

# TRANSCRIPT OF PROCEEDINGS

ADAM L. GRUEN

**ORIGINAL**

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NASA CULTURE STUDY

INTERVIEWS

INTERVIEW OF

JOSEPH LOFTUS

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I N T E R V I E W

QUESTION: This is just a memory jog for me and, as I said, eventually, all of these will be transcribed and you'll get a chance to edit a copy. And it will be a nice little collection, which I don't know who we'll use but I think of myself as the first cut here. You know.

MR. LOFTUS: Well, I'll tell you. One good use I made of the Shuttle history is one of the questions the Rogers Commission asked is, you know:

Why do we have the configuration we have?

And, in order to reconstruct that for them and, frankly, it was a useful exercise for us, I made extensive use of our history files, chronologies, and what-have-you.

QUESTION: Here at Thompson?

MR. LOFTUS: Not just here, but also at Marshall.

MR. LOFTUS: And we wrote that up. I can give you a copy of it if you like, the briefing we gave the Rogers Commission.

QUESTION: That's terrific. So, then I'm not preaching to the choir here, I don't have to convince you the value of a history project.

MR. LOFTUS: Not at all. I am a history buff.

QUESTION: Great. Well, let's...go ahead.

MR. LOFTUS: So I'll give you a copy of that paper if it's of interest to you.

1 QUESTION: That would be fine.

2 MR. LOFTUS: I have also tried to, as I have gone  
3 through the programs from Mercury through the Station, tried  
4 to keep track of some trends, so that one could follow  
5 patterns.

6 QUESTION: I have seen this paper once before,  
7 believe it or not.

8 Was this published? Or, is this is this your...

9 MR. LOFTUS: It's been published in a number of  
10 places in a number of different versions because I update it  
11 periodically.

12 QUESTION: Terrific. I think I may have it in my  
13 files, but I'll take this copy anyway if that's okay with  
14 you? Is that my copy?

15 MR. LOFTUS: Sure. Yeah, that's for you.

16 Before we maybe get into anything specific to the  
17 Station, let me make an observation that may be of some  
18 interest to you. And that is, in doing the Shuttle  
19 thinkery, there was a major oversight, if you will.

20 And that is there was lots and lots of stuff on  
21 hardware and lots and lots of stuff on program decisions.  
22 But, there was major omission of the development of software  
23 and the software development and verification process.

24 And that's as significant an omission as if you  
25 left out a discussion of the main engine because the three

1 things that make the Shuttle possible are the very high  
2 thrust, high specific impulse engine, the very light-weight,  
3 very efficient thermal protection system.

4 And synchronous, quad-redundant, redundancy  
5 management system with a 40-milliseconds switching time.

6 Any one of those three things doesn't exist, the  
7 Shuttle doesn't exist.

8 QUESTION: Um-hum.

9 MR. LOFTUS: And, yet, there was nothing captured  
10 in the routine issue.

11 QUESTION: Well...

12 MR. LOFTUS: I mention that because, in the  
13 Station, we're going to have the same potential in that the  
14 SSE activity and many other activities are going to get  
15 treated differently than the flight hardware. And, yet,  
16 they are going to be vital to the success of the program.

17 QUESTION: Well, let me respond to that. I'm  
18 glad you said that because it turns out that I have been  
19 paying special attention to a number of key drivers in the  
20 program. One of them is the power system, which I believe  
21 drives the Station technically.

22 If you don't have the power, you obviously can't  
23 do a lot of stuff on the Station that you want to do.

24 The other one that I think is going to be  
25 critical to the success or failure of the program is

1 software.

2 And I've been paying close attention to SSC.  
3 I've been working closely with Dana Hall and other people in  
4 Jack Garmon's group to make sure I know what's going on.

5 And also TEMMIS, which I think is very  
6 interesting, but I mean the judgment is out yet on how  
7 effective that's going to be. It's just started, really.

8 But, I have been paying close attention.

9 So, I'm very happy to hear you say that because  
10 it confirms my suspicion that, indeed, software and data  
11 management and --not just data processing, but data  
12 transmission as well is another key aspect of the Station  
13 program.

14 But, you looked a little bit more suspicious  
15 about power. You don't agree with me on that one?

16 MR. LOFTUS: I think the power system has to be  
17 dealt with in a number of pieces. The power generation is I  
18 think fairly straightforward. You know, if it doesn't work,  
19 get a bigger hammer kind of thing.

20 QUESTION: Okay.

21 MR. LOFTUS: The key in the power thing is going  
22 to be the power distribution system.

23 QUESTION: FEMAD?

24 MR. LOFTUS: And the reason power distribution  
25 system is significant is because it is the cross-coupling

1 between systems which makes redundancy management difficult.

2 Schematically, you look at a bus and it shows,  
3 you know, like one dark line on the page. And you have Main  
4 A and Main B and Main C. In point of fact, that may be a  
5 thousand wire segments from stud to stud to stud.

6 Secondly, when you have systems that are vital,  
7 you're going to have them tied to two different buses. So  
8 that, if one bus fails, the black box continues to run on  
9 the alternate bus.

10 What that means is that, when you have a failure  
11 in the power distribution system, you have one of the most  
12 complex problems in reassessing your redundancy management.

13 QUESTION: Okay.

14 MR. LOFTUS: Because you may think you've got  
15 redundancy for vital functions and you may not.

16 And I say that because the power management  
17 system is one of the most complex in the Shuttle for that  
18 very reason, that you don't really know what you have in the  
19 way of redundancy until you know in great detail how your  
20 power distribution system is laid out and failures which  
21 impinge upon it are amongst the most complex contingency  
22 reconfigurations.

23 QUESTION: Let me ask you a question about power  
24 management distribution system.

25 The management of it goes right currently to

1 Lewis Research Center, in the program?

2 MR. LOFTUS: Well, you've got management in  
3 several senses. Lewis is responsible for the development of  
4 the system and of its components.

5 You can think of the management of it, and not in  
6 an alternative sense, as being here because here is where  
7 you have the data management system.

8 QUESTION: That's right.

9 MR. LOFTUS: That will do all of the commands to  
10 configure the system.

11 QUESTION: Okay.

12 MR. LOFTUS: So, it's going to be a complex  
13 interface.

14 QUESTION: The reason why I ask is, in 1983-84  
15 time frame, there were the advanced development test bed  
16 assignments. And each Center, as you well know, got the  
17 lead and the others were supporting. And the only one where  
18 there was some confusion, as far as I could tell, was the  
19 power subsystem. Perhaps because it was so broadly defined,  
20 it touched on everything, that it was too tricky an issue to  
21 settle easily.

22 Do you have any insight on that, that you could  
23 lend me in my research?

24 MR. LOFTUS: I was not privy to that family of  
25 decisions. I was working other problems.

1 QUESTION: Okay.

2 MR. LOFTUS: So I don't really know how that was  
3 done, other than the general observation that there was far  
4 too much politicking and far too little engineering in many  
5 of those decisions.

