Interview with John R. [Dick] Lyon

by

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Dr. Butler: This is Dr. Orville Butler and we're here at the Kennedy, Kennedy Space Center Headquarters' building this morning, or this afternoon, I guess it is.

Mr. Lyon: Right

Dr. Butler: Uh, talking with, uh, with uh, Dick Lyon. And I guess I'd like to start off by getting some general background. Tell us a little about where you grew up and your education and the events which led you to, to a career, uh, in space. Uh, and I, I guess you started your career at Western Electric which

Mr. Lyon: Western

Dr. Butler: provides a connection because I and Steve Adams wrote the history of Western Electric.

Mr. Lyon: Oh, is that right. Fascinating.. Well I grew up in a, in a little Kentucky Appalachian town called Middlesborough Kentucky. And I went through high school there. I ended up marrying my girlfriend from, from Middlesborough although it was after I went to college. I went to college at the University of Kentucky. Uh and went through engineering. I desired a degree and an interest in engineering. Uh, although I have to admit at the time growing up in Appalachia you didn't see a lot of engineers and I thought most of them wore a railroad cap, you know. But, at any rate, I got my degree in engineering at the University of Kentucky. Went to work for Western Electric in Burlington, North Carolina. We were working on anti-aircraft defense system, the Nike-Hercules defense system. Spent four years there. uh, had an opportunity to move up and even go on and get an advanced degree at Western Electric. It just wasn't a part of my career plan. Uh, they were going to send me off to Bell Telephone Labs and get a Ph.D. And that just wasn't where I was headed in my career. So I went to work for Honeywell in Florida. And I was interested in coming to Florida. At

Honeywell I was introduced to working on guidance systems or ground checkout systems for guidance systems for the Gemini program and the Centaur programs. And wh, then after a couple of years at Honeywell I had an opportunity, through a friend, to come to work for NASA. And man I thought that was exciting to be a part of the human spaceflight program. So Gemini was still flying at that time and the Saturn vehicles were being developed. The Saturn IB was was flying, just made its maiden flight. And so I came over in June of 1964 to work for NASA. And at that time I believe, if my history is correct, it was before it was Kennedy Space Center. There was a launch operations center out of Marshall here and I came to work the Johnson, no excuse me, for the Manned Spacecraft Center Florida Operations. So it was Manned Spacecraft Center at that time. And about six months later it all, the Kennedy Space Center was formed in 1965 and those Marshall and Manned Spacecraft Center formed Kennedy Space Center. So it came into Kennedy. But I came here working on the Apollo, uh, had the opportunity to be the engineer who planned the outfitting of the launch pads for the command and service module and then the lunar module. That was launch complexes 34 and 37. Then I did the same job for launch complex 39. And had an opportunity to get in on the ground floor with a blank sheet of paper, you know, and do that kind of work. From there I worked on the Apollo Lunar Surface Experiments and uh which had a had a nuclear RTG, radioisotopic thermo-electric generator, and that was a very interesting project. Then I moved from there into the Shuttle organization and for design engineering at Kennedy Space Center. And a gentleman named Tom Utsman was the first guy in that organization as the project manager for the shuttle infrastructure here at KSC.

Dr. Butler: This would have been when?

Mr. Lyon: Uh, you know its hard to remember what year that was. It wss before we had a configuration for Shuttle and I haven't looked at that date. But Tom started that

for Design Engineering. I was his first employee. We were able to lay out what the Space Shuttle configuration was going to look like at Kennedy, the number of VAB cells to modify, the number of pads and mobile launchers and orbiter processing facilities and all that. And we developed that plan, put it together, sold it to the Shuttle Program and it became Shuttle Program directive number one signed by Washington headquarters. Uh, just the way we wrote it. So that was a fun thing to do. Another blank sheet of paper type of job. Uh, Tom Utsman did that job for several years and then I replaced him as he moved up the line as the head of the Shuttle Project Engineering office for Design Engineering. And

Dr. Butler: That was in 1977.

Mr. Lyon: That was about right, yeah. You've got that. In 1980 I became the director of Project Engineering for the Engineering Directorate and the Shuttle part was still within my directorate plus any of the Design Engineering activities at Kennedy Space Center. Uh, I moved from there to the Deputy of Design Engineering and I don't remember what year that was.

Dr. Butler: That was '84.

Mr. Lyon: '84, ok, 1984. And I served in that capacity for a couple of years and then right after the Challenger accident I moved from that job to become Deputy Director of the, of the Payloads Management and Operations organization and served over there working with John Conway who was the director. And I performed that job from '86 until January of 1990 and in January of 1990 I was appointed by General McCartney, I believe at the time, as director, well as the Program Manager for the Space Station program. Space Station Freedom as it was called at that time. And we served in that, served in that job until 19, early 1994 when the redesign was performed on Space Station Freedom and it became International Space Station.

