An Interview with

ALLAN BLUE

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Conducted by William Aspray

on

12 June 1989

Minnetonka, MN

Charles Babbage Institute
The Center for the History of Information Processing
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Allan Blue Interview
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Abstract

The concentration in this interview is on the Information Processing Techniques Office from the time Blue arrived at DARPA in 1965 until his retirement in 1977. Topics discussed include: a trend to increase relevance of funded projects; increasing orientation to industry; increased paperwork and micromanagement from outside IPTO; comparison of DARPA offices management styles; relations with NSF, ONR, and NIH; the DARPA contracting process; and personnel hiring problems. This interview was recorded as part of a research project on the influence of the Defense Advanced Research Projects Agency (DARPA) on the development of computer science in the United States.
ALLAN BLUE INTERVIEW

DATE: 12 June 1989
INTERVIEWER: William Aspray

LOCATION: Minnetonka, MN

ASPRAY: This is an interview on the 12th of June, 1989, in Minnetonka, Minnesota, with Al Blue.

BLUE: ... I was hoping it would be a little quieter than the other tables.

ASPRAY: Oh, I think this will be okay. I interviewed Ivan Sutherland not too long ago, and we did it in the Pittsburgh airport in an outside room with planes going by every couple of minutes, and that came through on the tape.

BLUE: Yes.

ASPRAY: Could you spend a few minutes telling me about your own personal history, how you got involved with DARPA, just so I understand the context?

BLUE: Sure. I was working for the Atomic Energy Commission in March of 1965 when a very good friend of mine, who had also been with the Commission and had left to go to ARPA, asked me if I would be interested in coming to work there. I, at the time, was Oak Ridge Liaison Officer for the Production Division, and it was a sort of a dead end as far as any additional advancement was concerned. So I was delighted to move. I went there in March of 1965 and left in November of 1977. I did not go as an IPT employee. I went as what they called a Program Management Officer. But I was handling IPT from the administrative standpoint.

ASPRAY: You were in the Program Management Office?

BLUE: That is right. I handled VELA -- that was the nuclear testing business -- and IPT, and, I guess at the time,
Behavioral Sciences.

ASPRAY: What was your background?

BLUE: I had a master's degree in social studies from Syracuse Maxwell School. I had gone to undergraduate school at Union College. I was a Republican in Maxwell School which was kind of a no-no. When it came to placing people, they would not give me the time of day. This was the spring of 1953. Eisenhower had just been inaugurated and he had frozen everything; there was no way to get a job in government. Before this I had taught school in a private school over in South Byfield, Massachusetts in Governor Dummer Academy. But I wanted to get a master's, and I wanted to teach government. So I was going to see how it was, then get out and go back to teaching. Of course, I never did. But anyway, I managed to circumvent the placement office and went out and got a job on my own with the AEC down at Portsmouth, Ohio. AEC in 1953 was a dynamic organization. They were in the midst of a big expansion program, a gaseous diffusion plant expansion program. It was great fun. Later on I came to Washington to work with the Military Application Division. But by 1965 AEC was getting a little long in the tooth. The old Manhattan Project people were still there. It had matured, and it was not the real dynamic thing that it had been. NASA was just starting up at that time. So the young guys were fleeing the older agencies in droves to go to work for this other new one, NASA. But I chose ARPA instead and I am very happy about that.

ASPRAY: Yes. And at some point in your career at ARPA you moved from the Project Management Office over to IPT.

BLUE: Yes, that was about... Gosh, I would have to look to see, but probably two years later.

[INTERRUPTION]

BLUE: Taylor was the guy who brought me over. He convinced the management that there ought to be one non-technical guy in each of the offices. There was one at the time; Herb Test worked in Material Sciences. There was a
gal who sort of worked with the -- what was it called? The missile people, ballistic missile business. So I was a third, and they put me in IPT -- a good move. I was always appreciative of Bob for getting me into his shop.

ASPRAY: Yet IPT was much smaller in budget size than either of those others.

BLUE: Well, yes, but the work was fun, and the people were fun...

ASPRAY: Oh, I did not mean it from that perspective, but from the management's perspective about whether they wanted to spend the money on a person in a small office.

BLUE: Well, IPT was certainly smaller than BMD, I guess -- Ballistic Missile Defense. But it was bigger than Materials, so...

ASPRAY: I see.

BLUE: Budgets did not necessarily correlate exactly with how much work there was to do. It takes as much paperwork to get out a $50,000 contract as a half a million, or a million dollar one.

ASPRAY: So when you came over to IPT, Taylor was running the office? Is that right?

BLUE: That is right.

ASPRAY: Was Larry Roberts there by then?

BLUE: Not at first. Larry came down a little later.

ASPRAY: Was there anyone else working in the office in a professional capacity of some sort?
BLUE: Well, let's see. To start off with, when I came Ivan was just replacing Licklider as a young second lieutenant still in the service.

ASPRAY: Right.

BLUE: He brought in Bob Taylor as his deputy, and there were just the two of them. I was sort of the third person in the office, if you will, because when they had a question in my area of so-called expertise they would... I would be in their office as much as in my own.

ASPRAY: So what kinds of questions would they come to ask you about?

BLUE: Well, the theory of operation that ARPA went by in those days was that you went out and got the best man for the job, and he came in, typically with absolutely no understanding of how the government works. So it was supposedly up to us to lead them through this maze of government red tape to accomplish whatever it was they wanted to do technically. I say "red tape" but there was very little of it. ARPA was a unique place. If you have heard this before, it bears repeating because it was just fantastic as government agencies go. I am sure you have heard the fact that we could get an idea in the morning and have the guy working under a Letter of Intent by 4:00 the next day.

ASPRAY: Right. I want to go into a little more detail in the contracting process a bit later (if we could hold off for now).

BLUE: The standing comment was we just kept the Larry Roberts and the Ivan Sutherlands out of jail.

ASPRAY: Yes. Did your advice go beyond the specific paperwork and procedures to follow to questions about what might sell to the military, or what might sell to...?
BLUE: No.

ASPRAY: Okay, fine.

BLUE: But back in those early days, there was not a great deal of emphasis put on what would sell to the military. It was, "What is good research? Who can we give good money to and expect to get good results?"