6 QUESTION: Okay. That's a fair assessment.

7 MR. LOFTUS: And I think, essentially, it was  
8 unnecessary because we have worked very well with the Lewis  
9 guys. They have been very helpful to us in much of the  
10 development of power distribution system components, and  
11 things of that variety.

12 QUESTION: Okay.

13 MR. LOFTUS: Enough on that.

14 QUESTION: Well, let me ask you then, let us go  
15 to a subject that you do know about, which is early Johnson  
16 planning. I guess, strategic planning as far as Space  
17 Station was concerned, and how it went from being to  
18 becoming, that is, the SOC studies and then the expertise  
19 that was gathered from that and how that was translated into  
20 early work in '82 and '83.

21 You were aware, obviously, of the SOC studies.  
22 Did you have a major, minor or no role to play in those?

23 MR. LOFTUS: Initially.

24 QUESTION: Okay.

25 MR. LOFTUS: Let's see. Why don't we begin by

1 sort of saying I'd gone off to Standard for a year as  
2 a...problem, and came back in '76.

3 QUESTION: Okay.

4 MR. LOFTUS: And we were just finishing up this  
5 set of studies where we had been looking at sort of space  
6 industrial facility, if you will. And given where we were  
7 in the Shuttle program, it was sort of a wind down activity.

8 QUESTION: The SIF or the Shuttle?

9 MR. LOFTUS: No, the Shuttle was...

10 QUESTION: In its development?

11 MR. LOFTUS: In development at that time.

12 We sort of looked around and sort of said: What  
13 was it that was making us think we needed such a facility?

14 And we said: We need a longer sortie times, and  
15 what have you.

16 So we looked at the Shuttle. And, in the  
17 Shuttle, we had originally in a spec that said we'll do 30-  
18 day missions.

19 But, as we got into development and we were faced  
20 with cost and schedule pressures, particularly cost  
21 pressures, one of the ways we saved a lot of development  
22 cost in tests was by allowing the system to use electrical  
23 energy. We let each black box come in at a higher power  
24 consumption.

25 You eliminate a lot of thermal testing and

1 analysis by wallpapering the vehicle with heaters. And you  
2 just let them cycle on and off to thermally condition the  
3 vehicle rather than going into various --

4 QUESTION: Heaters/radiators, you mean?

5 MR. LOFTUS: Yes. The heater mostly.

6 QUESTION: Right.

7 MR. LOFTUS: Because the vehicle radiates.

8 QUESTION: Radiates, okay.

9 MR. LOFTUS: So you just, in effect, use  
10 electrical energy to save a lot of redesign, analysis,  
11 tests, et cetera.

12 QUESTION: The same way that a house, for  
13 example, might not be very energy-efficient, but it would be  
14 cheaper to design?

15 MR. LOFTUS: That's right.

16 QUESTION: Okay.

17 MR. LOFTUS: You've got the picture.

18 So, consequently, the nominal energy around the  
19 Orbiter rose to be four times what it might had been had you  
20 squeezed everything to be electrically efficient. But, it  
21 was cheaper.

22 QUESTION: Right.

23 MR. LOFTUS: But that meant that a given amount  
24 of cryogenic stores would no longer give you the same amount  
25 of mission duration because you are consuming the cryogens

1 at a higher rate.

2 The same thing was going on on the Space Lab side  
3 of the equation. Essentially, they came in at two and a  
4 half to three times the expected or the nominal energy  
5 values for sustaining the Lab, if you will, as opposed to  
6 energy to be consumed by the experiments.

7 So we said, well, one of the things we had looked  
8 at in this Space Station thing was that we could build large  
9 solar arrays. So we said why don't we have a storable solar  
10 array that we could carry on the end of the manipulator.

11 And then we could carry it into orbit, deploy it  
12 on the end of the manipulator. We could position it  
13 anywhere we wanted. And then we could do 30 days. And,  
14 what's more, we could build that array big enough that we  
15 could pay back all the power margins.

16 QUESTION: Right.

17 MR. LOFTUS: So that we could run 10 or 15  
18 kilowatts on a payload, up to the limits of our radiator  
19 capability.

20 QUESTION: Right.

21 MR. LOFTUS: And we pursued that for quite a  
22 while. And, eventually, put it back in a box because...

23 QUESTION: This was -- let me interrupt just a  
24 second. Was this the PEP, power extension package?

25 MR. LOFTUS: Right.

1 QUESTION: Okay. I want to get my acronyms  
2 straight.

3 MR. LOFTUS: Right. And if you need to look at  
4 any of that kind of stuff, all of the files that I kept we  
5 transferred to Mary Cermiele, so that she's got the working  
6 files on all of that.

7 QUESTION: To Mary Surreal?

8 MR. LOFTUS: Cermiele, C-e-r-m-i-e-l-e.

9 QUESTION: And she's with your...?

10 MR. LOFTUS: She's in ED-3.

11 QUESTION: Correspondence?

12 MR. LOFTUS: No. She's an engineer.

13 QUESTION: Okay.

14 MR. LOFTUS: Because we don't expect that problem  
15 to go away. It will keep recurring during the life of the  
16 Shuttle. As a matter of fact, it occurs again in NRC report  
17 on Space Station. It says you need a longer ashinometer.

18 QUESTION: I want to discuss with you the EDL,  
19 but we'll get to that.

20 MR. LOFTUS: Okay.

21 About this same time, we also entered into a  
22 family of studies that sort of set an alternative way to do  
23 this is to have a bus bar on orbit.

24 QUESTION: Bus bar.

25 MR. LOFTUS: On orbit.

1 QUESTION: Okay.

2 MR. LOFTUS: A power module that you would fly up  
3 to plug in to use it to furnish you with electrical energy  
4 for as long as you wanted to stay on orbit. And where you  
5 could leave a payload operating between missions.

6 QUESTION: Right.

7 MR. LOFTUS: And Marshall and we were working on  
8 the power module kind of a thing.

9 QUESTION: This was after the PEP study?

10 MR. LOFTUS: Concurrent.

11 QUESTION: Concurrent.

12 MR. LOFTUS: And this whole question then was all  
13 sort of raising again the question which sort of led to, you  
14 know:

15 What were you really trying to achieve? You  
16 know. What was the long duration of Orbiter? What was  
17 tapped? What was power module? What were you all really  
18 trying to achieve?

19 And in our in-house studies and discussions, we  
20 began to sort of say, hey, you know, we really haven't sort  
21 of come clean with ourselves and understood what's going on.

22 And we said maybe we are not fully facing up to  
23 the change of stake that the Shuttle represents.

24 We used to build things for a mission so they  
25 were dedicated to an explicit purpose. And you could use

1       them for secondary purposes, as we did with SkyLab, built  
2       out of Apollo hardware.

3               But, that was sort of a cobbled together thing.  
4       Not a bad thing, but not purpose-built, if you will. And so  
5       we began to say, you know, Shuttle really doesn't have a  
6       mission. It is a capability which I configure for many  
7       different missions.

