An Interview with

GEORGE H. HEILMEIER

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Conducted by Arthur L. Norberg

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George H. Heilmeier Interview
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Abstract

Heilmeier describes his introduction to the Department of Defense as a White House Fellow assigned to the Office of the Secretary of Defense working in the Office of the Director of Defense Research and Engineering. Most of the interview is devoted to his years as Director of the Defense Advanced Research Projects Agency (1975-1979). He discusses programmatic changes (including those pertaining to artificial intelligence), budgetary issues, personnel, and relations with management.

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NORBERG: Could you tell me something about your duties in the Office of the Director of Defense Research and Engineering (DDR&E) during the early 1970s, when you were an assistant director of that office?

HEILMEIER: I came to the Pentagon in September of 1970 as a White House Fellow. I worked as a special assistant to the Secretary of Defense. That was a one-year appointment. I became very closely associated with John Foster, who was the Director of Defense Research and Engineering, and spent most of my year working on issues that were related to defense research and engineering. At the end of that year, I was ready to go back to RCA, but Foster wanted me to stay. He offered me the position of assistant director at Defense Research and Engineering for electronics, physical sciences, and computer sciences. I stayed in that position until early 1975, when I became the acting director of DARPA. I wasn't confirmed until sometime in the first quarter of 1975. What specifically did you want to know?

NORBERG: What sort of duties did that office entail for you?

HEILMEIER: That office was the focal point for all the Department of Defense's work in those subject areas. That involved long-range strategic plans, investment strategies, coordination of programs, program reviews and approval of the military service program in the areas of electronics, physical sciences, and computer science.

NORBERG: Does that suggest, then, that you had a considerable amount of interaction with DARPA people?

HEILMEIER: No, in that position DARPA was more or less an island unto itself in that period. DARPA's programs were outside the purview that I had as an assistant director of Defense Research and Engineering.

NORBERG: They were?

HEILMEIER: Yes.

NORBERG: Was anybody in the office of DDR&E handling DARPA other than Foster, maybe?

HEILMEIER: No. The director of DARPA reported to Foster. Well, he took his direction from Foster.

NORBERG: Certainly. Who succeeded Foster?

HEILMEIER: Mal Currie.

NORBERG: If there's very little involvement with DARPA, what led to your decision to assume the directorship of DARPA?

HEILMEIER: Mal Currie felt that DARPA was deviating from its mission. He was unhappy with DARPA, for whatever reason. He felt that there wasn't enough really good work being done in DARPA. In his view, it was getting bled off into a lot of other areas. When Steve Lukasik resigned Mal Currie asked me to take the position. I accepted that position because I thought that here was a chance to have more direct control over an important agency and a very interesting program.

NORBERG: Now, if there was very little contact, if any, with DARPA before that, why did this seem like the route to go?

HEILMEIER: Well, I knew what DARPA was doing. I didn't have any control over it, nor was I involved in it, but I knew what it was doing.

NORBERG: Incidentally, along this line, if you had responsibilities in DDR&E for computer science what sort of computer science were you looking into...?

HEILMEIER: Well, at that time the three services were primarily focused on software and software methodologies.

ADA was born, or the predecessor to ADA was born, during the period when I was in DDR&E. I simply decided that even the DoD wasn't big enough to support all the languages that were being used in its weapons systems. And so I said, "Let's try to essentially truncate the number of languages down to a reasonable number so that we could afford to support them with good compilers and good system building tools." And that was the origin of ADA. That was all started when I was in DDR&E.

NORBERG: When you entered the office as director of DARPA then, what objectives did you have? If Currie was unhappy with it, what did you think you had to do?

HEILMEIER: Well, the things that Currie was unhappy with had to do with DARPA getting involved in all kinds of studies and analyses related to geopolitical events. Currie felt that DARPA ought to get back to its real mission, namely, the leading edge of science and technology. He felt it was being diverted from that mission by all this interest. So when I came to DARPA one of the early missions was to get rid of a lot of that crap.

NORBERG: Can you be specific about which things you were going to try to get rid of?

