

**INTERNATIONAL SPACE STATION PROGRAM
ORAL HISTORY PROJECT
ORAL HISTORY TRANSCRIPT**

RANDOLPH H. BRINKLEY
INTERVIEWED BY REBECCA WRIGHT
MOUNTAIN CITY, TENNESSEE – FEBRUARY 24, 2016

WRIGHT: Today is February 24th, 2016. This interview is being conducted with Randy Brinkley as part of the International Space Station Program Oral History Project. Mr. Brinkley is speaking with us via telephone from Mountain City, Tennessee. Interviewer is Rebecca Wright. Thanks again for taking time today.

When we spoke yesterday we talked about when you decided to take the leadership role on the International Space Station [ISS] Program in January 1994. When you began, the Program was behind schedule, it was over budget, there were serious technical problems identified. As you told me, you just didn't know what you didn't know. But the challenges were many, both internally attempting to integrate new programs with existing cultures at NASA, and externally learning to work with a new international partner, one that was very experienced in long duration flight, but also one that historically had been an adversary to the nation. It certainly wasn't an easy job. I think we all want to know, why did you choose to take it?

BRINKLEY: I thought it was, one--a tremendous challenge and professional opportunity, and, two--it was something that I believed would make a difference to our nation. That was really important. It had a major impact on the future of human spaceflight and for our nation. I felt I was obligated to take the job, quite frankly.

Maybe I didn't know what I didn't know and how challenging it was. But, I knew that if I walked away from it, I would regret it for the rest of my life. When I was asked, I didn't question. I was honored, then set about to figure out how to do it.

WRIGHT: Can you share with us some of the qualities or the experiences that you felt that you had that gave you the confidence that you could figure out how to set about to work it out? You spent many years in the Marine Corps. I know you worked a few years in industry before you went to work at NASA to do the Hubble [Space Telescope] servicing mission. But why did you feel that you could make this work?

BRINKLEY: I guess because I felt like all my life I had a professional life in the Marine Corps and along the way, I had been successful in whatever endeavor I had been involved in. But I also credited the success to the people around me. It was the way I was raised, and certainly in the Marine Corps, whether I was the platoon commander, I knew that I had learned the same thing from my platoon sergeant in the Marine Corps, and the same was true in Marine Aviation after I graduated from flight school.

I just kept doing the things that had made me successful—and that was to do the best I could and surround myself with dedicated and talented people and listen to them and create an environment that would enhance their ability to succeed.

We had just come off repairing the Hubble Telescope, which if you go back and look at *Newsweek* and some of the press coverage about the mission, it was really critical to the reputation and future of NASA. At least [NASA Administrator Daniel S.] Dan Goldin certainly thought so. I probably didn't appreciate the importance at the time, but somehow we were

successful in that. I felt like if we had been successful basically following the same kinds of leadership principles and managerial experiences in organizations and what I'd learned, and it had worked for Hubble, I felt like there was no reason that it wouldn't work for the International Space Station.

I just knew that I was going to work as hard as I could to do everything in my power for us to be successful. When I say us, I mean capital US, never about me, it was about us. I never ever once at NASA got to the point that I drank my own bathwater and actually thought I knew that I was one of the graybeards who really knew everything that was tutorial to other people. I never never got that comfortable with myself, nor my experience.

To me it was a natural thing just to listen to people. Listen not only to one person, but multiple people. At the end of the day I wasn't afraid to make hard decisions. I did so with a lot of input.

WRIGHT: You certainly had a lot of opportunity to make a lot of hard decisions because of the different challenges that you had to overcome. I know there are many, and I'm sure there are more than will ever be documented, because some of them were big, but others were larger, so that took an overwhelming amount of time that you spent on those. But are there some as you look back on those years that stick out more in your brain, those that were like an awfully hard mountain to climb but you managed to do it? Could you share some of those with us that stand out in your mind that were very significant to the success of the Station?

