NASA AT 50 ORAL HISTORY PROJECT
ORAL HISTORY TRANSCRIPT

REX D. GEVEDEN
INTERVIEWED BY REBECCA WRIGHT
WASHINGTON, D.C. – 20 MARCH 2007

WRIGHT: Today is March 20th, 2007. We are at NASA Headquarters in Washington, D.C., to speak with Rex Geveden, NASA's Associate Administrator, for the NASA at 50 Oral History Project. The interviewer is Rebecca Wright, with Sandra Johnson and NASA Chief Historian, Dr. Steve Dick. 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 then placed in the History Archives here at NASA Headquarters, where it can be accessed for future projects.

Can I answer any questions before we begin?

GEVEDEN: I think I'm ready.

WRIGHT: Okay. Well, thank you again for allowing us this time.

We know that you're responsible for all the technical operations of the space agency and work directly with NASA Administrator Michael [D.] Griffin to help develop strategy and policy. Also you have direct oversight of all the NASA programs and field Centers. We'd like for you to begin the day by briefly describing your duties and telling us how you came to your current position.

GEVEDEN: Okay. Let's see here. Maybe it's best to start with a discussion about this particular position, the Associate Administrator [AA]. This is a position that is actually kind of newly reconstituted in NASA. Griffin brought back the idea of an AA for everything, if you will; AA for nothing, AA for everything. This last existed, I believe, in about 1972 or '73, last occupied by, I believe Rocco [A.] Petrone. Steve might know. But it was featured prominently in the [James E.] Webb administration of NASA.

Griffin had a couple of things in mind when he created the position. One was he wanted to have someone in the agency functioning more or less as a Chief Operating Officer who was concentrating on the down-and-in business of the agency. So to that end you see the Mission Directors, the Field Center Directors, and the technical components of Headquarters, Chief Engineer, Safety and Mission Assurance, PA&E [Program Analysis and Evaluation], reporting through me to the Administrator.

So I've kind of got my eyes on the whole technical portfolio of the agency. That's really one motivation for having recreated the AA position. Of course, when you do that, when you have a down-and-in Chief Operating Officer concept, then the Administrator and the Deputy can go and do a lot of the up-and-out functions, international partners, Capitol Hill, the White House, and major industry components and all that kind of thing.

Now, the second reason, the second motivation behind recreating the position, was that those two positions, the Administrator and the Deputy, are presidentially appointed, Senate-confirmed positions, and therefore political; and typical for those positions to change out with new presidential administrations. The idea here was to have organizational continuity from one administration to the next by having this AA position. So I'm sitting in a position that's the top

nonpolitical in NASA. I came into it about eighteen months ago, actually, which is the longest I've held a job in the last decade or so.

Now, how did I come into this job? I spent six years in industry before coming to NASA in 1990, and I had sort of a typical career progression for an executive. I started as an engineer, worked my way into project and program management ultimately, and had a long association with a relatively famous flight program called Gravity Probe B, which flew in 2004 and tested aspects of [Albert] Einstein's theory of general relativity. It was a long, long, complicated program, and it had a lot of interesting reputation to it, very challenging science and technology.

I eventually became the Deputy Director for the Science Mission Directorate in Huntsville [Alabama] at the [NASA] Marshall Space Flight Center. From there, about a year later I became the Deputy Director of the Space Flight Center of Marshall, which is the fire and smoke Center of the agency, among other things.

I was in that position for about a year when [Sean] O'Keefe, the former Administrator, asked me to come to Headquarters and become the NASA Chief Engineer, against my will. I was in that position for about seven, eight months when Griffin asked me to come up and become the Acting AA, and I was Acting for three, four months, and then was made permanent in August 2005, I think. So that's the sort of tortuous path I followed on my way here.

WRIGHT: You mentioned that you started with NASA in 1990. Could you share with us how NASA has changed over the time, from that time to where you are now?

GEVEDEN: Sure. Sure, and I assume I can be frank here. [Laughs] The NASA that I came into was headed by Dick [Richard H.] Truly, and Truly was—well, of course, he was kind of a

transitional figure at that time. It was right before [Daniel S.] Goldin came in. I believe that Truly was the first insider to ever run the agency, maybe with the exception of [T. Keith] Glennan, who was sort of an insider with NACA [National Advisory Committee for Aeronautics]; but Truly, of course, having been an astronaut and having a military career. Truly wasn't there for very long, so I don't have much of an impression of him.