And uh I went back to the payloads Directorate as a Deputy. By that time Bob Crippen had become Center Director. I spent a year in the Payloads Directorate and then Bob asked me to consolidate logistics at Kennedy Space Center in early 1994 [?] and I spent my last two years of my career with NASA in the logistics operations for the entire Center. And a big part of that was Orbiter logistics. And I retired in December of 1996. And since that time I have worked, primarily I have worked for four small disadvantaged businesses who were involved here at Kennedy Space Center and I, as the program manager for the Dynex contract which was the engineering development contract for about four and a half years. And since that time that contract has gone to Arctic Slope Regional Corporation Aerospace Company and I'm now the Vice-President of Florida Operations for them and still working in that same engineering development area but its called the University Affiliated Spaceport Technology Contract. So that's kind of the history of my life and where I am at this point.

Dr. Butler: Ok, uh, one of the things that we've been trying to understand in the development of Kennedy Space Center, uh, part of, one of Kennedy's important roles has been in the processing of the Shuttle. And you spent several years with the Shuttle. How do you see the processing of the Shuttle changing over the years that you worked with it.

Mr. Lyon: Well, my role was primarily developing the infrastructure to process shuttle. I did not really get involved in processing shuttle. Got involved in processing the payloads for Shuttle. And I think what I have seen happen in processing those payloads for shuttle is some of our predications or whatever come true, is that we need to process this flight hardware on the ground and integrate it well before it goes into space, because we find so many problems and issues. I mean we're working with very high tech, highly complicated systems and designs interrelated with humans operating them, that you find situations that you couldn't really

check out until you put two modules together, or three modules together. Uh, things that you probably couldn't predict very well and you don't want to find those kinds of things on orbit where you have two or three personnel to work it, not all the equipment and not all the tools to be able to resolve those things. And so we've found, and I think proven, that it's a very valuable asset to have this kind of an integrated checkout approach before you fly and find your issues and problems before you fly.

Dr. Butler: What was your relationship to Level IV experiment integration?

Mr. Lyon: Our organization performed the Level IV experiment integration. and we used a lot of, at that time we used a lot of new grads and all that came out of the colleges, universities, that was kind of a training ground for our young people to do that level IV integration for experiments. And I thought it was very successful and they became very valued components of the experimenter's team.

Dr. Butler: Hm, hm.

Mr. Lyon: Uh because they new the systems here and they new how how things worked and they new how the space lab or whatever carrier we were integrating this into, how those things worked. And in some cases, uh, for instance the European Space Lab missions, many times our young engineers were taken to Germany, or to whatever country that was performing the experiment to be there while they were on orbit to help them with any issues or problems that came up while they were on orbit. So they became a very valued part of that Level IV integration and the ultimate experiment objective.

Dr. Butler: Now, during during this time Kennedy was pulling back from hands on operations and was increasingly turning those over to contractor and yet level IV

continued to be hands on. So how do you see level IV experiment integration group as being different or the same as the rest of Kennedy?

Mr. Lyon: Uh, the pull back, I think, left left a few open holes and it and I think some lessons learned had to be repeated by doing it with Civil Service personnel. The level IV experiments, experimenters came in. They may not be the same people that had had space flight experience before. A lot of them were new. So they found a very valuable asset in having a government person who knew all the ropes, who knew how to get them through the various bureaucratic wickets or programmatic wickets that they had to meet or safety and these kinds of things. And they were just a valuable asset and it helped the experimenter to not have to learn that lesson each time. Or even as experimenters go to Goddard, it may be a little bit different at Goddard than it is at Kennedy Space Center or at Ames. So, it was a bridge, a facilitator and I think its missed. And it was also a wonderful training ground for the Civil Servant to be able to move on up the line later in his career or her career and have the insight and oversight the government needs to meet its objectives in oversight and insight in the contracts that it lets.

Dr. Butler: Now in uh, I guess the way I want to ask the question is, how is it that you got involved in Space Station.

Mr. Lyon: When I was working in the payloads organization there was, this was the organization that was going to perform the operations for space station. I had a design development background from Shuttle and being a project manager in Shuttle, that I became the oversight and I wanted to be oversight for the development of this new program. My love, my first love was to go into a program where there was a blank sheet of paper and we got to be creative and do that. I mean that's just what I like to do. I like to be a program, a project

manager from that point of view. So I kind of put myself in that position and I worked it in that operations organization from the point of view that we started developing the requirements and the input and the operations concept for space station. And then I got selected to be on a source board up in Huntsville Alabama where we selected Boeing as the as a space station contractor at that time. So I ended up with a space station reputation for a couple of years and the first space station manager was C.M Giesler. He retired at the end of 1989 and they needed a replacement and low and behold I was in position to fill that that those shoes and was very excited about doing it and appreciated General McCarthy having the confidence in me to do it and of course John Conway supported that and promoted that idea too. And its probably one of the best jobs I ever had. I really really enjoyed being a part of that. And there were, there were space station program managers at each of the centers: Johnson Center, Marshall Space Flight Center and when I first went in Goddard had a role for, for some of the attached experiments that would go on Space Station, which eventually fell out. I mean that part of it never really took off. And then Glenn Research Center which at the time was Lewis Research Center had the power supply and so they had a program manager. Then the program was managed up at Reston, Virginia out of Reston, Virginia. And of course we had the internationals, the European Space Agency, the Japanese Space Agency and the Canadian Space Agency. So that was a team, and that team kind of acted like a board of directors for the program. Uh which we had a program manager at the Reston level which was uh, Bob Moorehead. And it all reported to the program director who was Dick Coors, and Dick Coors had just come from, from the return to flight activities after Challenger. He had managed that. He and Arnie Aldridge, who was the associate administrator at the time. So it was a great team of people to work with and

Dr. Butler: When you became director, what was Kennedy's role in Space Station?