HEILMEIER: Well, there were all kinds of studies about disarmament; all kinds of studies about what was going to happen geopolitically around the world. In retrospect, it didn't amount to a heck of a lot of money, but it was a distraction, a big distraction, a major distraction. And unfortunately, the agency, at least at the upper levels, was travelling in circles that were more oriented towards the soft sciences, so to speak, rather than the hard sciences. And Currie wanted it back to a focus on hard sciences.

NORBERG: Did you have any notions about what the strengths and weaknesses of DARPA were at the time you took it over?

HEILMEIER: Yes, I did. I had some notions.

NORBERG: Can you recall those at this time?

HEILMEIER: Yes, I thought that a lot of DARPA money was being spent based on an incomplete understanding of why the money was going and what the implications of success were in a lot of cases. In other words, DARPA was like a big cashier booth, and my feeling was that the program managers did not have the kind of understanding of the programs that I felt comfortable with. When I was in DDR&E, I saw numerous examples of what I felt were DARPA efforts that were not carefully thought through.

NORBERG: Were these in this geopolitical area or were they general?

HEILMEIER: No, they were general.

NORBERG: How did you operate then, when you came into office, to change the situation?

HEILMEIER: Well, what I decided to do as a director of DARPA was to read all the DARPA orders and sign them personally. In the past, directors of DARPA didn't do that. They would sign them but they wouldn't read them. It was an enormous task to read those DARPA orders, but I did it and I would bounce some of them back to the office directors with some questions. And people began to understand that they had to do a better job of understanding their programs. And one of the offices that I came up against very early in the game was IPTO.

NORBERG: In what way?

HEILMEIER: When I would get an ARPA order to sign I would read the proposal, and the proposal would have really no description of what people were really trying to do, or a very meager description of what they were trying to do, very meager description of the state of the art and the limitations of the state of the art in their specific area, a limited discussion of what was new in their approach and why they thought it would be successful, no mention of the implications of success. And so when I looked at this I thought to myself, "Literally, I am being asked to sign a check for a certain amount of money and there are no deliverables other than a report," and sometimes there wasn't even a report. When I started probing this what I got back was, "Well, the reason we don't have any reports is that this stuff gets published in the literature." I said, "Fine, but I would like at least to have some report that said, 'We gave them the money and here's what we got back.'"

I also thought that we ought to get good proposals. You see, there was a so-called DARPA community, and a large chunk of the money went to this community. When I looked at the so-called proposals I thought, "Wait a second; there's nothing here." It was just, "Give us the money and we will go do good things." Well, Licklider was the director of the office at the time and Lick and I tangled professionally on this issue. He said, "You don't understand. What you do is give good people the money and they go off and do good things and that's it." I said, "Lick, I understand that, but what you are trying to tell me is that all the good people are in just the universities that you support and I don't believe that." I said, "There's got to be other ideas out there." And I said, "Furthermore, these people may be good people, but for the life of me I can't tell you what they're going to do. And I don't know whether they are going to reinvent the wheel, because there's no discussion of the current practice and there's no discussion of the implications, so I can't tell whether this is a wise investment for DoD or not."

This set the community in orbit. The biggest defenders were the AI guys. The AI guys came back and they were livid. "You mean the director of DARPA telling us that we have to write good proposals with milestones in them and whatnot. Absurd!" And I was visited by former DARPA office directors from IPTO who in essence told me, "Heilmeier, you don't know what you are doing. Your job is to get the money to the good people and don't ask any questions." And my reaction was, "That's pure bullshit. That's irresponsible." In any event, the AI community really got up in arms because I was exceptionally critical of them.

NORBERG: Why?

HEILMEIER: They were getting a large amount of money, and for the life of me I couldn't tell what they were going to do. In other words, when I revisit this next year, "What is it you're going to show me?" Well, they would never want to commit to anything. "Just give us the money; we'll do good things." That offended me. I received numerous visits from the community saying that "You are going to destroy the community. This wonderful community that we have put together you are about to destroy. Why are you about to destroy this community, because in essence you are asking questions that you have no right to ask?" My reaction was, "That is utter nonsense." They said that I didn't have the right to ask the questions because I didn't really understand their field. In essence, "You aren't smart enough." Well, I can live with that, so I said, "Fine, we will put together a blue ribbon panel to look at what you guys

are doing." So I had a blue ribbon panel put together to look at this field of AI under the direction of Freeman Dyson. Is the name familiar to you?

