INTERNATIONAL SPACE STATION PROGRAM
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KEVIN P. CHILTON
INTERVIEWED BY REBECCA WRIGHT
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WRIGHT: Today is July 28, 2015. This oral history session is being conducted with Kevin Chilton as part of the International Space Station Program Oral History Project. General Chilton is speaking with us via telephone from his home in Colorado Springs, Colorado. Interviewer is Rebecca Wright. Thank you again for taking the time to talk with me today.

We know that from 1987 to 1998 you were part of the NASA Astronaut program. You served as a pilot on two [Space] Shuttle missions and the commander of one, STS-76. After returning from that last mission, you were asked to become the Deputy Program Manager of Operations for International Space Station program. You did that until August of 1998. If you would, could we start there? Share with us why you chose to go through that transition, and what were some of the responsibilities of that job.

CHILTON: Sure. First of all, I didn't choose to go through the transition. I was actually ordered to. It was a little interesting history at the time. I had volunteered to return to the Air Force in 1996. I actually had orders in hand to go back. Those orders were cancelled, and I was told that I was to report to the International Space Station [ISS] Office. It wasn't a voluntary thing. Nonetheless, it turned out to be probably the best thing that could have ever happened to me.

It was an interesting time for the Space Station. If memory serves me right, Mr. [Randolph H. "Randy"] Brinkley, the ISS program manager was thinking about departing the

program. I think that had to do with—this is all hearsay of course—that [NASA] Headquarters [Washington, DC] had not been fully doing their job in representing the Space Station to the Congress. As a result, the program manager [Randy] was constantly being called up to Washington. It was just an almost impossible situation for any one individual to manage, that is, to try to run a program in Houston and be hauled to Washington every moment Congress had a question. I think what happened was NASA Headquarters recognized this problem and decided to relieve Randy of that burden and basically said, "You stay in Houston and run the program."

In any case, when I was first told that my orders to return to the Air Force had been cancelled, the reason given was that there was an expectation that Randy would be leaving the ISS program and that I was going to become the program manager. Of course, this seemed incredible to me if for no other reason because I had never run a program let alone one of the scale of the ISS. Fortunately for all concerned, Randy did not leave, but stayed on as the program manager. When I came to the [ISS] program, there was really no position for me. Thankfully, Randy was still in place and the Deputy position was filled. So, it was decided to create a new position for me, which was the Deputy for Operations. Essentially, we took what had been the Deputy position and split it in two—we had a Deputy for Engineering and a Deputy for Operations. Doug [Douglas R.] Cooke had been the previous Deputy. He had departed [the program] and Jay [H.] Greene came in to be the Deputy for Engineering. I was appointed the Deputy for Operations. We both worked for Randy. That's how it all got started.

WRIGHT: That's an interesting pairing. Jay Greene of course came from the flight control area and the flight director areas from Apollo.

CHILTON: Yes, Jay was also the [Space Shuttle] Orbiter Program Manager, because I can remember he ran the Orbiter Project. I think after he left being a flight director he may have done something in between, but he was running the Orbiter Project Office for some time before he came to the Space Station program.

WRIGHT: Yes. Long career of engineering. How did all of that mesh together? How were you able to share information to support what was going on and in moving forward?

CHILTON: It was an interesting time in the program itself. I can remember when I first came on board, I found out the program was behind schedule, over budget, and had a serious technical problem with Node 1. Node 1 had failed its first pressurized structural test—that's what I walked in the door to, and what happened during the first six months that I was there was a really good thing.

Jay came in, and he and Randy got together and made some significant changes to the way the program office functioned. Also, Mr. [George W.S.] Abbey became much more involved in the program. The program had been run with a large number of IPTs, integrated product teams. I can't remember the number, but a very large number of integrated product teams. And, there weren't any formal control boards in the program, or at least certainly not the type of control boards that I'm told had existed in the Apollo program.

Randy and George and Jay really came up with the thought that since Apollo worked out pretty well, that perhaps we should adopt some of those organizational constructs from that program. I think Jay pushed for this really hard. Jay set up the Configuration Control Board, which was an engineering board that he ran, and with his help, I set up and ran the Operations

Control Board. We both attended each other's boards. We set up a process that allowed Jay to have absolute firm control over the configuration of the Space Station and every module that the program was building, so no changes could be made in design or engineering without coming to Jay's board.