My first really strong impressions are of Goldin as the Administrator, and of course, he did that job for nearly ten years. My view of Goldin was that when he came in he was viewed as a welcome reformer. He brought a lot of energy and a lot of creativity to the agency, and I think his view was the agency had become a sort of complacent bureaucracy, and I think he was right. He brought the faster, better, cheaper reforms. He downsized Headquarters. He created the Lead Center concept; did a lot of stuff there that early on was, in my view as a newcomer to the agency, were welcome initiatives.

On the other hand, over the course of ten years I think he came to be seen as something of a terror. He was very sort of capricious in his outlook. He changed his interests from day to day. I think we never knew where we were, whether we were going to focus on aeronautics or on astrobiology or on propulsion or whatever. So I think the agency felt very adrift at that time and very insecure because of Goldin, his personality, and how the agency was run.

I think morale was very poor for most of that administration, seven, eight years, and I think for two reasons. One was the leadership was seen as unstable and dangerous and also because the agency did not have a clear mission, and people knew it and people talked about it all during that period, but it was very unlike the Apollo period, in which we had a focused mission. I'm telling you nothing new, but we didn't have a clear mission.

Contrast that to today. In today's environment we have an Administrator who I would say is easily the technically most competent Administrator this agency's ever had, somebody who's got a clear idea strategically where to go and articulated that direction very early on, in fact, in his Senate confirmation hearings, articulated the six strategic goals for the agency. Those made their way into our strategic plan, and of course, they follow from the President's [George W. Bush] Vision for Space Exploration.

So where are we today? I think where we are is we have clear strategic direction. I think most people believe that, even though there is transitional pain, that we know where we wish to go. I think they also believe that, in the case of the Administrator—I won't judge myself—but in the case of the Administrator, they believe that we have competent leadership to get there. So I think that the sort of the morale, the organizational health, the culture, is in a better state than it's been in for a long time from my knot hole, and I think people see us as making progress toward a very clear vision.

WRIGHT: Would you share with us—you mentioned about a very clear strategic vision. Tell us about how you will be moving your vision through all of the area that you're in charge of. Tell us about that vision.

GEVEDEN: Okay. Well, there were six strategic goals spelled out in our 2006 Strategic Plan. If it's useful, I can go through some of those, or not, depending on what you think is valuable. But sort of in a nutshell, those were around completing the International Space Station; getting off the Shuttle by 2010; developing a new Crew Exploration Vehicle [CEV], which would be the follow-on to that one; having a balanced portfolio in aeronautics and science; creating a lunar

return program with applicability to the Mars Program. Exploiting commercial capability was one of the six, and I'm forgetting what the sixth was, but that's sort of a basic view of it. Very strongly oriented around our exploration and our human space flight goals, with emphasis on balance in the rest of the portfolio.

My role in this job is basically the implementation of that entire strategy. I've talked a lot around the agency about what I call the NASA game plan, which is our implementation strategy for the strategic goals that I just articulated. In fact, I talked to a group about this last night. If you think of the game plan as the set of implementing strategies, and then the game that we're playing are those six strategic goals, return to the Moon, complete the Station, have a balanced portfolio of science and aeronautics, and so on.

So I focus on implementing those. I don't focus on developing strategy. That's the Administrator's job, with the White House. My goal is to make sure those are implemented, and I do that in a lot of different ways, and I could bore into as much detail as you like on those.

WRIGHT: Well, could you share with us some of those challenges that you're going to be facing while you implement?

GEVEDEN: Sure. Sure, I will. Okay, let's talk about challenges. One very clear challenge that we're facing right now is that entrenched parts of the portfolio, if you will, if I could use that term, have very strong bases of political support, so the human space flight program and its legacy, the Shuttle and Station, enjoy enormous political support, and enjoy political support for a lot of reasons. Some of it has to do with jobs and the history of those programs. Some of it has

to do with the White House and the Department of State's view of the importance of those programs and how we relate to our international partners and all that.

I'll just say a word about that. The top priority, as was articulated by the White House in discussions a year and a half, two years ago, is the completion of the International Space Station. That implies we're going to fly the Shuttle another fourteen times or so. We're going to satisfy those partner agreements. The thing most people would say, that you can't justify the existence of the Space Station based on the scientific research value; there's not enough there.