NORBERG: Very, very.

HEILMEIER: I sort of did that because I wanted to defy them to say that Freeman Dyson wasn't smart enough to understand what they were doing. In any event, the formal report was kind of soft. But privately, the reaction was, "Hey, we can't get our arms around this thing. I mean, these guys don't think like people do in other disciplines." [laugh] So I went back to the community and I said, "Look, I recognize the need to do basic research in AI, but I also recognize the need for you folks to sign up to some challenges." So I gave them some challenges. One challenge was Morse Code recognition, and another challenge was to do something about the interpretation of sonar signals and ASW [anti-submarine warfare] signals in general. The third challenge was command and control. I wanted systems that could adapt to the commander instead of forcing the commander to adapt. So I said, "Look, if some of you guys would sign up for these challenges I can justify more fundamental work in AI." And some did.

NORBERG: Do you recall who did?

HEILMEIER: Yes.

NORBERG: That's critical to me.

HEILMEIER: Some of the folks at MIT did. Some of the folks at Stanford did, but they did it in a special way... they began working with an independent firm outside of Stanford, but it was clear that they were involved in working on it together. Yes, they did stand up. And SRI stood up, and Rand stood up and said, "Fine, we understand what you want; we'll do it." And then I took the heat off the community. I got real proposals, by the way. You weren't going to get a couple million dollars from DARPA just by saying that, "We're going to go off and do good things with x number of graduate students and y number of professors for a year." That era was over. You would get your money based on articulating what you were trying to do and how it was done today and the limitations of current practice, etc., etc. Those were the questions that became known as "Heilmeier's catechism." And as long as people were able

to answer those questions, or, as the case may be, if they didn't know the answer they'd say, "Well, I need the money to go get the answer," my reaction was, "Fine." But the Heilmeier catechism was instituted and we didn't have any problems after that.

NORBERG: Well, let me drop back and ask you a couple of questions about the earlier period. Did you have any belief that IPTO had accomplished a number of things in the first decade of its operation, let's say?

HEILMEIER: Oh, indeed. Indeed. There were some very important contributions that I heard about over and over again. I heard about time-sharing; I heard about networking; I heard about speech recognition. Incidentally, the speech work I did away with, because there weren't any new ideas emerging from the work at that time. In spite of what they told me, the systems were not performing well. Clearly, what we needed was another approach to the problem. I said, "I am not willing to continue this approach because it's not leading us anywhere. Systems that are 80% accurate or 75% accurate have no place." And so we scaled the speech program down and we said, "We are going to wait until we get a new idea."

NORBERG: With these accomplishments then, did you consider that those activities in networking and internetting, as it was developing in the early 1970s, and so on, were sort of finished issues?

HEILMEIER: No. My view was that IPTO, and I believe this today, IPTO was sitting on the technology base that in my view could have a major impact on the Department of Defense. It hadn't had that impact. That's why we put together the challenges. And when I looked at what had been done in the past, all very interesting, all very useful, but it wasn't impacting DoD. The whole concept of the command and control testbed was a concept that would enable us to bring in those IPTO technologies and demonstrate the ability to essentially "fly before buy" in designing command and control systems. We had the technology to do it; we just didn't have anybody who was worried about bringing IPTO's technology into the DoD. They had a community that was completely divorced from the DoD.

NORBERG: Do you think it was appropriate to think of that community as the potential agent for bringing such technology into DoD?

HEILMEIER: Not the only agent, but they had a role to play, a strong role to play.

NORBERG: Because I would have seen other gatekeepers as a possibility there -the MITREs, the Rands, the Battelles, maybe.