BRINKLEY: Probably one of the most critical times for the International Space Station was the launch of the first element, the Functional Cargo Block [FGB]. I think it was in November of

'98 or '99. The FGB had environmental control and life support system, and it was a Russian vehicle, although we [the United States] paid for the development through Boeing and Khrunichev. If that launch had failed or if that element had failed, it was a single path failure. We didn't have any additional backup modules to launch. It was all or nothing.

One of the things I remember that was of such great concern was that five months earlier, there had been a failure on the launch vehicle, the Proton. That's the vehicle that we were going to fly on. That was the launch vehicle from Khrunichev that the FGB was going to be launched on. We spent five agonizing months going through root cause corrective action, doing everything in our power to make sure that we understood what caused the previous launch failure of the Proton and that it didn't happen again, because if it did, the Space Station Program would have never survived. There were no backups. It really would have been a catastrophic failure for the Program and for NASA.

That's probably the one that comes to mind as probably the most significant because there weren't any alternatives.

WRIGHT: No do-over on that one, was there?

BRINKLEY: No.

WRIGHT: While we're on that topic, would you like to talk about that day when the launch happened, where you were, what your role was at that moment?

BRINKLEY: We were all in Baikonur for the launch. Mr. Goldin was there, Mr. [George W.S.] Abbey was there, the head of the Russian Space Agency, dignitaries, representatives from the White House staff, and news coverage. It was a very very cold November day. It was for all the marbles, and we had a perfect launch, and we waited until we had separation from the Proton launch vehicle and the Functional Cargo Block. It was a great relief and a great sense of pride for all of us. I remember it was being televised on NASA Select back in the States. My family watched it, and lots of other people, because it was so important. That was a special day. I thought at the time there were so many people that never believed we would ever develop the hardware, much less successfully launch the Space Station, and there it was, the first element was in orbit. Shortly followed by the second launch with [Robert D.] Bob Cabana and his [STS-88] crew on the Shuttle *Endeavour* in December [1998] to deliver Node 1.

WRIGHT: At the same time were there a lot of concerns? Did you believe that Unity was going to do well once it was there?

BRINKLEY: I really did; I used to laugh. We had 21 different independent review groups overseeing the International Space Station, and it seemed like we spent half our time dealing with the various review groups, answering questions about this and about that. I guess the good news is they probably asked every imaginable technical, every question that you could imagine. Maybe instead of being a real impediment and a pain in the rear end, maybe it was really beneficial because it certainly caused us to have the Space Station looked at from every possible angle.

WRIGHT: Absolutely. Were all of those [review groups] cross-cultural? Or were some independent from each nation?

BRINKLEY: Most of them were U.S. But there was one that was joint Russian and U.S. That was headed up by General [Thomas P.] Tom Stafford, the Stafford review group. Tom had been doing that function for Phase 1 [of ISS]. Actually Tom also had headed up an independent review group for the Hubble. I was grateful for his role on the Hubble mission and certainly they played a very important role on the International Space Station. He had Russian members and U.S. members.

Tom was very special because he was the commander of the Apollo-Soyuz [Test Project, August 1975], so he had a relationship with the Russians. Viktor Legostaev, who was my counterpart, knew Tom from those days when they did Apollo-Soyuz. Viktor really had great respect for Tom and for NASA and is a wonderful wonderful man. Those relationships really helped, and Tom certainly helped with his team of Russians and Americans in their independent review. Their endorsement was really helpful of the decisions and the directions that we made; they were supportive of that. That gave a lot of credibility to the Program and the decisions that had been made.

We were very open about everything, and I think that made a difference. We weren't trying to hide anything. I looked at those review groups as an asset, not a liability, because they weren't going to go away. So how do you use them to leverage value added? We did that to the best of our ability.

But Tom, he'd been in this business all his life. He really understood, he knew the Russians. He and his team were a great asset to us.

WRIGHT: Now that you had those two historic modules up where they needed to be, you certainly had more things to do, because you had more challenges with the next modules. I believe within the next six or eight months you had issues with the Priroda and the Spektr target dates not being met.

