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ORAL HISTORY INTERVIEW

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SUBJECT OF DOCUMENT: [use relevant bold-face introductory terms]

Oral history interview with Joseph P. Loftus, Jr.
[full name of interviewee]

about Program evolution, organizational
[main focus of interview]
interfaces.

¹⁹⁶²⁻
Title: Apollo Spacecraft Project Office
[interviewee's current and/or former title and affiliation]

1968 - Operations Integration Branch, Systems Engineering
Div. ABPO

Interview conducted by Robert G. Merrifield - Staff
[interviewer's name/position]

Historian at MSC
[location of interview]

Transcript and tape(s). [for inventory only: # pages 20; # tapes 1]

Masters 2

CONTENTS:

Biographical - [date/place of birth; family background] _____

Education - _____

Career Path - _____

Topics - Relationships between Mercury, Gemini & Apollo programs;
definition of roles: flight crew & flight operations;
working relations between program offices & E+D Dir.
 differences & debate two groups: inhouse oriented & industry oriented;
traditional working models
Little Joe Program - beginning of organizational interface & pattern
through Apollo; Contractor ^{design} registrations; Subsystem
manager system; tension: program office vs
obj/line organization; test specialists vs. analytic
specialists; outside/internal recruitment;
NASA growth ^{issues} parallel NSC; tension
between headquarters & field offices;
question of program offices at headquarters;
success due to commitment and common
working goal; Configuration management
system (interface between Hqs & field centers)

- DON'T FORGET TO CALL PHIL & SET UP AN APPOINTMENT FOR THURSDAY!!

- Betty - Jim Elms address

- Gene Rice - W. Don't know?

- Interview with Joe Leftus 7/24/82

Warren North

Director
Cecil Johnson
Bill Rector

was Washington
with
Birmingham

Chuck Matthews
Charlie Donlan

Q2 - Project Directorate common in industry. GSC used it.
Good scheme for multiple small projects. Model for
electro-space (Hughes, GE, Philco) rather than
manual space -

Q2 -

1) Multi-project in parallel sharing a common
thread. 2) Significant element of concurrency of
maturity

Model not suitable for

1) scale of projects were large

2) projects not concurrent in state of
maturity

3) diversity of interfaces

Logical
Structure

Logical
Structure
Dwelt with each
program as an
entity to itself

Secondary structural reasons:

- rate of growth of organization

- Mercury had to keep its staff; two
groups spun off - Mach II & Apollo.

- Those who stayed w/ Mercury! Mach II were
plant killers

- Those in Apollo were recruited from a
number of places - Caldwell Johnson & CSR
organization had only 6 people from
Mercury programs - Apollo had a different
kind of culture - persons from industry
and Wright-Patterson

Differential
culture

- Mercury ^{more} ~~not~~ of a Langley orientation.
- Program offices (with higher grades) could hire more easily from industry, plus the industry gravitated to project offices.

- and E&D jobs ~~had~~ had to build infrastructure for their laboratories.

Program offices build up infrastructure among contractors.

- Walt Williams experience

Jim Elms ^{two} Decisions

- 1) To constraint the character of the organization in terms of its ability to develop system.
ability to do analysis & test to be a knowledgeable buyer,
but not skills to be implementer

- 2.) subsystem management - system to insure intelligent heritage to project - alternative to omnibus project director

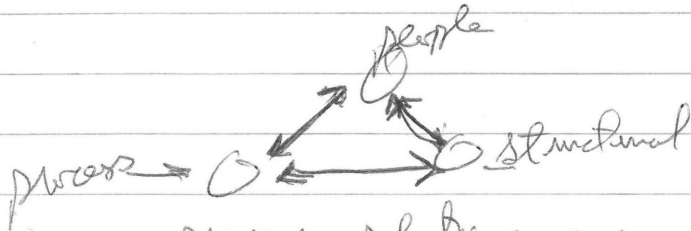
Technology from
Laboratory

- Global project mgt. issues - between Program Manager & Center Director

- Needs managers involved in configuration control.

Three

- people
- structural organization
- process organization



process solutions are interface solutions

Process that makes or breaks the organization
is how the boxes accommodate each other

at SSC - CCB

POP

adjust the interface between
the functional boxes

Bias in our system

We are requirements constraints, hence we
don't do efficient & effective things because
it's difficult to get a requirement.