HEILMEIER: Well, the Rands were involved. The Battelles at that time weren't sophisticated enough. MITRE was involved to the extent that I thought that they could be involved. But you have to remember in 1975 the technologies DARPA was working on were not exactly technologies that were everyday, matter-of-fact technologies to people in the systems community. My challenge was to get the people in the systems community introduced to those technologies. And the best way to do that was to put together demonstration projects that said, "Look we, the AI community, can help you interpret ASW signals." That's an important problem. Morse code understanding. "We in the AI community can help you automate this process of understanding Morse code." Real challenges, real problems. Technology being supported by DARPA that I felt could impact those problems, but no bridge. No bridge. My view was that we were sitting on things that were too valuable not to at least attempt to have them influence problems that the Department of Defense had. After all, the Department of Defense was funding them. It wasn't National Science Foundation; it was Department of Defense. I think in retrospect there's some people who still feel that this was a bad time for their world. I think there are others who feel it was a very good time.

NORBERG: Well, one of the things that we see as we look through the budget developments in that period from 1965 through 1985, for that matter, is that in the middle 1960s to 1980, roughly, the overall DARPA budget is going down. And yet the IPTO budget continues to rise - small, in comparison, of course.

HEILMEIER: I don't think the overall budget from DARPA was going down in that period, or I would ask you to check that.

NORBERG: Sure. Well, I can show you what was uncovered.

HEILMEIER: When I was in DARPA the budget was roughly $220M, and by 1980 the budget I think was in the

$300M to $400M class.

NORBERG: 400 sounds right. 1980 it was 50 million for IPTO. I didn't bring that other chart.

HEILMEIER: Look, IPTO budgets went up, and they went up even during my tenure, in spite of the fact that other people were saying I was out to destroy the so-called community. They went up. They went up for a very simple reason, namely, IPTO was sitting on the technologies that could have a major impact on the DoD, and we needed to do something about that. We were not the National Science Foundation, in spite of the fact that Lick and other former directors thought that's what their mission was.

NORBERG: But in the early 1970s, before your tenure as DARPA director, IPTO separated out their program into two areas in 6.1 and 6.2, whereas previously it had all been 6.1. And they were beginning to look at secure systems for the DoD. They were looking at climate dynamics and so on. Were these not the sorts of problems that you would have thought were associated with DoD interests?

HEILMEIER: Oh, I think they were associated with DoD interests, and there was a small computer security program when I got there, which I didn't touch. My view of the climate dynamics problem was that we weren't converging. Other people may have been doing something useful and getting results, but we weren't. So my reaction was, "Hey, let NOAA and other places work that problem, but we're not producing anything that is very useful."

NORBERG: Okay, did you interact with any of the other staff of IPTO besides Licklider and, later on, Russell?

HEILMEIER: All of them. Every single one of them.

NORBERG: How was that done?

HEILMEIER: Face to face. They would send me an ARPA order. I would essentially write them back a whole raft of questions, including the catechism questions, and they would immediately come back and want to argue about it. And my door was always open. It was the first time, I think, that program managers actually dialogued their program

with the director of DARPA. That's what they all told me anyway. And my reaction was if I am going to be reading these ARPA orders and asking questions, they had every right to defend their own case. Now, Lick would step back and say I had no right to do that. My reaction was, "I had a responsibility to do it."

NORBERG: Was this true with other offices in DARPA as well?

HEILMEIER: Absolutely, they got the same "wire brushing," but they were better at responding. They were already a little bit more skilled in making sure that they had deliverables in their programs and milestones in their programs. They knew what their contractors were going to do. They were really doing a better job of it than IPTO. IPTO really didn't have a program management structure. They had a financial management structure and they had a cheering section.

NORBERG: That's interesting. I was just running over some of the earlier interviews with IPTO directors and comments made about helping people to write proposals so that they indicated the impact on DoD programs, putting milestones in these proposals, but for the 1960s, not the 1970s.

HEILMEIER: It wasn't there.

NORBERG: Well, I haven't seen it either, although...

HEILMEIER: It may have been there in the 1960s, but it certainly wasn't there when I showed up.

NORBERG: Well, what I have seen in reading ARPA orders, and I have seen quite a lot of them...

HEILMEIER: Did they tell you that, or did you find it written down somewhere?