BRINKLEY: One of the big issues that we had was if we launched the FGB and the Node 1, and the Russians continued to slip on the Service Module, there could be such a gap that the first two elements could run out of on-orbit life or gas and fuel, prop, etc. before the Service Module was ready.

That was a huge issue as to when the Service Module was really going to launch because of the delays and lack of funding by the Russian government. That really caused a lot of angst. I ended up having to testify [to Congress] over that on several occasions. It was a real hard point in Congress with the critics, and rightfully so, because we were burning \$2.3 billion a year, and a year delay in the Service Module basically cost the taxpayers \$2.3 billion. There were work-arounds and other things we were doing, but a year slip on the Russian side had dramatic impact in terms of cost to the Program on the U.S. side, and it affected all the other partners as well, because everybody was waiting around to fly the hardware that was being built.

We had similar problems with the Destiny lab, but not as long, and it wasn't as critical, because the Service Module provided the follow-on environmental control and life support system for the whole Space Station. The only way we could be human-tended was with the Service Module.

WRIGHT: You couldn't catch a break with what was going on in Russia, I would imagine, with all the turmoil and the ruble falling and political unrest and changes in the country. Did you have a contingency at all to help?

BRINKLEY: Yes, we did. We were funding FGB2 that we could launch to attach to FGB1 to extend it on orbit until the Service Module got there. There were all kinds of things that we were looking at. But these weren't the days of Apollo where you could throw all the money from [Fort] Knox against it. A lot of the contingency plans weren't funded. Or maybe certain aspects were funded. We did fund some of the work on the FGB; it was the test vehicle for the first FGB that we looked at how to make it move from a test to an actual FGB2.

WRIGHT: At times were there concerns that the Russians were using leverage possibly to garner more funds for what they needed? Did you encounter any of those types of situations? Or did you feel that things were being done to the best of all ability?

BRINKLEY: No, that was happening all the time, but to be candid, the Russian government was not funding the Russian Space Agency to the level that it needed to be in order for them to be able to execute the Program on the schedule that we had.

They continued to struggle with minimal funding. But, they're very clever people, and they were always trying to figure out a way to get more money from the U.S. side. We recognized that and if you go back and look, the Russians flew billionaires to the Space Station, they did it really with our passive blessings, but in order for them to get the \$10 million for somebody to fly to the Space Station, because they needed the money. Although there was great

angst about who would approve it. But initially that concurrence was approved by NASA, but it was with the understanding that it would be astronauts from the European Space Agency, Japanese Space Agency, etc. that that's where the money would come from. But the Russians were more entrepreneurial than that. They went after and sold those launches to billionaires and we were stuck with our concurrence. That's one example. We paid for a lot of things that you could argue they should have contributed to, but also if they hadn't, we would have been further delayed. I think they did the best they could with what they had.

I clearly felt after the successful launch of the FGB—Zarya or Sunrise—the first launch of the Space Station, that really crystallized both sides to realize we can actually do this, we did find a way, we will find a way. Everybody took ownership of that. That was a turning point for the Program. We never really got the severe criticism after that that we had before.

WRIGHT: You proved the impossible could be done.

BRINKLEY: Yes, and we had like 40 more impossible missions ahead. Just take it one at a time; stay focused.

I wanted to talk a little bit about how Node 1 came to be named Unity and the FGB was Zarya and how all the elements got to be named. What brought it up was with the FGB. There had been a lot of angst back and forth from the Freedom days with the Clinton Administration and [former Clinton senior advisor George] Stephanopoulos and other people about what to call the Space Station. It was a political issue, and nobody in the White House—we couldn't get a name that was acceptable.

It was a real morale issue at the Program level that we didn't have a name. What are you going to call the Space Station? There was political angst because of the name that had been given under the Reagan administration, Freedom. They didn't want to do that.

We decided that since we couldn't name the Space Station we would name all the elements. We decided on our own that Node 1 was Unity, because it represented the bridge between the Russian segment and the U.S. and the other segments. That's how Unity came about, and we took that name, and didn't ask, didn't run it by George Abbey. That's how Unity became Unity.