Mr. Lyon: Ok, we were planning operations, but we were in an era when the development centers didn't see a need for the integrated test and checkout at KSC. In fact for the early days and the early meetings, the story I would get when I would go to the meetings with these other guys is that why does Kennedy have any money to perform anything? We don't need to worry about Kennedy until we get this Spacecraft built and ready to deliver. And all we need to do is have a place to have a receiving inspection, to be able to put it into a canister, take it to the launch pad and launch it. Because this will have been checked out against simulators and interface units and all. So we went to the table with the background and experience of having seen an Apollo and a Shuttle, excuse me, an Apollo and a Shuttle system which came in several different components from different contractors with different design centers and we saw the issues and the need for integrated testing. Design and development centers test systems to their limits a lot of time. We had to make sure that one element of a configuration plays with the other element and that its functionally a total system. So that was our message and we had laid out a plan for integrated testing and ways of doing that and we needed something like the Space Station Processing Facility to perform those kinds of things. So that was our major mission. And at the time Dick Coors became program manager. Dick was a very savvy individual. He had that shuttle experience. He knew what it took took to perform check out here and to integrate that so Dick Coors supported it and we developed a good relationship and Dick helped us sell the need for a Space Station Processing Facility. And before we got there I think we made some twenty three, is the number I remember, presentations to very senior level management at NASA headquarters as to why after we got them to accept you needed to do some testing and all here,

why we needed a new facility versus modifying an Operations and Checkout building, which was very very limited in its capability to do this and handle very man modules at one time.

Dr. Butler: Ok, why did you need

Mr. Lyon: We

Dr. Butler: this new facility?

Mr. Lyon: Ok, one of the things is in Space Station, each of these modules were unique and different and we needed to develop a generic type of facility. The O&C facility was very unique to a special configuration for different modules that had to sit in a particular span and there were hard stands. So we set up a generic facility and we knew we would have a configuration of multiple modules that we may want to move together physically and definitely electrically to be able to check things out and we just didn't have the room. And if you walk through the space station facility today you'll get a good indication of why it's the way it is. I mean it has an overflow today into the O&C building where there's some things stored there. So I think we had the better crystal ball at that time of where we were headed and what we would need to do. And we have international modules and we've had the experience before of contracts that are development oriented have milestone and targets where they have a ship date and there's a lot of pressure and a lot of focus on meeting those ship dates. But you aren't always totally complete when you do that and work travels with it. And that's been our experience too. I've been here forty years now, but that's been our experience through forty years that work travels to the launch site that wasn't completed at the manufacturing and development site. So it was with that background and history and knowledge that we pushed very hard for that and we continued to make presentations and develop plans and develop, develop solutions that could address these things. And I think that was a strong part of Kennedy. We had a strong operations and

development organization you know that came together and worked together to build this kind of a plan. And its proven its worth.

Dr. Butler: At the time in the early 1990s there was an ongoing struggle in Congress to get funding for Space Station. What do you remember about that and how did that impact uh developments at Kennedy.

Mr. Lyon: Well, it was something that all of us were conscious and aware of, uh. And the general public and the press was following it. I probably gave more press interviews during that period of time than at any other time during my career. You know, where people wanted to know what was happening and what we thought about it, how it was impacting us. Uh, it was just always a threat. Our contractors here worked to form with the local chamber of commerce and others support teams that went to Congress and walked the halls of Congress to try to build support for it. But I guess its like any other NASA program, we worked it like it was a real program full time and just kept going. And we had bumps in the road where we had to perform exercises to reduce costs. So it was one, one of a continually reassessing what we said we needed to see if we could find more cost effective ways to do it and to lower the costs. So that was a, that was a continuous exercise. We looked at alternatives all four years.

Dr. Butler: What were some of the methods that were used to attempt to reduce costs?

Mr. Lyon: Many of the methods, well most of them were performed in this overall team concept of people coming together from the different centers. And we would, uh, we would propose that if they could change some part of the flight hardware and modify that, that would simplify the checkout and the handling of it, that we could reduce our part. Or if we could, we could become common and maybe delay or move some of the testing from one area to

our area generally because we felt like the integrated testing that we could, we were in the best position to perform here versus uh performing a detailed or building a detailed simulator, maybe its an electronic simulator, not a mechanical simulator back at a at the power unit place which was out in, at Rocketdyne's plant in California. Uh, if they could simplify their test setup by bringing it here to test with some of the real hardware. That was one of the approaches. So there was numerous methods. And we looked at ourselves to say, hey, have we made this thing too complex? And again we forced the generic type capabilities. For instance the space station facility today, if you go over there, you'll notice that you can put most any module in any of the footprints, any of the checkout footprints because all of them have the same services of various kinds of power, gasses, fluids, uh, so that you can move an air palette stand into position and move a module of any configuration in there and you'll have all the services to check it out, so that you didn't have to build something very unique for that particular module. So that was one of the biggest things that we tried to do to keep the cost down and also to just make it more flexible over a longer period of time.

Dr. Butler: Who were the important people who were working with you on Space Station at this time?