My board was really more about operational requirements control, as well as scientific requirements control. So, as new operational or scientific requirements were envisioned by the Astronaut Office or science community, the promoters of those requirements would have to first come to the Operations Control Board and justify their requirements. If they overcame that hurdle, they would then go to Jay's board for approval and then on to the program manager, Randy. This process was useful in a couple of ways. One, it exposed new requirement proposals to a broad community [Prime Contractor and NASA reps from Engineering, Life Sciences, the Astronaut Office, Mission Operations Directorate, Safety, etc.] at the Ops Board that often could recommend non-material solutions to meet all or part of the requirement. If, however, the requirement survived this vetting and there was a compelling argument to change the design or configuration of the ISS, the requirement still had to survive the scrutiny of Jay's Engineering Board which, at the end of the day, had the job of delivering functional hardware on schedule and budget.

We had a pretty well-organized program within a year, very disciplined, anyway. Within the program office you had certain, actually specific control authorities reporting directly to the program manager, who was reporting directly to Mr. Abbey. Then below that, the IPTs could go off and work their various issues along the way, which usually were to answer questions back to the control boards. It was a very important time of transition, I think, for the program and the

way it was managed. I don't take any credit for that, but I had the opportunity to participate in it and learn from it.

WRIGHT: How was it received by the people that were trying to pull these pieces together?

CHILTON: I imagine it was like any change. I don't have a good recollection of it. But, like any change, suddenly there was this meeting you had to go to a number of times a week, and you had to get permission from either Jay or me to move forward on something. People usually don't like that, but it didn't matter; it was the right thing to do, and it really helped fix the program in my view. I shouldn't say fix it—it allowed it to move forward.

WRIGHT: It seems like it helped set a foundation. Did you see more changes before you left? Or did this just become more solidified before you went on to the next part of your career?

CHILTON: Well, I'd say another big change in program management was the advent of the Saturday morning meetings. George Abbey chaired these meetings and they became referred to as the "GASR" which stood for "George Abbey's Saturday Review." I believe this was also another Apollo program tradition. The program managers for both the government [Randy Brinkley] and for Boeing [Doug Stone] were required to go to this meeting, along with their lead deputies/vice presidents. So I was always at it, Jay was always at it, the Boeing program manager and his key deputies and all the Boeing people were on the net [telecom] for this particular meeting. It was really a review of the Boeing team and our team that was done every

single Saturday for the entire two years that I was on the program. I'm sure it continued on after I left.

It was an attempt to try to get control of the schedule. We were having trouble building the broader program schedule. Boeing as the Prime Contractor was having trouble building an integrated schedule, so it was really hard to determine your critical path in managing the program. That can, and often did, lead to surprises along the way where suddenly you find you have to stop to wait for something to get caught up that you didn't realize was on the critical path. With the GASR, the team was able to put an overwhelming focus on that and many other issues.

Those Saturday morning meetings—frankly, they were painful, because who wants to spend all Saturday morning every Saturday in a meeting. From the contractor perspective they spent all of Thursday preparing for that meeting and all of Friday dress-rehearsing for it and briefing us [the ISS program office]. It added a lot of extra work, but it also added the appropriate focus that allowed the contractor to understand clearly what the expectations of the NASA customer were.

A lot of hard questions were asked and ultimately answered at those meetings across those two years I was there and that also really helped to bring more discipline into the program and improved the performance of the Prime contractor as well as subcontractors who were all asked to participate as well. The Boeing program management team was always very focused on success—but as a company, I think as a direct result of the GASRs, they started to put additional resources toward the International Space Station program. They recognize that it was important to support the ISS program with their best talent, and they put additional pressure on their subcontractors to do the same.

The GASR added another layer of discipline and expectation. Even the subcontractors had to brief at the Saturday morning meeting. As a result, there was added attention on getting things done on time, particularly if your part of the program was on the critical path. I thought it all worked pretty well.

WRIGHT: You mentioned at the beginning of your explanation that you felt like you learned a lot. Were there some specific lessons that you brought with you?

CHILTON: I think it was more personal for me. I didn't know what I didn't know. Every day was a learning opportunity. I learned a tremendous amount about business and finance and contracts from Dan Tam and Lucy [V.] Kranz. Lucy was our contracting officer and Dan was our CFO [Chief Financial Officer]. Dan had run many big programs for TRW. He just taught me a lot about how a contract is written, how you incentivize people, and just how you do business in a program. I didn't appreciate how to do that. Lucy taught me the finer points of contracting. Of course, no money got spent unless she approved it, so she was in just about every important meeting.