We were at the last general design review for the launch of the Functional Cargo Block, and Mr. [Anatoly] Kiselyov, who headed up Khrunichev that was making the block, I said to him, "We have named our first node Unity. Mr. Kiselyov, have you thought about a name of the Functional Cargo Block, which is going to be the first launch of the Space Station?"

He said, "Mr. Brinkley, that's a good point. I'll think about it." About an hour later he said—this certainly wasn't democracy—"Mr. Brinkley, it will be named Zarya, which in Russian means Sunrise. The rise of a new era of cooperation between the United States and Russia working together."

That's how the FGB became Zarya, and Node 1 became Unity, and then the lab became Destiny, and not to be outdone, the Italians had Michelangelo for their module, and everybody got a name. We felt, "I don't have the name of our dog, but I have the names of the front leg and the back leg and the tail and all the dog's parts." That's a little humor, but a true story.

WRIGHT: Since we're talking about the Russians and their tremendous name within an hour decision, talk a little bit more about your time in Russia. You said that you went there, I forgot, yesterday, 30 times I think you told me?

BRINKLEY: Twenty-six.

WRIGHT: Twenty-six. You had also mentioned that you had spent a great deal of your life thinking that if going to Russia it would not be for a good reason but yet you were. How did the first visit compare to the last? How had the country and the whole environment changed because of the Americans being there and how had that impacted the Russian Space Agency?

BRINKLEY: The first time I was there, we went to the Russian Space Agency for a series of meetings. That night the head of the Russian Space Agency hosted a dinner for us. [William M.] Bill Shepherd and I were walking around the halls of the Russian Space Agency by ourselves looking for the toilet, unescorted, just wandering around. It struck us both that a year earlier, *no* American had ever been in the Russian Space Agency building; few even knew where it existed. There that night, the two of us were wandering around in the Russian Space Agency building.

Actually that day was the birthday of the Marine Corps. That night Mr. Goldin told Mr. [Yuri] Koptev, who headed up the Russian Space Agency, "Mr. Koptev, today is the birthday of the United States Marine Corps. Colonel Brinkley, the Program Manager of the International Space Station, was a colonel in the Marine Corps." Then Mr. Koptev smiled and said, "Well, we

don't have any military in the Russian Space Agency, we don't have any marines in the Russian Space Agency.”

Then later on at drinks in a private conversation I said to him, “You may not have any ex-military but you certainly do have several KGB agents.” He cracked up. Because one of the guys we knew was; it was an open secret. He had served at the Russian embassy in DC for a number of years. It was funny. Okay, you don't have military, but you have your KGB.

WRIGHT: I guess this was the opposite of what you told me earlier, you did not know what you did not know. This is one of those things that you did know what you did know.

BRINKLEY: Oh yes, we realized. Every general design review in the States, there would be several of the Russian team members that were delayed, would have trouble with their visas because of their “background”—all of that was done through the FBI. We knew who was; after you work with people for five years, you get to know one another.

WRIGHT: How much had things changed from that first time that you were there?

BRINKLEY: The first time I was there, there was not one McDonald's [restaurant]. My counterparts on their business cards had inked out CCCP, Central Committee of the Communist Party. They had all been members of the Communist Party. None of them would acknowledge it. The people that we were dealing with, they were the leadership of the Russian Space Agency and they were all members of the Communist Party. That transition was somewhat interesting to say the least.

What I did find about the Russians, which is logical now, but at the time I thought the Russians would find this freedom empowering and a great experience. Instead it scared them to death because from a culture perspective, Russians--their minds don't work the same way ours do. They're used to being told what to do, from the czars all the way through communism.

For them, deciding what to do in Houston on an important issue, was career-ending. We would never get decisions on the spot. We would get, "We'll think about it tonight and get back to you tomorrow," knowing that the phone system would be red-hot with discussions all night long, back and forth, back to Russia as to whether to do something or not to do something. Even if those people that were there did have authority, they were reluctant to exercise it.

WRIGHT: Talk about when the Russians first started coming over here for meetings.