Mr. Lyon: Uh, well certainly the operations side, we had a program office and we had a design development team and a, and a operations team. And Steve Francois, who runs the expendable vehicle operations for NASA today, he's the director of that particular organization, was involved in operations planning. He had a gentleman named Chuck Taylor, who was planning the, who headed up the operations planning and on the design and development side we had a gentleman named Walt Statley [phonetic] who ran that for the design and development And those two worked very well together in pulling off the overall detail plans

and we orchestrated that from the program office point of view and saw that they had all the support and funding that they needed and negotiated whatever deals we needed to negotiate with the other centers, the interfaces and all that. So those were kind of the key gentlemen named Walt Murphy, uh, there were two folks in the design directorate at that time, one was Jim Philips, who retired somewhere in the process and I don't remember exactly when and then a gentleman named Walt Murphy replaced him and in the operations side, John Conway was still the director of the Payloads Management and Operations activity during that time. Uh, McDonnel Douglas before they became Boeing was the primary contractor and McDonnel Douglas actually furnished both our design and development work force and the operations work force. And a gentleman named George Faenza [phonetic] was the director of McDonnel Douglas at that time. He was the vice president and program manager for that contract. It was called the Payload Ground Operations Contract. So that's where that effort came from. Again the people that we worked with strongly at NASA headquarters were Dick Coors as the program director and Bob Moore as the program manager.

Dr. Butler: Whats the relationship between Kennedy, or what role did, we haven't gotten any artifacts here to process yet, uh, what role did Kennedy play prior to, I think the first, I think the first component came in 1994? Uh

Mr. Lyon: Ok

Dr. Butler: and what role, and I assume you also had contractors involved, what role would they play prior to the arrival of the components

Mr. Lyon: Well the big role that we had was number one, building the facility and we had an architect and engineering firm that came in and designed the facility. So we had our operations organization and our development organization inputting into these requirements

and into the overall concept of how we wanted to perform these operations and how we wanted this facility to look. We were providing requirements and managing the architects and engineering firm. And then we had the construction contractor and at the same time we were working with the other centers who were providing the different modules in defining interfaces and then we were designing and building the ground support equipment and all of the infrastructure that comes into play. So and at the same time the operations people were working with the people that provided the power modules or the trusses or the lab modules as to what their systems looked like, what kind of testing needed to be performed to verify itself. We had a very uh busy activity. In fact my recollection is for those four years, we were investing somewhere around sixty to eight million dollars a year into this planning, developing, designing uh activity for the space station facility. Of course we broke ground for the facility in March of 1991 and we had a ribbon cutting ceremony where the facility was pretty much designed, I mean pretty much built and outfitted in 1994. So, there was a lot of work to integrating all of that equipment, all of that test equipment and the plans into this new, into this newly designed facility. McDonnel Douglas at the time, who is now Boeing, was a major major contractor in that element in that period of time.

Dr. Butler: And what was your relationship between uh Civil Servant and your counterparts at McDonnel Douglas? What role did you play and what role did they play?

Mr. Lyon: I was the program manager. George Faenza of course provided the engineering and the operators that were the arms and legs of doing the detailed design. We produced design drawings and the government civil service team actually signed off each individual design drawing so it was a a integrated working relationship, what we call integrated product teams today. Uh, where the operations people from the Civil service and the contractor

and worked together in these teams to produce these drawings to let contracts through our procurement organization to purchase these things and then to track it through the manufacturing process and then the testing process and then to install them into the building and again check them out as an integrated system all these ground systems. So and run prototypes through them or some kind of a pathfinder type vehicle to make sure that everything worked well together.

Dr. Butler: Any unique problems you remember?

Mr. Lyon: Probably one of the most unique problems that we had was we put down a tile floor in the SSPF and when we started running the air bearing palettes over the tile floor, the air bearing palettes were kicking up some of the tiles. So we went through a major redesign effort, had to tear up all the tile in that high bay and go with an epoxy type of floor covering that was more permanent and much stronger and didn't get damaged by the air bearing. Of course the air bearing palettes had to carry pretty heavy loads of work stands and payload modules and so. There were lots of issues and problems, but that was probably one of the largest and one of the most unique and and one of the more costly that we had to go back and work. Another interesting problem is that we wanted to be able to, as you already know we had the visitors center, we have the tours of KSC to let the public know what we're doing to see where their tax dollars are going and to enjoy some of the, some of the benefits, some of the novelties of seeing large space hardware processed, which is very exciting to the general public. It draws quite a record number of visitors to Kennedy Space Center and Central Florida to see this, so we wanted to put a viewing window into the space facility. And we had some pretty novel ideas to make it look like the public was walking into the space station, into a space station module that they could look into a window that was in the far end, that was in the eastern end of the building, they could look all the way down. Those, that got a little expensive as you tried to cut costs and

all, and, but eventually as you probably well know now there is a visitors viewing window. It happens to be in the southern side of the wall, but its still a very good view and the public can do that. But as we went through our cost cutting processes and all that was one of the things that got eliminated. But I think it was something we all knew would come back somewhere in the future, that the agency and the Congress and everybody else would want that kind of capability.