Process
variables

- more a deficiency in the budget -
no capital budget distinct from
operating budget

we don't make more investment because
we are over-whelmed with short-run
expenditures.

- Need to parson decisions.

Organization is effective in dealing w/ issues.

Its strength rewards people for knowledge;
uniquely open system.

⇒ Distinction between bottoms up & top down

James C.
Dr. ~~John~~ Elms

112 Kings Place

Newport Beach, CA. 92663

- constantly trying to balance E&D : O&O

what's the relationship between subsystem managers and his line management & project managers

Looking at
ambiguity

⇒ common ~~initial~~ first priority, but secondary goals were different

⇒ conflicts resolved on a one-to-one basis;
~~no project~~ job of middle management was to make system work.

⇒ learning experience what is manual space flight all about + learning how to operate (manage) in this environment.

⇒ Very important to have a managerial format which was often tutorial - vignettes format
those who rose in organ. were those who could explain the facts to management.

Interview with Joseph Loftus
3/16/71

I guess the point I'm trying to make is was ~~x~~ in the STG at Langley before they moved down here, there was an embryonic program organization that had been involved in some inhouse studies during the contractor studies that were involved in evaluating the contract studies and subsequent ~~th~~ those in drafting the statement of work under which NR was to perform its further activities after they were put on contract. ~~In~~ This group of people were still for the most part members of organizations in STG. Names that come to my mind *McMillion* McMinion in CSD, *Kellert* Kellert, Flight Dynamics. I spent a fair amount of time working with him on simulations. When we moved to Houston, Charlie Frick was the first Program Manager. Caldwell Johnson had the responsibility as the Project Officer, which I believe was the title he used at the time. We began to have a formal program organization. It was formalized even somewhat before that when Bob Philand had been head of the group as it was in Langley, headquartered in Office City when we came down here, what's now the Houston Petroleum Center. The thing I thought significant about this era was it was a fairly substantial reorganization which created the Flt Crew Operations Division under Warren North, which created the precursors of the Flt Operations Directorate as it exists today. There were a large number of activities between these organizations and the 3 program groups.that were operating at that time, Mercury, Gemini and Apollo. The thing I thought missing in Chapters 5 and 6 ~~was~~ how the interactions with these 3 program offices the fact each one of the program offices was in a different state of maturity relative to its program and the interaction between the organization and the program office ~~did~~ something to establish the character of the ~~overall~~ organi-

zations. Mercury for example and the demands of the network had been such that in STG large numbers of people were deployed around the world on ships with the network. The Flt Operations organization became an organization which consolidated that function instead of having those people detailed to such duties from other diverse places within the organization. It was the classical process of institutionalizing a function. Here was a duty that had been - other duties as assigned - for a large number of people and now that duty was institutionalized as an organization. There were a lot of the questions that came up about principles that should be reflected in programs. One that comes to my mind was the question of economy. In the Guidance, Navigation, and control of the spacecraft. That remained for many years a major philosophical programmatic issue. Almost as the problem was defined, the solution was evident in that one could make the ^{ground} ~~grand~~ primary for navigation while making a vehicle primary for all the guidance and control functions. The design problem - it was a design problem as well as a management problem. One of attitude - in the extreme cases the autonomous flight vehicle would have needed a minimum launch that when once launched could have executed the entire mission unassisted. Not just the nominal mission but off nominal conditions. That would be the ultimate in autonomy. In effect, in that scheme of things, the flight commander, the senior crewman on board in effect, would have been in charge ~~of~~ so to speak. In the other case, you would have so many major functions performed on the ground that in effect the person in charge had to be somebody on the ground and the flight commander ~~in-fn-~~ was in charge of steering the vehicle but not in charge of determining where it should go. In the limit, you would say it was in the tradition of naval command of a ship's captain when

sailing in fleet under the admiral. The admiral decided where to go - the captain was in charge of getting the boat there. This meant the flight director, the mission control center had a control function. That debate was a significant debate because it helped to establish relative roles or define the roles between the flight crew and the Flt Operations people and it was taking place then around a program mission. This program issue was reflected in various capabilities of the programs and their spacecraft. In Mercury the ground clearly had certain command functions, and the crew reported to the ground. As you went to Gemini you began to have an onboard function with a computer, radar, and it could do an on-board solution to the rendezvous problem, but when the rendezvous target was outside of the capture envelope of the radar, the flight vehicle had to depend upon the ground to tell it what maneuver to perform in order to get within a range where it could see the target vehicle. Also, as it began to see the target vehicle, it had to depend upon the ground for status information. I have a table of data about Mercury, Gemini, and Apollo S/C which might be interesting in illustrating in a quantitative way some of this data because it shows the number of ground communications parameters about the S/C and how much was shown onboard, and how much was shown on the ground and tends to illustrate how ~~a~~ roles were being defined.