ASPRAY: That is certainly true in IPT from what I have seen. Is that true in other offices in DARPA? Materials is the most like IPT, I guess, in some ways. It is the most academic...

BLUE: Yes, the so-called... What did they call them? Not centers of excellence, but... I do not know. They had a program which was very much like IPT. Now, are you up to speed on the 6-1, 6-2 business?

ASPRAY: Yes. I know about that.

BLUE: Well, we were initially all 6.1. Eventually we got some 6.2 money, and of course, we were doing all sorts of crazy things with 6.2 money that you are not supposed to, or in theory were not supposed to do, but...

ASPRAY: Like...

BLUE: ... like we would build an ILLIAC IV or Arpanet, and that sort of thing.

ASPRAY: Why weren't you supposed to use 6.2 money for that?

BLUE: Well, because there was 6.3 and 4 and 5, you see.
ASPRAY: I see.

BLUE: The idea in exploratory development was not that you made hardware out of it.

ASPRAY: Yes, I see. Why would they go ahead and use 6.2 money for that? Why not try to get that into a 6.3 or 6.4 budget?

BLUE: God, did ARPA have any money beyond 6.2? I do not know that they did.

ASPRAY: I do not know the answer to that. I have never seen any budget figures with 6.3 money.

BLUE: Neither have I. I do not think that ARPA had anything beyond 6.2.

ASPRAY: Okay. So you were there also when Larry Roberts was hired to come on. Is that right?

BLUE: Yes.

ASPRAY: We have heard as many stories as people we have interviewed about why Roberts was hired, what his duties were to be when he came on board. Do you want to tell us what your perspective on that was?

BLUE: I always assumed it was to proceed with his networking. The ARPANET.

ASPRAY: Yes. With any kinds of promises, explicit or implied, about his duties to become director at some point of IPT?

BLUE: Well, if he did not come there with the promise that he was going to be a future director of IPT, I think it soon became obvious to anybody that he rated the job if anybody did.
ASPRAY: We have been interested in seeing if there was some attempt to make an orderly transition from Taylor to Roberts, and whether his hiring to come in and do the networking project was really just that, or whether it was the start of the move to change administrations in the office.

BLUE: Well, also, remember that in those days the concept was that nobody stayed in ARPA very long. You brought a guy in and got the best of his brains and then he moved on and the next prodigy came along, if you will. So I never viewed the Taylor departure as being under any kind of duress. A lot of technical people wanted to put roots down in ARPA -- not a lot, but there were those who came and did not really feel like moving when their turn came, and some of them maybe went out under less than ideal circumstances. But that was not an IPT exclusive. That happened all over the place.

ASPRAY: Who would do the pushing if it was time for somebody, like a program officer, to go? The Director's Office?

BLUE: Yes.

ASPRAY: I see. Now, I understand there was a period of time where you were effectively running the IPT office between administrations.

BLUE: No, not for weeks or...

ASPRAY: Oh, is that right? A week, or... I had not looked closely at the dates, but I had assumed it was some considerable time longer.

BLUE: No, for no extended period of time did I... At one time it was just Larry and me in IPT, and he would go away and I would be acting director. But that was a paper sort of thing. Nothing...
ASPRAY: I thought that this occurred at the time just before Licklider came in on his second...

BLUE: Well, it was a short period of time.

ASPRAY: It was just a short period of time. Fine. Okay. And then you were around some in the Kahn period also. Is that right?

BLUE: Yes, and up through Russell.

ASPRAY: Oh, through Russell, and then Kahn.

BLUE: Let's see. No, I left when Dave Russell was still...

ASPRAY: Was still there, but...

BLUE: But he was director. Of course, Kahn had been there for a long time.

ASPRAY: Right, but not in the director's post at that time.

BLUE: That is right.

ASPRAY: I see, okay. I do not know how to ask this question very well, but you were positioned to see lots of the different directors. You saw, whether they were in the director's position at that point or not, Licklider, Taylor, Roberts, Russell, Sutherland and Kahn. Can you make some comments about their personal styles or management styles that differentiate the way they ran the office, or managed people, or managed programs that would be useful to note or to understand in a history of the office?
BLUE: Well, you must remember that the office changed greatly from the time I arrived until the time I left. Its objectives changed, and the political and the budget climate changed. So what might have been an effective type of leadership at the end was not necessarily the best kind of leadership back in the earlier days.

ASPRAY: Well, let's hold off on that question I asked you, then, for a moment. Maybe we will come back to it. But let's explore what you have just said to me. Can you describe to me how the budgetary environment changed, and the political environment changed, and the missions of the organization changed over time?

BLUE: Well, certainly when I arrived it was, as I mentioned before, an environment in which you gave money to good people and expected good results. There was no concern with relevance. Relevance became the buzzword more and more as we moved along. At the end, trying to do just good basic research for the joy of it was extremely difficult, if not impossible, to get through the budget process. Now, going back to the joy of ARPA: you know, if a program manager has a good idea, he has got two people to convince that that is a good idea before the guy goes to work. He has got the director of his office and the director of ARPA, and that is it. It is such a short chain of command that... Well, let me digress just a second. You have, I assume, gotten hold of a copy of the ARPA history that was done by...

ASPRAY: The Barber Association.

BLUE: ... Barber Associates.

ASPRAY: Yes.

BLUE: Did you ever try to get access to any of the tapes that Barber had in...?

ASPRAY: We have never been able to track them down. We have made some forays to do so, but we have not been
successful.

BLUE: Is Lee Huff still associated with Barber's...?

ASPRAY: I do not know offhand because I was not the one who did the exploration on this.

BLUE: I see.

ASPRAY: You recommend Lee Huff to...?

BLUE: Well, Lee Huff headed the Behavioral Science Office in ARPA at one time. He was a successor to Licklider, if you will. When we were about to let a contract for the ARPA history with another firm, Lee Huff came and raised some questions about whether or not we could really sole-source this when he and Barber Associates were fully qualified to do it. So, we then went into a solicitation mode and got proposals from the people we had already been talking to, and from Barber Associates. Lee Huff was very much involved in this, because he had been in ARPA. He knew the way things worked, and so forth. So if he is still around, he would be probably the best contact to try to get into those tapes. I do not know how valuable they might be, but they interviewed a hell of a lot of people. Of course, it dealt with all of ARPA rather than just IPT.