BRINKLEY: Absolutely. The first cosmonauts came over to stay; there's a funny story with Bill Readdy and Bill Shepherd taking them out to go grocery shopping. They were convinced that they were being taken to stores that were specially set up, because they couldn't comprehend having more than one type of cereal on the shelf in the supermarket. They were blown away and they were convinced that it was all set up. Now it's that way everywhere [in Russia].

When all the Russians would come, I knew every suit that every one of my counterparts owned, because they only owned one or two. They certainly didn't have a lot of money. They would stay at a hotel that offered free breakfast and a happy hour and hors d'oeuvres. They would save all their money. We would work Monday through Friday, we would have a general design review or summary meeting where we had to sign protocols on Friday, then we would have a celebration Friday night, dinner together. Then they would leave on Sunday instead of

Saturday. We always left on Saturday to come home from Russia, but they always left on Sunday.

On Saturday you could guarantee yourself you'd see them at Home Depot. They would be loading up everything they could. They saved all their money, and they'd be loading up everything they could get their hands on to take back to Russia. If you wanted to see your Russian friends, if you happened to be in Home Depot you would see them.

WRIGHT: Any last-minute details you had to do, you had to go to Home Depot and shop with them.

BRINKLEY: That's what they would do. They would be there buying stuff. The other thing is they refused to drink American vodka because they said, "We only export the stuff to you that's not drinkable." They always brought their own vodka. They would not drink our vodka.

WRIGHT: I guess they had empty suitcases then to put things in from Home Depot, right?

BRINKLEY: Yes, that's what they would do.

WRIGHT: Wow. Were these tools or things that they would go back and use for their homes or for a business?

BRINKLEY: No, mainly for their homes. All the things that we have, little items, this and that. None of that was available when we first got there. I went back a couple years ago. I was just

amazed, because they had everything there that you could find in Paris or on Rodeo Drive in Los Angeles. When we first got there, there was nothing on the shelves.

WRIGHT: I'm glad you were able to see that transition and be able to be a part of that for where it came from.

BRINKLEY: It was an amazing experience. I have great respect for the Russians. They are incredibly educated. Our counterparts, we had Russians who had left aerospace industry with PhDs that were our drivers for the Program Office of NASA. PhDs in electrical engineering, and they spoke fluent English. There was no shortage of educated Russians that we interfaced with. A lot of them left the industry because they could make more money in the flea market than they could working in aerospace.

WRIGHT: Speaking of Russian engineers, some things they certainly had in common with American engineers, but one of I believe the components that was of a difference is how safety was done. How did you resolve some of the discussions about how things were going to be built or how things were going to be operated to bring safety standards to a common place between the two different space agencies?

BRINKLEY: The biggest difference how it relates to safety was how the Russians tested versus how we tested things. They tested things to failure. Catastrophic failure. We had given up on testing things to catastrophic failure decades ago. Couldn't afford it. We didn't build 10 test modules. They did because it was a jobs program, and it kept people employed. So they would

build nine test articles and they'd destroy those nine. That's how they knew the failure tolerances, because they tested them to failure. We never did that.

The Russians really had a hard time getting used to analytical analysis in terms of limits on hardware, because they were used to testing. That was a real issue that we had between the two sides. They learned a lot from us. We were able to get comfortable with their safety side because they could show us catastrophic test results.

Initially they didn't want to share that. It was proprietary, so they wouldn't tell us initially, "just trust us." We had to show them analytical [results], and you could argue that that at least was a sensitive area, whether it would be intellectual property or whatever, to get them comfortable. Then they would show us their test results. Both sides had to give a little. That related I think to the safety.

I will say this. I never felt once that there was a lack of regard or concern about safety of the cosmonauts. I felt they were just as dedicated to mission success as we were and the loss of humans would have had just as much political angst and concern in Russia as it would in the U.S. I never felt when it had to do with the crew that either side took that lightly.

