergraduate degree is from Yonsei University located in Korea, his native country.

He arrived in the United States in 1982, and said, "One thing led to another, and I'm still here," which includes almost twenty years with the space agency. During an interview conducted June 25, 2008, at NASA Headquarters, Shin shared his goals for the Aeronautics Directorate and began with explaining the mission of aeronautics both historically and current.

Aeronautics research in NASA really has a long history dating all the way back to the days of the NACA [National Advisory Committee for Aeronautics]—more than 90 years of tradition in doing aeronautics research. When NASA was formed in 1958, NACA was absorbed into NASA. The bulk of what NACA was doing in flight research and aero research became the NASA Aeronautics that we know today.

Our mission is to ensure US staying at the leadership of the technology in aeronautics. That is the foremost mission for us, for Aeronautics Research here. But at the same time, we work on technologies that will help space missions within the Agency, like access to space and entry/descent/landing on any planet with some atmosphere, like Mars. We work on a lot of fundamental technologies to enable these capabilities.

So I'll say sort of broadly, there are two main missions: one is to work on all aeronautics technologies to help US industry, and also to work on technologies to enable space missions within the Agency.

You have stated that you want the Aeronautics Division of NASA to be the world's best. How will you be able to gauge whether this goal is achieved?

We are the R&D [Research and Development] organization and we are not the ultimate customer; space-side NASA is the ultimate customer for the time being. In the future maybe commercial space industry will boom a lot more, and maybe NASA will not be the sole customer in the space industry. But NASA's aeronautics research has always been about supporting the external community. We don't build airplanes; we don't make any sub-systems for NASA to use in aeronautics.

What I mean by we must be the world premier R&D organization is NASA needs to be on the cutting edge of research, rather than following the rest of the world. To be the world premier R&D organization, we will be leading all the technologies in aeronautics for the world.

How do we measure that? Since we are, again, doing research and development, it's fairly simple to me that when our researchers are regarded as the technical authority around the world, that is the proof. I casually challenge our researchers, as an example, that when they go to

technical conferences and it doesn't really matter whether it is an international or domestic conference, I want their technical session to be standing room only, where people just can not get into the room to listen to our researchers talk.

I want NASA researchers to be invited as the technical expert in any major technical forum or discussion and sought after by not only US entities but international entities. To have our technical experts' opinions and viewpoints matter. It is a fairly simple-minded answer, and when I talk to technical people, they all understand what I mean, so I challenge our researchers that each one of them, in their own technical area, need to strive to become like that. Then, in aggregated sense, I can conscientiously say that we are number one in the world.

Why do you believe this to be an important goal for your division?

We are trusted to conduct about \$500 million a year in aeronautics research. Some people say that's not a significant amount of money when compared to the entire NASA budget, which is approximately \$17 billion now; that's not even four percent of the entire Agency budget. But if you think about what Europeans spend, or for that matter Asian countries, \$500 million is still a lot of money for doing aeronautics research. I think combined, all the European government agencies are just now approaching our level of investment, and for the many, many past decades, their investment has been far lower.

I'm a simple-minded person, so when the nation gives us that kind of trust and gives us that kind of resource, there's only one thing that we need to do, and that is to become number one in the world.

I will challenge and push our researchers in NASA Aeronautics to become number one, because it is not right when a country spends that much money—the most amount of money

compared to the rest of the world—and we are not doing our job. So that's my motivation. It's simple as that.

Share with us your ideas about NASA's aeronautic partnerships with agencies, industries, universities, and the private sector.

NASA Aeronautics is not our only customer; we have to work with external partners. The challenge for us is we have a lot of different competing interests and motivations among the external stakeholders. It's a daunting task to work across all sectors of industry, from major air framers, engine companies, helicopter communities, small airplane manufacturers, to avionics manufacturers. Just to work with the spectrum of the industry partners alone is a daunting task.