ASPRAY: When we were talking before you made this comment that the environment changed -- the budgetary environment and also the political environment. Do you want to expand on your comment?

BLUE: Well, it was a short comment and I thought I was going into that before. It is just a question of doing undirected research at the start and supposedly totally relevant research at the end.

ASPRAY: But what sorts of factors do you see as contributing to that change in philosophy in the office?
BLUE: It came down, not from ARPA, but from DDR&E on up. I am not really sure why you had to be able to sell relevance. Mostly we could not afford to do the things that we had done. A good example of this, although the good guys won in the end, was when George Heilmeier took over as director of ARPA, and he brought with him a fellow named Colonel Whitaker.

ASPRAY: I have heard the name.

BLUE: Nobody liked Whitaker in IPT--just like nobody liked IBM in IPT. He was just viewed as a hatchet man, and he had been making statements over in DDR&E about what a wasteful bunch of guys were over in ARPA in the computer end of things, and he was going to straighten them out and so forth. So, one of the results of this was that I had to prepare a total budget history of our support of artificial intelligence, and it came up to a fairly sizable amount. Not all of that work was on artificial intelligence, but you could not split the contracts. We gave so much to MIT, and basically that was Marvin Minsky. Stanford was John McCarthy. So those totals got lumped into AI research. Probably it was mostly AI. So it came up to something like 35 million or 50 million at the time. This was anathema to Heilmeier and Whitaker, and so they had a monster rally at ARPA in Rosslyn. We got all the principal investigators at the time. Maybe they have already spoken to you about this.

ASPRAY: Feigenbaum has mentioned it to me.

BLUE: Yes, Feigenbaum was there; Les Ernest was there; Minsky was there; Allen Newell was there; and there were others. It had all of the drama of a shootout at the OK Corral, because here were these guys, the real big guns, who were going to come in and just set Heilmeier straight. I was disappointed. I remember I walked out of that meeting and I thought, "My God. These guys may be smart but they sure cannot tell you what AI is and why it is good any more than the guy down in the street can." They did such a poor job, I felt, in defending AI research that I fully expected that they just signed their own...

ASPRAY: Right. No more money for them.
BLUE: It did not work out that way. As often happens, many of the real good decisions get made elsewhere. I do not even remember who was head of IPT at the time -- probably Lick. Lick probably sat down with George Heilmeier and spun him around 180 degrees. As a result, the ax never fell, and we were all delighted and we kept on. But that sort of epitomized the idea that in this cross-examination the idea is "Where are the results? What have you done? How does this make driving a tank easier?" Nobody had an answer to that. It was, "Wait ten years." “Well, we cannot wait.” The relevance thing changed IPT. For a long while, or for a period of time, I think we were able to continue to support good people by inventing stories about what they were going to do for the military. But that again got a little harder to do. As a matter of fact, I think we had to include relevance statements in all of our ARPA Order initiating memoranda. I think that is what they were called. You see, we sent a memo to program management and it was on the basis of this that they wrote the ARPA Order. We eventually had to include relevance statements in all of these.

ASPRAY: I have seen some of those, yes.

BLUE: Fiction in many cases.

ASPRAY: Yes. Earlier you suggested that this relevance issue was one that just slowly built up over time. Do you see any particular times when it grew more rapidly than others?

BLUE: Without sitting down and looking at a chronology of things, I could not pick out any particular time when it jumped up.

ASPRAY: I see; because several people have mentioned the Heilmeier era as being a time when that really...

BLUE: Well, without question, just as the director of IPT had great influence on the course of its progress, the director of ARPA put his stamp on the agency. It was so small and so compact that, no question about it, when
Heilmeier came in there was a definite change in direction. No question about it.

ASPRAY: What would you characterize as the features of this change? How did the Heilmeier era differ from the past era?

BLUE: Well, before then, you would go up to the director's office with Lukasik and sit with your feet on the desk and Larry would tell him, "Well, gee, I have got this great idea," and you could talk and knock it back and forth. I do not think that Larry had ever, ever had anything turned down by Lukasik, because Lukasik understood. He was interested in the things that IPT had done. He knew their track record was excellent. If IPT came forward with a program that said, "This is good; you had better do it," he would find the money for it. With Heilmeier there was none of this give and take, easy back and forth stuff. He was just a different personality - he conducted much more formal reviews, and you crossed the t's and dotted the i's and filled in all the squares, and then if he liked it, he would see.

TAPE 1/SIDE 2

ASPRAY: Was the character of the kind of research that was approved by Heilmeier different? Was there more of a call to have more short-term, product-oriented work done during this period than open-ended research?

BLUE: Yes, I think so.

ASPRAY: What about moving into a different set of contractors? Were industrial contractors called upon progressively more in this period?

BLUE: Well, they were, but that was a function, I think, of the nature of the jobs IPT had begun. I think our first experience with a true industrial complex contractor was Burroughs with ILLIAC IV. We got a lot of skinned knuckles over that because their price just kept going up and up, and they had overruns. I remember one time we went up to
Paoli and they had just discovered a miscellaneous account that they had not even known existed or something. All of a sudden we were another two million bucks in the red. Keeping ILLIAC IV going was just a pain in the butt, because the tail was wagging the dog. It was much bigger than anything we had ever been into before. We were dealing with a type of contractor that we had not been dealing with before. Our agent for this -- you know, the ARPA agent business -- was RADC and they were not...

ASPRAY: RADC?

BLUE: Rome Air Development Center.

ASPRAY: Oh, yes.

BLUE: They were not on top of the contractor the way they should have been. It gave us a lot of grief, really. But then, as Russell came in with the packet radio and all of that stuff, there was nobody else to do that but industry. Suddenly we were faced with overheads that were much bigger than we had ever faced in the universities and so forth. So, I do not know that Heilmeier... Certainly he was happy when one of his... He was more industry oriented. I am sure he still is down at TI, if he is still...

ASPRAY: He is still there.

BLUE: Yes, as a matter of fact I saw his name recently. So I suppose maybe he had more trust in industry than he did in the universities.