NORBERG: Well, that's what I was just going to say.

HEILMEIER: Who told you that?

NORBERG: Well, first of all, Licklider told me that, as one very good example.

HEILMEIER: Nonsense. Nonsense.

NORBERG: But looking at the ARPA orders, what is there is Licklider's vision of the program, not the PI's or the contractor's vision. And you are essentially confirming that it was not there.

HEILMEIER: Well, the other pieces were not there either. The other pieces of the catechism.

NORBERG: Yes. Do you remember these staff members, who they were, in IPTO that you dealt with?

HEILMEIER: Yes, Bill Carlson, Dave Carlstrom, Bob Kahn. Let's see, who else was there? Floyd Hollister.

NORBERG: How did you go about evaluating these people?

HEILMEIER: Face to face.

NORBERG: Well, I was thinking in criteria applied, rather than the context.

HEILMEIER: How well they knew their programs; how well they could address the catechism questions was basically how I evaluated them.

NORBERG: And what did you learn from these people? Were they able to address these satisfactorily from your point of view?

HEILMEIER: Steve Walker was another one, by the way. Once they were told what I expected of them, they managed to do a pretty good job.

NORBERG: That suggests then that program turned around. What was the program like when you left? Because after all, you were only there two years.

HEILMEIER: No, I was there for close to three. I thought the program was a solid program when I left. I thought we had a much better feel for what we were doing and why we were doing it, and I thought we had broadened... not necessarily broadened in the technical sense, but we had essentially brought the IPTO program into DARPA again. This wasn't NSF West anymore.

NORBERG: [laugh] NSF West.

HEILMEIER: Other side of the Potomac.

NORBERG: Yes. What gave rise to the decision to select Russell to head the office?

HEILMEIER: Russell understood very early what I wanted and why I wanted it. I looked outside of DARPA for an IPTO Director, but I couldn't find anybody who would take the job, which is a problem that continues today. I couldn't find anybody and Dave, I think, understood what I wanted and so Dave was the logical choice. He was Lick's deputy at the time.

NORBERG: Why couldn't you find somebody from outside the community?

HEILMEIER: They wouldn't take the job.

NORBERG: After all, they do find people to take the job, and they may not always be the best people, but...

HEILMEIER: Well, as Craig Fields will tell you, he appointed one IPTO director that was the 100th guy that he had talked to about the job.

NORBERG: Wow! I have discussed that with people like Dertouzos and what the problem is in getting the directors

in there.

HEILMEIER: Well, there is a problem. You see, in the other areas in science and technology you can get people from the community to come in for a period of a couple years. For whatever reasons, we have been unable to do that in the IPTO domain. I think it's a question of money.

NORBERG: Yes. Did you ever take the position that you needed to get rid of staff in that office?

HEILMEIER: You mean replace them because they weren't good enough? Yes, sure.

NORBERG: Who did you bring in?

HEILMEIER: I brought in people that I thought were stronger technically, for one thing, and who weren't career bureaucrats.

NORBERG: Were there career bureaucrats in that office at that time?

HEILMEIER: There were some people that had been there a long time.

NORBERG: Well, I think of the people who were in program management. I don't think of people in actual technical positions.

HEILMEIER: Well, we had a few people that had been there a long time and had just become stagnant.

NORBERG: Now, what was your interaction with DDR&E as head of DARPA?

HEILMEIER: DARPA, at that time, technically reported to the Secretary of Defense.

NORBERG: DARPA did?

HEILMEIER: Yes, it took its direction from DDR&E, but reported to the Secretary of Defense.

NORBERG: I see.

HEILMEIER: After I was in DARPA - well, I guess it was maybe July of 1975 - I went to Jim Schlesinger, who was the Secretary, and I said to him, "Mr. Secretary, this is what I am going to be doing at DARPA, and if I am doing things that you don't want me to do or going off in the wrong direction, you need to tell me so I can fix this." We had a session that lasted the better part of an afternoon and at the end of the session he got up and he said, "I like everything that you are doing. Keep on doing it." And I said, "Fine." He said, "Is there anything else I can do for you?" I said, "Yes there is." I said, "I am getting a lot of phone calls from your staff, who are telling me that you want me to do this, or you want me to do that." And I said, "To be quite honest with you, Mr. Secretary, some of these things are a little flaky." This is where a lot of these studies and analyses for the less critical stuff was coming.