Dr. Butler: Ok, during your tenure on Space Station here we had a transition from it being Space Station Freedom with its,uh, almost Cold War, uh, philosophy or Cold war

Mr. Lyon: Right

Dr. Butler: outlook to the International Space Station. What do you remember about that?

Mr. Lyon: Uh, it was a pretty traumatic period of time. But it was, it was also a period of time where we were having a tough time getting support in Congress and I think it became a political solution at the very highest levels of government to involve the Russians and to take some of the sting, I guess, out of the Soviet Union falling beginning to come apart and it was an opportunity some people call it turning swords into plowshares instead of the old biblical thing of turning plowshares into swords or however that went. At any rate it was to give the Russians back something to invest in and to be a part of an international program, plus they already had a lot of technology and a lot of experience in having their own space station in the MIR. So, I think it became a political thing and and there were a lot of folks who were very strongly committed to Space Station Freedom. And if you look at the International Space Station today, it basically has the elements that were designed and developed under Space Station Freedom. Uh, the difference being there's no propulsion module provided by the USA, the Russians provide that with their service and propulsion module and perform the station keeping

thing and of course they provide the Soyuz for transport and emergency egress. Uh, so I think it was kind of a blip in the schedule. I think we actually, perhaps, paid more money, achieved a little less uh, with the international space station than the way Space Station Freedom was going, but Freedom was struggling for for support and probably could have been stopped and canceled at any time. As you know, we know we had the one vote margin in the house, I believe that was in '93, or somewhere in that time frame. So it was a move to re-energize the space station support, to bring the Russians in, and I don't, I honestly don't think the cost and the time that was promoted actually materialized and we probably would have had a less expensive, more robust space station had we continued on with Freedom is my own personal opinion. But then we may have had nothing, if it didn't fly politically. So, I think the right thing was done and still Space Station will never reach its potential until you can have a significant crew on board space station. Its not going to be able to do what its intended to do with a two person crew, because there's so much, I mean its such a complex system that you have to continually be in some kind of maintenance and just keeping it flying type of mode. Oh, it's the right thing to do and and it changed the whole NASA structure and the contract structure all changed at that point in time. And a lot of it changed just to bring new blood into the thing to get my end uh. [tape appear not to record a brief section] I'll have to debate the old way of doing business or the old configurations and all so there was a major change out of personnel all across the board.

Dr. Butler: Ok, how did it change things here at Kennedy?

Mr. Lyon: Uh it changed the Kennedy organization. The people that worked in my space station team mostly went to other jobs and got integrated back into the Center in different areas. Kennedy Space Center became part of an integrated product team. It was broken down with. They basically eliminated the program manager's role here at Kennedy and it was all

run by Johnson Space Center with Boeing as a prime contractor. So our people fit into Integrated Product Teams under the Johnson Space Center Program Manager role and so it, it was a structure, a different way of doing business that still worked and worked very well and we had Kennedy people doing the same kinds of things but just in a different management organizational structure.

Dr. Butler: Was there a change in in the relationship with the contractor?

Mr. Lyon: The contractor, uh, lets see. The contractor was still, and I phased out of it at that time so it's a little bit difficult for me to answer. But the contractor was still a payload operations contractor and they probably had a little less significant role but they were still scheduled to be the operator of the facilities and all the equipment that came in there but they were not scheduled to do the detailed test and checkout that they were previously scheduled to do. And that came more from the Development Centers from the large Boeing contract there. So there was a minor change in roles. Again they worked in these integrated product teams, the contractors as well as the Civil Servants that were under the Johnson Space Center program management team.

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Dr. Butler: As it went more towards the international Space Station, uh, what would, How much interaction did you have with the international agencies, with European Space Agency and the Russian space program?

Mr. Lyon: Ok. Uh, well again, I was moving on to a different job at that point and time, so I did not have a significant role at that point and time. Now while we were still Space Station Freedom uh we met regularly with the Japanese, we met in in Japan, we met in Europe we met in Canada, and we had routine integration type meetings, statuses of how each of

their elements were coming to make sure that we, we were all were completely tied in. And I'm sure that that continued to happen. I do recall the early contingents of NASA people going to Russia and learning what they could about the Russian systems and beginning to integrate and negotiate agreements there. Uh, but I, but I don't have any of the real details. Before we ended with Space Station Freedom, we were looking for a rescue vehicle and we had begun to work with the Russians even at that time for utilizing the Soyuz or some sort of Soyuz like vehicle for rescue vehicle. So we had what we called, I believe it was ASTP program, but I can't recall what, what that acronym stood for

Dr. Butler: The Apollo Soyuz Test Program, Project.

Mr. Lyon: Well lets see. No, then it was something else. But it had to do with a, with a utilizing the Soviet experience in a capsule to be a rescue vehicle for Space Station. So we began talking with the Russians at that time and we had several meetings in Moscow and and here at Kennedy and also at Johnson Space Center on that topic.

Dr. Butler: Ok, now you have indicated that you were moving on to other programs. Who were the crucial people.

Mr. Lyon: The crucial, the person that really took the leadership role at that time was Steve Francois, who uh became the the, he wasn't called the program manager at that time but he was the KSC lead person for that phase of the program as it transitioned into the ISS. And of course today Tip Talone has picked up as Steve moved into this expendable vehicle role. So Steve kind of picked up the ball at that transition period.