Another issue that began with significant in this general business was the function of trying to establish working relationships between program offices and what is the E&D Directorate.

The program office is in effect ~~defining~~ trying to define a program and a flight vehicle and get it built. That consists of a debating operation in many ways. Here is the program office and it's saying to MIT for example, - we want you to build and design and deliver a flight vehicle system - guidance, navigation and control system. We want that system to have certain characteristics. How do you decide which characteristics it should have. Now you begin to hear from the various directorates. The Mission Control Center people want to require that the system the program office is buying from MIT shall be compatible with their ground systems. The Flt Crew people want to require that the computer cannot take a step automatically, it must ask permission of the crew. The program office has to get on with building hardware until it has to seek some resolution of that debate. How much shall it accommodate - and I think this was the significant thing about the program offices in the way that they interacted with line organizations in creating the Center - was the degree to which they reacted to the operational organizations and the other organizations and by responding to them, or by relying on them in various activities they made those organizations what they are. For example, looking to another kind of a problem. In the Gemini program - one of the questions was how would one procure the training equipment. There were two options ~~of~~ available to the Gemini Program Office. It could define training eqpt requirements and procure the training equipment and then give it to Flt Crew Operations as an operating organization. Or it could give Flt Crew its delegation of their authority and some funding and let them procure the equipment. Then having done that ^{exercise} -/some oversight as to ~~the~~ whether or not the right kind of equipment, the right kind of training philosophy or at least one consistent with the program objectives was being

brought about. The Apollo Program Office faced that same kind of a decision and that decision was handled somewhat differently in the 2 program offices. Partly because of the difference in the program and partly because of the fact they were concurrent. The early parts of Gemini and Apollo were running parallel. ~~There-were-probably~~ There was a difference in the interface between the Center and its contractor in the case of Gemini with McDonnell and a major reliance upon the fact that MacDac had been a participant with us in the Mercury program and therefore was knowledgeable while there was concern that the NR-Grumman organizations needed more help from us in understanding the full implications of manned space flight. There were also differences in some parts because of personalities.

I think the major difference is simply the fact that in operations organization all we had to keep the focus of its attention on that system which it currently must operate. So that even when Gemini and Apollo were getting started, the operations organizations had to spend the greatest portion of their energy on Mercury. When Mercury ended and Gemini came next, they did what they could on Apollo but they spent the greatest part of their energy directed at Gemini and it was only as Gemini began to come to an end that they could spend the full force of their attention on Apollo. That was inevitable because they were responsible for the upgrading success of those programs in their operational phase and it would have been inappropriate for them to do anything else. It meant that they had to rely on the program offices to begin to understand their needs, and respond to their needs even when they had relatively limited time and energy to direct towards these programs that were still yet to come.

They often found the Program Offices understanding of their requirements to be something less than perfect.

I think it's also important to talk about the engineering and development directorate because there were counterparts sets of actions here. During this time, the embryonic engineering directorate was trying to work with the administrative people to define the facilities and things that would be required at the Center, to recruit and develop its own staff and to some degree they did not have as extensive a participation in Gemini as they had had in Mercury and were to have in Apollo. This was not to say they didn't have some significant participation in the Gemini program.

I think the problem they faced at this time was that Jim Chamberlin who was Office had the Gemini Program/which had come out of the Mark II type studies came from AVRO and was accustomed to an aircraft company kind of a project team which used company engineering, manufacturing like test, etc., but was clearly and positively in charge of the program. He was on a very tight schedule and the organization was young and spending a great deal of its energy in growing and he tended to rely on heavily on the contractor. A lot of the people throughout the Center objected to the degree in which he relied on the contractor because they felt that was the contractor was preempting their role and this is a classical problem that any program manager is going to face in an organization like this. We had essentially two groups of people - one group that had come out of the NACA and the other group where they were accustomed to working inhouse, and another group of people who had come out of aircraft industry and some of the DOD organizations, predominantly Air Force, who were accustomed to working with industrial organizations with a laboratory kind of consulting service,

which in many cases they had ^{previously} ~~obviously~~ obtained from the NACA.