NORBERG: Oh, yes, got it.

HEILMEIER: And his response was a very direct response, as you might expect from Jim Schlesinger. He said, "Bullshit! If I want you do something, I will tell you myself." I said, "That's fine." Thereafter, when I got a call from one of his staff saying, "The Secretary wants you to fund this study at a certain place on bases in the Philippines," or something like that, my reaction is, "Well, that's fine. Have the Secretary call me and I'll do it." And they said, "Well, we're acting for the Secretary; we're telling you go do it." And I said, "I am sorry; we're not going to do that." And we didn't. And as a matter of fact those calls stopped coming.

NORBERG: So there was no reporting to DDR&E, if that's the case?

HEILMEIER: Well, I had very close ties with Mal Currie, and I would always review my program with him every year, because he had cognizance over the budget. But there was no problem; Currie and I got along just fine. He supported me 100%.

NORBERG: Were there difficult budget discussions in that period?

HEILMEIER: Not with Mal Currie.

NORBERG: Yes, well, maybe not with him. What I was really leading toward was in that period defense budgets sort of begin to cycle. The cycle seems to be worse than it was, say, in the late 1950s. And what was the reaction inside DDR&E and therefore in DARPA, in your office, to the budget process within the Department of Defense? Did it affect what you were trying to do?

HEILMEIER: Yes and no. One of the advantages of being the director of DARPA is that you defend your budget to the Congress directly. And I went over to the Congress and I think we more or less kept our budget flat to slightly up during that period while they were cutting dramatically research development and engineering elsewhere. Yes, we felt some budget cuts, but nowhere near like other people did. And I felt that we got a reasonable hearing over there. Tony Batista was really the intellectual leader of the House Armed Services Committee R&D Subcommittee. And we used to tangle, but by and large it was part of the process that you had to go through and at that time they were questioning everything. I didn't always agree with the cuts that they made or their reason for making cuts, but...

NORBERG: How did the statements that you made to the Congress get developed inside the office?

HEILMEIER: I wrote them.

NORBERG: With consultation?

HEILMEIER: Yes.

NORBERG: Consultation with whom?

HEILMEIER: With the office directors. Let's see, there was a DARPA posture statement that they contributed to, but the testimony I gave and the statement that I submitted was mine. You know, we had this big, long document,

but when I got up to testify I was speaking for me, and I was speaking without something that somebody had handed me. It was something that I had written. If you read the testimony during that period it's kind of interesting.

NORBERG: I have. That's why I asked you about it. Where was this coming from?

HEILMEIER: That's the first time somebody got up there and said, "We're going to tell you what we did wrong, as well as what we did right." That was very refreshing, for example.

NORBERG: What effect did it have?

HEILMEIER: As I said before, our budgets were not cut nearly as much. They knew they had to cut something out of our request, but I got the feeling that it was pro forma, that they really did like what DARPA was doing.

NORBERG: Was there an interaction with people on the hill other than in these formal hearings?

HEILMEIER: Oh, yes, I would go visit them periodically and talk with them and try to explain what I was doing.

NORBERG: Was this a practice before you became head of DARPA or not, do you know?

HEILMEIER: Yes, I think so.

NORBERG: Because I know there were hearings held all the time from 1965 on.

HEILMEIER: Yes. No, I think there informal visits; I don't know to what extent, but I think there were.

NORBERG: When you did make those visits, or present formal statements, did you try to focus on IPTO programs at all, or was that just if it happened to be good you would do it. If not...

HEILMEIER: No, I would stay away from IPTO programs.

NORBERG: Why?

HEILMEIER: Because the staff were very sensitive to those. They didn't like them.

NORBERG: The staff? The congressional staff?

HEILMEIER: Yes.

NORBERG: Why didn't they like them? Do you know?