8               Now, if I begin to think that through, then what  
9       happens is you can almost sort of say that that's a  
10      characteristic of a maturing enterprise. That as you begin  
11      to mature an enterprise and has more capability, you can  
12      build capabilities which can serve many, many missions.

13              And this isn't just going on in Space  
14      transportation. The Space Telescope is the same kind of  
15      thing. That doesn't have a mission the way OAO did.

16              That lens, that telescope has such gathering  
17      power that no array of instruments I could put at that focal  
18      plain can use more than a few percent of that capability.  
19      So I'm going to have to change out those instruments many,  
20      many times. And I am going to have missions which will be  
21      epoxy of some particular operating strategy, but the  
22      telescope doesn't have a mission. The telescope is a  
23      capability.

24              QUESTION: Understood.

25              MR. LOFTUS: Very significant thing. We're

1 institutionalizing capability.

2 So, we said, if you really pursue that line of  
3 reasoning, then what you have to think about is that what I  
4 really want to talk about building is a space operations  
5 system. Well, if I start thinking about a space operations  
6 system, then the components begin to become fairly clear.

7 I need a capability to get from Earth to Orbit  
8 and to get things back from Orbit to Earth, whether they're  
9 crew or product.

10 And the Shuttle does that. And when I originally  
11 thought of the Shuttle, I was also thinking of the Space  
12 Station.

13 Now, if I think of a Space Station as an element  
14 of an operations structure, then it is a node in my  
15 transportation system. It is a depot. It is a corral where  
16 I can accumulate assets on Orbit.

17 It also gives me the opportunity to base things  
18 on Orbit so that now my Orbit to Orbit transfer vehicle can  
19 be space-based rather than earth-based.

20 So we began working that kind of a thought. And  
21 that's what led us to sort of say, hey, a Space Station is  
22 not a science lab. It is a node in a transportation  
23 structure.

24 I don't need a Space Station to do science. I  
25 need a Space Station to do operation. And it was from that

1 kind of thinking that we're sort of saying:

2 Now, what's really going on here at a structural  
3 level in the evolution of the Space business?

4 QUESTION: Let me interrupt you for a second to  
5 ask you a few questions here.

6 First of all, you and who else were thinking  
7 along these lines? Where were you at this time?

8 MR. LOFTUS: Well, since 1970 or '71, I have been  
9 effectively part of the Office of the Director. At that  
10 time, I was called the Chief of the Technical Planning  
11 Office. And I had a staff of maybe 20 people.

12 In a reorganization we conducted several years  
13 ago, we decided to put the staff elsewhere, but to keep me  
14 here to keep some oversight of all of these activities that  
15 I think you could characterize as being either  
16 infrastructure or future oriented.

17 QUESTION: Okay. So, it was you coordinating  
18 various segments of Johnson Space Center?

19 MR. LOFTUS: Well, these things are, you know,  
20 there's sort of a constant dialogue; the people who were in  
21 this dialogue were primarily myself, Max Faget, Bob  
22 Highland, Al Levere and Jerry Craig. I guess there's one  
23 other, Dick Bailey.

24 QUESTION: I don't know Dick Bailey.

25 MR. LOFTUS: Dick is in the Systems Engineering

1 Group in the Space Station Office here at JSC, with Tony  
2 Redding. I guess Tony would belong on that list also.

3 QUESTION: I certainly know the other four.

4 MR. LOFTUS: Yes.

5 QUESTION: As a matter of fact, I'm going to meet  
6 Tony and Max tomorrow.

7 MR. LOFTUS: Well, out of that kind of  
8 discussion, we came to the conclusion that we really ought  
9 to undertake another Space Station study. Understand that  
10 Space Station studies were something we initiated in all  
11 even-numbered years, or at least that was the tradition for  
12 25 years or so (laughing).

13 But, that the notion was that, instead of trying  
14 to think of a Space Station and justify it in terms of "I  
15 need it for a science facility," where essentially the  
16 arguments are that there's economies of scale, centrality of  
17 logistic support, what have you -- and if you think about  
18 the earlier Space Stations, particularly the Space Station  
19 as we were conceiving of it in the late sixties, early  
20 seventies, where we were in a phase B on the Space Station  
21 before we turned around and walked down the hill and said--  
22 Hey, we can't use a Space Station until we have a Shuttle --  
23 we were thinking of the Space Station in terms of blue  
24 books full of requirements. And the way you justified the  
25 Space Station was by the weight of the blue book.

1                   And we found, as we were trying to work that  
2 problem that there were substantial diseconomies of scale,  
3 that what you were doing by putting many different science  
4 activities or applications activities in one facility, you  
5 were creating conflict.

6                   A wanted to look at the Sun; B wanted to look at  
7 the Earth; D didn't want anybody moving, at all, didn't like  
8 things that went bump.

9                   And so we ran into this sort of saying:  
10                   That's not why you need a Space Station.

11                   Why you need a Space Station is I need a depot on  
12 orbit so I don't have to haul everything back and forth  
13 every time.

14                   And I need places to do things. Think about a  
15 Space Station as an accumulator, okay?

16                   QUESTION: Um-hum.

17                   MR. LOFTUS: If I could fly the Shuttle at a  
18 hundred percent of capacity every time because I could leave  
19 things on orbit, I'd pick up almost a 30 percent improvement  
20 in my ability to get tonnage to work.

21                   QUESTION: Right. A true Space operations  
22 concept, in other words.

23                   MR. LOFTUS: That's right.

24                   Now, we said: If I have such a Space Station and  
25 I am planning on long-term manned operations in Space, then

1 one of the things I will most certainly do with a Space  
2 Station is the Life Science Research to learn how to qualify  
3 people for long-term life and operations in Space.

4 But, I don't have any science requirements for  
5 the Station. Okay?

6 QUESTION: Other than the Life Sciences?

7 MR. LOFTUS: Other than the one that sort of  
8 says...since it's going to be a manned facility, it will  
9 inherently lend itself to learning how to live and work in  
10 Space such that I can go on to the Planets.

11 QUESTION: Let's stop there for a second.

12 Why manned facility? If it's a depot, you could  
13 make it simply a storage depot for further missions for  
14 using the Shuttle or using some kind of an orbital transfer  
15 vehicle, but not actually have to have any manned face  
16 there? Sort of a glorified power extension package or fuel  
17 depot.

18 MR. LOFTUS: Or a module.

19 QUESTION: Right.

20 MR. LOFTUS: Because many of the things I want to  
21 do in Space I want to use a man to do because they're one of  
22 a kind. They're complex. The servicing, the satellite  
23 servicing, the cleaning, if you will, that sort of says  
24 maintenance, repair, refurbish, replenish, okay, these kinds  
25 of things.