ASPRAY: Because of this increasing need to have interaction with the industry and to monitor industry, did the formal paperwork process of approval and the process of monitoring, change? Did it become more formal, more burdensome over time?
BLUE: I would say probably. Certainly the program managers would be the people to answer that, but I expect their answer would be yes.

ASPRAY: Were there specific calls for new kinds of paperwork, or new kinds of, say, quarterly or progress reports that...?

BLUE: Well, if anybody has ever talked to you about the reporting system that ARPA had, you know it was a joke.

ASPRAY: That is the impression I have had.

BLUE: Hell, by the time you had got the quarterly report you knew what was going on. It was just to fulfill a requirement; that is all. The contracting officer, wherever he was, had to put in a report section. So this was just bowing to that requirement. I do not think that anybody ever read the damn progress reports. Now, this may have been different when you were dealing with TRW or some of those people toward the end of my time.

ASPRAY: Toward the end of your time.

BLUE: Yes. Maybe they paid some attention to them. Well, I never did.

ASPRAY: Okay. The reason I ask that is...

BLUE: Because they lie, you know. It is like a company's annual report.

ASPRAY: Yes.

BLUE: Well, I wanted to comment on something you said before, and that is the disappearance of paperwork. One of the things that occurred to me very early in the networking business -- you know, the Arpanet mail -- is that
everything got on your terminal and nothing ever went into the files. I will bet that if you went through the files you could tell, even if you did not know about it, when the net came up, because the paper trail just sort of disappeared because it was on your terminal.

ASPRAY: So the only paper you had was what you had to have for legal reasons.

BLUE: That is right. All of the comments back and forth... I even started to file messages for awhile, because, say, one would refer to ARPA order 799. And so I thought, this cannot just disappear; it ought to go in the files. But that soon became absolutely impossible. Larry would come in in the morning and he would have 40 or 50 communications waiting for him. It became obvious, I am sure, to other people as well that here is a monster that we are hatching; we are sitting on top of it and it is going to eat us up one of these days. I do not know what the answer is -- whether it did or whether it was a golden egg. It certainly has blossomed into a...

ASPRAY: Well, the reason I ask the question is that there was a basic underlying assumption there. We have heard from any number of people that IPT, but generally DARPA, today is not the same organization it was 15 or 20 years ago. One of the past IPT directors has used the term "arthritic" describing that and points to the fact that it might take 18 months, where it would take four months in the past, to get all the paperwork done and get a grant approved. I am trying to understand, assuming that that is in some part correct...

BLUE: I am sure it is absolutely true.

ASPRAY: Yes. I am trying to understand how that happened.

BLUE: It is the same thing that happened to AEC that I told you about earlier. It is the same thing that I am sure happened to NASA long ago. An agency just matures and gets old and cautious and hidebound. They probably should abolish ARPA and start something else, just like you ought to get rid of a director after he has been there, or a program manager after he has been there, for two or three years. Now, I heard that Craig Fields was still in ARPA as
deputy director or something.

ASPRAY: Right.

BLUE: That is a crime. Taking nothing away from Craig, he just should not be there that long.

[INTERRUPTION]

ASPRAY: Can you go through the contracting process for me -- describe just what went on. It may be pretty routine, but I would just like to get it straight.

BLUE: You do not want the exceptional cases -- just the regular routine.

ASPRAY: Yes, and if you think that it is worth noting some other exceptions then let's talk about those later, but mainly describe the routine.

BLUE: Okay, so a program manager gets an “unsolicited proposal”, which he has been discussing with a guy for six months or more. But he finally gets the proposal. It comes into ARPA. Since he knew it was coming, he already had a line in his budget for it. He writes up an initiating memorandum and he attaches a copy of the proposal. He writes a sole-source justification. It comes to the director of IPT. He knows all about it anyway because they have been discussing it, so he signs off. It goes up to program management. Program management writes an ARPA Order. The program manager in IPT has already selected the agent he wants to administer this contract.

ASPRAY: What basis did you use for selection?

BLUE: Well, if the program was associated with something that had obvious Air Force implications to it, you probably would go to an Air Force agent. If it was Lincoln Lab it would go to Hanscom Field, because they handle all
the Lincoln Lab work under a single contract. If it was MIT it would go to the Office of Naval Research... ONR... for the same reason -- there was only a single government contract with MIT and ONR administered it. But if he wanted to really look after the job himself and he did not want a service organization in the loop, if you will, he went to DSSW, which was Defense Supply Service Washington. They just wrote contracts. They did not perform any technical program management. They did not do anything except write contracts, and since we were very much in bed with them, they wrote contracts fast for us. So IPT sends it to Program Management. They write the ARPA Order. They send it to the director, who then signs off on it, and the ARPA Order goes to the agent. In this case we are saying DSSW. They could operate very quickly -- in weeks -- and a lot faster if you built a fire under them and convinced them that there was a good reason to go faster. But they would get a contract out in a matter of weeks and the guys worked on that. If you wanted him to start earlier you would have DSSW write a Letter of Intent, and he could begin under that. We used to have to caution these guys -- "Don't have the guy incur any costs until he has at least got the Letter of Intent." That happened a lot. The project managers would really want to get going on something and the guy would begin charging, and then we would have to somehow find a way to fold these costs...

ASPRAY: Back into something else.

BLUE: Yes. But that was not a major problem.

ASPRAY: What about monitoring of it once the contract was awarded?

BLUE: Well, if it was a DSSW contract, the contract monitor was the IPTO program manager. And he supposedly read those progress reports. But usually he monitored by telephone and by seeing the guy. If it were, say, an RADC thing through the Air Force, they supposedly had a technical guy up there who was put in the middle between the IPTO guy and the principal investigator. But that was a kind of a farce too, because, hell, ARPA went direct to the guy just the same, and they (the Service people) used to get a little teed off about it.

ASPRAY: Did you ever have problems with the contracting organizations -- that they did not think that it was
appropriate to give a contract for this or that or the other?

BLUE: Once in a while, but usually it was not done on the technical content of the contract. It was done on the sole-source justification or the ASPR -- Armed Services Procurement Regulations. ASPR is a four foot shelf of books. If you wanted to find some problem in the contract...