HEILMEIER: They just didn't feel that they were relevant to the DoD.

NORBERG: None of that seems to come out in the hearings.

HEILMEIER: Well, what comes out in the hearings isn't always what happens in discussions with the staff.

NORBERG: Well, sure.

HEILMEIER: I stayed away from trying to defend those programs and IPTO in general. I would talk about command and control. I would never talk about IPTO's speech recognition program or IPTO's natural language program or things of that nature. I would stay away from that, because their view was, "Hey, the National Science Foundation ought to support that, or industry ought to support it." Those were the kind of challenges you would get.

NORBERG: What led you to leave the Department of Defense?

HEILMEIER: When Bill Perry came in to become the director of Defense Research and Engineering, he and Harold Brown essentially asked for the resignation of everybody who was in a senior job in the Pentagon. I was the only one that was asked to stay on, and I always felt very, very good about the fact that I was asked to stay on. I stayed

until December of 1977, but I left for a personal reason, namely, my daughter was just entering junior high school. I knew I wasn't going to be in Washington for the whole duration of her education, and my wife and I felt very strongly about providing her with stability. We wanted to move some place where we knew that she would go to one high school for four years and have a circle of friends without having to be jerked up in the middle of her sophomore year and moved somewhere else, or whenever we decided to move. So I decided at that particular point in time that I had better make the decision now, because Harold Brown was pushing me to make a commitment for the entire administration. I said, "Harold, I can't do that." And he said, "Look, you can stay as long as you want, but we really think that if that's your personal decision stay for a year and then go." That's basically what I did.

NORBERG: I see. But staying with the administration was four years, and that would have accomplished the high school objective.

HEILMEIER: No, she was in junior high school at the time.

NORBERG: Junior high school, so it would be seven years, wouldn't it? You probably know there are people who say things about when you went to Texas Instruments that you suddenly became a convert to AI. How do you react to that charge?

HEILMEIER: Nonsense. It's utter nonsense, and to prove that just look at what happened to the AI budget once we started doing things that were useful. The budget didn't go down. Now, some people lost their contracts, but the budget didn't go down. I had always felt that AI had something to contribute. I felt that there were applications where AI could make a real contribution and I wanted them to happen. Unfortunately, asking for applications was not something that these people felt terribly comfortable about. They were too busy "advancing to the state of the art." When I went to TI, I knew that this was a new frontier, that there were useful things that could be done and so we started doing them. But becoming a convert when I went to TI? No.

[INTERRUPTION]

NORBERG: In what way?

HEILMEIER: Look at what happened to the AI budget in DARPA after we decided on these challenges. It went up. We started spending more money. And if I weren't convinced that AI had applications, why would I be increasing the funding? These guys act as if they got the money around me. They got the money because I wanted them to take on these challenges. The charge that I became a convert to AI when I went to TI is just utter nonsense and is not supported by actual events.

NORBERG: Can you give me just a brief description of what you did at TI when you went there at the beginning?

HEILMEIER: I was a vice president for systems technology. I was there for only a month or so when I became vice president for research, development, and engineering, a much bigger job, for all of TI. One of the things that I did was to recognize that TI needed to be in the information sciences if it wanted to be a major player in the information revolution. It was already in the components business and had a small computer business. So we put together a bona fide research and development thrust in what I called modern information technology, and part of that was AI. Ed Feigenbaum loves to write and talk about the fact that I became a convert after I went to TI, and that's simply not true.

NORBERG: That's the person that I was referring to, and he still says that, too.

HEILMEIER: It makes good copy and he wrote it in a couple of his books, but it's simply not true. And he ought to be the first to know that, because I strongly supported the work that he and others did on the interpretation of acoustic ASW signals. Strongly supported it. The Navy didn't, but I did. These guys act as if money went to them behind my back, or went to them without me knowing it. You see, that's simply not true.

NORBERG: Did it have an impact on Navy programs after the developments occurred at Stanford?

HEILMEIER: Yes, but not nearly as quickly as I would have thought.

NORBERG: That's another question, obviously. All right, thank you very much.

END OF INTERVIEW