WRIGHT: Do you feel that there was possibly some leverage based on the two incidents on Shuttle-Mir—the fire and the collision—that gave an opportunity to discuss safety maybe more forcefully than not? Did those issues occurring on Shuttle-Mir have an impact on some of the discussions?

BRINKLEY: The Stafford Review team played a critical role in looking at those incidents. That really made a big difference to us in Phase 2 and the ISS. But those two incidents on the Mir,

and that joint independent review team, they drove a lot of those changes that we benefited from on the ISS in terms of exposure and insight as to what happened and change of procedures.

When you asked me that question, I didn't have an example on ISS, but clearly their [Stafford Review team] role, I would use those as prime examples.

WRIGHT: Let me ask you about safety for the astronauts and the crew overall. The ISS was being viewed as a future orbiting laboratory. Were you also working at the time with the science and life science communities as well as others to create the overall Station to be a sustainable environment? How much were you involved in those pieces for those elements as well?

BRINKLEY: We were in charge of them. They were critical. [Michael T.] Mike Suffredini was the Payloads Program Manager for me. He had the primary interface with the science community in terms of the racks and everything that was being built. That was a big deal.

The science community was not bashful about their views and their priorities. Unfortunately, we had overruns where a significant amount of the funds to deal with those came out of the science line; we eventually were able to put it back. We had to borrow from the science because if we didn't build the Station, we weren't going to do any science, but there was a lot of angst about that and about not being able to do the science that the Space Station was intended to do.

I think three of those independent review teams were from the science community. They would let Mike Suffredini and I know in no uncertain terms their opinions about things.

WRIGHT: Another piece that was happening during that time, and it actually goes back to safety, was finding an assured crew return vehicle for the Station. At one time there was a possibility the X-38 was going to serve in that role but it didn't.

Can you give us some background about what happened and how you were involved with that decision of the X-38 and the Soyuz becoming the vehicle for the crew to use?

BRINKLEY: There were two things. One was the Soyuz was the baseline, had been the baseline, and had a flight history. Clearly we wanted to have a U.S. return vehicle or lifeboat, but we did not have a flight-proven vehicle. When push came to shove in terms of the funding, the X-38 became expendable.

But now keep in mind that was before the decision to stand down the Shuttle. One of the angsts that I have today is the decision to stand down the Shuttle has turned out to be a huge gap between that standing it down and having an operational capability to replace it. We still don't have one to this day. That was never envisioned.

It wasn't envisioned ever. I'm not going to point fingers. But the lack of that on the U.S. side has significantly adversely impacted the science on the Space Station because we don't have a capability to bring science back to Earth. We're just now getting that capability with SpaceX and the Dragon vehicle. That's adversely affected the science, bringing protein crystal growth or whatever back to Earth.

When those decisions were made, it was before a decision had been made to stand down the Shuttle. The Shuttle was our lifeboat. The Shuttle was our transportation system, and the Soyuz was the lifeboat.

John [F.] Muratore and his X-38 team, really sharp engineers, worked hard, were very creative, but at the end of the day the decision was made at Headquarters there was not sufficient funding to continue it. It certainly was one of George Abbey's favorite projects, I can tell you.

WRIGHT: It was a sad day I think, at JSC; the pride of JSC, being able to build it here—

BRINKLEY: Yes, I still have a model on my desk here at my home that Muratore gave me.

WRIGHT: Speaking about the crew, before you left, crews were training, and Shepherd was going to lead that command. Did you have any involvement with that encouragement to put him in charge of the first crew going up?

BRINKLEY: Yes. I had lobbied hard to George Abbey and Dan Goldin that Shep deserved that because he had worked so hard as my Deputy. Of anybody that should be the first commander, it should be Bill Shepherd.

WRIGHT: You still feel like you made a good decision, don't you?

BRINKLEY: I certainly do. I will say that during one conference call on NASA Select, Dan Goldin wanted to fire Shep, because while on orbit Shep had arbitrarily told Mr. Goldin that he had decided what to name the Space Station. Goldin called Abbey. He said, "I'm going to fire him." Abbey said, "You at least got to wait till he comes back to Earth."