ASPRAY: You could find one.

BLUE: If you looked long enough in ASPR you can find one. But agent relations was, for ARPA, a life blood. So once or twice a year ARPA Program management would set up an ARPA agent's meeting. This gave the administrative types a chance to go down to Orlando or someplace nice and sit around and talk. Well, that was a treat for the contracting guy up in Rome or wherever, because he did not get to do this very often, and it was good for ARPA, because you developed a sort of a working relationship with these guys which paid off. It was just sweetening the guys up to grease the skids, and it worked pretty well.

ASPRAY: Were you party also to the budget planning and submission process?

BLUE: Yes.

ASPRAY: Because in some ways it sounds to me like a bit of a madhouse, because you would have maybe three years of budgets going on at the same time. Is there any wisdom you can give us about trying to understand that, or should we just ignore that aspect of it as we write...

BLUE: Well, it is not hard to keep two sets of books, if you will -- this year and next year. That was basically what you were looking at. Then, of course, you had a budget year beyond that that you were trying to work up at that time, but basically you were talking two years -- this year and next year.
ASPRAY: I see. Okay.

BLUE: Yes, budget probably consumed more than half of my time, and a large percentage of the time of the program people too, because that was their life blood. They could not do it without money.

ASPRAY: I will take you back to contracts for a moment. Are there some exceptions you want to talk about as illustrative in some way or another?

BLUE: Well, I was thinking about the way ISI got started. You must have heard about that...

ASPRAY: I do not know this story, no.

BLUE: Well, we were funding work at Rand. Keith Uncapher worked for Rand, and he had the idea that he wanted to leave Rand and basically start up a center of excellence type thing under the aegis of USC -- I don't know that he even knew it was going to be USC. Keith moves well in that kind of circle, and before long he had arranged such a deal. He had Larry's support, and he had a draft proposal to us. The idea was that ISI was going to be a principal cog in the IPTO wheel. They were going to be involved in a lot of things and act as a sort of an umbrella for a lot of different projects. So in February sometime Keith said he had his proposal ready, and we all went out there. And because we knew this was going to be a rush project we took the head of DSSW contracting with us -- Gene Stubbs. He could talk for DSSW, and we could talk for ourselves, I guess; and Keith could talk for ISI -- the budding ISI. We sat around the table out there at USC. I remember I had a calendar, and, as a matter of fact, the proposal was not in yet, because the first date we dropped in was when the final proposal was going to hit IPT. The second date was when we were going to be able to finish writing a background for an ARPA Order, and when it was going to go to DSSW. I do not think it was any longer than two or three weeks from the date that we were sitting there in the room that we figured it was going to be ending, and they would have a Letter of Intent and be ready to go. And they were. Yes, that was kind of a wonderful example of the power we had to play with when we felt it was important to do so.
ASPRAY: Was there a particular need on IPT's part to have this kind of organization that could do lots of things for them, that could act (I don't mean this in a disparaging sense) as a sort of a job shop, such that when you have a particular problem that needs to be done, whether it's managing a group of people or a particular kind of technical problem or whatever, it could take care of them? ISI has done a lot of those kinds of things.

BLUE: Yes, it is important.

ASPRAY: BBN had sort of played that role.

BLUE: Yes, in a more limited way, but yes, BBN has been a great asset of IPT's, and ISI has too. Of course, Keith was going to set up this computer center, which he did. All of our stuff was on his PDP-10. You know, when I first went to work for ARPA, in order to buy a computer, you had to write a justification, whether it was a 1401 or a Univac. It did not make any difference -- a computer was a computer. And you could tell the difference in those days. We would have to go someplace in the Pentagon and there was a guy over there keeping track on a ledger of every computer that DOD owned. I can remember going over there and talking to these guys and telling them why we had to have four PDP-10s that year. Well, they soon realized that...

ASPRAY: They could not keep track.

BLUE: ... it was exploding exponentially and there was no way you could keep track of this stuff. So that requirement went down the drain -- one case where buying things got easier rather than harder. But it was a... Yes, you had to have so many... You know, you had to sole-source, why you had to have a PDP-10 rather than any other brand, and you had to go down the excess list of every government agency to see if that computer was on there so that you could pick it up for nothing. Asinine, but that was... There are certainly other examples of getting contracts out in a hell of hurry, but I think that was probably the biggest one we ever did that with.

ASPRAY: What kinds of changes would you point to between IPT in recent years and IPT in the early years that
you associated with ARPA?

BLUE: Well, the biggest change, I felt, was the fact that we were going into producing through non-university sources. The industrial contracting that was associated with packet radio and... there were others. I have nothing to jog my memory here. It was a bigger business and it was not that much fun anymore, that is for sure. There were deadlines, and demonstrations, and dog and pony shows. Poor Dave Russell, he did that for a living there. He was good at it -- exceptionally good at it. But you had to try to sell the product.

ASPRAY: Being in the program management office for awhile you got to see some of the other programs. At least, you had direct responsibility for some, but to a certain degree you probably saw the whole range.

BLUE: Yes. I had handled Defender for awhile and Agile for awhile.

ASPRAY: How was IPT viewed within DARPA? The people that I speak to are all IPT people and they think of it as the jewel in DARPA somehow. Was that view more widely held?

BLUE: I had the feeling that a lot of the offices were envious of IPT because they were getting good results. They seemed to be favored by management, perhaps, budget-wise. But that was because they came up with good ideas and got good results and had good spokesmen. I keep coming back to this, but Larry could sell you almost anything and do it on the basis that, "I have never been wrong before so believe me this time and you will be happy you did."

ASPRAY: I see.

BLUE: As far as Licklider was concerned, Lick was just right for being the first director of IPT, I am sure, and did some wonderful things. When I heard that he was returning, as a matter of fact, I thought... When you were working with Larry, you came into the office and you hit the ground running, and you did not quit running until the whistle blew, and then you ran some more. He was on the go every minute. When Larry ate a meal it was like shoveling coal
into the steamboiler because you have to have energy, unfortunately, so... So this had been going on for awhile, and as much as I loved working for Larry, I thought, "Well, Lick is going to be different."