There were very different traditional models in which these 2 groups had grown up and the prior history they had brought. A lot of the history ^{as an} of the Center ~~and its~~ organization is how they learned to understand each others point of view, adopt elements of it, and come to work together. It's a very knotty problem. It's a classical problem. The military has had ~~several~~ versions of the problem in terms of the arsenal system, how you go about procuring new total weapons systems. Recently the companies have been experiencing some of the disadvantages of the total package procurement kind of a scheme which was sort of the ultimate reliance on the contractor.

There was this conflict. It was a very substantive and real kind of a problem. How did you get on with the program very rapidly as the Gemini program must, if it was to fit in its proper niche between Mercury and Apollo. Perhaps the significant thing was that as the Center began to accumulate a substantial amount of working manpower the Gemini program was maturing into ~~best~~ and the engineering directorate had now gotten up to such mass that it could begin to have a substantial impact and it did. It helped solve several of the problems the Gemini Program faced. But it took time to bring that about. By the time Apollo had begun to get a clear theme which wasn't until we had made the decision to go lunar orbit rendezvous the engineering directorate was in a much more substantial position and played a much more significant role. To backtrack - they were very significant in reaching that lunar orbit rendezvous decision. That concept had been put forward by John ^{and had been extensively by groups under Owen} Maynard, Don Cheatham in the STG when the early apollo studies ~~were~~ going on.

That was a design approach which led not only to differences of view within the Center on some points but also was a matter of debate between the Centers in that Dr. VonBraun tended to favor the earth orbit rendezvous- A direct type of approach. Another significant point where a major program decision ~~taking-~~ taken very early in the program was based upon the work of the Engineering Directorate was the decision that related to pressure ^{feed} ~~set~~ engines. in the SM. Dave Hammack and a group of the propulsion people in the E&D Directorate did a series of studies under which they concluded that the pressure systems with a single engine were the ~~proper~~ approach to the main propulsion system for Apollo. There was a period where people wer trying to find ways of working together and establish some relative roles. The people in the program offices had the feeling - the Program Mgr had to be in charge of the program in order that it have integrity of some single focus. The Program Office couldn't have the numbers of people-~~arrang-~~ a range of technical types and expertise that were required and they wanted to find some way to turn to people within the E&D and get them to render assistance. The people in E&D who ~~had~~ skills and interests and wanted to have some significant say in what was to be done. There were several things that developed during this era that related to the Little Joe Program. It represented perhaps in its own way the beginnings of the kinds of interface amongst organizations that ~~were--~~ was going to characterize Apollo. We had an aerodynamics group, in the Engr Organization that was responsible for design analysis, and they were going work on Little Joe trajectories. The Flt Operations people were going to be responsible for operating the test sequence that was to take place at WSTF so they were doing aerodynamic and trajectory work. Convair was the producer of the vehicle so they were concerned about the performance of their launch vehicle and they were doing trajectory work and the thing that

was to be tested was the NR CSM and they were concerned about the performance of the system and they were doing trajectory work. The problem was that you would get into a meeting and everybody had a different trajectory because everybody had a different routine for calculating the trajectory doing integration, etc., and everybody used a little different kind of input data, and everybody worried not only about his part of the problem but everybody's else's part of the problem and things were sort of confused. The resolutions that arised were probably pretty healthy and began to typify the kinds of solutions that were later developed in that the program office took on the function of saying this is the data. It decided what were the right kinds of data to be used in order to make various calculations and it would conduct the negotiations amongst the various pazrties where it was decided how one would establish that data. Then one began to get consistent and coherent ~~mes~~results and results that were acceptable to everybody because they could be understood. This pattern began to carry forth throughout the Apollo program. The program people weren't responsible for generating the numbers but they were responsible for conducting the discussion which established what calculations were required and in effect assigning that function to someone but doing it in such a way that the results were acceptable to everyone. One of the areas because I was involved in it was the discussions that had to take place between us and contractors in the realm of engineering simulations. We within STG had done a number of studies as to the various ty es of control systems, etc., that were appropariate to Apollo and work of that variety had gone on at Ames and elsewhere. The contractors had done it and one of the program decisions what had to be made was how would one establish and operate ~~eng~~engineering facilities which wou ld simulate the vehicle so one could decide upon the design parameters, the control system,