1 QUESTION: (Inaudible.)

2 MR. LOFTUS: Lend themselves to being done  
3 manned. Okay?

4 QUESTION: Um-hum.

5 MR. LOFTUS: So that's why we thought of it as a  
6 manned facility.

7 QUESTION: Okay. So that you could have  
8 continual operations without the use of a Shuttle,  
9 essentially?

10 MR. LOFTUS: Well, I would make the Shuttle more  
11 efficient --

12 QUESTION: Right.

13 MR. LOFTUS: -- by having the depot.

14 QUESTION: But, rather than use the Shuttle to  
15 fly to each individual satellite may not even be possible in  
16 certain cases. By having manned there, you could go out  
17 from that base.

18 MR. LOFTUS: Or I could send an automated vehicle  
19 to bring it to the station for service and repair and then  
20 put it back where it wants to be for operations.

21 QUESTION: Okay. And so that became part of the  
22 planning as well.

23 MR. LOFTUS: Well, at any rate, that family of  
24 thoughts, if you will, that sort of said let's think about a  
25 station, but let's not think about it in the way that it has

1 always been thought about in the past. Okay? Was what sort  
2 of motivated the SOCs studies.

3 And in order to get resources together, we put  
4 together a team under the engineering directorate to go off  
5 and do that kind of a study.

6 QUESTION: Now, this was with Johnson funding?

7 MR. LOFTUS: It was primarily in-house.

8 QUESTION: Right.

9 MR. LOFTUS: Primarily, manpower.

10 QUESTION: Primarily, in-house; primarily,  
11 manpower. Okay.

12 MR. LOFTUS: And we did those studies. And then  
13 we took them forward to Dr. Frosh, who at that time was the  
14 Administrator. And, in effect, I made an advocacy that sort  
15 of said:

16 Hey, the Agency really needs to have something  
17 like this out in front of it. Sure, we've got a lot of work  
18 to do to get the Shuttle flying and work off all the  
19 backload of activities that have been accumulating while the  
20 Agency's flight capability has been limited.

21 But, you know, we've got to have things like this  
22 if we are going to train in generations of people, motivate  
23 them. A program like this has a mechanism for transferring  
24 the experience and wisdom of the older guys to the younger  
25 guys, and we need to do that because the older guys are

1 leaving. And this is a mechanism for doing those things.

2 And the nation needs a vision kind of thing. All  
3 the classical arguments.

4 And out of that sort of came the beginnings of  
5 this new round of Space Station activity. We started doing  
6 things out of more organized work out of the Advanced  
7 Missions Office.

8 QUESTION: Advanced Manned Missions?

9 MR. LOFTUS: Right.

10 QUESTION: At headquarters?

11 MR. LOFTUS: Right.

12 QUESTION: Okay.

13 MR. LOFTUS: The Advanced Missions Office in the  
14 Office of Space Flight.

15 QUESTION: Okay.

16 MR. LOFTUS: Has traditionally been the office  
17 that led major studies, like Space Station or Lunar Base  
18 Station.

19 QUESTION: Absolutely.

20 MR. LOFTUS: Or what have you. Because that was  
21 the way of driving out what the transportation requirements  
22 were.

23 And so they tended to be the focus that pulled  
24 together those kinds of plans for the agencies.

25 There's something of a departure from that now

1 with the creation of Code Z and Sally Ride, John Aaron's  
2 activity. One of the things we're still trying to sort out  
3 now is what's John going to do and what's Daryl Brantz going  
4 to do now, the manager of that activity truly. What's their  
5 interface?

6 QUESTION: Um-hum.

7 MR. LOFTUS: Because that's the first time we've  
8 ever split those things.

9 QUESTION: And the Code S has its evolution  
10 strategically planning section.

11 MR. LOFTUS: Right.

12 QUESTION: I'm sure Code T and E and R probably  
13 have individuals also that --

14 MR. LOFTUS: Well, but, you know, in the past,  
15 they have sort of rallied around Code M.

16 QUESTION: Sure.

17 MR. LOFTUS: One of the questions, you know, is  
18 how are you, you know, if Station and Shuttle are really  
19 components of a Space operation system and the separation is  
20 to some degree an artifact of 50-1-L and other operations  
21 issue, when do you bring them back together?

22 QUESTION: Right.

23 MR. LOFTUS: You cannot operate them  
24 independently.

25 QUESTION: Absolutely.

1 MR. LOFTUS: You may be able to build them  
2 independently, but you can't operate them independently.

3 QUESTION: I understand. So there's the question  
4 of whether they should be under one roof or not, I mean, in  
5 the sense of where's the roof. Is it, in fact, the NASA  
6 Administrator, or is it within a Code. Okay.

7 Just let me get a time check on this. This pitch  
8 to Frosh was '78? I can go back in your files, I suppose,  
9 and find out specifically.

10 It seemed to me that the in-house studies were  
11 done in '78 and '79.

12 (Pause.)

13 But, at some point, it became Code M money, is  
14 what you're saying?

15 MR. LOFTUS: Well, JSC, having made some  
16 initiatives and gotten things started, we got the advanced  
17 man's missions people interested in helping us.

18 QUESTION: Which means that you asked them to do  
19 additional add-on studies? Or, they asked you? Chicken and  
20 egg?

21 MR. LOFTUS: Chicken and egg. I don't know. And  
22 I don't have something that I thought I had, might have had  
23 here, that would answer the question.

24 We had...the guy who did the briefing was Bob  
25 Pylander and all in all --

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QUESTION: To Frosh?

MR. LOFTUS: Yes. I don't remember anybody else right at the moment.

QUESTION: Okay.

MR. LOFTUS: But, Clarke may remember that because I think he prepared a lot of that briefing.

QUESTION: Okay. I'll ask him when I see him later.

MR. LOFTUS: But I think it was Frosh's sort of -  
-I would not say he enthusiastically endorsed the thing. But, he was more positive than merely permissive. And at least in my mind, that was a sort of fairly major bench mark on the thing, the impetus of activity, you know, Code M then began to take a more active role. There got to be a higher level of activity jointly between Marshall and JSC.

Subsequently, of course, we had a change in Administrators. Jim Beggs came in as the Administrator.

QUESTION: And by this time, 1980-1981, Boeing and I believe one other contractor, who escapes me -- was it Rockwell?

MR. LOFTUS: McDonnell.

QUESTION: McDonnell-Douglas. Had done the --

MR. LOFTUS: The study.

QUESTION: -- done the parallel SOC studies. So that's essentially wrapped up by this time, the change of

1 Administration?

2 MR. LOFTUS: My recollection is there was some  
3 spillover.

4 QUESTION: Okay. Meanwhile, Marshall is working  
5 on their own ideas. Or, were they coordinating with you on  
6 SSC? I don't think that --

7 MR. LOFTUS: We were both working Space Station  
8 and we each had a different approach to the problem, as you  
9 know.

10 Marshall has a different cultural view than JSC.  
11 We are primarily a development and operations organization.  
12 We are not a research effort. The research we do is pretty  
13 limited, and it's only in areas that are complementary to  
14 our ops responsibilities, primarily Life Sciences, Lunar  
15 Geology, a few things like that.