Then you add government agencies, FAA [Federal Aviation Administration], DOD [Department of Defense], [Department of] Commerce—all these agencies, that's another layer of challenge. Then you add universities into the mix, and you truly have very diverse constituents and customers.

Partnership is critical to NASA Aeronautics. So what I believe is we must be true to the notion of partnership, rather than just giving the lip service; we recognize that we are not working for ourselves, that we have to work with others. We know if there is no trust between the particular partner and with us, then we don't go anywhere with that kind of situation. With a true notion of partnership, the customer will be honest and also sincere working with us. And we can come to consensus rather quickly based on that trust. They know we will deliver and we will work in most sincerity. Then the partnership really blossoms.

My philosophy of partnership is critical for NASA Aeronautics and has to be built upon trust. If there's no trust between us and our partners, then we get into this never-ending story of

how to satisfy a thousand customers, and we're just torn a thousand different ways and just not accomplishing anything.

What lessons have you learned that you are applying in your current role?

There are several of them, out of 19 years of experience.

One is we should never lose the sight of what NASA Aeronautics is supposed to do—why were we created, and why has the nation given us that precious taxpayers' resource and asked us to do research. In my view, our country is asking us to put ourselves ten, twenty years ahead of US industry and work on revolutionary, fundamental research that at the moment, at the present time, industry may not even realize that they actually need these certain technologies or they cannot foresee the certain technologies needed for their market or product.

We are responsible for having this vision that would put us way, way ahead of industry, and we will continue to work on achieving that. I believe that is our role and that is our mission, to stay ahead of everybody else in the world and continue to push the envelope of aeronautics technologies. Along the way we kind of lost sight of that.

During the NACA days, we worked on a lot of fundamental aerodynamics issues, control issues, and propulsion issues. That's how we introduced and made significant contributions to efficiency of the aircraft, and brought forth the jet age, supersonic flight, and you name it. All these breakthrough technologies, NACA's fingerprints were all over it. How did we do that? Because we stayed on the fundamental research and pushed the envelope continuously.

But over the past couple decades, in my view, we swung too far in being too close to industry's short-term needs. We got too close to industry, working with industry, and tried to be helpful—no malintention here—tried to be helpful, but we swung too far and started addressing

their more near-term needs. Then we started losing these talents and skills to be able to conduct far-reaching, fundamental, cutting-edge research. This is one big lesson learned, and it takes a long time to recognize that, that we were losing that edge, and if you do it long enough, you'll see that impact.

So two and a half years ago, we tried to go back to our roots, to doing more fundamental research and doing cutting-edge research. Two and a half years ago we completely restructured NASA Aeronautics under the leadership of Mike Griffin, and also my predecessor, Lisa Porter. I believe we are standing on very firm ground now, going back to our roots. I would say that's one big lesson learned.

Explain the core principles that you believe will shape your directorate.

There are three core principles. The number one principle is much like what I've been sharing with you, trying to be preeminent and also doing cutting-edge research. We consider, again, the country has bestowed its confidence in us to be the steward, of being the number one group of doing research in aeronautics. So the number one principle is, we will be the steward of keeping all the core competencies necessary to continue doing this cutting-edge research in aeronautics. This first principle means simply to me that if you are a mediocre researcher or research organization, no one will give you that trust, no one will say, "Keep this, my treasure."

No one will think, "You are a mediocre person or group, and I still trust you, and you'll do fine with this, my treasure." No one will do that in their right mind. The first principle is simply, you have to become number one. You have to become number one in the world, not just in the nation, to get that honor of being a nation's steward for all core competencies of

aeronautics. So it just goes through the common thread that I've been talking about, being a world premier R&D organization in aeronautics.

Second principle is, we will do what we do best with the unique NASA capabilities and roles. We have limited resources, and I don't have any false illusion that NASA Aeronautics' budget will suddenly triple or quadruple in two years or three years, within the current NASA mission and current fiscal conditions in the country, I have no illusion like that.