[INTERUPTION]

BLUE: I thought, "Well, it will be great, because Lick is relaxed. He is a gentleman. We will be able to go out to lunch and really enjoy ourselves. Well, when Lick came to ARPA and stepped in it was a Christian stepping into the lion's den, because Heilmeier was there, and Lick just was not up to the same speed as these guys. We would go up to Heilmeier's office and Heilmeier would say, "Give me this. Give me this -- an analysis, and a complete budget rundown on this, and do this and do that and have it up here by four o'clock," and we would go back to the office and Lick would say, "This is not the ARPA that I knew."

[INTERUPTION]

BLUE: I think Lick was pretty taken aback at this. He eventually got onto the system but, boy, I am sure it was different worlds that he stepped into the two times he was there. Also, Heilmeier was just not the kind of guy that you could get friendly with; he was much more remote than any of our other guys.

ASPRAY: I see. Do you think that, with the exception of Lick's second tour, that the other people that you saw then as IPT directors were effective in their jobs?

BLUE: Yes, and I do not want to leave you with the impression that Lick was not effective. I am just saying that upon his arrival, it took a little getting used to on his part to...

ASPRAY: To see what the new environment...

BLUE: Yes, to cope with the new environment.
ASPRAY: Fair enough.

BLUE: Well, I do not think that anybody was any more effective than Larry. He epitomized the right guy for the job.

ASPRAY: Yes. Do you think it was important to have somebody that had a good technical background in the IPT director's position?

BLUE: Yes.

ASPRAY: Because in some ways you could say that Taylor was not really a technically oriented person.

BLUE: That is true. Bob, however, based on his performance after he left IPT at Xerox PARC, knew how to assemble good people. I guess I would rather not discuss Taylor (laugh)...

ASPRAY: Fair enough.

BLUE: ... because as I said earlier, I am forever grateful to him for getting me into IPT.

TAPE 2/SIDE 1

BLUE: ? spent a lot of money on a project that...

ASPRAY: Macromodules?

BLUE: Yes. ... had no future, and they should have known that much earlier than they did. On the other hand, you know, he pushed Doug Engelbart's work at SRI. I think Doug is one of the unsung heros of early ARPA. Has
anyone ever told you about Doug’s performance at the Joint Computer Conference out at San Francisco?

ASPRAY: No. Why don’t you tell me?

BLUE: Well, you ought to get somebody else to tell you, because they could give you a better story, I am sure. But what happened was, Bob was probably head of the office at the time, and he had Doug up on the auditorium stage in this big hall in San Francisco linked to his computer down at SRI. [The image on his CRT screen was projected for the audience via a huge TV projector we borrowed from the Navy.] Doug, as I am sure you know, invented the mouse, and then he invented a one-handed typewriter which only used five keys. He used the mouse in one hand and typed with the other. So Doug, before a hushed audience of I do not know how many, but the place was filled, put on an interactive show that just blew everybody’s mind. It was fantastic, because he was so supple. We had our fingers crossed that everything was going to work along the communication lines and so forth -- and they all did. Doug just breezed through a word-processing exercise, moving text, editing, and so on, and this was back in the days when nobody had seen anything like this.

ASPRAY: Right. So it had a dramatic effect.

BLUE: Oh, it sure did.

ASPRAY: Yes.

BLUE: Bob Taylor certainly was responsible for our continued support of Doug and his work out there. Of course, when he went to Xerox they pulled all that technology down there and used it again.

ASPRAY: In some senses, it seems to me that Bob Kahn would have been the appropriate person to hire as the IPT director when Russell was brought in. Does that seem in keeping with what you would see too? I mean, he had been around for awhile, had run some big projects for the office, knew the ARPA environment by that time.
BLUE: Yes, I am trying to think why Dave Russell was chosen. Of course, Dave had been around a long time up in VELA. A long time. I do not know. When was this? Who was ARPA director at the time? Was it Lukasik?

ASPRAY: By the time that Russell actually came on, it was Heilmeier, I think, but I am not really clear about that myself.

BLUE: It probably was. You know, has anyone ever told you what a hard time it was to get people to take the job as the director of IPT?

ASPRAY: I have heard some stories about that, yes. People who had active research programs did not want to leave them. Other people were concerned, especially in more recent times, about the salary cuts they would have to take to come to the office.

BLUE: Yes, I am sure it was offered to Allen Newell every time an IPT director left. He would never take his turn in the barrel. We used to say, "Come on Al, it's your turn. You have got to sacrifice a little something. We have been supporting you for all these years. Now you have got to come in and run the program." Dave Evans -- the same way. When they finally got Licklider to take the job he was on a walking tour of Wales. We were trying to track him down, because if you have traveled in England you know that supposedly you leave your passport at your hotel and then they report in and you can really locate people. And they did locate him. We tracked him down in the middle of Wales. I never saw Larry so overjoyed as when he finally got his replacement. It was his job to find his replacement, and when he finally got one he was delighted, because he was ready to go. I think some of his delight was also the fact that Lick was going to take it, because he liked him. Everybody did.

ASPRAY: Sure. Some of the comments you have made to me have suggested that there are lots of parallels between the history of ARPA and other government organizations. Many of the people that we have interviewed have said that IPT in particular had a management style that was unique -- "unique" is the word that we have heard used in
many places -- and that that was why they were so successful in the early years, for what really is a very accomplished program during that period of time. Do you see it as a unique management style?

BLUE: No, I would not say that IPT's management style was any more unique than anybody else's in ARPA in those early days. They all benefitted from the streamlined organization and short chain of command. We were getting the same kinds of administrative miracles out of the other ARPA programs. There was nothing unique about IPT in that regard. I think when people are talking about that they tend to just disassociate IPT from ARPA, but it was all the same ball of wax at that time.

ASPRAY: But do you see the progress at the young NASA as effective as the progress at the young DARPA?

BLUE: Well, not having been there, I do not know, but any agency that is just getting started enjoys a honeymoon of sorts. Well, in the ones that we are talking about, it was of utmost importance to the nation at the time, and so it got what it asked for. Now, I am also sure you are familiar with the fact that ARPA was started as the defense space agency.

ASPRAY: Yes.