and then verify that the components produced had the desired performance characteristics. The question essentially was the degree to which one would have a contractor engineering simulation facility and the degree to which one would have an inhouse engineering facility. What the scope of those facilities was to be and who would be responsible for running various simulation programs to verify that we had looked at all the modes of system operation for each of the various missions. This was a matter of great concern and interest to the people who were to be the Guidance and Control Division because they aspired to have such a facility. The contractor was concerned because he was charged with responsibilities for certifying his hardware and being able to develop and validate his designs. There was particular important interface also with MIT personnel who were furnishing guidance and control system. There was a long sequence of discussion which led to the problem of what should be the scope of contractors facilities, endeavors in this area and what should be the inhouse facilities and responsibilities. Perhaps the most significant thing in this whole set of interactions was the formalization of the subsystem manager scheme because this was in part a recognition of the way things were, but more significantly it was a very positive management endeavor to make things the way people thought they ought to be. It was probably one of the healthier things that happened, in the sense that by giving a reasonably clear charter to a large number of people and their organizations, it created a positive sense of responsibility and in part it was a recognition that those were key people in the program and they were playing a key role. Like many things there is no perfect way to do that and if the subsystem manager system had its weaknesses, but I think the important thing was not the weaknesses in the system but the strengths.

It gave large numbers of people in E&D and a pretty reasonable number of people in Flt Crew and Flt Opns a clear charter to interact with the contractor and it established a principle of working level discussion which brought to program management the contractor and NASA an issue for decision that had been thoroughly discussed and defined so that the issue for decision could be clearly identified. This came about after --- as a part of the subsys management there were several themes that had been implemented in a major reorganization of the Center. The fundamental theme was that one should have in an Engr organization technology oriented groups. For example one should put in a single organization all of the people familiar with reaction control systems so that the experience in the Mercury and Gemini programs would be properly reflected in the Apollo program.. One shouldn't have ones people who were familiar with small engines for example split up into 3 small groups in isolation from each other. It was probably the most overt move that said - as a major point of management strategy in trying to resolve the classical problem of how do you get an organization postured such that it does not over specialize. The problem one faces is that if you put people in a program management environment and keep them there, in too intensive fashion, they loose a certain amount of technical bias to the discipline as opposed to the program. On the other hand if you put them in a disciplined oriented organization they can loose the dedication to program, and the program needs to commit. That's the fundamental problem of this kind of an organization of the Center. The approach to some degree has been rather successful in having a discipline oriented organization which has test facilities suitable to its discipline as a way of maintaining its integrity at the subsystem kind of a level and at the same time laying on the organization a program level of commit-

ment which forces the organization to make the system work and stop trying to improve it. " It's a dynamic kind of a problem but it's in some ways a problem of attitudes and how you posture things and on balance it seems to have been a very clever solution. We seem to have avoided the problems of losing our inhouse independence in the sense that while we don't do a massive amount of research ~~and~~ and development, we do do some significant work and while ~~we~~ we do that, it has not gotten so abstract as to wind up in a posture where we have resented on the facility. Two independent organizations - one is a set of research labs which furnish consultants and the other being a set of program organizations which are essentially management oriented. That's a fundamental axis of tension that will always exist. It exists inherently between the Program Offices and line organizations, within the line organizations, it's going to exist between the test specialists and the analytic specialists and people who are appointed as Subsys Mgrs and therefore begin to take on some of the management and administrative responsibilities. It's an inherent tension that's built into this problem. The scheme of subsystem management as it developed within-in- Center changed the way of exploiting that tension in a healthy and productive kind of a way. That kind of interaction between the program offices and program management scheme is what's done so much to give the Center the color that it has.

Perhaps one of the things ~~x~~ of inherent tension between Program oriented people and lab oriented people we spoke that in Gemini we had the problem that one of the groups of people came out of an industry project office kind of organization and the other came out of the NACA. It was significant that as the Center grew, the recruitment of personnel into the program office tended to be strongly people who came from industry and from