16 So we don't have the research flavor that  
17 Marshall does; where we've got 800 people tied up in  
18 operations, they have an 800-man science organization. So  
19 they do have much more of a science bent, so their stations  
20 tend to be more science-oriented than our approach.

21 You know, there's probably a certain healthiness  
22 in having that. But I would sort of say that throughout all  
23 of this, there was this evolutionary aspect of a Station  
24 that sort of said, you know:

25 How do you make it operational?

1                   And then how do you accommodate science?

2                   But, the notion was is that you accommodate it,  
3 you don't try to make it justify the Station.

4                   QUESTION: That was your position?

5                   MR. LOFTUS: Yes.

6                   QUESTION: From the very beginning, essentially.

7                   MR. LOFTUS: Right. And, essentially, you sort  
8 of said:

9                   Apart from that operations facility function,  
10 what is the other driving motive for a Station?

11                   I would sort of have to say that it becomes the  
12 materials processing role, which sort of says:

13                   I wouldn't use a Station as a production facility  
14 in materials processing, but I really do need a laboratory  
15 on Orbit where I can run all of the protocol testing and the  
16 process development and what-have-you so that I am smart  
17 enough to build an automated factory to do that.

18                   And that's how we spelled out in some length in  
19 that.

20                   QUESTION: Okay.

21                   MR. LOFTUS: And it sort of says I'm going to,  
22 you know, use this facility in that kind of an engineering  
23 development sense to develop the automated materials  
24 processing facility.

25                   So it sort of says:

1 I can only do that research in Orbit and I can  
2 only do it manned if I'm going to do it efficiently in any  
3 span of time.

4 And so then that drives you to want a lot of  
5 power because that's an energy-intensive activity.

6 QUESTION: Which gets back to my original comment  
7 about power because, obviously, a lot of power is necessary  
8 just to house-keep the station. So it's important to get  
9 sufficiently rated amount of power in the Station to provide  
10 for all your experiments.

11 But, now thinking about what you're saying, it  
12 occurred to me that the current Space Station planning has a  
13 much stronger emphasis on science, science experiments, than  
14 Johnson might have originally desired. It has moved away  
15 from the SOC and much closer to one of the old type Space  
16 Station studies, with a sort of a multi-purpose.

17 So, what battles have you had to fight, if you  
18 have had battles to fight, to get it back to something  
19 closer to what you want it to be?

20 MR. LOFTUS: I don't think we have any. I think  
21 that there's a certain beauty that's in the eye of the  
22 beholder. The Station, as presently conceived, can become  
23 an operations facility. How it will evolve I think will be  
24 a question of what gets done over the next 10 years, if you  
25 will.

1                   And I don't think, when we put the focus on  
2 operations, that we meant that there wouldn't be any signs.  
3 It's just, you know, where is the CG, if you will, going to  
4 be.

5                   QUESTION: Correct.

6                   MR. LOFTUS: And I think it's fairly obvious that  
7 the Station will, in effect, take on a lot of these  
8 functions.

9                   Let me see if I can illustrate what I think is  
10 the issue in this kind of thing.

11                   When we said we were not going to build the  
12 Station, we had to build the Shuttle first...

13                   (Conclusion of side A of tape 1.)

14                   QUESTION: I assume that's some kind of an  
15 indicator. And I was right. Anyway.

16                   MR. LOFTUS: We said we were going to do the  
17 Shuttle because from our Sky Lab experience, we had learned  
18 that it's very awkward to have a Space Station and you can  
19 take 20,000 pounds up, but you can only bring 100 pounds  
20 down.

21                   QUESTION: Yet, the Soviets have a very similar  
22 kind of situation.

23                   MR. LOFTUS: They have very limited capabilities.

24                   QUESTION: To bring down.

25                   What do you need to bring down?

1 MR. LOFTUS: Well, if materials processing is  
2 your thing, you'd be able to bring down product. Maybe, it  
3 will bring down people.

4 QUESTION: Now, you say you knew this back in the  
5 seventies. This is a very important point.

6 MR. LOFTUS: Yes, sir.

7 QUESTION: That I'm trying to hammer down. That  
8 is that, in the seventies, engineers here and at  
9 Marshall...?

10 MR. LOFTUS: Working around the down-limits  
11 capability of the command module and the Sky Lab was a major  
12 chore.

13 QUESTION: Okay. Got you.

14 MR. LOFTUS: We also found that scheduling the  
15 Atlantic Fleet...bring down the command module was a major  
16 chore.

17 (Laughter.)

18 MR. LOFTUS: Okay?

19 QUESTION: All right.

20 MR. LOFTUS: So, those two things, you know, the  
21 fact that you couldn't bring home all the stuff you wanted  
22 to bring home and the fact that you had this major logistics  
23 operations to go through to land the Space Craft sort of  
24 made you say:

25 I sure would like an aerodynamic...because I

1 could solve both problems at once. Okay?

2 QUESTION: Got you.

3 MR. LOFTUS: So we said, well, the Shuttle will  
4 be a delivery vehicle. It will do what all my conventional  
5 launch vehicles do, take things to orbit and deploy them.

6 And if I could put a pressurized can in the cargo  
7 bay on some missions, I could fly the Shuttle around for  
8 some period of time, like 30 days, as sort of a surrogate  
9 Space Station.

10 Now, that led us then to think about delivery  
11 mission to the sortie missions. And they were thought about  
12 as exclusively for a long, long time. And that exclusive  
13 thinking did a great deal to drive the interfaces.

14 Space Lab was so designed, for example, that when  
15 you fly the habital module, it captures 100 percent of the  
16 orbiter interfaces in resources. And if you think about it  
17 for a little bit, you would conclude that that was a bad way  
18 to design the Space Lab interface, because when you really  
19 get into operating the system, what you'd like to be able to  
20 do is you'd like to be able to always fly a mixed cargo -- a  
21 sortie payload and a delivery payload on every flight;  
22 because, if you do that, you maximize the use of your  
23 resources in a beneficial way because the delivery payload  
24 goes up and gets deployed. So you are now within your  
25 landing weight limit capability.

1                   The delivery payload goes over the side, okay?  
2                   So he no longer captures power, thermal conditioning, data  
3                   processing, et cetera. You are on orbit. You have paid the  
4                   price. So you might as well stay there for as long as you  
5                   have energy to stay.

6                   And most sortie payloads don't much care. Okay?

7                   QUESTION: Um-hum.

8                   MR. LOFTUS: So what you'd really like to be able  
9                   to do is to always fly to my max takeoff capability, always  
10                  land at my nominal landing weight. And the best way to do  
11                  that is to always have a sortie payload and a delivery  
12                  payload on the flight.

13                  QUESTION: Right.

14                  MR. LOFTUS: But, it wasn't until 1976 that we  
15                  began thinking mixed cargo as opposed to either delivery  
16                  flights or Space Lab flights.