Also, part of my duties was to do the negotiations for how we were going to conduct operations and how we were going to train with our international partners. We had astronauts training over in Russia for the [Shuttle-] Mir program. But there were issues involved there, and the Russians had a different way of training than us. They had different expectations, so I ended up spending a lot of time negotiating with the Russian folks who were counterparts with regards to operational issues, training, and how we envisioned we would conduct operations on orbit as

an international team. The same was true with the Europeans and the Japanese and the Canadians.

Additionally, in one case, I had the opportunity to lead a contingent down to Brazil to invite them on to the program. We were doing a lot of bartering between the partners in those days—for example, offsetting the construction and contribution of an international partner's module with a free ride to orbit for the module aboard the Shuttle. We were interested in Brazil providing an external payload structure for the Station that was outside the program budget in exchange for the opportunity for one of their citizens to become a member of the Astronaut Office and potentially serve as a crewmember on the ISS. The negotiations were successfully completed before I left the program; however, I'm not sure they culminated in the desired outcome for either party.

I also learned a lot about leadership from watching Jay and Randy and George operate. And in the end, I believe I was very fortunate to have had my orders back to the Air Force cancelled in 1996. During those two years on the ISS program, I learned many things that better prepared me to contribute to the subsequent positions I held in the Air Force on my return in 1998. For example, I ended up managing budgets for the Air Force and led the development of the entire Air Force five-year budgetary program for two and a half years. Doing this wasn't a far stretch from my duties in the ISS program. In another assignment, I ended up doing political-military affairs for the Joint Staff for all of Asia-Pacific and the Middle East, where I had to routinely interface with and often negotiate with members of foreign militaries from around the world. And because of my time on the ISS program, I learned how to negotiate, how to cooperate, how to work with people from other countries and cultures.

I think those three big things—leadership, working with international partners and negotiating with them, and understanding the budgetary aspects and incentives with regard to contractual relationships and how to build a budget and execute it—all helped me when I returned to the Air Force. It's really more of a personal best thing that ever could have happened to me. I'm not sure I was the best thing that could have ever happened to the Space Station program, but I sure benefited from being on the ISS team and I'm very proud of those two years that I spent with the program.

WRIGHT: As you mentioned, it's a very complex and complicated weaving of different threads that all have to come back together. One of the things that you mentioned under your operations was science. Where was that when you left and/or when you got there as far as the science aspect being woven into the operations for the Station?

CHILTON: The scientific community and the operational community and the engineering community: they have three different objectives in mind. There's always a little tension there. The scientific community always wanted more capability, which would turn into more changes to the design, because technology was evolving along the way. Laptop computers, wi-fi, ethernet—and also the recognition that there was going to be a demand for more ground-operated experiments because there was an appreciation that certainly at least early on we weren't going to be able to man the Station with six or seven people. And if experiments were going to have to be remotely controlled from the ground, that meant we needed more bandwidth, which meant we needed more antennas and more power for transmitting data to and from the

ground, which meant we needed more pass-throughs and holes in the bulkhead to run those feeds through to more antennas, etc.

There's always this give-and-take on getting the hardware built per design and on schedule, and changes in requirements in the scientific community. To be fair, they might not see them as changes, but unfulfilled requirements that they would like to have, that they've articulated they would like to see put in. Then the operator is caught up in these discussions because at the end of the day they're going to be the ones who have to execute.

There was always that dynamic and that's why I think the board system worked so well. If you were a scientist in the scientific community and you thought a change needed to be made, you first came to the operations board, and if it survived that you went to the engineering board, and if it survived that, you got your change in. If it didn't, you didn't. Not everybody went away happy, but there was control. Because of that we were able to actually get something built and on orbit.

Often these discussions led to a recognition that some "scarring" for future capabilities was important to add for future enhancements. But, at the end of the day, there was always the obvious reminder that to get any capability on orbit you first had to get the ISS built. There was a lot of pressure because of schedule slips and cost overruns, and the only way you could control those is to freeze requirements and move forward and be very stingy on changing the design.

I would say during that time period—when we were as I said behind schedule, over budget, and had technical problems that had to be solved in that first year with regard to the pressure vessel on Node 1—there wasn't much sympathy for new changes to the design for the scientific community. Of course, that created some friction, which I think over the years probably got better, improved, but when I joined the program, it wasn't the time to be doing that.

Occasionally, you'd get the scientific community saying they're not going to support the program if their changes were not accommodated. Not everyone in the community would do this, but some would say if we can't do this, then we're not interested in the ISS, which added further pressure to the program's existence. I didn't have to manage that. Randy had to manage that. I thought he did a magnificent job of balancing those issues.