the DOD organizations. Many of them directly out of the service, others out of some of the organizations such as Wright Pat. They came because this was the onlyiest game in town. It was obviously the kind of a challenge that people would rspond to. There were lots of young technical people in those organizations who saw opportunity and who were free to move, who were fascinated by the challenges of manned space flightw It wasn't difficult to recruit people from ~~everywhere~~, from industry - other elements of the government, etc., This was a great asset to the organization. But it is significant that in the process of this, relatively few of the core group from Langley and STG came into the program organizations. They tended to concentrate in organizations in FOD, FCOD, E&D, - so some of the tensions that existed between the program offices and the line organizations was enhancement of this point we had mentioned of people coming from different environment. As the organization grew, everybody recruited from outside because that was necessary. The significant point to keep in mind was that the program offices tended to recruit more senior people externally while for example in Flt Operations, their growth was such that they could pre-dominantly recruit younger people and ~~train-i-~~ train them in the disciplines and modes of operation that they were endeavoring to establish. The same thing tended to be true in E&D. This was of reasonably significant nature because when the Subsys Management organizations were estalbished in 1964 as part of a ~~maj~~ major reorganization, substantial numbers of people were transferred between organizations. Another thing that chraacterized this era was- and to some degree characterized the Center ~~ws~~ the fact it was a highly verbal kind of an organization. It had not been strongly committed

to writing everything down and this gives some great difficulty in trying to reconstruct the history because it makes it far more dependent upon memory than it would be in other kinds of context. It's a heritage of the task force character of the STG and it carried forward into the Center and even today characterizes one of the great strengths of the Center which is its ability to put together ad hoc organizations that represent all the appropriate strengths to attack any given problem which is set and that capability which has stood us in good stead on such things as the POGO problems in Apollo or some of the other incidents, is in part a reflection of this tendency to rely upon people and their dedication to a problem rather than upon written formal definitions of responsibility and authorities and their solutions ~~as-a-means~~. It's one of the great strengths of the organization if it can continue to do that as it matures. Perhaps we ought to talk about the interface between the Center and Hqs because that became such a significant function of the program office.

At least, as I was able to see the problem The Agency at large was having the kind of classical delimas that we've been talking about within the Center. Not only was the Center ^{growing} going, but the entire Agency was growing. As it grew and grew rapidly there was a substantial change to the character of the organization because of the new roles that had to be defined between Hqs and the field Centers. In NACA tradition, the Hqs had been a relatively modest type of function. The great strength of the organization was in the field Centers and the Field Centers had a clear cut set of responsibilities and there was a minimum amount of conflict. The Hqs was clearly an administrative policy function - it had no major facilities or resources with which to compete with the field Centers. But as the Agency took on a programmatic character, ~~it-b~~ there began to be a

difficulty in arriving in a resolution as to what was to be the role of Hqs and the role of the field Centers. In Apollo, the problem focused in trying to arrive at a level of control of the Hqs vis-a-vis the field Center in terms of the program specifications. It was a proper kind of thing to try to have a ~~separat~~ ~~separate~~ set of specifications but the very early draft of the Apollo program specifications clearly identified the problem that there were difficulties in the interface between the Hqs and the field Center because draft of the specification was totally out of balance. It was vast in the level of detail to which it addressed such things as communication and it failed to address other subjects in their entirety. Part of the problem revolved simply around the question of was the program a singular program for the Saturn Apollo system and was the focus of program authority in Wash and at what level of technical direction were they going to implemen emphasize and perform in their own right vs their role in assigning functions to field Centers and establishing interfaces of that variety. What was to be the level of ~~reporting~~. ^{These} reporting. /Were major irritants in trying to arrive or these were things people discussed in trying to arrive at this resolution. In general, it tended to work out over time that the working interfaces with the Hqs organizations tended to be focused on a counterpart basis in the program office. About the time of the Subsys Management structure when Dr. Shea came to the center, there was a significant change of climate in the sense that having been in the Hqs and now being in the field Center, he felt comfortable in acknowledging that Hqs had certain legitimate functions. But that there was a necessary and proper degree of latitude that the Center

had to have and so there began to be a less argumentative kind of interface and one that began - still the proper and normal kind of tension that exists between a Hqs and a field Center, but the Hqs began now to recognize that its function was more oriented to looking at the relative roles and functions of the 3 field centers and what the interfaces ought to be amongst them and it competed less with the field Centers in terms of trying to direct those centers as to how they would do functions that were clearly within the scope of responsibility that had been assigned them. This didn't take place all at once and it wasn't uniform. It had a different history as it was reflected in the Mercury, Gemini, and Apollo programs. I didn't see it as clearly in other programs I didn't have the vantage point. Once the specs that perhaps Hqs conflicts outside of the operations area were perhaps more specific in the Apollo Program. One of the problems is the interface between the Program Office which is in effect a staff office of the Director for a particular project and its interaction with the Hqs kind of a program office which is a staff office of the associate administrator for a given project. The question of how do program managers at the Hqs and field center interact, and how did the Center director interact with the ~~asseeat~~ associate administrator and with the Hqs Program Director. It was a difficult interface to define.