WRIGHT: You did mention Keith Reiley before we started talking for today's session. Would you like to share a little bit more about the contributions that he made?

BRINKLEY: For every trip I made to Russia, Keith made two. The Russians loved him. He's a great engineer, and he had an incredible way of working with people. His counterpart at the time was [William H.] Bill Gerstenmaier in the Shuttle Program. Keith and Bill could get past any egos or any agendas and they'd figure out a way to get things done. Keith had an incredible rapport with his Russian counterparts. Alexander [G.] Derechin from [RSC] Energia, plus others. They were able to come up with great technical decisions and Keith just played an incredible role as launch package manager. If you were to ask Jay Greene, Jay thinks Keith walks on the Moon, as do I.

One thing that I remember in particular in our design of the Space Station, we realized we had a gap in power and that the Space Station would go dead. Keith came up with a design to put a solar array on a module and we're able to go from design to actually getting it built in nine months. We were dead in the water because we would have lost power if Keith hadn't figured out a way to come up with that design change and been able to get it done without affecting the schedule.

I would have to say also the guys at Rockwell who actually built the module, they were incredible as well. Everybody stood tall to get it done. From initial conception to design to actually having the hardware built, tested, ready to go, it's an amazing story. Keith came up with it, but everybody involved, just was a Herculean effort. At this point in time few people remember, but it would have never flown had it not been done.

WRIGHT: The Station has been flying, has had a human presence, for over 15 years. It is those days before it ever launched that if you tried to explain to the people now working on it some of the things that you went through, they probably would think that some of that stuff just can't be true.

BRINKLEY: You're right. There was no hardware interface between the Russian hardware and the U.S. hardware before it flew. The FGB never was mated to Node 1. On those interfaces, it was never ever tested on Earth. The interface was tested the first time on orbit, in the extreme atmosphere of space. That's a big deal. From FGB to Node 1, the first time was when [Robert D.] Bob Cabana and his crew got up there.

We hadn't checked to see if it would work at ambient temperature, much less space. But it worked—the power system, the software, the node interface, you had completely different systems on either side of the node. Those guys that work software figured it out, and there has never been a major software glitch on the Space Station. To me that's incredible. Software worked from day one.

There's a whole other story on the software that's just as remarkable as the hardware. The guys who ran that lab out at the Sonny Carter Facility [Neutral Buoyancy Laboratory, Houston, Texas] and the Russians, they really worked well together. They did an incredible job.

WRIGHT: Did it stay pretty much on schedule and budget or did it have ups and downs as well?

BRINKLEY: It had less ups and downs than the hardware did.

WRIGHT: You had also mentioned earlier [Bohdan] Bo Bejmuk.

BRINKLEY: Bo Bejmuk. Now that he's a retired Boeing executive, he serves on the Stafford independent review team. Bo really played a critical role in Phase 1.

WRIGHT: You said he did a lot with the hardware. Is that correct?

BRINKLEY: Yes. He was a Rockwell heritage guy that had been with the Shuttle. When we had to figure out the interface between the Shuttle and the Mir in terms of docking and to build that hardware for the interface, Bo was in charge of all that. We used the same on the Space Station, everything on the Russian segment was a Mir-2, was a derivative of Mir-1. They were able to come up with a design on the Shuttle for docking those vehicles, then we used the same interfaces on the nodes, anything that touched the Russian segment. Bo really played an important role.

WRIGHT: Randy, you shared a lot about what worked well and how things were able to work out. Were there just some challenges that you met that just didn't get done? Or where you had to compromise to a point that you weren't happy but had to move the Station forward?

BRINKLEY: Yes, there were decisions and priorities that I would have done otherwise, but again at the end of the day you can either resign or accept. There were decisions that were made above my pay grade. Mainly I'm talking about funding. You can only do so much, and you have to do

the best with the funding that you have. Everybody wants more funding, but at the end of the day when that's what you're given, you have to either make that work or go do something else.

WRIGHT: In 1999 you made a decision to go do something else. Why did you decide to leave NASA?