But there are other reasons you'd want to do the Space Station. Some of them have to do with logistics. Some of them have to do with the development of capability, there's no doubt this is the most complex construction project ever undertaken by human beings. But another reason you do it is to involve international partners, to bind the ambitions of other nations with our space ambitions, and I think that's seen from a national strategic point of view as an important thing to do, to satisfy those agreements.

So that is sort of the bedrock of the NASA program, because it enjoys the most political and the most strategic support. So it's sort of immutable. We're just not going to change that strategy unless something very significant happens, like loss of a Shuttle or something. That's pretty much fixed in the portfolio.

The science base, which now is 32 percent of our budget, the scientific activities, Earth science, heliophysics, the planetary science component, and then also astrophysics, those enjoy very energetic support. Principal investigators and others that are adherents to science in the science portfolio have a strong base of political support and they're very active. So that part of the portfolio is pretty static, too, in terms of how much support it gets. Science is going to be, I don't know, roughly a third of our portfolio for the foreseeable future. Aeronautics is seen as

something that has languished in recent years, and the support for that is either static or improving.

So what that means is that this exploration campaign we're undertaking, this new component to our portfolio, this new Vision for Space Exploration, is actually quite literally the bill-payer for any challenges that we take to our budget. We can't really change the International Space Station-Shuttle part of it. We can't really change science. We can't really change aero very much. So exploration becomes the bill-payer, and you see that in the consequences of all the budgetary decisions that have occurred. Whenever we have a rescission, whether it's uncovered capacity, whether it's a year-long CR [continuing resolution] that results in flat funding from year to year and takes five, six hundred million out of our budget, exploration pays the bill.

So trying to implement a program that's a new program and doesn't yet have its political base of support, doesn't yet have all of its large contractors on board and advocating for it, is a very hard thing to do. People will say, "Well, I want to do science. I want to do aero. So we'll just go to the Moon later, or we'll go to Mars in 2040 instead of in 2030; what difference does it make?" I think it makes a huge difference whether we commit to going now or going later, and so it worries me very much. It's a hard challenge, and it's manifesting in schedule breakage every day. That's one of the biggest challenges.

Another big challenge for us is—it's kind of interesting to look at NASA's portfolio. It's almost all high risk, high payoff. So we tend to fly stuff that's two, three, five hundred million dollars at the small end, two, three billion dollars up on the big end of it. Sometimes it involves human life; sometimes it doesn't. But almost all of it is visible, and so failures are extremely visible in the agency, and being able to execute this risky portfolio successfully is a challenging

thing to do. It really is. You're constantly at risk of mission failure, of working in very harsh environments, working in very visible environments. The Congress pays attention. The public tends to pay attention. So having success with that challenging portfolio is hard, I think.

I don't know; maybe enough on that point.

WRIGHT: As you begin meeting these goals and objectives of the vision, what are the lessons learned that you'll be applying that you've learned through your NASA experiences?

GEVEDEN: Well, maybe I'll sort of talk about that at the corporate level, and then maybe down to the personal level. But, there are several very obvious lessons out of our last epoch in human space flight.

The Shuttle is a vulnerable design. It's as much as anything a compromise of technical and political and financial forces, and it resulted in this vehicle that we have, which is an elegant and beautiful and capable vehicle. It's also a vulnerable vehicle. It doesn't degrade gracefully, and in some ways it's not robust to safety problems I guess is the way to put it. If you start having a significant problem on the Space Shuttle, it is likely to end up in catastrophic failure.

There's no serious escape system on that, on the Space Shuttle. There's no abort kind of system. You look at a system in which there's external cryogenic tankage with exposed thermal protection systems all the way through the launch phase, and you have a system that can be damaged by a hailstorm, for God's sake.

Now we're pushing back and fixing 2,600 divots or whatever the number is, manually, because we've got exposed thermal protection and exposed foam for this external cryogenic

tankage, and the crew sits down there in the middle of the propulsion stack, in the middle of where the explosion occurs. We'll never design a vehicle like that again.

So in returning to this Apollo system, in which the crew sits atop the launch stack, in which there is an escape rocket, in which the thermal protection system is not exposed during launch, at least the return part of the thermal protection system, the base of the reentry vehicle. All of those are lessons that we're learning and applying right now.