And I have no qualms about aeronautics being a lower priority than exploration, as an example. NASA is the space agency for the nation, and I don't have any problem whatsoever in that perspective. So we have to do what we do best within the budget we have, which is about \$500 million a year—still, an awful lot of money.

My second principle there is I challenge the researchers of my team that if you are not number one in your technical area, I'll give you maybe a little bit of latitude to be number two while you are striving to become number one in a very short time, but remembering that at the moment you're number two. That's the minimum. If we are number three and number four, let's get out of that area. We are not going to follow the pack because a certain area is fashionable at the time, and even in a technical area, there is such a thing as a fashionable thing to do. For example, since everybody's jumping on the bandwagon, NASA should get into that as well. I will not—as long as I'm in this position—I will not allow that. We are not going to be a follower.

Third principle appears to be kind of specific, talking about the Next Generation Air Transportation System [NextGen], working a partnership with that group. However, I use NextGen as a representative of our commitment to the true partnership. So, with this principle, I actually mean a real partnership with our broad external communities. I mean real partnership,

not lip service or just shake hands kind of partnership, but real partnership. The way I look at it is given the limited budget, number one principle is our goal. And in order to get there, we have to do the second and third principles right. By concentrating on what we do best with the given budget, and then leveraging off with the partners doing real partnership, then I think \$500 million can go a long way. So that's kind of how I explain to our people how the three principles work together and why they are so important for us.

How has NASA changed since you first arrived?

We have become somewhat demystified, if there is such a word in the dictionary. When I came to NASA, I really didn't know what NASA did. It was a somewhat mystical entity. We had a lot of aura behind us. When you talked to your neighbor and said you worked for NASA, there was a big "wow" effect. Several years back, there was a newspaper article a bit on the critical side that questioned how many in the nation can remember or rattle off names of astronauts, whereas we all remember astronaut names from the Apollo days. Just about every educated or average US citizen would remember that. But now, not many people remember even a single name of an astronaut.

That article continued with an analysis of why that is the case. And as I recall, the number one analysis was, we are stuck. We are stuck in low earth orbit. We have become a sort of bus driver or ferry driver between Earth and the [International] Space Station. We just keep going back and forth, back and forth, and we never go beyond Station or never go beyond [the Space] Shuttle.

I don't fully subscribe to that, but that's the perception in the country, and I think there is a point. We have become somewhat demystified and have become somewhat commoditized.

People have started taking NASA for granted. The only time they get the "wow" effect is when they see Shuttle launches, and sometimes some fantastic pictures coming from Mars—it is too far in between.

That's why I welcome President [George W.] Bush's Vision for Space Exploration, because NASA is all about providing inspiration and vision for the nation, and, I might add, pride. Pride for the nation. If people see NASA or talk about NASA, they should get this overwhelming emotion of, "How do they do that?" The question that should come to everybody's mind in the nation is, "How do they do such wonderful and marvelous things? I just cannot comprehend, but they do some magical things." That relates directly to national pride. No other country on this Earth can do what we can do through NASA funding.

Our Administrator is the best person to lay out a sound plan and reasonable plan to achieve the President's challenge and vision. For the past four years, Mike Griffin has worked diligently to lay out that plan and we are well on our way back to, again, becoming mystifying. That's what NASA's all about—inspiring people and dreaming about impossible things, something that just cannot be comprehended by average people, even highly educated people. We should go back to that, so elementary kids will feel inspired, just like I was when I was ten years old and watched, in Korea, the Apollo 11 moon landing on black and white TV.

How NASA has changed? Your own success sometimes becomes your enemy, and by building that tremendous safety record for Shuttle—which is still a complete experimental vehicle—people just take it for granted. People don't understand and appreciate the difficulty of each one of those flights of the Shuttle. So we need to bring back that aura behind every one of us, and let people know how the wonderful things we are doing with the investment that the nation is making.