17                  QUESTION: Okay.

18                  MR. LOFTUS: All right? The purpose to that  
19                  anecdote, I guess, is to sort of try to make the point that  
20                  simple conceptual things like that, whether you get them  
21                  right or get them wrong, have a lot to do with the  
22                  efficiency of your program.

23                  The fact that that is not well-understood leads  
24                  to such decisions, for example, as:

25                  NASA shouldn't apply commercial communication

1 satellites.

2 Now think about what that means. It means that  
3 every time I fly a sortie mission, the nation is wasting the  
4 opportunity to deliver a commercial communications  
5 satellite.

6 QUESTION: Right.

7 MR. LOFTUS: But, I then have to turn around and  
8 buy the ride on an expendable launch vehicle for that  
9 satellite.

10 So, from a policy point of view, that was an  
11 insane decision to waste the nation's resources. The  
12 interesting thing is that the people who were advocates for  
13 that decision had no notion of what they were doing --  
14 people over in the Department of Transportation. They did  
15 not understand the difference between the up-way and the  
16 down-way capability of an airplane.

17 QUESTION: Okay. Let us take the story up  
18 through the big changeover.

19 MR. LOFTUS: Okay. Beggs come in.

20 QUESTION: Beggs come in and...?

21 MR. LOFTUS: Beggs is returning. Remember, he'd  
22 been there as the Administrator for OST. So he sees the  
23 Space Station...

24 QUESTION: OAST?

25 MR. LOFTUS: Yes.

1 QUESTION: Okay.

2 MR. LOFTUS: At that time, it was OART.

3 QUESTION: Right. Kodar. But, it was Kodar.

4 And he had been the Associate Administrator.

5 QUESTION: Okay.

6 MR. LOFTUS: So he was already sort of a  
7 disposition to understand Station and he was also of a  
8 disposition to understand the need to get a new development  
9 project in place.

10 QUESTION: By the way, let me interrupt for a  
11 second.

12 Have I missed anything with the Hertz study or  
13 the MaShood workshop, or anything like that? Do you think  
14 there's anything there that...I mean, obviously, they're  
15 parts of the story. As far as Johnson is concerned...

16 MR. LOFTUS: Well, we participated in all of  
17 those things.

18 QUESTION: Participated. Okay. But, you know,  
19 the Fletcher study also?

20 MR. LOFTUS: Oh, yes.

21 QUESTION: Okay.

22 MR. LOFTUS: Al and I spent months riding  
23 airplanes back and forth to Washington to work with Jim.

24 QUESTION: Okay.

25 MR. LOFTUS: I guess I would characterize all

1 those kinds of things, Adam, as sort of the necessary  
2 process by which organizations like this arrive at some  
3 consensus.

4 QUESTION: Okay.

5 MR. LOFTUS: And, you know, gather their  
6 constituencies into consensus.

7 QUESTION: A very, very important part.

8 MR. LOFTUS: Yes.

9 QUESTION: Because if anybody thinks that this  
10 process was logical, rational and went from A to B doesn't  
11 understand...

12 MR. LOFTUS: It's very logical. It's very  
13 rational.

14 QUESTION: Okay.

15 MR. LOFTUS: But it is metarational, if you will,  
16 as well in the sense that people have to buy in. And  
17 they're not going to buy in until they've worked the problem  
18 for themselves.

19 QUESTION: Okay. I guess we could discuss  
20 semantics, but I agree basically the process of consensus is  
21 an important part of the story.

22 MR. LOFTUS: Yes. Let me put it this way. I  
23 think it's particularly important in an organization and  
24 enterprise like this. One of the things that characterizes  
25 NASA to many people's bemusement is the tons of...

1           But, if you think about it, this is one of the  
2 most sophisticated, educational enterprises in the world.  
3 And it had to be that way. If you think about what the  
4 configuration management system is, it is essentially an  
5 educational process.

6           We have a decision system where you have a  
7 configuration control board. Somebody runs that board, and  
8 he's the only decision-maker. There are a lot of  
9 counselors, if you will. But, what do they do? They sit  
10 there and they get educated.

11           A young engineer comes in and says "We have a  
12 problem with this piece of equipment." In order to get this  
13 group of people to understand his problem, he has to educate  
14 them. You know, what's the function? How does it execute  
15 the function? What's the problem? What's the fix? Okay?

16           QUESTION: Got you.

17           MR. LOFTUS: Now, the guy at the head of the  
18 table may be an electrical engineer and you're talking  
19 mechanical problem or an aerothermodynamics problem. Or, an  
20 optical problem. But, the educational process is  
21 magnificent.

22           QUESTION: Right.

23           MR. LOFTUS: And the consequence of this is that  
24 this is an organization in which that kind of education is  
25 going on constantly. It's one of the things that makes it

1 such a neat place to work, you know.

2 QUESTION: Right.

3 MR. LOFTUS: Well, I think that's a significant  
4 point when you talk about this consensus process, you know,  
5 because everybody here is a student. And until they have  
6 worked through the problem themselves, they're not sure  
7 you've got the right answer (laughing).

8 QUESTION: So it takes some time.

9 MR. LOFTUS: Yes, absolutely.

10 QUESTION: Absolutely, yes.

11 MR. LOFTUS: It's not a political consensus  
12 alone. It really is a technical consensus.

13 QUESTION: Okay. There are two things I wanted  
14 to ask you. One is you were mentioning that Beggs wanted a  
15 new technological development which -- and almost from the  
16 beginning, I mean, Beggs essentially wanted the task force.  
17 He wanted a group dedicated to the Space Station.

18 Who was the man in charge of overseeing Johnson's  
19 participation in that group, things like the task force,  
20 things like the CAG?

21 MR. LOFTUS: Once we got those things formalized,  
22 Bob Filam.

23 QUESTION: Okay. There was some, I mean, I've  
24 talked to a number of people, as you probably know. And  
25 there was some feeling that a number of excellent people

1 came up to the CDG. But that there was some reluctance on  
2 the part of Johnson to send their best people. Or, there  
3 was some reluctance, in fact, to really participate.

4 So I wanted to get Johnson's side of that.

5 Do you suggest that I talk to Bob again?

6 MR. LOFTUS: Well, Bob could give you some  
7 thoughts on that. I think that there were two or three  
8 things. First of all, you know, the caliber of people you  
9 furnish to an exercise like that is to some degree a  
10 function of the tasks your people are going to decide. If  
11 you ask to send somebody up there to run the thing, you're  
12 going to send the more senior guy and you're probably then  
13 going to commit more resources to assure he brings it all.

14 QUESTION: Right.

15 MR. LOFTUS: So, when it was chosen to have  
16 Luther do that, then that onus fell on Marshall, not JSC.  
17 So then you wind up with JSC sort of plays one complement of  
18 arithmetic instead of being responsible for the problem.  
19 You work the things that, you know, matter to you.

20 And I don't mean that in a sulking, pouting kind  
21 of a way. It's just, you know, that's the way the game gets  
22 played.