WRIGHT: Thanks. That's a nice statement to be able to explore. I want to go back before that time period. You were in a unique position because you were one of the few Shuttle commanders who had the opportunity to dock to the Russian Space Station Mir. You actually saw long duration residents in place as you were working on Station. You actually had a view of what was going on up there. How did the experience of visiting a station and delivering the first U.S. residents to start a long-term continual presence in space for America, how did that impact your thoughts when you came back to try to make some of these decisions? Or did it at all?

CHILTON: I think it informed me. I had a better sense of what was required for Shuttle rendezvous and docking operations as well as what was required while the Shuttle was docked to the Station for sure. And I was introduced, in a very small way, to what life on a space station would be like. But we also had the benefit of folks like Norm [E.] Thagard, Shannon Lucid, John [E.] Blaha, and others, who had spent time on Mir. We had the benefit of their knowledge [as residents on Mir].

It was clear that the Russian element, which included the Base Block and the FGB [Functional Cargo Block] was going to be very much like Mir. It was also quite clear that the Russians wanted to run the International Space Station exactly the way they ran Mir. That was a

tension point to be sure. Of course, we had our way of thinking on how things should be run. I'm not so sure any of that ever got completely resolved to anyone's complete satisfaction, but clearly the ISS team is making it work today.

I've heard that the Russians do their thing on their half of the station and the rest of the international community does their thing on their half. I'm not sure if that's true, but trying to sort through who's going to be in charge when, what ground control center has what authorities, whether it was going to be Houston or TsUP [Moscow Mission Control] in Moscow, how that was all going to work out were all part of the challenges we tried to address in the Operations Control Board and in negotiations with the Russians. They [the Russians] didn't have to worry about any of that when it was their space station Mir, but with ISS they did. Those were tough negotiations. Obviously, the thing is working, but from a U.S. perspective we probably didn't get everything we wanted, and from a Russian perspective they probably didn't get everything they wanted.

To your point, having had the opportunity to rendezvous and dock, see those operations, see the EVA [extravehicular activity] operations which we conducted on STS-76 while we were docked, gave me a better appreciation for how to address some of the operational issues that came before the Operational Control Board. I had at least some level of understanding of the context of the issue being brought forward due to my experiences on STS-76, so it certainly helped in that regard.

WRIGHT: Last, what do you believe that the legacy of the Station will be as it moves to its next ventures?

CHILTON: The hope was always that there would be scientific discovery up there that would benefit mankind. Maybe there has been; I haven't tracked the scientific side of it very closely. That history hasn't been completely written yet; that could yet happen. But, I think that the bigger legacy is that the program proved that you can do a large, very complicated international program with partner nations that often have very different equities at play. It also proved that international programs are very difficult to run. But, in spite of the complexity and level of difficulty, it showed that you can actually do this. You can actually bring various countries together, various cultures together, with oftentimes different objectives in mind, and actually do something incredible.

It's probably the largest international project ever attempted and successfully completed when you count up the number of people that participated in its development—and now operation—in the history of the world. The fact that it's in space just raises the level of difficulty even higher.

I can't tell you how many times people said: "It would never happen, too many EVAs to construct; it'll never be successful, too many Shuttle and other country rocket flights required to construct; you certainly will have a problem where you're going to lose a part, or a whole segment won't be able to make it up for whatever reason." None of that happened—and the fact that none of those things happened or were a factor in the building of the ISS did not happen by accident. It was successful because a lot of people were so very very dedicated and gave up so much of their time and their lives to make sure the program happened the way it was envisioned, and it did.

I can't tell you how many times I took visiting dignitaries over to [Johnson Space Center] Building 9 to show them the scale model of what the completed International Space Station was

going to look like. It wasn't a very big model, probably wingtip to wingtip it was maybe six feet. All of the modules, the truss and the solar arrays, and all the piece parts were displayed in the model. And while I was taking folks over to look at the model and explain to them how it was all going to come together and work, we hadn't launched a single piece of hardware yet. I kept looking at that thing going, "Man, we've got a long way to go."

Then it seems like in the blink of an eye—not really, because there was a lot of work involved—but you look up in the sky now and it looks just like that model. It's actually got more parts to it than we envisioned back then. More capability. That's just fantastic, a fantastic testament to NASA, the contractor teams, and the international community that made that happen.

WRIGHT: It is. I'm sure you get a really good look at it in Colorado Springs when you watch it pass over.

CHILTON: I was up in the mountains recently with a whole bunch of people and saw it go by. It was a great pass. It was awe inspiring to all of us.

WRIGHT: That's great. Thank you.

[End of interview]