On the aeronautics side, the same principle can be applied—we have made a lot of contributions over the many, many decades to civil aviation and aeronautics industry as a whole. Now, we have to put ourselves ten, twenty years ahead and still provide the vision and challenges for the nation.

What advice would you give someone who wanted to join NASA?

I often tell young people that you have to really have a sense of patriotism. I really mean that. English is my second language, so sometimes I don't get it right, but I know some people call a vocation a “calling,” and in this case, it is really fitting. You just don't come to work at NASA simply to make a living. Every one of us could have gone to someplace else and could have made a lot more money. Coming to NASA, to me, is truly a calling. It is the most prestigious form of public service, in my view, the country can offer. You come to NASA out of pride and a sense of patriotism.

We do things that nobody can do, and it's really not a matter of money. We have such a vision and capabilities that even if another developing country wants to pour gobs of money as that nation's strategy, they will not be able to do what we are doing and what we have accomplished. It will take years for them to catch up.

If you are a technical person in aeronautics and space, this is the best place to be. We do deal with all kinds of bureaucratic, mundane things as well. It's not all fantasy. So you will come and experience all that, but if you come with that sense of patriotism and a sense of calling, you will overcome that. I tell people that you shouldn't come for money. If you come for money, you will not last.

Any final thoughts?

NASA should be both the engine and the lighthouse for the nation in the technological leadership. Again, it applies both in aeronautics and space equally. We have to be the engine of the nation to propel this preeminent technological leadership that we enjoy. So much depends on this technological leadership that no one can copy or no one can follow or catch up any time soon. We shouldn't lose that.

I often compare aeronautics industry with auto industry. You don't think about being patriotic when you buy an automobile anymore. It's a commodity. It's just like a computer. Any developed country can produce real high quality automobiles. Detroit doesn't own the auto industry anymore. How did that happen? They owned that industry several decades ago. I think we have become complacent. That's probably what happened, much like any other areas and many other things in life.

If we are not careful, both in aeronautics and space, which feed a tremendous trade surplus for us and also military supremacy—we shouldn't overlook that, too—we shouldn't lose that edge. But there are indications that that might be happening.

Airplanes—at least the current configuration—are becoming a commodity. Many developed countries can produce airplanes and engines, and good ones. Our own manufacturers partner with foreign companies for their own strategic reasons. They need to sell their engines and airplanes to foreign countries, and our airlines need to fly to foreign countries, so they strategically buy, purchase, foreign products. Mix them up. They're mixing their fleet for political and market reasons, and they could not have done that if the products coming from foreign countries are far inferior to US products. They would not have done that. These are business people, and they wouldn't purchase purely out of a political reason or market-driven

reasons if the bottom line doesn't pan out. The reason why they're doing it is now foreign products are able to compete with US products. That's the bottom line.

So that is a good indication, and our alarming bell, for us to wake up and think, "What is happening here? Are we walking down the same path the auto industry had walked down two decades ago?" If we are not careful, we will be. This country doesn't manufacture any regional jets; it's all either Canadians or Brazilian. Why did we get out of that sector? We don't know. But that's a very attractive sector and the Canadians and Brazilians are dominating this market. Boeing now is regaining number one seat again, fortunately, but they fell behind Airbus for several years. So again, it's not a given that US aeronautics industry is always number one. We have to be very mindful.

I'm not as familiar with space as in aeronautics, but I would maintain that China is coming on strong, and we have to realize that the Chinese government is a completely different government system. They can put whatever resources and people at their will, and they will get there. Mike Griffin has mentioned this several times at different venues, that we have to realize this difference in the government regimes. They are a communist country, and they can really set the goal and make it happen. So we have to be mindful about these things happening around the world.

You cannot always consider return-on-investment and business cases in some strategic areas, as a nation. I believe in market economy, free market economy, and I believe this country has done very well practicing that free market economy principle. But we have to make government investment with those long-term strategies. Some government investment cannot be solely justified by business cases and return-on-investment analyses, and the aerospace sector is one of them.