23 Secondly, in trying to build the flight rate up  
24 and deal with all the issues that we were dealing with  
25 there, we were really manpower limited. You know, Marshall

1 has a few more people than we do, total. And they don't  
2 have all the people tied down in STS management and  
3 operations that we do.

4 QUESTION: That's what Aaron was saying this  
5 morning.

6 MR. LOFTUS: I mean, you've essentially got a  
7 difference in resources to work a problem like this of  
8 almost two to one. So, when you look at what we were doing  
9 in the Shuttle, you know, there was a limit to how much we  
10 could commit to those kinds of things.

11 QUESTION: I think that's an important part of  
12 the story, too.

13 It is difficult to do the pre-phase A and phase  
14 A, sometimes even phase B work on a new program, when you're  
15 still working with a really operational phase.

16 MR. LOFTUS: I wouldn't put it that way.

17 QUESTION: All right.

18 MR. LOFTUS: We have always made ourselves commit  
19 some resources to these kinds of activities. And I would  
20 argue that the measure of whether or not we have done  
21 enough, you know, just whether or not we've gotten the right  
22 answers in a timely manner that have technical substance,  
23 not a question of whether we had as many people as somebody  
24 else did.

25 Frankly, I think we have had far greater success

1 than the numbers indicate because we have, because of this  
2 combination of design, development and operations, and  
3 because of the fact that we used the same people to do both,  
4 we get a synergism that I think gives us an effectiveness  
5 far more significant than the numbers.

6 QUESTION: Okay. I think that's an important  
7 point also.

8 MR. LOFTUS: Yes.

9 QUESTION: The same people that do development  
10 are responsible for operating. And so you cannot afford to  
11 shoot problems off because you know you're going to be the  
12 person that will have to deal with them five or ten years  
13 down the road.

14 MR. LOFTUS: But that also means that, when I do  
15 a design, I design it with operations in mind.

16 QUESTION: Would you say that that's peculiar to  
17 Johnson, or is it a NASA-wide philosophy?

18 QUESTION: I would sort of say it tends to be  
19 unique to the Centers which do both development and  
20 operations -- Goddard, JPL and JSC. It is a difficulty that  
21 some of the other Centers have in translating concepts in  
22 designs into realities.

23 It's one of the things that's a constant source  
24 of tension between ourselves and some of the Marshall guys.  
25 It's also one of the reasons that the Marshall guys very much

1 want to get into operations. Okay?

2 And there's that tension. You know, how do you  
3 do that? Is eventually, you know, you're going to have to  
4 have an operations organization different than your  
5 development organization ala the DoD? You know, systems  
6 command versus space command?

7 I think sometimes there's some scale of activity  
8 at which that becomes necessary. You know, then you have a  
9 whole host of problems that you have to live with to, or  
10 learn to manage.

11 QUESTION: You bring up an interesting point and  
12 I really haven't touched on it at all. And that is about  
13 the DoD.

14 Did you deal with them at all during this early  
15 time period, '81-'82, on Space Station?

16 MR. LOFTUS: As a matter of fact, the Air Force  
17 had a Man in Space working group at that time. And myself  
18 and Paul Wytes and Jim Logan, a number of others,  
19 participated.

20 QUESTION: A Man in Space working group.

21 MR. LOFTUS: They were sort of saying you know,  
22 what is the role of military man in space? And they were  
23 going down the same sluice that that always go down in the  
24 military.

25 They say: Well, he could do this. And the

1 minute you specify the task, I can devise an automated  
2 system to do it. The problem is the reason for Man in Space  
3 as far as I'm concerned is that I don't know what the  
4 problem is. Therefore, you can't design an automated  
5 solution (laughing). Okay?

6 And there's some examples of that in those  
7 papers.

8 QUESTION: Right.

9 MR. LOFTUS: The other reason I think you want  
10 Man in Space from a military point of view is you want to  
11 hold it hostage. It's the same reason I have a battalion in  
12 Berlin. They're not going to stop anybody if the balloon  
13 goes up. But, what they do is they make it a table stakes  
14 game. They're the ED.

15 And one of the reasons for Man in Space is to  
16 hold it hostage.

17 Now, you can sort of say: If they're going to go  
18 to war, he's vulnerable. If we're going to go to war, we're  
19 all vulnerable.

20 QUESTION: Right.

21 MR. LOFTUS: Okay. What it does is it escalates  
22 the threshold. Okay?

23 QUESTION: Was there any...I'm sorry? Go ahead.

24 MR. LOFTUS: Before we leave that thought, let me  
25 just make it clear:

1           NASA is a part of the National Security  
2 apparatus. Okay. Many people in NASA don't think of this  
3 in that way, but that's what it is, okay?

4           QUESTION: Do you have a counterpart in Air  
5 Force? Somebody that you regularly deal with?

6           MR. LOFTUS: I have a bunch of them.

7           QUESTION: Okay.

8           MR. LOFTUS: I am such a miscellaneous set of  
9 activities that I don't think there's a direct counterpart  
10 anywhere.

11          QUESTION: Okay. How are we doing on time?

12          MR. LOFTUS: Well, we're at 10:40, and I don't  
13 know what your calendar is.

14          QUESTION: I have no interview scheduled for the  
15 rest of the morning. I do have some this afternoon, but...

16          MR. LOFTUS: Why don't we take -- I'll give you  
17 another 15 minutes, then I've got things I've got to do.

18          QUESTION: Okay.

19          MR. LOFTUS: While we're interrupted, there's the  
20 paper for the Rogers Commission.

21          (Pause.)

22          QUESTION: Hum. That's nice. That's a beauty.  
23 My copy? Terrific. Hours of reading pleasure here.

24          Okay. So, we're in, say, 1981. Mr. Beggs in his  
25 confirmation hearing, says:

1                    "It seems to me that the next step is a permanent  
2 manned Space Station," something like that.

3                    And, in '82, begins to set the wheels in motion.  
4 Task force is set up roughly around May of '82, reporting  
5 more or less to Beggs, although it's nominally routed  
6 through General Abramson at that time.

7                    Meanwhile, you're working here at the job  
8 essentially that you have now.

9                    Well, that may be actually...you may still have  
10 headed up your staff before the reorganization.

11                    Issues that stick in your mind in the task force  
12 days?

13                    (Pause.)

14                    MR. LOFTUS: Well, one that was often on my mind  
15 and that I discussed at length with Culbertson and Hodge was  
16 what I thought was the undue political engineering,  
17 partitioning of things in ways which weren't organic.

18                    QUESTION: You've mentioned that several times as  
19 a theme that sort of disturbed you, the combination of  
20 politics and engineering.

21                    MR. LOFTUS: I don't mind the politics and I  
22 don't mind the engineering, you know. What I was concerned  
23 about is that there was not enough concern in those  
24 decisions to what I will call the functional integrity of  
25 things.

1 Do you want to divert for a minute?

2 QUESTION: Sure.

3 MR. LOFTUS: I'll show you a conceptual model  
4 that I find useful for understanding, you know, what's going  
5 on as Goddard evolved, as JPL evolved, as JSC evolves.