We also know that we built a system, in the case of the Space Shuttle, that was enormously operationally expensive. It takes 18,000 people to run the Shuttle Program. We cannot have a system with that kind of operational complexity going forward, because we need to be able to wedge up the budget for Orion, for Ares, and then in the out years wedge up budget for landers and for habitat on the surface and for other kinds of systems.

The only way we can do that is to have an operationally lean system, which means that you can't have 10,000 people, literally, 10,000 people, down at the Cape [Canaveral, Florida] processing the Shuttle from mission to mission. You can't do it. It needs to be a factor of five or a factor of ten smaller than that. It needs to be a crew of a few hundred people or a maybe a thousand people that are processing the next vehicle, or we won't able to do this.

So one of the real lessons learned that we're applying every day is to try to design to ops [operations]. Design to ops; that means that you think about the operational scenarios as you go through the development, and you design around that. Sometimes that means it's more expensive in the development phase, but the recurring costs are more limited when you design to ops. So that's a very important thing that we're doing.

I'll speculate here a little bit and say that I think we're going to have to learn how to design toward reliability, and I'll try to explain that a little bit. In Shuttle and in other kinds of

modern systems that involve humans we have spent a lot of energy on creating redundancy, in creating voting schemes and logic that sort of protect you against failure. It can get to the point, and there's a book on this, on complex systems, by a guy named Perot [phonetic]. It can get to the point where the system reaches sufficient complexity that it's almost operationally impossible, and this happens when you build up layers of redundancy and fail-safe and all that kind of thing.

We have to take, I think, a reliability-based approach, a probabilistic approach to reliability of systems, and I think those lessons will be integrated into the systems that we build going into the future.

Let's see here. Maybe that's about all I have on that for right now.

WRIGHT: Okay. That sounds good. Especially after [Space Shuttle] *Columbia* [STS-107, accident] there was a lot of discussion about NASA's culture. Would you share with us what your perception of the culture is in the NASA Agency today?

GEVEDEN: Yes, I will. I've got a few things to say about that. I think the CAIB [*Columbia* Accident Investigation Board] was right, in the sense that we didn't have a safety-oriented culture, and we didn't have, I don't know, sort of the right kind of organization and the right kind of culture that would support bringing forth dissenting opinions, disagreements. We didn't have a healthy tension in the system that manifested itself in a positive way. I think that's right.

Now, I believe that our initial take on how to solve that problem was misguided. We went out and hired a contractor to do surveys and give us executive coaches and all that, and if you pursue that logic, what you have to believe is that we lost the Shuttle; we did a survey; and

now we're going to work on the pieces of the survey that we found to be weak. And, oh, by the way, NASA scored higher on the pre-survey than any organization they'd ever surveyed before.

So we started working on these two slight weaknesses, which were perceived organizational support and communicating across organizational lines I think were the two. [NASA] Johnson [Space Center, Houston, Texas], in particular, took a pretty good beating on their culture. So we worked on those things a little bit, and the idea was now we can take the test again, and we improved our score, and therefore we're not going to lose any more Shuttles. I think that's a really oversimplified way to look at the problem, to put it gently, to put it kindly, generously.

So I don't think that's the way you attack culture at all. I think the way you attack culture is you set the tone, and you lead by example; but even more than that, you design the organization and you design the principles and the operating principles and the values around the kind of culture you want to have. I think that's what we're trying to do right now.

One of the first things the Administrator did was to promote the Center Directors to the same status as Mission Directors so that they're all direct reports now. One of the reasons behind that was is that—and it sounds subtle, but it's very important—he wanted to create a very clear distinction between the programmatic chain of command and the institutional chain of command. So promoted Center Directors up; took them out of the programmatic chain of command so that now the programmatic chain of command flows from the Administrator through me to Mission Directors, who have programs and projects, science, aeronautics, space operations, and exploration. The chain of command flows through those Mission Directors to Program Managers in the field to Project Managers in the field. That's where that goes.

Now, the institutional chain of command is separate and distinct from that, clearly distinct now. It flows from the Administrator through me to Center Directors, who are not in the programmatic chain of command now but are in charge of technical excellence, safety and mission assurance, procurement, down through the institutional components of all the field Centers, Directors of Procurement, Directors of Engineering, and their workforce.