BRINKLEY: Because I had always wanted to go back into industry. I felt like I had done everything that I could—I felt the Station was in a position where I could walk away and feel proud about it. We had two elements on orbit working successfully. We had all the Phase 2 elements well along, ready to be launched. I could have stayed and I guess ridden that out. I talked to Mr. Abbey.

I wanted to go run a company, and I wanted to do something outside the government sector. I'd spent 25 years in the Marine Corps, I spent 10 years in NASA. I wanted the experience to have an opportunity to do something on the industry side.

WRIGHT: What lessons did you learn from working your years at NASA that you brought with you into your new your career?

BRINKLEY: I think NASA was a follow-on building block to the Marine Corps. At NASA I felt I had achieved a degree of credibility in industry. When I was offered the job as senior vice president at Hughes Space and Comm [Communication Company] for all the satellite programs, I didn't know anything about satellites, but I figured it couldn't be any more complicated than Space Station or the Hubble.

WRIGHT: Was that a true statement once you got there?

BRINKLEY: I found the Marine Corps is the most empowering organization I've ever been a part of and NASA is the second most empowering organization. Unfortunately, my experiences in industry, they're certainly not of the same league in terms of empowerment.

WRIGHT: It's a good thing you had lots of experience and challenging opportunities then. It sounds like that's what prepared you for that. Did you leave any recommendations or suggestions when you left, when you knew you were exiting out? Were there some thoughts you shared?

BRINKLEY: Yes, we had an extensive lessons learned database. When I was in Hubble they were trying to recapture the Apollo lessons learned. The first thing I did is try to go back and look at lessons learned as to how I might apply them to being the mission director of the Hubble repair mission. What I found was, there really wasn't such a thing.

So we within the ISS Program established our own lessons learned. There was an extensive database created. Maybe they've thrown it away, but it certainly was extensive while I was there, to capture lessons learned as we went along.

WRIGHT: As you look back on the years that you were there, what do you consider your greatest or the most significant contribution that you made to the Program?

BRINKLEY: I guess I would say it was facilitating the relationship between the Russians and the rest of the space agencies. I certainly don't take all the credit for that, but I realized that we had to treat the Russians as partners, and I recognized that if we didn't we'd never be successful.

I had to set the tone, and I knew how important personal relationships were. I learned that from them. It wasn't necessarily obvious, but after dealing with them I had great respect for them and I realized we were never going to be successful if we didn't establish personal relationships. And we had to find common ground—couldn't do it the NASA way—we had to find common ground.

If we had not been able to overcome those cultural differences, we would have never solved the technical and operational issues. Given where we started and the background of both sides, I think one of the greatest contributions that the Space Station has made is in international relationship. If you look at where we started and what it took for us to be successful as where it is today, that is an incredible success story.

WRIGHT: It is, it is.

BRINKLEY: If there's ever to be—this is my own opinion, but if there's ever to be a follow-on mission to Mars or getting out of low-Earth orbit, it will not be a national program. It's unaffordable. It will have to be an international program. The lessons learned on the Space Station would serve those involved in good stead to review them in terms of working together, whether it's with the Russians or the Chinese or the Indians or whomever. I don't see that kind of historic explorational effort ever happening unless it's done with the commitment of multiple nations.

WRIGHT: It's good that you helped set that foundation in place so many years ago so that at least hopefully it'll go forward and not go backward. Before we close out today, is there anything else that you would like to add? Or did something else maybe come to your mind that we haven't talked about that you'd like to share that we can include in the session?

BRINKLEY: No, I can't think of anything in particular. I remain very very proud of the Space Station and the people that are running it today. The Program Manager is a dear friend of mine who deserves to be the Program Manager. They're as dedicated as they've ever been. The ISS - - it really is one of the 10 engineering miracles of the world. It's really significant in terms of when you look at it in perspective.

To be part of it was a great honor, and with the people that I had a chance to work with. I've been blessed by all that.

WRIGHT: Thank you. Thanks for the contributions that you've made.

[End of interview]