Dr. Butler: Ok. And what were you moving on to?

Mr. Lyon: I moved to an interim job in the payloads management organization at that time. Spent about one year there and then moved into this logistics

organization and actually while I was in that particular job for that year, I got involved in several significant initiatives. For instance I was the Kennedy Space Center representative on the team that was converting to the SFOC going from the Lockheed Martin Shuttle Operations and you know all the multiple contractors that were pulling the Shuttle program together to developing the USA organization. So I sat on that team with Dr. Wayne Littles up at at NASA headquarters and spent a good bit of time on that. And also two or three other significant shuttle teams. In fact the way I got involved in logistics, I was put on Mr. Goldins team when he was looking for ways to reduce costs and improve efficiencies throughout the agency and all its different contracts. So I was put in charge of developing the study of how you could perform orbiter logistics more cost effectively and reduce the cost in that. So that was a relatively long term assignment in which I had a team to support. Mr. Hattaway was a part of the team whose the associate director at the Center now. And it ended up that Bob Crippen asked me to do the job of integrating logistics at KSC and the orbiter logistics came into that role as one very significant part of that overall role.

Dr. Butler: Ok, you mentioned that you were on the team to develop the transition from SPC

Mr. Lyon: Right

Dr. Butler: Shuttle Processing Contract to SFOC

Mr. Lyon: Right

Dr. Butler: The Space Flight Operations Contract.

Mr. Lyon: Right.

Dr. Butler: Uh, could you briefly identify what the issues were in the transition from, from the Shuttle Processing Contract to SFOC?

Mr. Lyon: Some of the biggest transition as far as the government was concerned is the cultural change of giving the contractor more autonomy, more authority and the government stepping back from an in depth management and oversight to, I believe the terminology it was changed from oversight to insight; letting the contractor, the SFOC contractor have, just have more autonomy and more control of of their their activities and so forth. And the government didn't penetrate nearly as deeply. So I thought that was probably one of the more significant things on the Civil servants here is that they felt they were losing responsibility, accountability and jobs just weren't as interesting or challenging as they once had been. So there was, it was a huge cultural change for the civil service here. It was a significant cultural change for the contractors too, in that they were stepping up their responsibility and their accountability. So they were a little bit more challenged and it was, it eliminated quite a few of the contracts, so that's a major change to to the various contractors. They weren't real happy about giving up their contracts. So there was quite a bit of the of thought, negotiation, even on the contractor side that says, what kind of strategy to we come up with to preclude being harmed in our contracting relationships with NASA or having a piece of the action. And that's how Boeing and Rockwell Downy at the time, you know, came together to form USA thing, as as a great compromise, I guess. And at the time it was advertised as a Shuttle horse, you know. I mean we're being formed and organized to do one thing and that's it. We won't be competing, we won't be an organization that's competing with Boeing or Rockwell at the time, for other jobs. So, excuse me, Rockwell became Boeing, it was Lockheed Martin. Rockwell. So it came at a time when thse major contracts were consolidating, contractors were consolidating and and a large Boeing and becoming a large Lockheed Martin chose to team together so that neither one was totally shut out. There were major culture changes on both sides. And I think the

adjustment to that, there was just a lot of pain and agony. I think you probably saw quite a few Civil Servants saying, there were letters written to Congress and to the administrator and all saying this isn't going to work if we aren't still deeply involved and and those kinds of things. So there was a lot of just changing the culture and growing into this new thing.

Dr. Butler: And what were the essential changes in the uh in the Kennedy Space Center culture.

Mr. Lyon: I think the Kennedy Space Center culture, and again, somebody like a Mike Wetmore or a Bob Sieck could probably talk to that a whole lot better than I can.

Dr. Butler: We've interviewed both.

Mr. Lyon: Ok. And and Bob probably had a lot to say about the the change of that culture, but as I saw it, it was the civil servant having to say I no longer have a final signature on this schedule or on this test test plan or test procedure and I now have to back away and influence it through a diff, a whole totally different means versus a direct signature. I have to use my best logic, my best rational and convince the contractor that's not the best way or it can be done better this way or your doing it totally wrong and your going to have an accident and cause damage or whatever. So he got thrust into a different role of not being the final sign, signatory authority on it and having that direct control versus being an influence and having insight. He still had to know what was going on and not let something bad or damaging happen but he didn't have the signatory authority to do that. Again I was watching this from a whole different perspective.

Dr. Butler: Hm, hm. Did you [apparent tape problem] at this time making the transition into logistics

Mr. Lyon: logistics

Dr. Butler: role

Mr. Lyon: right.

Dr. Butler: What was Kennedy's, Kennedy Space Center's concerns about logistics and what were the concerns that you were, that you needed to address as director of logistics?