So when you set up a system like that where you've got a clear delineation between program and institution, then the institution can take care of its requirements, its regulations, its policies, and make sure that those are enforced in programmatic implementation. The Program Managers are out there trying to get missions flown. The institutional Managers are out there trying to make sure the processes, the people that we apply to it, are following the right principles for development.

If there's a disagreement between those two chains of command, agreement is sought at the lowest possible level. If it is not achieved, then there are ways to protest those decisions all the way up the chain of command so that the final point of adjudication is in the Administrator's office, and it starts through me. And we've done that. We've had six or seven really tough issues between Engineering and the program, say, reach this level.

When you put in a system like that and you tell people it's your responsibility to protest a decision that doesn't sit well with you, if something doesn't feel right in your gut, if something doesn't work well in your analysis, it's your responsibility to raise the decision. And you organize your agency that way to create that healthy tension that you want between the institutional and programmatic elements, then I think you've got a chance of getting people to talk about the danger of foam or the danger of an ice frost ramp or the danger of a RP-1 tank on

the Atlas mission that we flew for Pluto, New Horizons. And it has happened. People are talking about it.

So I think you create the culture by example of leadership. You also design to the culture that you want by putting together the organizational mechanisms and the processes to make it work. So my sense is that we—and there's more to it. There are many more dimensions to the culture, and one of the things that the Administrator has said is that we will not cede our authority to external advisors.

We got into a consent loop with the CAIB and the Stafford-Covey Task Group. We got into a consent loop in the sense that we said, "Your recommendations are requirements, and we will follow your requirements, and, oh, by the way, we'll submit our data to you to make sure you approve of our response to your recommendations."

We're not doing that. Our external advisors are wise, seasoned, intelligent people that we should listen to. We are the people, we, NASA, are the people who are responsible for executing the nation's civil space program, and we will take responsibility for which recommendations we accept and which we do not. We need to apply that discernment and make recommendations about that. So sort of liberating ourselves to do what we think is right is a positive cultural step.

The Administrator and I have put great emphasis on making sure that we have the core capabilities, the technical talent—and technical, I mean broadly; not just engineering, but procurement, legal talent, institutional talent—to execute the mission. So you're seeing a lot more in-house work. You're seeing a lot more autonomy in decision making, and you're seeing a healthy tension.

It is my belief that the consequence of constructive disagreement is a healthy culture. To me the signs of poor health in an organization are the inability to deal with conflict. So when

you hear this kind of language in a meeting, when an argument sort of breaks out in a meeting, and people start saying, "Oh, let's take that offline," or, "We'll take an action on that." Or, you know, "We don't need to talk about that in here. Why don't you two get together?" That's poor health.

To me, we've got to have an organization, a culture in which you can fight a little bit, in which you can say, "You know what? I think it's dangerous to fly with those ice frost ramps the way they are," or, "No, I don't like the way you're doing the thermal protection system," or, "I don't like the way you're executing that contract, because I think it puts us at risk." Let's fight about that stuff, in a civil, constructive, respectful way, but let's fight about it. That's how you get to organizational health, cultural health, and that's what we're trying to do.

I think it's contrary to conventional wisdom, by the way, which says, "Let's not disagree in public." I don't want that kind of an organization. I want to fight a little bit.

WRIGHT: As you move toward the future, what do you believe NASA's role is as far as for the nation? How do you want the nation to view NASA in the future as it's moving toward its next fifty years?

GEVEDEN: I want NASA to be perceived as the agency in our government that does the most innovative and the most excellent things that we do as a society. I think we enjoyed that reputation there in the Apollo era. We still, I think, residually enjoy that reputation, but I want to make sure that we protect and promote and improve that legacy. It's my strong belief, very strong belief, and you'll hear the Administrator talk in similar terms, that the ability to do space, the ability to do human space flight in particular, but also the other parts of what we do,

aeronautics and science and space operations, those things are a precious strategic capability for this nation.

I have said that for those nations that can afford to do it and have the desire to do it, the ability to explore space remunerates positively towards greater security and survivability on one's own terms. This is the reason why the Russians do it. It's the reason why the Chinese are trying to do it. It's the reason why the Indians want to do it, and the Iranians and everybody else. They know the strategic value of being able to put people in space, to be able to put instruments in space, and to be able to do those things.