The whole question of whether or not you ought to have a Program Office at Hqs was of course one of the fundamental kinds of problems. It was clear that Brainerd Holmes felt that to have what he considered the necessary level of control of the program, that he needed that kind of thing. That perhaps is almost the definition of what was the Associate Administrator in the Hqs organization running the program or were they running an institution within which there was to be a program, and where was the program then to be run. This was the issue that was difficult to resolve - to uncouple the institutional function from the programmatic function. When you were trying to create both simultaneously and where the institutional requirements were to some degree being defined by the program to which you were committed. For example - the character of the MSC in terms of the fact that it has major test facilities was an endeavor to define the institution and say - we don't want to be just a program management institution because the point we spoke about earlier about maintaining one's technical depth so we tended to arrive at a resolution which said we will build those major facilities which at the end of the program will be national assets. That will allow us to have direct technical activity which will maintain our expertise. That close couple was what led to a great deal of friction at the interface. It was a very real problem. What kind of a Hqs were we to have. What kind of a field Center were we to have. One of the things that was discussed in terms of having a program manager. It was interesting that there was general agreement that one needed a program manager whose function was to integrate the activities at the 3 centers. In general the field Center people felt that it ought to be an activity which monitored their negotiations that they should negotiate the details of an interface and Hqs should observe

and endorse that sort of activity. Hqs viewed as necessary to make some preliminary definition and coax the people to some negotiation. One of the themes discussed was whether or not such a program manager could not be resident at one of the field Centers in something of the tradition that an admiral sails with the fleet - but doesn't necessarily have command of the ship on which he and his staff reside. In the end, the program management function was in Wash but increasingly became a separate function from the institutional Hqs function. As the program matured, there came to be a reasonable interface between the Hqs program office and the field Center program office in that the field Center program office was the point through which all the interfaces with Hqs of an official nature were directed. This created for the program manager some problems in the sense he had to be very careful to recognize that he was a staff function for the center director and to be careful to not overstep that authority. That was the general reflection of the fact that within the center we faced the same kind of problem the center Hqs issue represented and that is - how did one uncouple the program from the institution. One didn't want the program manager to manage the ~~center~~ entire Center and yet by managing the program, he made many decisions which impinged strongly upon that activity. It is inherent in an organization of this variety that this will be an area in which a great deal of judgment and a certain inherent tension exists and it's reflected in tensions that exist between a program organization and a line organization. That's how we've institutionalized the conflict. But it's ~~an~~ one that's been done in a healthy way.

It's a real problem ~~where 1/4 of the institution~~ - you don't want to forfeit the institution to the program. You don't want to indenture it to absolute slavery but you want to indenture it to service.

In all this, the thing that I've felt in the history of the institution is that in all these conflicts between ourselves and the contractor, between program offices and line organizations, between the Center and the Hqs, - the thing that's been the secret of the strength and successes of the organization has been that people fought about things that mattered because they mattered, and accepted solutions because they worked. There were the ~~inevitable~~ kinds of personality clashes but in the growing kind of climate that has characterized the Center until recently, there has never been a petty kind of character of things at what I've been able to see. Perhaps that's the product of youth and expansion versus retrenchment and these kinds of things that are beneficial but I have to think there is something more to it than that. There's been a positive kind of management thing that the management is thought of being a large group of people and the whole practice of the manner in which we do flight operations, the manner in which we conduct flight readiness reviews where the subsys manager attests to the readiness of his system, the reliance on people is not just a matter of accident ~~xxxx~~ it's a matter of deliberate policy. Overtly expressed. That's what has kept it productive.

We did get to a formal resolution of the Hqs Field Center interface in terms of the specifications, and the configuration management system. The configuration management system wound up embodying a definition of a level of control for the Hqs, a level of control for the Center, a level of control for the contractor and within the Center the configuration manage-

ment scheme then ~~sought-to-~~ saw to it that authority was given to various elements of the configuration management system in flight operations, flight crew, and E&D where they had a level of change authority such that Slayton ran a crew procedures panel under which he had certain authority for change and when ~~ix~~ matters exceeded~~th~~ the authority he had it went to a program configuration board. That configuration managemtn scheme is the formal expression of the current interface between Hqs and field Center.