Mr. Lyon: Ok. The reason that they created that is that they were concerned that logistics didn't have any continuity, it was dependent upon. Each organization had its own logistics function. And there was different logistics facilities, there was different logistics management teams throughout the center. They all had a little different, different way of doing business and this was an attempt to get some consistency and hopefully some cross utilization of logistics. Uh some things we succeeded in and some we just couldn't overcome. For instance the hydraulics units that are used on the solid rocket boosters and the hydraulics units that are used on the orbiter are made by the same manufacturers in the same place, plants, the difference being that one gets dumped in the ocean as part of the return of the SRBs and the orbiter doesn't. They were effectively the same units and they were built in the same factory and they have one fence down the middle with a totally different inventory for the SRB hydraulics and a totally different inventory for the Shuttle. Many of those components were exactly the same, but they had different part numbers, they had different inspectors, they had different management teams and we tried to integrate those things and we always ran into the debate that they had to be that way because of their different missions. And I think that we promoted and provided ways that they could account for that, but the eight-five, ninety or maybe even ninety-five percent of the parts were exactly common, even though they had different drawings. So those were some of the things we were challenged to try and bring together, but the programs had such detailed

accountability and responsibility for their set of components to make sure the booster would fly properly and the orbiter had the same, that you could never get Rockwell and USBI together to agree on that, even though they both had the same subcontractors and their products were built on the same production lines.

Dr. Butler: Hmm.

Mr. Lyon: So, that's one of the areas we failed in. Other areas we were able to begin to share common stocks.

Dr. Butler: Tell us about some of the successes.

Mr. Lyon: Some of the successes, and I have to go back and think about this. I would say things like pneumatic stocks, some of the propellant stocks of of components, we were able to get common stocks and common agreements between our different contractors that they could share those components and and utilize them. I mean if you look at a pneumatics panel on this center, they all use common regulators and valves and gauges and so we were able to cross, the best we were able to do, because we couldn't take scope out of these contracts, the best we were able to do was to get agreements between contractors to be able to share and use it out of each other's stock. And so we got some commonality and some some cross changing and interchanging there. And I think that's basically the reason the Center's gone back to each organization, each contractor having its own logistics, because you couldn't make it work contractually without doing a massive contract change order and you would almost have to let a new logistics contract, you know, to support everybody. So the concept could never quite jell, but we did of lot of good cross agreements between folks, between folks, contractors.

Dr. Butler: Ok, when, when did the Center return?

Mr. Lyon: After I retired and I'm not sure exactly when. It was probably in the '97, '98 time frame. I think it was in this KSC 2000 organization, I believe is when they dismantled that on common organization and then put it back. You know they did the same thing with safety, and quality and all. I'm pretty sure that was KSC 2000 that did all that.

Dr. Butler: Any other issues that you can think of that we really need to address in terms of the Kennedy framework in particularly the 1990s?

Mr. Lyon: Not that I can think of. I would say the biggest thing that Kennedy always had to face was that when a new program started up there was, Kennedy had to push its way into the program and to be an innovator or instructor. The development people for flight hardware become so focused on flight hardware that checkout and integration become something that we can do later. So all their energies, all their efforts, all their dollars go into this early up front, how do I fly this vehicle. How do I build it. How

Dr. Butler: It's a perspective, there's a perspective that's often called ship and shoot.

Mr. Lyon: Yes, they have a definite ship and shoot mentality and they would have a ship and shoot mentality up til the day they shipped if they didn't have Kennedy Space Center in there as their conscience sitting on their shoulder whispering in their ear all the time "This isn't going to work." You better build in this capability and to do that you have to do it somewhat early in the program. It can't just happen at the last moment. I mean, we can go back, I remember very vividly as a young engineer in Apollo when they sent down the fuel cell servicing system. Well, they had always checked out the fuel cells in the Apollo spacecraft and the Lunar module spacecraft sitting in the same checkout bay and they could service it very well. But when it got to the launch site and they had to pump the cryogenic propellant through some

four to five to six hundred feet of tubing and their design was to pump it through a half inch piece of tubing, you didn't get cryogenic fluid very far until it became gaseous hydrogen or gaseous oxygen. So the fuel cell servicing ground system that they provided to the launch site wasn't workable. And it had to be redesigned and rebuilt and a whole new integrated design in order to get cryogenics into the fuel cell. And you you had that kind of a story that continually repeated. They just didn't think in terms of a launch site and in the salt environment and and having to pump it through long distances, because you can't carry it, a big fuel cell servicing cart three hundred feet up a tower and sit in on a platform that will take the weight of all the stuff they have up there. You can't get it through doors and elevators and all that. So those are the kind of lessons learned that we picked up in the early Apollo days that we've been trying to bring to the table and you have to bring to the table in every program, because they don't have that mind set or that experience or even that interest. Uh In the early Shuttle program we went back to Johnson Space Center when we were selling the need for Kennedy to develop the facilities and ground support system and so forth at Kennedy. One of the things that we were able to demonstrate to Johnson Space Center at the time was look how much attention you pay to this and what your focus is and your going to talk about billions of dollars, a few million dollars in building Kennedy, Kennedy infrastructure and servicing and Johnson Space Center had two engineers, one basically an accountant and one engineer assigned to ground support equipment for the Shuttle program. And they had one liaison engineer out at Downy for, at Rockwell. I mean, we were able to demonstrate to them and say look, your not paying the right kind of attention to this. This needs focus too. I mean your going to spend a billion dollars at Kennedy Space Center you need more than two people having some insight and oversight. Now their part of the budget wasn't that big 'cause they didn't have facilities and all but they had a few hundred

million. That's been our message throughout my career here and we have to address it on every new program that starts up. We'll have to address it on exploration also, I'm sure. Because its just something they feel like that comes at the end.