That value manifests in many different ways, but among those are you build your technology base. You build your technical base with it. You build your human capital base. This is a business in which the barriers to entry are very high, and so if you can demonstrate that capability, then you build your technical base, and in my view in this modern world there's no difference between technological superiority and economic superiority. So you therefore build your economic base. All this has important implications to national security, to global leadership and those kinds of things.

Now, even if you don't buy that part of it—and some people don't—even if you don't buy that part of it, I think that if you choose as a nation to do these very, very hard things—put people on Mars; it's going to be very darn hard—then you have to trust that choosing to do those things is going to give you benefits that are unforeseen at this point and that it's worth making the investment.

I talk often about how, and sorry to live in the past here, but it's just a fact that if you look at the nation's investment in our civil space program, and the ballistic missile program, to some extent, it led to miniaturization of electronics. It led to embedded software, advanced

materials. It led to, for God's sakes, the cable television industry. The guy that's running around digging in your yard with a Verizon label on his jumpsuit owes his job to this nation's investment in space. The technology that we created made its way into heart monitors, into improved screening for breast cancer.

It was the enabling technology. We created the enabling technology for modern, small, lightweight, cheap smoke detectors that are in your home right now. The GPS [Global Positioning] System that exists wouldn't be there if it weren't for our investment in the space business.

So you do these things. You choose to do these very hard things, which seem abstract and which seem to some people to be useless, going to places like Mars, but in the end the economic benefit, the strategic benefits, are enormous. I want to see the nation committed to that course and I want to see them seeing us, us NASA, as enabling that.

WRIGHT: Based on your strategy, based on this vision, why would you encourage someone to begin a NASA career at this point?

GEVEDEN: Well, hell, a NASA career, it's just the best thing you can do with your life. [Laughs] There are other laudable and worthy things to do with a life, no doubt, and I certainly could improve my own. Just for all the reasons that I articulated, the importance of NASA cannot be overstated, in my opinion.

But apart from that, ideologically speaking, I believe in the advancement of knowledge. I believe in the advancement of scientific understanding. I do. I believe that's something that cultures do that advance and grow and that bring along their people with them.

I believe, from an idealistic point of view, that it's mankind's destiny to migrate into the cosmos ultimately, and I think our survival depends upon it. I think there will come a day when we corrupt the environment or an asteroid hits us or some other kind of thing happens, and we're going to wish we had planted the seeds for survival of the species into other parts of the solar system, or beyond, if that ever becomes feasible.

So, having this little toehold on the Moon, having the ability to maybe get on Mars and exploit the in situ resources and live there, I think is an important step in the migration of humanity and to the salvation of humanity, if you will, not to be too philosophical about it. But idealistically, it's what I want to do with my life. But practically speaking, it's what I want to do, too, because I think it's too important to the nation not to do it.

On top of all that, we just have a very, very damn sexy mission here. We've got robots running around on Mars. We've got people in space continuously, twenty-four hours a day.

We created the technology that led to the weather satellites that helped us evacuate the Gulf Coast during [Hurricane] Katrina. Katrina turned out to be something of a policy disaster for this country and our reaction time was too slow, but there would be 100,000 dead people if it wasn't for weather satellite technology.

There are just so many good things that we do in the space program, and I could commend all those to any person who's interested in pursuing a career in it.

WRIGHT: Well, before we close today, is there anything else that you can think about that you'd like to ask?

DICK: I think you've already covered the role of exploration as an important motivator for NASA. I guess you could argue that NASA is the premier exploration agency for the country. Would you say that?

GEVEDEN: No doubt. I think NASA is the premier exploration agency for the country, well, for the world. I give these center guest briefings down at [NASA] Kennedy [Space Center, Florida] periodically, and I will say down there that, "This spaceport that we're sitting at today, and this theater in this spaceport, is the only place on the planet from which humans have departed for another heavenly body."

This is a rare capability that exists here, and this is the only nation that's put anybody beyond low-Earth orbit. We've put people on the Moon, for God's sake, and we'll put people on Mars eventually, so I think we represent mankind here with this meatball. You know, this is not just a national thing.