6 QUESTION: This was an important issue in the  
7 late '83, early '84 period. The decision was made to make  
8 Johnson the lead center for level B, a decision that was  
9 subsequently found to be not, I mean, the people at  
10 headquarters were not very happy ultimately with that  
11 solution.

12 So, I've often been told that level B was used as  
13 a trial to see if that kind of management concept could work  
14 for Space Station.

15 MR. LOFTUS: I think you have to back up to 1970,  
16 and look at where the Agency was. We were under a very  
17 considerable pressure to downsize the Agency. And we were  
18 shrinking staff in the post-Apollo activity.

19 And that confronted the Agency with a major  
20 strategy question:

21 Do you take 5 percent off every Center every  
22 year?

23 Do you close up some Centers?

24 You know, how are you going to take this  
25 attrition?

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1                   And there were a couple of fairly profound  
2 decisions that were made. One was that we would close out  
3 the Electronics Research Center in Boston because it never,  
4 ever had sort of really gotten full-grown and autonomous.

5                   The second thing we did is we decided to take a  
6 major reduction in headquarters staff...really major. Okay.  
7 And then to take what reductions we had to in field centers.

8                   And when you took this massive reduction in  
9 headquarters staff and you now had to take on the management  
10 of a large program like the Shuttle, you didn't have the  
11 hundreds of people that were available to do that.

12                   QUESTION: Sure.

13                   MR. LOFTUS: So, now the question was:

14                   Could you partition the role that had previously  
15 been done all at headquarters and do some of it in the  
16 field?

17                   And we talked about such models, for example, of  
18 how the Admiral sails with the Fleet, but he doesn't have to  
19 be, you know, captain of the boat he rides on. Okay,  
20 analogies of that flavor.

21                   So the concept came about that said, okay, there  
22 is a portion of the program management job that must be done  
23 in Washington, and we'll do that in Washington with  
24 headquarters staff. But, there is a portion of what had  
25 been done in Washington that we can do in the field where we

1 have the technical resources to do it. And that was the  
2 creation of Level II. Okay?

3 QUESTION: Uh-huh.

4 MR. LOFTUS: It was the way of dealing with the  
5 way in which we had down-sized the Agency. Okay?

6 QUESTION: Fair enough.

7 MR. LOFTUS: Now, the point is that, when we came  
8 along with the Space Station, we sort of said, "That worked  
9 pretty well." Okay?

10 We didn't have to have a big monster  
11 headquarters.

12 QUESTION: Who is "we" here?

13 MR. LOFTUS: We, JSC; we, much of the Agency's  
14 management.

15 QUESTION: Okay.

16 MR. LOFTUS: Okay. Don Hearth, for example, in  
17 his exercise, was sort of saying, you know:

18 We do not want to build up a big monster  
19 headquarters again. You know? There are problems in doing  
20 this kind of management in the field, but that's a better  
21 set of problems to live with than the problems of too big a  
22 headquarters.

23 QUESTION: Okay. Got you.

24 MR. LOFTUS: Okay. So the notion was that we  
25 were going to take this template that we had from the

1 Shuttle program and apply it to the Station program. Going  
2 to have a Level A at headquarters. That's going to control  
3 all those Level A class requirements. And do those  
4 arbitration decisions that can only be done in headquarters  
5 by somebody who is not one of the contending parties.

6 QUESTION: Right.

7 MR. LOFTUS: But, there's a family of engineering  
8 activity, technical management, if you will, that can be  
9 done in the field, Level B. Okay.

10 Now, how well those kinds of things work depend a  
11 great deal on a whole host of issues. And I would have to  
12 say that, from my observation, Level B did not work well.  
13 Okay?

14 And I think it was because they made a number of  
15 grievous errors. I have very high regard for a lot of the  
16 people. But, at the time that those people were being put  
17 in those jobs, I argued vehemently that they were the wrong  
18 people.

19 QUESTION: Hum. You're talking at the program  
20 office?

21 MR. LOFTUS: Up and down the line. The big  
22 problem we had in the Space Station, and one of the biggest  
23 problems in the Space Station as I saw it, is that we did  
24 not put into a lot of the key positions people who had  
25 program management experience. Okay?

1                   Neil Hutchinson, outstanding fellow, had not had  
2 program management experience. Okay.

3                   QUESTION: John Aaron? His deputy.

4                   MR. LOFTUS: John did.

5                   QUESTION: Okay.

6                   MR. LOFTUS: But, John had been, well, he had  
7 been the number two guy in the development of the flight  
8 software for the Shuttle. Outstanding trouper, okay. But,  
9 we staffed Level B with practically nobody from program  
10 office experience in the Shuttle.

11                   Similarly, Level C, same thing was going on at  
12 Marshall and headquarters.

13                   Now, my concern with that process was that you  
14 were taking a whole lot of people who were used to being in  
15 contending roles and putting in roles where they were  
16 supposed to work together. And, yet, they had no experience  
17 in doing that.

18                   QUESTION: Right.

19                   MR. LOFTUS: Now, had you taken people who were  
20 accustomed to doing that, you know, had you taken many  
21 senior people out of the Shuttle program, they would have  
22 already had established working relationships with Marshall  
23 and headquarters. And they would know the role of a program  
24 office weenie. Okay?

25                   QUESTION: And this ties into something you had

1 said much earlier, which is that part of the usefulness of  
2 the Space Station program to NASA as an agency was that you  
3 could train the new generation. And, here, it's essentially  
4 a fumble because you have a discontinuity.

5 You have people in a new program who had no  
6 experience from the old program.

7 MR. LOFTUS: You've got it.

8 QUESTION: It is hard, admittedly, to crow-bar  
9 somebody out of their established...no?

10 I would have guessed that would be the program  
11 problem that you would run into.

12 MR. LOFTUS: The basic problem we ran into is  
13 that, and I argued with Mr. Griffin about it, was that we  
14 were permissive. We let -- Jerry said "Neil is going to be  
15 a program manager," and then we said, "We'll let Neil pick  
16 his people." Okay?

17 Well, Neil picked people he knew, so he picked a  
18 lot of people out of operations. He picked Al Levere. Then  
19 Al picked a lot of people out of engineering, because those  
20 were the people he knew. Okay.

21 He brought his team.

22 Well, what happens when you do that?

23 Then you find you can't move people out of the  
24 program office, Shuttle program office, in there because all  
25 the good jobs where you could use them and their influence

1 have already been filled.

2 QUESTION: Right.

3 MR. LOFTUS: So, now it's not attractive for them  
4 to move.

5 QUESTION: Got you.

6 MR. LOFTUS: Okay? But, suppose you had said,  
7 one, I want a senior guy there who has been to these wars  
8 before so that he understands what he's getting into? I  
9 would not have put Neil in that job.

10 I would have put Aaron Cohen.

11 (Laughter.)

12 QUESTION: Let me...

13 (Tape paused.)

14 (TAPE CONCLUDED.)

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