BLUE: ARPA was an experiment. This management style was an experiment. In the early days you used to hear, "God, why don't they run everything this way? It would compress time. It would save money." And so forth. Well, of course, you cannot do that. There was room for maybe one of them at a time. By the time I left, ARPA's time was up. We were getting micro-managed just like everybody else, which is why you ought to start over.

ASPRAY: So you do not see any real solutions to making ARPA the effective tool in the 1990s, say, for computer science?

BLUE: Well, I have been away twelve years now. I do not even know who the director of ARPA is.
ASPRAY: It is Jack Schwartz.

BLUE: Jack Schwartz.

ASPRAY: Oh, not of ARPA -- of IPT.

BLUE: Was Jack Schwartz in IPT? The name does not mean anything to me.

[INTERRUPTION]

ASPRAY: It is hard to know where to place it that way. He seems to be starting to get a better reception recently. People are looking back on it with...

BLUE: Well, we used his SRI system in the office there for years -- NLS, it was called. Of course, that was another thing that basically IPT did was they put ARPA up on the computer, if you will. The first printouts of our budget happened after I went there. We had a 1401 over in Cameron Stations that we had to go over and sometimes we would spend half the night there trying to get an ARPA budget. We always called it the machine run. That was always a strange dichotomy -- here we were funding all of this computer stuff and we would have to go over to Cameron Station lugging a bunch of hand-annotated sheets and give them to a keypunch operator, and she would punch these things in. Then they would run this crap. The totals did not come out right, and you would have to go back through all these cards. What a primitive way to do things, but that was the way it was working in 1966.

ASPRAY: Yes. What effect would you say the Mansfield Amendment and the Vietnam war had on the way that work went on in the office?

BLUE: Well, the Vietnam war was right up ARPA's alley -- although not in our office. Our shop was not affected
other than by the political protests that went on then. But of course, Agile was developing all sorts of gimmicky stuff. They had a strange priority called Zap Channel that even expedited the normal ARPA way of doing business so they could put all these good ideas into the field in no time at all. The Mansfield Amendment... Refresh my memory.

ASPRAY: Very roughly, that the Defense Department should only be funding work that was specifically defense related, and other things should be going over to places like NSF.

BLUE: Yes, the relevance business. Well, it had the effects we discussed before, and that is that it made it harder to sneak good 6.1 research by. It meant more stretching of the truth on the budget sheets.

ASPRAY: How accurate were the 6.1 and 6.2 budgets in the sense of whether they were in the right category or not? If you saw something that was funded in 6.1, can you pretty much count it as basic research? Or alternatively, in 6.2 was there some basic research hidden there that...

BLUE: Sure. I suppose that maybe they canceled out, but there was a lot of this. We had totals we had to hit within our budget for 6.1 and 6.2, and so we did a lot of horse trading back and forth. It was viewed as just ways to get around a system which was much too constraining, and it was developed too far in advance to reflect what you were going to be really doing when it came time to spend the money.

ASPRAY: Well, that is true in the period of a year or two, but suppose that one wanted to look at, say, 6.1 budget figures over a 15-year period, 6.2 budget figures over a 15-year period. Do you think that they would be useful in giving you trends of basic research versus developmental...?

BLUE: Yes, I do. Of course, you never went back and corrected the figures, you know.

ASPRAY: No, but the next time you had to put a budget in, you might adjust them because you knew you were
doing more developmental work or something.

BLUE: No, you probably would not, because that shows that you were lying the year before, but on the average, look at the figures over a period and they will certainly give you a trend. I would not quarrel with that.

ASPRAY: Are there other people you think that we might want to talk to? People you can suggest?

BLUE: What do you want to talk to them about?

ASPRAY: Well, anyone other than yourself and the IPT directors who could tell us about important aspects of the running of the office.

BLUE: How many program managers have you talked to?

ASPRAY: We have not.

BLUE: I do not know where Barry Wessler is, but maybe you would like to talk to Barry. Do you have a list of all of the personnel who worked for IPT?

ASPRAY: No, I do not. We have tried to put together main people through our interviews, but we do not have any other easy way of doing that.

BLUE: Well, you could get it out of ARPA. They have, I think, a database that would give you every program manager that ever worked for IPT and the dates of arrival and departure. I believe they were working on that when I left.

ASPRAY: I see. Okay. Now, we have had some very initial discussions with a few people like Bob Englemore and
Cordell Green.

BLUE: Cordell Green! Gosh, I had not thought about him. Yes, I made a list of some people and never, never Cordell Green. Steve Crocker was an early-on program manager; last I heard he was working for the Air Force in California. I think the ARPA project managers loved the power. They loved the work. In general I felt that guys were never any better in their lives than the years they spent at ARPA. They seemed to rise to the occasion. Maybe if you had a way of giving others these same duties and same power, they would all look good. But you had to have a lot of self-confidence to be a project manager then. You would go out and talk to the people that you were going to fund. How does somebody tell Allen Newell that "I am going to be monitoring your work."

ASPRAY: Right.

BLUE: But I do not know that any of them did not do his best to try.

ASPRAY: Can you tell me about those groups that do not get funded. I mean, we have talked only to the chosen. Did you have lots of complaints or bitterness on the part of other universities, say, that didn't get funding? Did lots of proposals come across the transom that...?

BLUE: Not a heck of a lot. They did not get to the proposal stage before a lot of talking had been done.

ASPRAY: I see. So it was really very rare for a truly unsolicited proposal to come to the office.

BLUE: Very rare. They would sometimes get passed around as a novelty item.

ASPRAY: I see. We had heard that Slotnik's proposal was one of those.

BLUE: Was truly unsolicited?
ASPRAY: Was truly unsolicited.

BLUE: Well, if Ivan told you that then I would believe it.

ASPRAY: I do not remember if it was Ivan or somebody else that told me, but it was somebody close in to the community.

BLUE: That does not surprise me. That was his second try at a parallel processor.

ASPRAY: Yes, that is right.

BLUE: He had done one with Westinghouse, wasn't it?

ASPRAY: Right.

BLUE: Well, time just caught up with ILLIAC IV as it did with the macromodules.

ASPRAY: Let me see if I have any more questions for you. No, I think I have gone through the set of questions that I have. This is your chance to say whatever you would like.