I receive correspondence from people all over the globe. There's a guy in South America that writes to me every month or two. "I'm really excited about what's going on with the Space Station. Oh, by the way, did you think about this sequence? Let's put on Node 2 before you do the Japanese experiment module or whatever." He's out there thinking about how we construct the Space Station, and he writes me and gives me pointers on it. But he's in love with our space program, and I meet people from all over the world who love this program, who see it as a ray of hope, who see it as representing mankind's aspirations in some way.

DICK: Do you also get the question, though, "Shouldn't we solve our problems on Earth first?"

GEVEDEN: You do get that question, but I'll tell you—should we solve our problems on Earth first? Let me speak to that. This is a question that seemed especially relevant in light of Katrina, in light of the war in Iraq. People will say, "Well, you know, we've got a war. We have Katrina. Why are we spending money in space?"

I have a couple of reactions to that. First off, spending money in space is a convenient and specious argument. We spend money on the ground, and most of it goes into the pockets of people who have chosen to study hard subjects and commit to the space program.

The other thing I would say to that is, look, Hurricane Camille occurred the summer Neil [A.] Armstrong and Buzz Aldrin were on the Moon for the first time, when this nation first went to the Moon. We had a Vietnam War going on at that time. Does anybody regret the commitment that we made at that point in time?

Yes, you can say if you try and stack up Mars exploration against AIDS [Acquired Immune Deficiency Syndrome] research or against childcare or something like that, or education, it doesn't stack up that well if you just sort of abstractly put it together in that list.

But I will say this about it. The benefits to this economy, to this nation, to everything that's come out of the space program, the benefits are enormous. You have to think of NASA's part in America's portfolio, our federal portfolio, as not a cost, like a lot of things are, but as an investment. I've seen an economic analysis that suggests that something like eight dollars come back to the economy for every dollar we invested in space in this country. So this is a dividend-paying thing. This is a stock. This is Home Depot, this is Walmart in our portfolio, and it pays dividends instead of taking cost away.

So I don't think you want to compare it to those things to the detriment of NASA. I think you want to say we're committed to education, we're committed to healthcare, we're committed

to childcare, we're committed to breast cancer research. But we're also committed to, on the margins of our very robust economy, we're committed to space, too. I think it's a false alternative to suggest that you have to choose among the two, because this nation can afford to do all of it and do it well.

DICK: You're preaching to the choir here. [Laughter]

GEVEDEN: Yes, I probably am, sorry. I'm waxing emphatic.

WRIGHT: Is there anything else that you'd like to ask or you would like to provide at this time for your part?

GEVEDEN: Yes, I might make one other comment. It's my belief that we're on the cusp of something very significant here in space, and you can feel it all over the globe if you are plugged into the space community. You can see the Russians activating their space program. You can see, as I said, the Chinese obviously have a very ambitious program. The Indians, the Brazilians, the Iranians, others, everybody wants to be in space right now. So you feel a very significant global commitment to it.

Obviously, there are commercial dividends to be had in space, and we've had a robust commercial satellite industry for a long time. But now you're starting to see the emergence of new kinds of things. You're seeing the emergence of the commercial human space flight market. Who saw that coming? Who saw Richard Branson being able to sell 200 seats at $200,000 apiece to fly people in the low-Earth orbit for five minutes? I think there are cheaper ways to get

lightheaded for five minutes [laughter], but doesn't it say something about how interested people are in space?

Who thought space tourists like Dennis Tito and Anyusha Ansari and what's his name, Greg Olsen, would pay $20 million to go into space for ten days? Who would think that Internet entrepreneurs like Elon Musk and Jeff Bezos and others would be spending their billions on developing space capability? There's a commercial emergence of human space flight. There's a global emergence, and so a huge amount of interest in space exploration, I think partially stimulated by this nation's commitment to it.

I just feel like we're on the verge of something great here, and it feels wonderful to be a part of it. There is momentum out there that hasn't existed for a long time. I think it's comparable to the Sputnik [satellite] and Mercury-Gemini-Apollo days. That's how exciting it is.

DICK: It's appropriate for the fiftieth anniversary. [Laughs]

GEVEDEN: Right. So, it's a great time for there to be a revitalization of interest in space.

WRIGHT: Well, we thank you. Appreciate your time and all your words.

GEVEDEN: My pleasure. It was probably a lot of them in that forty-five minutes. [Laughter]

WRIGHT: Well, we appreciate that even more. Thank you.

[End of interview]