Dr. Butler: The Kennedy perspective is if it comes at the end it comes at a much higher price.

Mr. Lyon: It comes at a much higher price, your schedule probably will, you'll delay the overall program and potentially at worse you could launch useless hardware into space, or space that's nearly useless. I mean if you get into space and you find oh my goodness I've got two female connectors I'm trying to put together here, because I didn't put them together on the ground. Its not a, you have another launch or another expense, you know, to fix that, even if you can get back to where that connector plugs in, and it's the kind of work that's very difficult to do. I mean, its pretty tough to do crimping and soldering and so forth in space and to do that kind of detail work. And we find things like that when we checkout on the ground. So the big energy and big effort in the early part of the program is bringing that message to the table. and its not a message that they think is timely. They don't necessarily want to hear that at the beginning of the program.

Dr. Butler: Where do you bring that to the program in space station?

Mr. Lyon: In space station

Dr. Butler: Or or or were you further along by that time you

Mr. Lyon: No in space station. We we had. We went through a period of time, Mr. Giesler went through a period of time where he had a Space Station Program manager and I won't mention that particular name. He was beginning to zero out the KSC budget and he was going to do that at the urging of the development centers who felt that they needed more

dollars in their budget. I mean they had one large budget and these guys wanted to get all they could of that. And they didn't like seeing money go to Kennedy Space Center where you didn't need to do anything except have a receiving inspection, put it in a canister take it to the pad and launch it. And then there was a change, and I don't recall all the changes and it came about at the about the time I came into the job, when Dick Coors got assigned to that program director level, whose probably one of the best program managers that NASA's ever put out. He was the guy, he an Arnie Alderidge that brought the Shuttle program back together after Challenger. And Dick understood the total program from tomb to tomb. He was not parochial saying I'm just a Johnson Space Center guy and that's all my interest.. I mean he really looked at the overall program and understood it and understood the need and the benefits. So he was not a hard sell. We still had the directors or the program managers from the other centers still with that same attitude. But, by my being there and being able to work with Coors and he had an ear that wanted to hear this, we were able to work that. And Dick Coors, I think was personally responsible for selling the requirement for the Space Station Processing Facility to Congress. He had a Senator Sensunbruner (Phonetic) who was the chairman of the committee at that time I believe. I think Dick Coors is one of his favorite people. You know, and they developed a great relationship and a trust relationship which was very important at that time. And so Dick had a major influence on selling that. And it made my job easier, although we still take shots from everybody else, but by having Dick in that position helped tremendously. Any other prom director, I don't I don't really know where we would have been. We probably would have had some kind of a modification of the O&C. And I think [we would have been cramped]/tape problem/ for space and had some real issues.

Dr. Butler: Well I thank you very much for taking the time to talk with us.

Mr. Lyon: Ok

Dr. Butler: Who are crucial people that we ought to talk to about Space Station.

Mr. Lyon: Have you talked to Steve Francois?

Dr. Butler: We've talked to him about ELV. I don't think we've talked to him about

Mr. Lyon: You probably ought to talk to him about Space Station because

Dr. Butler: Ok.

Mr. Lyon: Steve was the guy that kind of stepped in when I was transitioning out and he transitioned in. Steve was actually the guy in charge in 1994 when they had the ribbon cutting. So I would think Steve would have good information there. I would like Gary Ray [phonetic] who's still out here who worked on it from the design and development area. And I could get you Gary Rays phone number and all.

Dr. Butler: We'd appreciate that.

Mr. Lyon: And he would probably because he became more involved in that time frame of '94 on until the first modules came from a design/development point of view. And I think Steve is the key one from '94 on into the operations because he, he was there with the first operations and /tape problem/ was brought along, George Abbey at the time and I think the main reason Tip came in is because Jay Honeycut and Bob Crippen who knew Abbey very well uh says Tip is probably the best guy we've ever had that that knows how to make, knows how to make sure that hardware is built right and tested right at the factory and conditioned and ready to ship. So Tip kind of came in with the focus to transition the hardware delivery from the factories

to the launch site. And so he spent a lot of time working with the manufacturers and designers and if you've talked to Tip,

Dr. Butler: Yes.

Mr. Lyon: he's probably told you that story. So that was his area of expertise and how he got injected into this.

Dr. Butler: He tells the story that he didn't want to be involved.

Mr. Lyon: No, he got, he literally got pulled in and George Abbey was a major influence in that, along with Jay Honeycut, who was an Abbey protégé in that so to speak. Uh and Jay saw Tip as probably his best integration/operations guru and Tip is good. Tips a very qualified guy and interfaces well with people

Dr. Butler: yes he's

Mr. Lyon: and he's very, very dynamic and very aggressive in his manor. He says things like they are. And if you talk to tip I'm sure you've got a good story on that. So probably the missing link between Tip and myself is Steve.

Dr. Butler: Very good

Mr. Lyon: From an operations point of view and from a development point of view probably Gary Ray is a good one.

Dr. Butler: Thank you for your time

Mr. Lyon: All right

Dr. Butler: And if we have any further questions we'll give you a call

Mr. Lyon: Okie doke. I appreciate having the opportunity. It caused me to think about a lot of things I haven't thought about in a long time.

END OF INTERVIEW.