BLUE: Well, ARPA was a joy to work for, and I never felt a day when I did not get up and was not anxious to get to the office. People worked their tails off. In IPT, it was a little different for me coming from AEC, where I was a young kid and everybody else was older than I was. Suddenly I was in ARPA and all of the bright guys were younger than I was -- or many of them. That was a little hard to get used to. But I admired them all. They were certainly dedicated to their jobs. I hope they get some recognition for what they did because they certainly put in the hours.
BLUE: I had not been in ARPA ten days before Herb Test, a fellow I had mentioned earlier, who was I guess by
default ARPA’s press agent, came around and grabbed me and said, "We are going out to Andrews Air Force Base
and we are going to catch a SAM (special air mission) airplane and go to Billings, Montana. We are going to
dedicate the large aperture seismic array, LASA. McNamara is going to come out and do it, and all the congressional
deginations are going to be there. As of now, you are assistant public relations man for ARPA." So we went. As I
recall, McNamara did not make it because of some crisis. But it was a full dress thing. I think people from all over the
world were invited. From that day on, when Herb Test was not there, I supposedly interacted with the press
business office. It was done under the Office of Information -- you know, the Department of Defense; DOD Office of
Information. But the theory was that ARPA did not publicize anything. We did not want stories about us in the
papers. We did not seek any limelight. We sought no publicity whatsoever. That was policy. We were very
successful at it, because once... I think the theory was that... once you get on the front pages you are fair game and
people begin to say, "What the heck is this? What is an ARPA?" You cannot stand that kind of exposure for long,
or somebody does not like it and they start shooting at you. So it was a conscious decision that we did not want this
to happen. End of short story.

[INTERUPTION]

BLUE: We used to report how many graduate students we were supporting. This was a 6.1 sort of thing. I know the
materials office, who, by the way was headed at one time by this guy who is now working the Fleishmann-Pons
results out at Stanford, duplicating the heat. He was head of ARPA Materials. Anyway, we used to keep track of
how many graduate students, because this was a selling point for 6.1 money, you know.

ASPRAY: Now, did you just have gross figures, or did you have actual names and institutions, or...?

BLUE: Just gross figures, but also that they had so many research assistants and so forth. Some of these people are,
you know, like Alan Kay. You are probably familiar with...

ASPRAY: Yes.

BLUE: A lot of people got some work from ARPA, and I think a lot of them felt sort of favorably inclined towards ARPA because of that. It did not demand anything in return from them. But all of that reporting went by the boards, when that no longer became a selling point for giving you money.

ASPRAY: Right. I remember Bob Fano telling me that he went in to see somebody in the very early 1970s about more support for education and having the person bluntly say to him, "ARPA does not support education," and that was the end of the conversation and he got up and walked out of that room and went back home to Boston.

BLUE: Somebody in IPT told him that?

ASPRAY: Yes.

BLUE: Well, I can remember the time that, after 5:00, I was sitting around in my office and trying to do some things that I could not get to during the day, and Lukasik stopped in. He often did that. Anyway, I had a big stack of final technical reports on a...

TAPE 2/SIDE 2

BLUE: ... big table by my door. I did not want to throw them away and I did not want to read them right then, but I used to browse through them. Well, Steve came in that day and we were passing the time of day and kidding about things. Then he started out the door and happened to pick up a report I had tossed over there that day. It was from the University of Utah. Dave Evans was there at the time, and I think Barry Wessler was out there by that time. It was on dance research -- supported by IPT. It was where they wired up a dancer with lights on his arms and legs and
torso, and he did this dance routine, and they would keep track of it through the computer and devise dance routines, and so on. Steve hit the ceiling. "Dance research! Jesus Christ!" You know, "What am I going to tell... Suppose this had gone into the Armed Services Committee? Dance research!" It turned into a big flap -- we had to call Dave Evans immediately, "Dave, what is this dance research?" It was a big crisis. I also remember one time, not in IPT, when there was a Behavioral Science contractor at the University of Cincinnati, or some place like that, who got on the radio and gave an interview to someone in which he criticized defense research. Of course, in the 1960s that was easy to do. You got very popular on campus if you did. He let loose a blast at the Department of Defense, and ARPA had his contract canceled that afternoon. He was off the payroll and out of there. Of course, we had this fantastic thing on ILLIAC IV, which I am sure you are familiar with. Dan Slotnik had given this interview to the Daily Illini and so forth. Of course, Lukasik hit the ceiling over that and called Slotnik in and that was a real donnybrook. I have still got a copy of the paper somewhere, plus a picture of the beautiful building they built for ILLIAC IV and it never went there. I also have the guts of a macromodule at home, which was brought in one time for a show and tell, and it was kicking around there for years. I finally carted it home. It is one macro module on a little stand and all the connecting wires. At one time I had the little prototype quarter-size Rand tablet. I gave that to Tom Ellis, Keith Uncapher's deputy at ISI. Tom had worked on its development at Rand. Anyway, the last I saw that it was on his wall. I had one of the mylar strips from the terrabit memory for the ILLIAC IV. We had that hanging on the wall and I took it with me when I left. I believe I also have some of Ivan Sutherland's original sketches for Sketchpad, his program where he would compute stresses on a bridge. I had some of Larry's stuff -- photographs of a CRT when he was doing hidden line stuff at Lincoln Labs.

[INTERRUPTION]

BLUE: They (students in the 1960s) had the feeling that IPTO really was not the Department of Defense, and they did not mind doing IPTO research because it was all in the family, and they were not really supporting the war and this sort of thing. I think it was a rationalization on their part.

ASPRAY: Did you have any principal investigators resign in the late 1960s?
BLUE: Not that I know of. There were some who we had some rather spirited discussions with. It tended not to be the PIs but some of their people, graduate students and so forth. Other than the ILLIAC IV, we did not have any overt problems. Really, they just felt that IPTO was part of the family; it was not part of the DoD. We were thankful for that because we were not doing anything different; we were not neglecting anything that we had been doing before in order to keep our contractors. They were just looking at IPT and saying, "How can that bunch of guys be really interested in murdering civilians?" or whatever. So I think we had a good rapport with the research community.

END OF INTERVIEW